

THE USER COST OF LOW-INCOME HOMEOWNERSHIP: 2003-2010

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The User Cost of Low-Income Homeownership: 2003-2010[☆]

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Abstract

Empirical research examining whether owning a home is less costly than renting for low-income households is largely lacking. We use detailed information provided by a set of low-income homeowners and renters who participated in the Community Advantage Panel Survey to determine whether low-income households in the United States were better off owning or renting from the perspective of *ex post* user costs between 2003 and 2010. We calculate the homeowners' user costs directly from the survey data, and we derive hedonic measures of equivalent rent for these homeowners via pooled regressions of house prices and rents on housing characteristics, from which we obtain capitalization rates. For the median homeowner in our sample, we find that owning was less costly than renting a comparable property between 2003 and 2010. Moreover, we estimate that annual house price appreciation of about 2% percent was required for the median low-income homeowner to find owning no more costly than renting during this period.

Keywords: User Cost, Equivalent Rent, Low-Income Homeownership, Community Reinvestment Act

JEL: R21, R28, R31, R38, D14

1. Introduction

Although government efforts to foster low-income homeownership have been ongoing for decades, it is still an open question as to whether and when such policies actu-

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ally generate benefits for low-income households in financial or social terms (Dietz and Haurin, 2003; Shlay, 2006). From a financial perspective, proponents of low-income homeownership sometimes observe that low-income homeowners, on average, tend to accumulate positive wealth, while comparable renters do not (Boehm and Schlottman, 2004; Turner and Luea, 2009). In particular, homeownership can be viewed as a savings commitment mechanism, and evidence also suggests that the return on investment from leveraged homeownership often dwarfs the unleveraged returns to other common investment vehicles, such as stocks and bonds (Stegman et al., 2007; Hasanov and Dacy, 2009).

However, the extent to which individual low-income households accumulate or lose wealth through homeownership depends greatly on the location and timing of house purchase, as well as on the length of time for which homeownership is sustained (Case and Marynchenko, 2002; Duda and Belsky, 2002). Moreover, empirical research examining directly whether owning is, in practice, less costly than renting for low-income households is largely lacking. For example, Duda and Belsky (2002, p. 234) stress the need for

...comparative studies of the ex-post costs of owning and renting;... studies based on known low-income buyers rather than price-based proxies for them; and studies that take into account the actual mortgage terms and products of low-income buyers as well as some of their demographic characteristics.

To address these shortcomings of the existing literature, we use detailed information provided by a set of low-income homeowners and renters to consider the question of when low-income households are better off owning or renting from the perspective of the *ex post* user cost of capital.

Our data set comes from the Community Advantage Panel Survey (CAPS) and comprises information about a sample of low-income homeowners and a comparison group of renters who were matched based on neighborhood and an income ceiling in 2004. The owners all originally received 30-year, fixed-rate mortgages at near-prime terms through the Community Advantage Program (CAP), which is a secondary mortgage market program for community reinvestment mortgages, as defined under the Community Reinvestment Act (CRA). CAP was organized by Self-Help, Fannie Mae, and the Ford Foundation in 1998. The owners and renters in the survey have been followed on an annual basis, and the data set contains information about changes in housing tenure status (i.e., tenancy vs. owner occupancy), incurred maintenance costs, itemization of tax deductions, and mortgage terms. The data set also contains quarterly zip-code-level house price estimates provided by Fannie Mae for

the period 2003-2010. The CAP data are described in detail by Riley et al. (2009), who find that, with respect to income and race distributions, the CAPS participants are largely representative of the low-income homeowners and renters who participated in the May 2003 Current Population Survey.

In brief, our methodological approach involves the direct calculation of user costs for the owners sample from the survey data, followed by tenure-pooled hedonic estimation of capitalization rates and equivalent rents using methods developed by Linneman (1980) and Crone et al. (2009) that make use of the property attributes of owned and rented properties. We then compare the estimated user costs with the estimated equivalent rents for the owners sample to assess whether owning has been more costly than renting for these households. We also then evaluate annual break-even house price appreciation by equating the user cost of owned housing, exclusive of observed appreciation, with the estimated equivalent rent in a given year.

