HOMEOWNERSHIP AND WEALTH AMONG LOW– AND MODERATE-INCOME HOUSEHOLDS

Working Paper: March 2011

By
Michal Grinstein–Weiss
Clinton Key
Shenyang Guo
Yeong Hun Yeo
Krista Holub

Center for Community Capital
The University of North Carolina at Chapel Hill

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Homeownership and Wealth among Low and

Moderate Income Households

Michal Grinstein-Weiss [1,2,3]

Clinton Key[1, 2]

Shenyang Guo[2]

Yeong Hun Yeo [2]

Krista Holub [2]

[1] Corresponding author (Grinstein-Weiss and Key are co-first author, listed alphabetically)

[2] School of Social Work, University of North Carolina at Chapel Hill

[3] Center for Community Capital, University of North Carolina at Chapel Hill

ABSTRACT

Using a set of Low and Moderate-Income homeowners who received prime mortgages through from the Community Advantage Program (CAP) panel and a matched set of renters we assess the effect of homeownership on net worth and components of net worth. Our aim in the paper is to test the claim that, all else being equal, investing in a home yields higher short-term economic returns than renting and choosing other forms of investment and consumption. We attempt to isolate the effect of home ownership from the factors that cause both homeownership and increases in wealth using three matching approaches that address sample selection and endogeneity in the data. Findings indicate that LMI homeowners experience greater short-run change in net worth, assets, and non-housing net worth than do renters, after balancing renters and owners on observed characteristics and adjusting for influential outlying cases. These findings are particularly interesting because the period of study coincides with the housing crisis and periods of shrinking home values and equity.

INTRODUCTION

This paper tests whether investing in a home yields greater short-run returns in terms of net worth for low and moderate-income (LMI) homeowners than for a comparable group of renters over the same period. Homeownership has become a reality for an increasing proportion of households across the country in recent decades and has been seen historically as a vehicle for wealth creation. Between 1960 and 2005, the national homeownership rate increased almost 5 percent, from 62.1 percent to 66.9 percent. Much of the gain in homeownership came from low-income minority homeownership, which increased by more than 800,000 households between 1994 and 1999. In this period, low-income homeownership increased at a faster rate than other groups (Belsky and Duda, 2002).

Bostic and Lee (2008) point to three causes of growth in low-income homeownership: increases in income, education, and wealth; market innovations; and a rise in government policies that incentivized the expansion of credit and mortgage lending to low-income households. With increasing homeownership opportunity, the risk involved for LMI households pursuing this goal also increased. The design of the mortgage product plays a critical role in the risk of default (Ding, Quercia, Li, and Ratcliffe, 2010). Many of the innovative mortgage products have adjustable rates, introducing what Bostic and Lee (2009) term "instrument risk." Borrowers who receive these mortgage products face "an elevated risk of default even when their personal circumstances do not change" (Bostic and Lee, 2009, p. 229). The combination of an increased LMI homeownership rate and the increased risks to borrowers associated with new mortgage products and access to credit markets warrants a careful review of the financial costs and benefits of homeownership to LMI households.

Many arguments for the expansion of homeownership suggest that it has positive economic impact on owners. Home equity represents 60 percent of the total wealth among the

American middle class (Wolff, 2002). In addition to being a valuable asset in its own right, homeownership can help create new household wealth through house price appreciation, the preferential tax treatment of mortgage interest, and forced savings by amortization of a mortgage. Recent research contributes to a more nuanced understanding of the effects of homeownership by exploring specific factors that determine the likelihood that homeownership will build a household's wealth (Herbert and Belsky, 2008; Boehm and Schlottman, 2004; Bostic and Lee, 2009; Stegman, Freeman and Paik, 2007; Di, Belsky, and Liu, 2007). In this literature, there is a growing sense of skepticism regarding the potential benefits of homeownership for low- and moderate-income (LMI) homebuyers, who often face difficult mortgage terms and lower home value and appreciation rate. This is especially a concern in light of the recent housing crisis. In order to help policymakers and individuals make the best possible decisions about homeownership, more research is needed which explores the relationship between homeownership and wealth accumulation, particularly among LMI homeowners.

LITERATURE REVIEW

Research on the relationship between homeownership and wealth accumulation shows that numerous factors determine whether or not homeownership will be a good financial investment for a given household. For LMI households, key determinants include the rate of housing price appreciation, type of mortgage received, tenure as a homeowner, and the overall market conditions of the time period (Herbert and Belsky, 2008; Boehm and Schlottman, 2004; Bostic and Lee, 2009; Stegman, Freeman, and Paik, 2007; Di, Belsky, and Liu, 2007).[1]

The first key determinant is housing price appreciation, or the rise in the value of the house as an asset, and it plays an important role in evaluating housing as an investment strategy

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[1] For a comprehensive review of factors influencing the amount of returns to homeownership, see Herbert and Belsky, 2008.

(Belsky and Duda, 2002). Research on the appreciation rates of low-priced housing, which LMI homebuyers typically purchase, has produced inconclusive findings. Some research found that lower-priced housing suffers from low rates of appreciation compared to higher-priced housing and that this discrepancy in appreciation rates negates the financial benefits of homeownership for these households (Shlay, 2005; Reid, 2004). On the other hand, several studies found no systematic differences in housing price appreciation by income levels of neighborhoods (Boehm and Schlottman, 2004; Bostic and Lee, 2009). Herbert and Belsky (2008) review the literature on housing price appreciation and suggest that due to the dependency on the specific time period and market there is either no significant difference between low-priced and high-priced homes, or mixed results. The decline in house prices nationally since 2006 complicates patterns of price appreciation further. Because appreciation, or lack thereof, is a driver of wealth growth attributed to homeownership, this remains a pressing issue in the study of the consequences of homeownership in the LMI population.