The user cost literature most closely related to this paper comprises the work of Elsinga (1996), Belsky et al. (2005), and Garner and Verbrugge (2009). Elsinga (1996) compares the *ex post* user cost of owner-occupied and rental housing units in six neighborhoods in Holland for the period from 1978 to 1993 based on survey data. Belsky et al. (2005) simulate the user costs of renting versus owning between 1983 and 2001 for low-income homeowners and renters in Boston, Chicago, Denver, and Washington, DC. Garner and Verbrugge (2009) also use survey data to compare user costs to rents for the median housing structure in New York City, Philadelphia, Chicago, Houston, and Los Angeles between 1982 and 2002. Like much of the large existing user cost literature, these three analyses emphasize the primary importance of timing and market price movements in determining whether owning is less costly than renting. In addition, user costs for renters tend to be less volatile than those for owners as a result of fluctuations in house prices. Secondary factors that are found to reduce the relative user cost of owning include better mortgage terms, better property location, higher household income (due to the greater tax benefit of deducting mortgage interest), refinancing to obtain better mortgage terms, and government subsidies for owned housing. Our paper complements this existing work by considering more recent and more detailed data for known low-income households in the U.S., both before and during the recent housing market decline that began in 2006. In light of recent economic events, our results may help to inform the ongoing evolution of U.S. housing policy with respect to low-income households.

For the period of 2003-2010, we estimate median cumulative owner user costs of about \$36,000 and capitalization rates of 5-6%. In comparison, we estimate a median cumulative equivalent rent of approximately \$41,000. Thus, our analysis suggests that homeownership was less costly than renting at the median for low-

income U.S. homeowners during the period from 2003 to 2010. Decomposing these results by year indicates that median annual user costs were generally lower than median equivalent rents before 2007 and were higher thereafter. Thus, because of when they purchased their homes, the households in our sample experienced gains from appreciation prior to the market downturn that were, at the median, sufficient to offset the relatively higher user costs that they have experienced since the decline began. In addition to these overall figures, we observe regional differences, with median cumulative user costs being lower than median cumulative equivalent rents in the South and the West but higher than median cumulative equivalent rents in the Midwest. Overall, we estimate that annual appreciation of about 2% was necessary to ensure that owning was no more costly than renting for the median household during the period considered.

The remainder of the paper is organized as follows. In the next section, we describe the data set and provide details about the calculation of the owners' user costs and equivalent rents. In the third and fourth sections, we present results and discuss the robustness of our estimates. In the final section, we conclude and suggest directions for future work.

2. Data and Methods

2.1. The Community Advantage Panel Survey

The Community Advantage Program (CAP), from which we draw our data, is a secondary mortgage market program for community reinvestment mortgages. CAP was initiated in 1998 by the Ford Foundation, Fannie Mae, and Self-Help, a non-profit financial institution located in North Carolina. Under this program, Self-Help has purchased existing portfolios of community reinvestment loans from originating lenders who have been otherwise unable to sell their loans in the secondary market and then has resold them to Fannie Mae while initially retaining recourse.

The Ford Foundation provided the original underwriting capital for the CAP purchasing arrangement and continues to fund the Community Advantage Panel Survey (CAPS), an ongoing annual survey that collects detailed financial, social, and demographic information from a subset of 3,743 these borrowers who received CAP mortgages between 1998 and 2004, and a comparison group of 1,531 similar renters who were selected based on geographic proximity and an income ceiling. The baseline interview for the owners sample occurred in 2003, while that for the renters sample took place in 2004.

The survey data collected via CAPS forms the basis of our analysis. However, we restrict the sample to those respondents who completed an interview in every

year of the survey and have not moved since their original baseline interview. These restrictions allow us to track changes in user costs for the same group of households over time. Moreover, they permit us to make use of both the locational proximity of the matched owners and renters¹, who were originally sampled to be located within at most four blocks of each other, and the property characteristics information, such as the number of bathrooms, that was collected by the survey beginning in 2008. We use these attributes in deriving hedonic measures of equivalent rent for the owners, as described below.

After these sample reductions, and after removing cases that have incomplete data for house prices or property characteristics, our final group of households comprises 620 owners and 145 renters. Demographic summary statistics for these respondents as of the baseline survey are provided in Table 1, and the characteristics of their residences are summarized in Table 2.

Approximately 56% of the owners sample is female, compared with 72% of the renters sample. In addition, the owners sample is slightly more likely to be White (62% vs. 56%) and were more likely to have completed college (24% vs. 15%) as of baseline. In addition, respondents in the owners sample were more likely than the renters to be married (39% vs. 17%) and less likely to be divorced (22% vs. 39%). The owners were also much more likely to be working (93% vs. 50%) at baseline, which may partly be due to the fact that the owners sample is also younger than the renters on average: 55% of the renters were 50 years of age or older at baseline, compared with only 14% of the owners. Important sample differences also exist by income, as 68% of the renters had a household income of \$20,000 or less at baseline, compared with only 12% of the owners, more than half of whom reported a household income of at least \$30,000. Moreover, 58% of renter households had only one household member, while 72% of owner households had two or more members. Approximately 70% of both samples are located in the South, with about 30% of each sample living in North Carolina.

With regard to housing structure, 86% of the owner households live in single-family detached housing, compared with only 20% of the renter households. About 44% of renters live in one-bedroom residences, while 99% of the owners have two or more bedrooms. In addition, 79% of renters reported having only one bathroom, while 65% of owners reported 1.5 or more bathrooms. The median property value in the Census tract where these households are located also varies across samples, with a slightly higher proportion of renters living in \$50,000-\$80,000 tracts (39% vs. 36%) and a slightly higher proportion of owners living in tracts with a median house value

¹The match was not one-to-one, so multiple owners were sometimes matched to the same renter.

between \$80,000 and \$150,000. Owners and renters also rate the quality of their housing differently. On a scale of one to ten (with ten being the highest quality), over 25% of renters gave their housing a quality rating of six or below, while only 9% of owners reported such low quality ratings. The next two sections discuss the construction of the user cost and equivalent rent for the owners sample.

2.2. Measuring the User Cost

For each owner household i in year t , we construct the user cost UC_{it} as

$$UC_{it} = M_{it} + r_t(1 - \tau_{it})E_{it} + K_{it} + d_tV_{it} - [T_{it} + \Delta V_{it}]$$

where the notation is as follows:

- M_{it} is the annual mortgage payment, including taxes and insurance.²
- E_{it} is equity in the house as of the third quarter of year t . The survey has been administered annually during the summer and fall, so the beginning of the third quarter falls roughly at the midpoint of the survey completion dates.
- r_t is the interest rate that could be earned by investing in something other than housing. As discussed below, we set r_t equal to the return on a 6-month Treasury bill.
- τ_{it} is the marginal income tax rate for the household.
- K_{it} is the sum of mortgage closing costs, homeowners association fees, and maintenance expenditures, if any. Data on cumulative maintenance expenditures were collected only in 2008, so we spread these costs evenly across the years 2003-2008 and also apply the average yearly maintenance expenditure during that period to 2009 and 2010.
- d_t is annual depreciation. Based on work by Poterba (1992) and Harding et al. (2007), we set $d_t = 0.02$.

²While we do observe the actual change in the unpaid principal balance for those households that retained their original CAP mortgages, we do not observe this amount for those who refinanced. Thus, for consistency, we do not subtract out the principal contributions in either case. However, the contribution of principal payments to the user cost is small, given the relatively recent origination and high leverage of these loans.

- V_{it} is the observed property value as of the third quarter of year t . With the exception of the purchase price at loan origination, which we obtain from Self-Help’s database, we use the quarterly house price estimates provided for these properties by Fannie Mae. These estimates are based on a zip-code-level house price index, which is then adjusted for refinance bias and information concerning property characteristics and taxes.³
- T_{it} is the tax refund received in year t from claiming the mortgage interest tax deduction, if claimed.⁴
- ΔV_{it} is the house price appreciation observed between the beginning of the third quarter of year t and the beginning of the third quarter of year $t + 1$.

In measuring the opportunity cost of holding equity in the house, two common approaches in the literature involve the use of the rate of return on an alternative asset (e.g., stocks or Treasury bills) or, alternatively, an internal rate of return that effectively reduces the user cost to a measure of implicit rent. Which approach is preferable depends on the goals of the analysis. For example, Gillingham (1983, p. 256) notes:

The use of an alternative rate of return in the user cost function implies that, even with a given potential rent for the services of the house, the user cost of those services is dependent on the specific financial and operating costs and price trend of that house.