Stegman, Freeman and Paik (2007) use data from Wave 3 of the Community Advantage Program (CAP) Panel Survey to examine equity accumulation in LMI households. The CAP data are unique in that the program offers prime mortgage products to qualifying LMI homeowners, giving researchers an opportunity to explore effects of homeownership on LMI households without the confounding, negative effect of higher-cost mortgages (for further information on the CAP program see details below in the methodology section). The authors found that, as of March 2006, CAP homes were experiencing healthy annual price appreciation and equity gains. For CAP homes bought between 1999 and 2003, the median price appreciation was 7.42 percent and median equity appreciation was 45 percent. While slightly lower than the national house price appreciation index (8.5% annually), these gains are indicative of the wealth-building potential of

homeownership for LMI households. Preliminary evidence suggests that these gains persist after the downturn in the housing market.

A second key determinant of the benefits of LMI homeownership is the type of mortgage received. The emergence of non-conforming mortgage products, specifically marketed to LMI households, in the late 1990s brought significant attention to the importance of the relationship between the type of mortgage received and the benefits of LMI homeownership. Bostic and Lee (2009) simulated household expenditures, neighborhood types, and mortgage instruments and found that mortgage affordability is a key factor in determining whether homeownership offers benefits for LMI households. Specifically they compared how wealth outcomes vary by home price (i.e. home purchase in a middle-income versus a low-income neighborhood) and by type of mortgage financing (i.e. high cost 2/28 adjustable rate mortgage versus thirty-year, fixed rate mortgage). Additionally, they emphasized that the value of homeownership increases through the early acquisition of home equity, most often achieved through a larger down payment. For example, after five years a one-person household making a ten percent down payment gained wealth at two to six times the rate than a person who made no down payment (Bostic and Lee, 2009). While numerous recent studies have examined the financial risks of delinquency and foreclosure for those who hold adjustable rate mortgages or other subprime products (Schloemer, Li, Ernst, and Keest, 2006; Quercia Stegman, and Davis, 2005), fewer studies have examined financial outcomes of LMI households using prime lending products.

Third, longitudinal studies looking at homeownership have shown that, for the whole population, homeownership is an important means of wealth accumulation over the long term (Di, Belsky, and Liu, 2007; Boehm and Schlottman, 1999; Di, Yang, and Liu, 2003). However, one critical issue for LMI homeownership is the elevated risk that LMI first time homebuyers will return to renting. Boehm and Schlottman (2004) tested the effect of this risk on the

accumulation of wealth for LMI homeowners using the Panel Study of Income Dynamics (PSID). They developed a dynamic model that, unlike similar simulations, explicitly accounted for the likelihood that first time homeowners will revert back to renting over time. Even when accounting for this risk, they found that household wealth is increased by homeownership although, not surprisingly, reverting renters decrease the aggregate benefit.

Similarly, using the PSID to compare wealth gains over time between homeowners and renters, Di, Belsky and Liu (2007) found that those who owned homes and owned for longer periods of time had significantly higher wealth accumulation than those who continued renting. Importantly, this study controlled for both the initial wealth of the household and the household's prior propensity to save in order to address the potentially confounding effects of the relationship between a general tendency to accumulate wealth and homeownership. Similarly, our study attempts to address self-selection bias, and differences between respondents who choose to own and those who chose to rent.

Lastly, research shows that for homeownership, as for most investments, market conditions and the specific time period in question are major factors that determine the utility of an investment. This is especially true for LMI households who may be less able to ride out poor market conditions (Belsky and Duda, 2002). Market conditions and the time period are clearly related to the issues of appreciation and tenure addressed above. They also raise the question of the opportunity cost of LMI homeownership. Housing equity accounts for the majority of wealth for most homeowners and, for LMI households, it is sometimes their only significant financial investment (Wolff, 2002; Joint Center for Housing Studies, 2000 as cited in Boehm and Schlottmann, 2004). Some research suggests that LMI households overinvest in homeownership and "crowd out" other investment options (Hu, 2005). Several studies validated this concern, finding that a well-diversified portfolio led to better wealth outcomes than homeownership as a

sole investment (Hurst, 1998; Ambrose and Goetzmann, 1998; Goetzmann and Spiegel, 2002; Hu, 2005). However, concerns that LMI homeownership limits investment diversification may be unfounded. Several studies looking specifically at the CAP sample found no evidence that equity accumulation crowds out other investments (Freeman and Desmarais, 2010; Stegman et al, 2007).

In all, while there is convincing evidence on the role of an owned home in the growth of wealth for the population at large, the literature does not speak as clearly to how lower income households fare economically as homeowners. Because low-income homeownership is expanding and, with the housing crisis, the subject of considerable interest presently, understanding the relationship between ownership and wealth in this population is more pressing than ever.

Data and Sample

This paper uses data from the Community Advantage Panel Study (CAPS). CAPS is an annual survey of homeowners in the Community Advantage Program (CAP), a secondary market mortgage loan program that provides 30-year, fixed-rate mortgages to eligible LMI borrowers. CAP uses flexible underwriting features similar to programs qualifying under the Community Reinvestment Act (CRA) lending requirements such as low or no down payments, a waiver of private mortgage insurance, and acceptance of a limited credit or work history. To be qualified for CAP, applicants must have a household income below 80% of the area median household income (AMI). However, for racial/ethnic minority applicants or applicants who purchase a home in a high-minority or low-income census tract, the household income ceiling is 120% of AMI.

CAPS consists of the CAP homeowners panel, the treatment group, and the CAP renters panel, the comparison group. The renters were randomly selected within the same neighborhoods

as CAPS homeowners, and they had to meet the same income eligibility criteria. Since 2004, CAPS collected yearly information on demographics, employment, household expenses, tenure status and movement for both owners and renters. In addition, CAPS includes several topic modules (e.g., social capital, parenting, wealth and assets, financial literacy) in each wave. Information on net worth and its components was gathered in a topical module in the 2005 CAPS and the 2008 CAPS.