Of particular concern is that such a measure may prove extremely volatile due to house price movements. In constructing a general price index to evaluate the value of the flow of housing services as a component of consumer price trends, therefore, an internal rate of return may be the more appropriate choice. Moreover, in that

³Further details about how these estimates were constructed is not available, because Fannie Mae uses an internal, proprietary process. However, we perform a robustness check of the data by comparing these estimates with actual sale prices for the 499 CAPS owners who sold their CAP properties during the survey period. We match these sale prices with the closest house price estimates based on the sale date and find a correlation of 0.82 between these two measures. The price estimates over-estimate the actual sale price for two-thirds of these observations and under-estimate the market value in the remaining cases. The median discrepancy is about \$3,000, or about 3% of the final sale price.

⁴We observe only gross income and must make assumptions about marital filing status and the number of deductions claimed for dependents based on reported household structure. Therefore, the tax refund may be overstated in some cases.

case, we would expect the user cost (as an implicit rent) to coincide theoretically with an equivalent market rent. For this reason, equivalent rent is commonly used in evaluating changes in the cost of owned housing over time.

However, we are interested in how household wealth changes as a result of the initial decision to own instead of rent and what this implies about the true cost of sustained homeownership for low-income households. Owned housing is an investment asset as well as a consumption good, and low-income homeowners hold most of their wealth in the form of home equity. These households gain wealth over time primarily via house price appreciation, so changes in their household wealth are closely linked to the user cost. In this sense, it is precisely the discrepancy between the property-specific user cost (including appreciation) and market rent that we seek to measure and evaluate. Previous research has found that user costs deviate substantially from rents, in both levels and trends, and both *ex ante* and *ex post* (Diaz and Luengo-Prado, 2008; Garner and Verbrugge, 2009; Heston and Nakamura, 2009).

Given that we choose to adopt the rate of return on an alternative asset in constructing the opportunity cost of equity, a related question is that of which alternative rate of return to use. One convention in the literature is to set r_t equal to the interest rate on the outstanding mortgage (e.g., see Rosen and Rosen (1983) and Elsinga (1996)). However, we believe that adopting this approach would overestimate the opportunity cost of equity for the homeowners in our sample during the time period considered.

In practice, the median annual interest rate on the original mortgages of these CAP borrowers was slightly above 7%. Given that 6-month CDs returned about 3% on an average annual basis and the stock market returned an average of -0.4% annually during the period considered (matched to households based on loan origination date), it is unlikely that these borrowers would have actually been able to earn interest equivalent to their mortgage note rates by investing their home equity in alternative assets.

Moreover, while investigating the wealth portfolio decisions of these same homeowners, Freeman and Desmarais (forthcoming) find that home equity tends not to substitute for other investment assets. Rather, given the high leverage on the properties in question, CAPS homeowners accumulate equity primarily via house price appreciation, and their accumulated equity is not, in practice, crowding out investments in other, potentially more diversified, assets. Therefore, we adopt the 6-month Treasury bill (T-bill) rate as the alternative, risk-free rate of return. The T-bill rate too has been frequently adopted in the literature in measuring the opportunity cost of capital (e.g., see Garner and Verbrugge (2009)).

2.3. Measuring Equivalent Rent

Using methods developed by Linneman (1980) and Crone et al. (2009), we derive capitalization rates for each year by estimating a tenure-pooled regression of property values and rents on respondent tenure status and property characteristics. Using these estimated capitalization rates, we then calculate the equivalent rent for the homeowners sample.