Out of 2,183 respondents who had net worth records for both years, 2005 and 2008, we dropped the respondents who changed tenure status during study periods (n=269) to make a clear comparison between owners and renters. The number of respondents who changed tenure status was too small to be a meaningful comparison group. After listwise deletion on covariates (116 cases missing tenure status, 51 cases missing housing fraction of income, 41 cases missing income, 2 cases missing age, 1 case missing education, and 1 case missing marital status), the final sample consists of 1,658 respondents (995 homeowners; 663 renters)[2].

Measures

This study investigates the changes of the following five outcomes from 2005 CAPS[3] to 2008 CAPS: total net worth, total assets, total debts, total liquid assets, and total non-housing net

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[2] The final sample (n=1,658) is more likely to be black, employed, and homeowners at 2005 CAPS than the respondents not included in our final sample (n=485). However, there are not significant baseline differences between those two groups, in gender, age, marital status, income, education, and so on.

[3] Because some components of debt (e.g., investment properties, land, vocational homes, vehicles) were not collected in 2005, the net worth value of 2008 is not directly comparable to that of 2005. To deal with this issue, the Center for Community Capital at UNC-CH created 50 multiple imputed datasets for the 2005 net worth records (Desmarais, 2010). We calculated the 2005 net worth and its related values from those 50 imputed datasets because of relatively small variances in those values between the imputed datasets and difficulty in implementing a propensity score analysis with an appropriate multiple imputation method. We also re-ran the analysis using identically constructed 2005 & 2008 values for net worth (omitting the missing values at both waves) and found results consistent with those presented in this paper.

worth[4]. We used the fixed 2008 dollar values for all monetary variables including net worth measures. Figure 1 shows the composition of our five wealth measures. In the analysis, our dependent variables are not the 2005 CAPS value of net worth and its segments, rather our dependent variables are the change in net worth and its components from 2005 CAPS to 2008 CAPS.

Figure 1 about here

The key independent variable of this study is homeownership status. Homeownership is a dichotomous measure (1=owner; 0=renter). Respondents who changed their tenure status (e.g., renters who become homeowners, homeowners who become renters) during the study period were not included in our sample. Thus, our sample represents those who continuously own or rent between 2005 CAPS and 2008 CAPS.

The study controls for a set of demographic and financial characteristics measured at the study baseline (2005 CAPS)[5] including gender, age, race/ethnicity, education level, employment status, marital status, number of adults in the household, number of children in the household, total annual household income, income change from 2005 CAPS and 2008 CAPS, and housing fraction of income (the ratio of the reported annualized mortgage or rent payments to the household income reported). Unlike the other variables in this study, housing fraction of income was retrieved from the 2004 CAPS because it was not available in the 2005 CAPS.

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[4] For the detailed information on the measures and components of net worth, see the CCC report, "Created Variable Modules in the Community Advantage Panel Survey" (Center for Community Capital, 2010).

[5] When the information from 2005 CAPS is missing, we retrieved data from the previous CAPS (2004 CAPS and 2003 CAPS). The numbers of these cases are 40 cases for employment, 40 cases for household composition (number of adults and children), 47 cases for marital status, 25 cases for income, and 243 cases for education.

This study also includes a set of neighborhood characteristics as controls. Neighborhood information comes from the 2000 Census. Census tract information is based on the respondent's address reported at the time of the 2005 CAPS. We control for the concentrated economic disadvantage (CED) scale (Caughy, Hayslett-McCall, & O'Campo, 2007; Sampson, Raudenbush, & Earls, 1997) which represents the relative economic condition of a neighborhood and is constructed using percent of individuals below the poverty line, percent of people receiving public assistance, percent of people unemployed, and percent of female-headed households with children. To develop the CED scale, each indicator is first standardized and then a composite score is divided by four, the number of indicators (α =.91). We also include median housing value and median rent within census tract in our analyses.

Analysis

The research aims to test the effect of homeownership on net worth. In spite of lack of randomization in the study design, we remain interested in pursuing evidence of a causal relationship. Conventionally the effect of treatment on an outcome has been evaluated through covariance control approach using a dummy variable to indicate treatment status (treatment group or comparison group). However this conventional covariance control approach has been shown in simulation studies to poorly predict known values under conditions of imbalance in treatment and selection bias (Guo & Fraser, 2009). Statistical methods for causal inference have undergone a significant change over the past 30 years, moving towards more rigorous methods to draw causal inference.

The use of a conventional covariance control approach with this study's quasi-experimental design, selection bias, and endogeneity makes it difficult to confidently identify causal effects. For example, in this study, we do not know if the changes in wealth result from

homeownership or from the respondent's social, economic, and demographic factors that likely

increase both homeownership and wealth. Several characteristics of this study make it difficult to

isolate the effect of the treatment using covariance control. Ordinary least squares (OLS)

regression models used for covariance control assume that the treatment variable is exogenous.

In studies with non-random assignment to treatment, treatment is endogenous and determinants

of incidental truncation or sample selection should be explicitly modeled and selection effects

should be taken into consideration when estimating causal impacts on outcomes (Heckman,

1978, 1979). Moreover, the strongly ignorable treatment assignment assumption (i.e. conditional

upon covariates, the treatment assignment is independent from outcomes under both treatment

and control conditions) is prone to violation in observational studies. Under such condition, the

presence of endogeneity leads to a biased and inconsistent estimation of the regression

coefficient (Berk, 2004; Imbens, 2004; Rosenbaum & Rubin, 1983).

Therefore the use of conventional approach risks producing biased and inefficient results

of the effect of homeownership on wealth. Consequently, this study addresses the issue of

sample selection and endogeneity through matching the treatment group (homeowners) and

comparison group (renters) on important respondent characteristics so that the differences in the

outcomes between the two groups can be attributed to the intervention (i.e. homeownership).

While addressing selection bias and endogeneity, this study estimates the effect of

homeownership on wealth using a difference-in-differences (DiD) framework. DiD compares

observed outcomes for two groups for two time periods. We test if change in wealth from 2005

CAPS to the 2008 CAPS among homeowners is statistically different from change in wealth

among renters. We evaluate the Average Treatment effect for the Treated (ATT), the most

common parameter of interest in the evaluation literature (Heckman, LaLonde & Smith, 1999).

We examine the difference in net worth change between homeowners and renters using bivariate

t-test, conventional covariance control OLS regression, propensity score weighting, kernel based matching, and matching estimators.

Propensity score weighting (Rosenbaum, 1987; Hirano, Imbens, and Ridder, 2003, McCaffrey, Ridgeway, & Morral, 2004).

Propensity scores can account for imbalances in treatment groups and reduce bias by mimicking randomization of subjects into treatment groups (Rosenbaum & Rubin, 1983). To generate the propensity score, logistic regression predicting homeownership status at baseline (1=yes; 0=no) is applied to estimate the conditional probability of a respondent to be a homeowner. This score is then used as an input to statistically rebalance the sample.

Propensity score weighting treats the estimated propensity score as a sampling weight and incorporates the weight in multivariate analysis. The core idea is to reweight treated and comparison groups to make them representative of the population of interest—a procedure similar to estimation after stratified sampling. Because we use ATT, the weights for the treatment group (i.e. homeowners) are defined as one and the weights for the comparison group (i.e. renters) are defined as the inverse of one minus propensity score.

Kernel based Matching (Heckman, Ichimura, & Todd, 1998).

Kernel matching is also known as a propensity score analysis with nonparametric regression. Kernel based matching constructs a weighted average of counterfactuals for each treated case and then calculates the sample average treatment effect across all treated cases. The critical feature of this method is the comparison of each treated participant to all non-treated participants (i.e. renters) accounting for distances between propensity scores. Because we use two time points in the study, this approach estimates ATT using a DiD framework similar to OLS, but accounting for sample imbalance.

Kernel based matching matches each treatment case to all individuals in the comparison group in such a way that it up-weights those who have similar propensity scores and down-weights more distal observations. It uses a tricube kernel function (i.e. non-equal weights) in a local linear regression. This nonparametric regression estimates ATT. We use bootstrapping to estimate the standard error of the sample mean difference between homeowners and renters and test a 95%, 99%, and 99.9% bootstrap confidence interval.

Matching Estimators (Abadie & Imbens, 2002, 2006)

In principle, each participant in a study has two potential outcomes, one where she receives the treatment and the other where she does not. The fundamental problem is that only one of the two potential outcomes is observed. In our study, each respondent is observed only as a homeowner or as a renter. Matching estimators directly imputes the unobserved counterfactual for both treated and non-treated participants by using a vector norm with a positive definite matrix, leveraging observations from conditionally similar respondents in the other treatment condition. The ATT, then, is the average of the difference between the treated outcome and the untreated outcome across all respondents. In this study, we estimate the sample ATT with bias-adjustment and a robust estimator that allows for heteroskedasticity. We specify 4 matches in estimating the conditional variance and mean functions, given our data 4 matches seems to include sufficient information without relying on data from unlike individuals. We used STATA version 11 for the analyses reported in this paper.

Extreme values

As shown in Appendix A, the wealth outcomes we consider all suffer from broad distributions. A small number of extremely high or low wealth cases biases our estimate of the treatment effect and introduces substantial error in our data. Because of the observed biasing effect of extreme outliers on our estimates, we conducted our analyses for both the analytic

sample and a trimmed sample excluding 2.5 % positive and negative outliers. The trimmed sample was created for each outcome because the influential outlying cases differ between outcomes. We preferred the general rule of the symmetrical trim to ad hoc removal of cases because it does not risk systematically favoring treatment or comparison cases.

Results

Descriptive Statistics of the CAP LMI Owners and Renters

Table 1 presents the characteristics of CAP homeowners (n=995) compared to CAP renters (n=663) in our analytic sample. At the baseline of study period (i.e. 2005 CAPS), the differences in individual and neighborhood characteristics between owners and renters are evaluated with t-tests for continuous measures and chi-square tests for categorical measures.

Table 1 about here

On every characteristic we examined, homeowners are significantly different from renters at baseline. Further, there are significant differences in neighborhood characteristics between CAP homeowners and renters. Neighborhoods of CAP homeowners are significantly better off in every item of the neighborhood economic disadvantage scale; lower unemployment, lower public assistance rate, lower rate of single parenthood, and lower poverty rate. However, the median housing value and the median monthly rent within the neighborhoods where two groups reside are about the same. These immense differences in individual and neighborhood characteristics between owners and renters suggest that these two groups are not directly comparable. Rather, these imbalanced data imply possible endogeneity issues and sample selection bias. As discussed above, covariance control approaches cannot be relied on to resolve

these problems. Therefore, we need to resort to more efficient matching methods to estimate the effect of homeownership on change in net worth.

Homeownership and Net worth: Analytic sample

Table 2 summarizes the five dependent variables (change in total net worth, assets, debts, liquid assets, and non-housing net worth) for the full analytic sample and presents the treatment effect estimated with four difference-in-difference approaches: conventional covariance control OLS regression, kernel-based matching, matching estimators, and propensity score weighting.

Table 2 about here

From 2005 CAPS to 2008 CAPS, the average gains in total net worth among CAP homeowners were about $15,000, compared to less than $11,000 among renters, in 2008 dollars adjusted for inflation. CAP homeowners increased the amount of total asset and total debt by about $20,000, and $5,000, respectively. During the same period, renters increased total asset and total debt by about $15,000, and $4,500, respectively. Compared to renters, the increases in total liquid assets and the total non-housing net worth among CAP homeowners were $3,660 and $3,036 greater. Despite their magnitude, all these differences in outcomes between two groups are not statistically significant in bivariate analysis.