More formally, in the conventional hedonics framework, the annual rent R_{it} of renter-occupied property i at time t is a function of property characteristics X_{it} and a random error term $u_{it} \sim \mathcal{N}(0, \sigma^2)$, as follows:

$$\ln(R_{it}) = \gamma_t X_{it} + u_{it}$$

Noting that $R_{it} = C_t V_{it}$, where C_t is the capitalization rate at time t and V_{it} is total property value, one can derive a comparable hedonic model for owned property as

$$\ln(V_{it}) = -\ln(C_t) + \gamma_t X_{it} + u_{it}$$

Using these two expressions, one can create a pooled hedonic for both rented and owned properties that allows the estimation of C_t . Specifically, the relationship of house values and rents to property characteristics can be expressed as

$$\ln(Y_{it}) = -\ln(C_t) D_o + \gamma_t X_{it} + u_{it}$$

where D_o is an indicator for an owner-occupied property and where

$$Y_{it} = \begin{cases} V_{it}, & \text{if } D_o = 1 \\ R_{it}, & \text{otherwise} \end{cases}$$

The average capitalization rate C_t can then be obtained from the estimated coefficient on D_o . Using this approach, we derive average capitalization rates for each year between 2003⁵ and 2010. For simplicity, we refer to this series of values as *CapRate*.

After deriving *CapRate*, we create corresponding measures of equivalent rent (*EquivRent*) as the product of the capitalization rate and house value in each year. In an effort to capture the greatest amount of local variation in capitalization rates while working within sample size limitations, as well as to illustrate the sensitivity of our estimates to sample aggregation, we estimate *CapRate* and *EquivRent* both for the sample as a whole (i.e., a single national market) and separately for various

⁵We apply the estimated values for 2004 to 2003, given that renters were not sampled until 2004.

state and regional subsamples representing local markets.

2.4. Measuring Break-Even Appreciation

Because the rate of house price appreciation is generally recognized as the primary driver of the user cost of owner-occupied housing, we also calculate the amount of house price appreciation that would be required to make the user cost equal to the equivalent rent. Specifically, we calculate the break-even appreciation rate r_b as

$$r_b = \frac{\Delta V_{it}^b}{V_{it}}$$

where ΔV_{it}^b is the dollar amount of appreciation necessary to equate the user cost (exclusive of actual appreciation) and the equivalent rent for household i at time t , as follows:

$$\Delta V_{it}^b = UC_{it} + \Delta V_{it} - EquivRent_{it}$$

3. Results

The estimated capitalization rates, median user costs, and median equivalent rents for the owners are presented in Tables 3 and 4 for each year of the survey, 2003-2010. We present medians, rather than averages, because the user cost distribution tends to be skewed and have long tails. Overall, the median user cost was approximately \$3,000 in 2003 and fell slightly through 2006, after which it rose to nearly \$5,000 in 2007, reached above \$10,000 in 2009, and began to decline again in 2010. On a cumulative basis, the median user cost for the period as a whole was \$35,712. The estimated capitalization rates are in the neighborhood of 5-6% throughout the period.

In Table 3, we present user cost and equivalent rent estimates based on the full sample, as well as estimates separately obtained for the South, the Midwest, and the West from regional estimations based only on the properties located in each region. We do not perform a separate analysis for the Northeast, because none of the renters in our sample are located there.

The regional variation that we observe largely reflects underlying housing market trends. The median cumulative user costs for owners in the West and South fell below the median cumulative equivalent rents in these regions (\$41,245 vs. \$43,290 and \$33,665 vs. \$42,423, respectively), while the opposite was true in the Midwest (\$46,891 vs. \$36,978). Midwestern median cumulative user costs were below equivalent rents until 2007, after which point local depreciation was sufficient to make renting more cost effective at the median on a cumulative basis.

Median user costs for Western homeowners on an annual basis were negative for much of the period as a result of the high appreciation observed in those markets prior to 2007. In contrast, for both Midwestern and Southern homeowners, annual median user costs have been positive each year during the study period. Relative to median equivalent rents, annual median user costs were lower than annual median equivalent rents between 2003 and 2006/2007 but were higher thereafter. Thus, homeownership was less costly than renting on an annual basis during the period of housing market appreciation, while the reverse has been true since the market downturn began.

In Table 4, we present similar, subsample-specific estimates for North Carolina, Ohio, Oklahoma, the Sand States, and all other sample states. North Carolina is the most highly represented state in our sample, so our results for the South largely reflect trends in North Carolina. Similarly, Ohio accounts for about half of our Midwestern observations. Capitalization rates have varied across states in line with appreciation trends, falling to less than 3% in the Sand States and reaching above 7% in Ohio. The median cumulative user cost in North Carolina as of 2010 was \$34,166, while the median cumulative equivalent rent was \$41,720. In Ohio, the comparable numbers are \$46,891 and \$32,155, respectively. Cumulative median user costs have also been higher than median cumulative equivalent rents in the Sand States of California, Arizona, Nevada, and Florida (\$56,135 vs. \$48,895).