Estimated by OLS regressions controlling for individual and neighborhood variables[6], surprisingly, the change in the total net worth among CAP homeowners were $18,632 less than that among renters (p<.05). The findings from OLS also showed that CAP homeowners had $28,295 less change in total assets (p<.01), and $9,963 less in the changes in total debts (p<.05).

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[6] Please refer to Table 1 for the list of covariates used in the analysis

Three matching methods produced different outcomes than OLS regressions with covariance control. Three matching methods consistently showed CAP homeowners had larger increases in most outcomes, excluding debt. Kernel based matching and propensity score weighting showed that the differences between two groups were not statistically significant for most outcomes. Matching estimators, however, estimated that the increases in the amount of total net worth, total liquid asset, and total non-housing net worth among homeowners are statistically larger than renters.[7]

Homeownership and Net worth: Trimmed Sample

When we eliminated 83 extreme outliers (i.e. 2.5% of total sample in each tail), the distribution of our outcomes appeared not to be as disperse as analytic sample. For example, the range of the change in total net worth among analytic sample was $4,538,646. The range decreased to $282,232 after removing the most extreme 5% of the analytic sample.[8] This implies that the extreme cases substantially influence the distribution of the outcome variables and could bias our results.

Table 3 summarizes the findings based on the trimmed sample, replicating the analyses performed on the analytic sample. In this trimmed sample, the average gains of total net worth among CAP homeowners were about $11,000. Renters appeared to increase total net worth only by $740. This resulted in a significant difference (p<.001), unlike in the analytic sample. Trimmed sample also produced significantly larger increases in total liquid assets ($3,319, p<.001) and total non-housing net worth ($5,427, p<.001) among CAP homeowners than among renters.

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[7] Both kernel-based matching and propensity score weighting utilize propensity scores to calculate their weights. The calculation of propensity scores is based on the logistic regression predicting homeownership with covariates listed in Table 1. However, matching estimators do not employ the logistic regression to predict propensity scores, rather it utilizes a vector norm to assess a treatment effect. Thus, the outcomes of matching estimator are different from the outcomes from two other propensity score based matching methods in this study.

[8] Excluding extreme outliers greatly changes the shape of outcome distribution. Please see the appendix A.

Consistent with the analytic sample, OLS regressions with the trimmed sample showed that the change in total assets and debts among CAP homeowners are significantly lower than those among renters. However, the change in total assets and total debts were not significantly different between the groups. Three matching methods consistently produced, with a few exceptions, significant tenure impacts on the change in total net worth, total assets, total liquid assets, and non-housing net worth. For example kernel based matching estimated that CAP homeownership was associated with an increase of $13,160 in total of net worth over renters (p<.001). Matching estimators and propensity score weighting also projected significant tenure impacts on the increase of total net worth, $11,427 (p<.001), and $14,904 (p<.001) respectively. Unlike other outcomes, the difference in the change of debt estimated by matching methods was not statistically meaningful, which is the same as the result observed in the analytic sample.

Differing findings in the analytic sample and the trimmed sample suggest that extreme outliers in our sample are influential. We suspect that the trimmed analyses produce more accurate and reliable results. [9] Moreover, insofar as the OLS results differ from those found using matching methods, we argue that the matching handles baseline sample imbalance and the endogeneity in the sample more efficiently than do OLS regressions.

Table 3 about here

Limitations

There are a few limitations that need to be acknowledged and addressed regarding this study. First, this study investigated on the changes of net worth over three years. This relatively

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[9] We replicated our analysis with the sample excluding 10% extreme outliers (5% for both ends). The results were quite similar to the findings from the 5% trimmed sample. Thus we rely on our results with 5% trimmed sample. Further, we did case studies for the most extreme outliers to know the plausible reason of huge changes of the amount of net worth. The case studies suggests that those extreme outliers might be a result of coding error.

short study period may not be long enough to capture the full impact of homeownership on the net worth change. Although this study still found significant tenure impacts on most outcome measures when employing matching techniques, it would be good to investigate longer term tenure impacts to know if tenure impacts are consistent, increase, or decrease over different time horizons. Second, as mentioned in the measurement section, some debt components were not measured in the 2005 CAPS. We used imputed data for the missing measures. Therefore, net worth measure at the 2005 CAPS may not be as accurate as the 2008 CAPS. [10] Third, our study sample is not representative for the national population LMI households, so we should exercise caution in the extrapolation of our findings. Fourth, matching methods employed in this study provide a way of controlling only for observed heterogeneity between renters and owners. Unobserved heterogeneity may persist after balancing in a study with non-random assignment. Finally, in choosing to exclude those who changed tenure status during the observation period we limit the generalizability of the findings. Future research should explore how tenure change might impact the observed link between owing a home and increased wealth.

Discussion

This paper finds that for LMI households with carefully underwritten mortgages, the choice to buy a home yielded more economic benefit than the financial choices made by a comparable set of renters. After balancing renters and owners on observed characteristics and eliminating extreme cases, we find that LMI homeowners experience greater short-run change in net worth, assets, and non-housing net worth than do renters. The result is of particular importance because the period of the study coincides with the downturn in the housing market termed "The Great Recession." Given that the LMI population was hardest hit by the recession,

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[10] Because of concerns of the accuracy and reliability in the imputed data, we replicated our analysis with the total net worth calculated by excluding net worth components that were not measured in the 2005 CAPS. The result is consistent with our findings presented in this paper.

that LMI households saw gains in net worth attributable to homeownership during a period of historic declines in housing prices is remarkable. This finding shows the potency of homeownership as a pathway to asset security. That this effect was observed among LMI homeowners with sustainable loans relative to sub-prime loans purchased on the market by similar households suggests that policies directed at improving mortgage market protections for consumers may pay dividends to homeowners beyond short-run protection from abusive or predatory mortgage practices.

The magnitude of effect we observe in this study is large enough to be observable in spite of the noise in the measurement of net worth. The effect is also large in real terms. The observed change in net worth over the three-year period, $11,272 for owners, represents a substantial portion of a year's household income, equivalent to about half of the sample's mean yearly household income for homeowners at baseline. For any household, but particularly for LMI households, this large infusion of wealth surely increases economic security.

Our data also show that outliers heavily influence estimates of the relationship between tenure choice and net worth. While we do not want to diminish the salience of the extraordinarily large changes seen by some respondents, gains and losses in net worth, assets, and debt over three years in the hundreds of thousands or even millions of dollars heavily influence the point estimates for change, thereby obscuring the important relationships present in the data. Consequently, the results obtained when excluding the five percent of respondents with the largest change in net worth (2.5% from each end of the distribution) offer a clearer portrait of the relationship between tenure choice and change in wealth experienced by typical LMI households.

A different challenge to inference arose from the use of tenure choice as the independent variable; there were the stark differences between owners and renters on many characteristics.

Because purely random assignment to ownership is unethical and infeasible, the field must rely on observational studies where the two groups often differ manifestly. Table One shows that in our data, owners and renters differ significantly on every measured covariate. It is well known that the same characteristics that increase the odds of homeownership also predispose the individual to faster growth in net worth. While we cannot address unobserved factors like motivation, talent, ambition, or luck, we use various matching approaches to condition findings on observed factors deemed to be predictive of both tenure status and wealth growth. While not definitively solving the endogeneity between homeownership and change in wealth, these approaches strengthen our claims and improve our confidence in the inference that homeownership results in greater short-term increases in net worth than renting.

Our findings are important new evidence of the potential economic benefits of homeownership for the LMI population. Even over a short time horizon and in a cohort of owners with low down payment, homeownership produces \$11,472 (p<.001) more growth in net worth than choices made by renters, using matching estimators to address endogeneity and trimming to reduce bias from outliers. The economic potential of homeownership found for this LMI sample is similar to that observed in higher income populations. Consequently, our findings challenge the notion that homeownership offers lesser benefit to lower income populations. Moreover, in the population under study, the risks and costs that attend homeownership do not diminish the aggregate economic benefit of homeownership relative to renting.

This paper also reaffirms the centrality of housing as a pathway to economic security. Our economy currently offers few alternatives for an LMI investor to gain returns on a high value asset with a low-dollar investment. The structure afforded by long-term, fair-interest mortgages provides a unique opportunity for asset growth. Using matching estimators and trimming, we estimate that home ownership yields an additional \$10,196 (p<.001) in asset

growth compared to renting over the same period. There is no significant increase in debt load that offsets the effect of ownership on assets. At the same time, we do not want to overstate the benefits of homeownership or imply that it is the optimal path for every LMI household. The dispersion in the data reveals a wide array of potential economic outcomes consequent to home ownership. Nevertheless, our rigorous analysis shows that the opportunity for some LMI households to engage in responsible homeownership facilitates the accrual of assets.

Interestingly, we also find a larger increase in non-housing net worth for owners relative to renters. The non-housing net worth of owners increases by \$6,937 (p<.001) more than that of renters, using matching estimators and trimming. Because an owned home is such a high value asset, many suspect it would diminish other investments made by homeowners without substantial excess earnings. Instead, we find significantly larger increases in non-housing net worth over the three-year period for owners than for renters after removing influential outlying cases. In fact, at the mean, the increase in non-housing assets contributes more to the increase in net worth than does the accrual of home equity. In the trimmed data, the increase in non-housing net worth comprises more than half of the overall increase in net worth for homeowners. Far from diminishing the capacity of LMI homeowners to invest in other assets, homeownership appears to facilitate growth in other types wealth, even after addressing differences in other characteristics between renters and owners.

Policy significance

Our findings offer confirmation that LMI populations can increase wealth through responsible homeownership. This new evidence should bolster policy makers who have long made this argument. The key policy implication of our findings, though, is the terms on which CAP owners realized the increases in net worth over time. Policy makers should note the loan characteristics offered by the program and consider the wider benefit of tighter oversight of

lending practices, particularly in LMI communities. Our findings do not argue that all homeownership is beneficial but that loans that are carefully underwritten and mortgages with responsible terms can produce outcomes long promoted by advocates for homeownership. The growth in net worth indicates that homeownership is producing economic security and the magnitude of the change suggests a population that is, at the mean, moving quickly toward financial independence.

Future work

Further research is needed to determine the long-term trajectory of wealth among LMI owners relative to LMI renters and to address other limitations imposed on this study by available data. First, our study only looks at a three-year span in the lives of owners and renters. Because wealth, particularly equity, accrues over long intervals and can be sensitive in the short-run to unexpected life events, longer observation periods are necessary to level out short-run shocks and better capture the trajectory net worth takes over the life-course. Longer study and further follow-up will determine if the three-year wealth gains documented here persist and if they increase over time. In addition, research that looks at the LMI population more generally would provide a useful contrast to this study's focus on LMI owners with unique, perhaps atypical, mortgages. Such work would allow us to isolate the effect of specific mortgage terms on the accrual of wealth in the LMI community. Finally, additional research using study designs that address differences between renters and owners on characteristics predictive of both net worth accrual and homeownership will move the field toward a more confident claim of causality than is possible under the constraints of design and methods currently available.