To explicitly assess how much appreciation would have been necessary for these low-income households to face equivalent housing costs from homeownership as from renting comparable properties, we also calculate break-even appreciation rates. These estimates are presented in Tables 5 and 6. We find that, at the median, annual appreciation of around 1-2% would have been required to bring user costs in line with equivalent rents. An appreciation rate of 3-4% would have ensured that 75% of owners found owning no more expensive than renting; at the 95th percentile, the required appreciation rate jumps to around 8%. As for the user costs, regional variation also exists in the break-even appreciation rates, with higher rates of appreciation required in the Midwest and lower rates generally needed in the South and West.

Overall, these results illustrate the key role that local economic conditions and market timing play in driving the relative cost of homeownership. At the median, the owner households in our sample experienced gains from appreciation prior to the market downturn that were sufficient to offset the relatively higher user costs that they have experienced since the decline began.

4. Robustness Checks

4.1. Household-specific capitalization rates

To evaluate the robustness of our estimates, we modify our calculations in several ways. First, as noted by Linneman and Voith (1991), the capitalization rate is, in practice, likely to vary across owners by income and age, as well as possibly by other demographic factors. In particular, the value of homeownership will be greater for more affluent households and for younger households due to the tax structure and expected increases in future income, so we should expect these respondents to have lower capitalization rates. Moreover, owners may intrinsically differ from renters in their willingness to pay for housing, with those households that place a greater value on owned housing being more likely to be owners. Thus, we also adopt the formulation of the capitalization rate suggested by Linneman and Voith (1991), which is a function of age, income, and a parameter to correct for selection into homeownership. Using this approach, we create a second measure of capitalization rates that varies across households. Specifically, let the capitalization rate for household i at time t be defined as

$$C_{it} = \alpha_{t0} + \alpha_{t1}A_{it} + \alpha_{t2}A_{it}^2 + \alpha_{t3}I_{it} + \alpha_{t4}I_{it}^2 + \alpha_{t5}\lambda_i + \eta_{it}$$

where the α_{tk} are estimated coefficients, A_{it} is respondent age, I_{it} is household income, λ_i is the inverse Mills ratio obtained from a probit regression estimating the contribution of respondent demographic characteristics⁶ to the likelihood of homeownership at baseline, and $\eta_{it} \sim \mathcal{N}(0, \sigma^2)$. Then, C_{it} can be substituted into the hedonic model, which can then be estimated via non-linear maximum likelihood, as described by (Wolfinger, 1999).

During the course of estimation, we find that including age and income in the model adds little to its predictive power, over and above the contribution of the inverse Mills ratio, and also creates instability in the likelihood function. Moreover, we obtain the best model fit for our data by estimating the capitalization rate as a simpler, deterministic function of λ_i . Thus, our final specification of the capitalization rate is $C_{it} = \alpha_{t0} + \alpha_{t1}\lambda_i$. We interpret the greater salience of the selection term for our sample, relative to that of Linneman and Voith (1991) (who find that it is insignificant in their model when the independent effects of age and income are controlled for), as indicating that capitalization rate differences across low-income

⁶We predict the likelihood of homeownership as a function of income, age, gender, employment status, minority status, marital status, and household size.

households largely reflect the way that demographic variation influences the homeownership decision. The intuition in this case is that the influences of age and income at the homeownership margin dominate any influence from within-owner variation in driving capitalization rates for this population. However, our results are essentially consistent with those of Linneman and Voith (1991), as our estimated capitalization rates do vary in the expected way across households with respect to age and income.

Under this alternative estimation approach, we obtain capitalization rates that are just slightly smaller than in our primary analysis, and this difference translates into a reduction of the estimated equivalent rent by \$30-\$100 at the median on an annual basis. On a cumulative basis, the median equivalent rent falls from \$40,984 to \$40,656. Annual break-even appreciation increases by less than three-tenths of a percentage point prior to 2007 and is comparable to our original estimates thereafter.