The findings presented in this paper enhance our understanding of wealth dynamics in LMI households, address timely policy concerns, and suggest important topics for future research. In showing the viability of homeownership as a wealth generator, even in a period

notorious for the challenges it posed to LMI homeowners, this study confirms the continuing value of homeownership to households as a pathway to prosperity. Further, the magnitude of the net worth change experienced in this short period by CAP homeowners hints that homeownership could serve as a mobility channel, producing wealth that could finance further economic opportunity. Finally, the findings underscore the importance of protecting homebuyers and creating the economic and social conditions that make homeownership a viable option for wider swaths of the population.

References

Abadie, A., Drukker, D., Herr, J. L., & Imbens, G. W. (2001). Implementing matching estimators for average treatment effects in Stata. *The Stata Journal, 1*(1), 1-18.

Abadie, A., & Imbens, G. W. (2002). *Simple and bias-corrected matching estimators* [Technical report]. Department of Economics, University of California, Berkeley. Retrieved August 8, 2008, from http://ideas.repec.org/p/nbr/nberte/0283.html.

Abadie, A., & Imbens, G. W. (2006). Large sample properties of matching estimators for average treatment effects. *Econometrica, 74*, 235-267.

Belsky, E.S. and Duda, M. (2002). "Assets appreciation, timing of purchases and sales, and returns to low-income homeownership." In Low-Income Homeownership: Examining the Unexamined Goal, edited by Nicolas P. Retsinas and Eric S. Belsky. Washington, DC: Brookings Institution Press.

Berk, R. A. (2004). *Regression analysis: A constructive critique.* Thousand Oaks, CA: Sage.

Boehm, T.P. and Schlottmann, A. (2004). Wealth accumulation and homeownership: Evidence for low-income households. Report prepared for US Department of Housing and Urban Development and Office of Policy Development and Research. Cambridge, MA: Abt Associates.

Boehm, T.P. and Schlottmann, A. (1999). Does home ownership by parents have an economic impact on their children? *Journal of Housing Economics, 8*, 217-232.

Bostic, R.W. and Lee, K.O. (2008). Assets and credit among low-income households: Mortgages, risk, and homeownership among low- and moderate-income families. *American Economic Review, 98*(2), 310-314.

Bostic, R.W. and Lee, K.O. (2009). "Homeownership: America's dream?" In *Insufficient Funds: Savings, assets, credit and banking among low-income households*, edited by Rebecca M. Blank and Michael S. Barr. New York, NY: Russell Sage Foundation.

Caughy, O. M., Hayslett-McCall, K. L. & O'Campo, P.J. (2007). No neighborhood is an island: Incorporating distal neighborhood effects into multilevel studies of child developmental competence. *Health and Place, 13*(4), 788-798.

Center for Community Capital. (2010). Created Variable Modules in the Community Advantage Panel Survey.

Desmarais, B. A. (2010). Multiple Imputation of the 2005 Cap Debt Data: Technical Appendix. Center for Community Capital, UNC-CH.

Di, Z.X., Belsky, E., and Liu, X. (2007). Do homeowners achieve more household wealth in the long run? *Journal of Housing Economics*, *16*, 274-290.

Di, Z.X., Yang, Y., and Liu, X. (2003). The importance of housing to the accumulation of household net wealth. Working paper 03-5. Cambridge, MA: Joint Center for Housing Studies, Harvard University.

Freeman, A. & Desmarais, B. (2010). Portfolio Adjustment to Home Equity Accumulation Among CRA Borrowers. Working Paper. Center for Community Capital, UNC-CH.

Guo, S., & Fraser, W. M. (2009). *Propensity score analysis: Statistical methods and Applications*. Thousand Oaks, CA: Sage.

Heckman, J. J. (1978). Dummy endogenous variables in a simultaneous equations system. *Econometrica, 46*, 931-960.

Heckman, J. J. (1979). Sample selection bias as a specification error. *Econometrica, 47*, 153-161.

Heckman, J. J., Ichimura, H., & Todd, P. E. (1998). Matching as an econometric evaluation estimator. *Review of Economic Studies, 65*, 261-294.

Heckman, J., LaLonde, R. & Smith, J. A. (1999), The Economics and Econometrics of

    Active Labor Market Programs, in A. Ashenfelter & D. Card, eds, 'Handbook of

    Labor Economics', Vol. 3, Elsevier Science, Amsterdam, pp. 1865—2097.

Herbert, C.E. and Belsky, E.S. (2008). The homeownership experience of low-income and

    minority households: A review and synthesis of the literature. *Citiscape: A Journal of*

    Policy Development and Research, 10(2), 5-60.

Hirano, K., Imbens, G.W., & Ridder, G. (2003). Efficient estimation of average treatment effects

    using the estimated propensity score. *Econometrica, 71*, 1161-1189.

Hu, X. (2005). Portfolio choices for homeowners. *Journal of Urban Economics, 58,* 114-136.

Imbens, G.W. (2004). Nonparametric estimation of average treatment effects under exogeneity:

    A review. *Review of Economics and Statistics, 86,* 4-29.

Joint Center for Housing Studies of Harvard University (2000), *The State of the Nation's*

    Housing, Cambridge.

McCaffrey, D. F., Ridgeway, G., & Morral, A. R. (2004). Propensity score estimation with

    boosted regression for evaluating causal effects in observational studies. *Psychological*

    Methods, 9, 403-425.

Quercia, R.G., Stegman, M.A., Davis, W.R. (2005). The impact of predatory loan terms on

    subprime foreclosures: The special case of prepayment penalties and balloon payments.

    Working paper. Chapel Hill, NC: Center for Community Capital.

Reid, C.K. (2004). Achieving the american dream? A longitudinal analysis of the

    homeownership experiences of low-income households. Working paper 04-04.

    Washington University: Center for Studies in Demography and Ecology.

Rosenbaum, P. R. (1987). Model-based direct adjustment. *Journal of the American Statistical*

    Association, 82, 387-394.

Rosenbaum, P. R., & Rubin, D. B. (1983). The central role of the propensity score in

    observational studies for causal effects. *Biometrika, 70*, 41-55.

Sampson, R. J., Raudenbush, S. W. & Earls, F. (1997). Neighborhoods and violent crime: A

    multilevel study of collective efficacy. *Science, 277*, 918-923.

Schloemer, E., Li, W., Ernst, K., Keest, K. (2006). Losing ground: Foreclosures in the subprime

    market and their cost to homeowners. NC, CA, Washington, DC: Center for Responsible

    Lending.

Shlay, A.B. (2006). Low-income homeownership: American dream or delusion? *Urban Studies,*

    43(3), 511-531.

Stegman, M.A., Freeman, A., and Paik, J.G. (2007). The portfolios of wealth of low-income

    homeowners and renters: Findings from an evaluation of self-help ventures fund's

    community advantage program. Working paper 2007-02. San Francisco: Federal Reserve

    Bank of San Francisco.

Wolff, E.N. (2002). *Top heavy: The increasing inequality of wealth in America* and what *can be done about it*. New York, NY: The New Press.

Figure 1. Wealth measures used in the study

Measure	Composition
Liquid assets	Checking account, savings account, stocks, bonds, mutual funds, IRAs, cash, CDs, and miscellaneous assets
Total assets	Liquid assets+ home value+ property value+ car value
Total debt	Housing debt+ non-housing property debt+ credit card debt+ student loan debt+ debts from purchase of durable goods+ debt from emergencies+ miscellaneous debt
Non-housing net-worth	(total assets-total debt)-home equity
Total net worth	Total assets-total debt

Table 1. Differences in characteristics between owners and renters (N=1,658)

Characteristics	Owners (n=995)		Renters (n=663)		
	Mean / %	Std.	Mean / %	Std	t/x^2
Individual/household					
Age	37.33	10.55	42.65	12.76	9.25***
Male	51.26%		26.24%		105.06***
Race/ethnicity					78.85***
White	61.61%		45.55%		
Black	18.49%		37.71%		
Hispanic	15.68%		13.12%		
Others	3.22%		3.62%		
Education					63.82***
Less High	9.85%		18.55%		
High Grad.	24.32%		33.33%		
Some college	38.59%		33.03%		
BA and more	27.24%		15.08%		
Marital status					51.20***
Married/partnered	57.29%		40.87%		
Divorced/Widowed	19.20%		32.43%		
Never married	23.52%		26.70%		
N of minors	1.01	1.13	0.75	1.05	-4.71***
N of adults	1.88	0.77	1.62	0.82	-6.46***
Employed	92.36%		63.80%		210.39***
Household income	$43,268	20,911	$20,012	13,759	-27.31***
Income changes	$11,638	26,460	$4,091	14,704	-7.43***
Housing fraction of income	24.85%	16.35	40.87%	96.24	5.14***
Neighborhood (census tract)					
Economic disadvantage	-0.16	0.76	0.23	0.97	9.24***
Percent unemployed	5.28%	3.75	6.59%	4.43	6.48***
Percent public assistance	3.27%	3.26	4.75%	4.48	7.81***
Percent single parent	10.19%	5.07	12.79%	6.76	9.91***
Percent poverty	12.04%	8.70	16.27%	10.67	8.84***
Median housing value	$92,850	36,387	$92,810	40,899	-0.02
Median rent	$468	156	$467	152	-0.03

*<.05; **<.01; ***<.001

Table 2. Differences in Net worth Changes from Year 2 to Year 5 between Owners and Renters: All Sample (N=1,658)

	Net worth	Asset	Debt	Liquid Asset	Non-housing Net worth
Min / Max	-$950,317 / $3,822,329	-$979,070 / $4,254,680	-$577,048 / $1,268,490	-$231,536 / $933,168	-$598,248 / $3,822,329
Group Mean					
Owners	15,082 (130,037)	20,214 (158,270)	5,132 (83,240)	9,319 (51,732)	12,692 (108,669)
Renters	10,789 (158,113)	15,295 (175,147)	4,506 (35,112)	5,659 (51,984)	9,656 (6,010)
Difference	4,293	4,919	626	3,660	3,036
DID Estimate					
OLS	-18,632*	-28,295**	-9,663*	-2,233	-14,141
Kernel-based matching	3,714	-138	-3,852	5,198	1,974
Matching Estimators	14,096*	12,892	-1,205	9,358***	12,490*
Propensity Score weighting	8,614	6,917	-1,697	6,067*	7,641

*<.05; **<.01; ***<.001

Table 3. Differences in Net worth Changes from Year 2 to Year 5 between Owners and Renters: Excluding 5% Extreme Outliers (N=1,575)

	Net worth	Asset	Debt	Liquid Asset	Non-housing Net worth
Min / Max	-$113,324 / $168,908	-$119,144 / $264,399	-$99,537 / $142,209	-$43,198 / $102,338	-$73,249 / $162,860
Group Mean					
Owners	11,272 (45,714)	11,294 (55,075)	897 (40,040)	5,778 (19,330)	6,375 (33,909)
Renters	740 (21,970)	5,899 (31,697)	2,923 (19,206)	2,459 (12,940)	947 (20,667)
Difference	10,532***	5,395	2,027	3,319***	5,427***
DID Estimate					
OLS	4,171	-6,444*	-5,180*	1,437	-2,333
Kernel-based matching	13,160***	8,639	-2,502	4,294***	8,489***
Matching Estimators	11,427***	10,196***	-879	5,292	6,937***
Propensity Score weighting	14,904***	10,679*	-1,939	4,047***	10,102***

*<.05; **<.01; ***<.001

Appendix A. Histograms and Outliers of Dependent Variables

A. Total Networth

B. Total Assets

C. Total Debts

D. Total Liquid Assets

E. Total Non-Housing Networth