4.2. Capitalization rates corrected for household mobility bias

As a second check of our estimates, we re-estimate our original hedonic model while incorporating a Heckman selection correction for mobility (Heckman, 1979)⁷. In our primary analysis, we only consider the experiences of households who did not move between 2003 and 2010. This restriction has allowed us to make use of property characteristics in calculating the capitalization rate and equivalent rent. However, it is possible that our sample over-represents low-income households who found it cost effective to remain in their residences. Omitting movers from the estimation may, therefore, bias the estimated capitalization rate and the corresponding equivalent rent downward.

When we correct for possible mobility bias, we obtain estimated capitalization rates that are, as expected, slightly higher than in our primary analysis. In particular, the equivalent rent measure in this case exceeds *EquivRent* by between \$100 and \$400 on an annual basis at the median. On a cumulative basis, the median equivalent rent increases from \$40,984 to \$42,682, which remains above the median cumulative user cost of \$35,712. Moreover, median break-even appreciation falls by one-tenth to one-half of a percentage point.

4.3. Tax benefit corrected for standard deduction

Finally, Beracha and Tibbs (2010) argue that the tax refund associated with claiming the mortgage interest tax deduction is often overstated in analyses of the user cost of homeownership. In particular, they suggest that only the portion of the tax refund derived from claiming a deduction in excess of the standard deduction should be

⁷We predict mobility as a function of demographic characteristics and employment status.

considered in calculating the user cost for homeowners. Therefore, we consider an alternative user cost measure that addresses this concern.

Under a reduced tax benefit, the median annual user cost increases by between \$300 and \$600 and raises the median cumulative user cost by about \$4,000, from \$35,711 to \$39,921, which approaches the estimated median cumulative equivalent rent of \$40,984. Moreover, making this change raises the median break-even appreciation rate by about half a percentage point for most years.

5. Conclusion

Using data from the Community Advantage Panel Survey, we have compared the user cost of homeownership with hedonic estimates of equivalent rent for low-income households in the United States. We find that owning was less costly than renting for the median homeowner in our sample during the period from 2003 to 2010. The median annual user cost was less than the median equivalent rent before 2007 and greater thereafter, but the initial period of house price appreciation has been sufficient to offset the more recent higher user costs for the period as a whole. However, regional variation exists: while homeownership has been less costly than renting for households in Western and Southern states on a cumulative basis during the period considered, median cumulative rents have been lower in the Midwest since 2007. Overall, we estimate that annual house price appreciation of about 2% at the median was necessary to insure that owning was no more costly than renting between 2003 and 2010.

One important limitation to keep in mind is that the median CAP borrower in our sample reported spending less than 1% of the house value on renovations and maintenance on an annual basis during the survey period considered. In fact, only about 25% of our homeowners spent at least 2% on home repairs and renovations. So our assumed depreciation rate of 2% may understate the true extent of depreciation on these properties. This inference is consistent with the results of Van Zandt and Rohe (2011), who find that many low-income homeowners face challenges in sustaining homeownership and maintaining their property values as a result of maintenance and repair expenses that they do not foresee when purchasing their houses. To the extent that CAP properties may require higher levels of maintenance in the future, it is unclear whether the user cost that we have estimated for the period of 2003-2010 may underestimate the longer-term trend in this regard.

A further limitation is that, while we have calculated equivalent rents for comparable properties, in practice finding rental equivalents of the owner-occupied housing stock is difficult or impossible in many locations. The housing units that are available for owner occupation often tend to be of greater quality and of a different type

(e.g., single-family detached vs. apartment complex) than available rental housing. If the quality of rental and owner-occupied housing differs systematically, then the cost of renting (given lower housing quality) may very well be systematically lower than that of owning. Thus, we infer that the owners in our sample have likely benefited from higher quality housing, as well as possibly somewhat lower housing costs given the quality of that housing, as a result of the decision to become homeowners. In future research, we hope to continue to track the experiences of these households and to investigate the role that relative housing costs may play in the decisions of low-income households to sustain or exit homeownership.

References

- Belsky, E., Retsinas, N., Duda, M., 2005. The Financial Returns to Low-income Homeownership. Working Paper W05-9, Joint Center for Housing Studies, Harvard University.
- Beracha, E., Tibbs, S.L., 2010. A Closer Look at the Value of Tax Benefits for Homeowners. *Journal of Real Estate Practice and Education* 13.
- Boehm, T.P., Schlottman, A., 2004. Wealth Accumulation and Homeownership: Evidence for Low-income Households. U.S. Department of Housing and Urban Development.
- Case, K.E., Marynchenko, M., 2002. Home Price Appreciation in Low- and Moderate-Income Markets, in: Retsinas, N., Belsky, E. (Eds.), *Low Income Homeownership: Examining the Unexamined Goal*. Brookings Institution, pp. 239–256.
- Crone, T.M., Nakamura, L.I., Voith, R.P., 2009. Hedonic Estimates of the Cost of Housing Services: Rental and Owner Occupied Units, in: Diewert, W.E., Balk, B.M., Fixler, D., Fox, K.J., Nakamura, A.O. (Eds.), *Price and Productivity Measurement: Volume I – Housing*. Trafford Press, pp. 51–68.
- Diaz, A., Luengo-Prado, M.J., 2008. On the user cost and homeownership. *Review of Economic Dynamics* 11.
- Dietz, R.D., Haurin, D.R., 2003. The Social and Private Micro-level Consequences of Homeownership. *Journal of Urban Economics* 54.
- Duda, M., Belsky, E., 2002. Asset appreciation, timing of purchases and sales, and returns to low-income homeownership, in: Retsinas, N., Belsky, E. (Eds.), *Low*

- Income Homeownership: Examining the Unexamined Goal. Brookings Institution, pp. 208–238.
- Elsinga, M., 1996. Relative Cost of Owner-Occupation and Renting: A Study of Six Dutch Neighborhoods. *Netherlands Journal of Housing and the Built Environment* 11.
- Freeman, A., Desmarais, B., forthcoming. Portfolio Adjustment to Home Equity Accumulation among CRA Borrowers. *Journal of Housing Research* .
- Garner, T.I., Verbrugge, R., 2009. The Puzzling Divergence of U.S. Rents and User Costs, 1980-2004: Summary and Extensions, in: Diewert, W.E., Balk, B.M., Fixler, D., Fox, K.J., Nakamura, A.O. (Eds.), *Price and Productivity Measurement: Volume I – Housing*. Trafford Press, pp. 125–246.
- Gillingham, R., 1983. Measuring the Cost of Shelter for Homeowners: Theoretical and Empirical Considerations. *The Review of Economics and Statistics* 65.
- Harding, J.P., Rosenthal, S.S., Sirmans, C.S., 2007. Depreciation of housing capital, maintenance, and house price inflation: Estimates from a repeat sales model. *Journal of Urban Economics* 61.
- Hasanov, F., Dacy, D.C., 2009. Yet Another View on Why a Home is One’s Castle. *Real Estate Economics* 37.
- Heckman, J., 1979. Sample Selection Bias as a Specification Error. *Econometrica* 47.
- Heston, A., Nakamura, A., 2009. Questions about the Equivalence of Market Rents and User Costs for Owner Occupied Housing. *Journal of Housing Economics* 18.
- Linneman, P., 1980. Some Empirical Results on the Nature of the Hedonic Price Function for the Urban Housing Market. *Journal of Urban Economics* 8.
- Linneman, P., Voith, R.P., 1991. Housing Price Functions and Ownership Capitalization Rates. *Journal of Urban Economics* 30.
- Poterba, J.M., 1992. Taxation and Housing: Old Questions, New Answers. *The American Economic Review* 82.
- Riley, S.F., Ru, H., Quercia, R., 2009. The Community Advantage Program Database: Overview and Comparison with the Current Population Survey. *Cityscape* 11.

- Rosen, H.S., Rosen, K., 1983. Federal Taxes and Homeownership: Evidence from Time Series. *The Journal of Political Economy* 88.
- Shlay, A.B., 2006. Low-income Homeownership: American Dream or Delusion? *Urban Studies* 43.
- Stegman, M.A., Quercia, R.G., Davis, W.R., 2007. The Determinants of Home Price Appreciation Among Community Reinvestment Homeowners. *Housing Studies* 22.
- Turner, T.M., Luea, H., 2009. Homeownership, Wealth Accumulation, and Income Status. *Journal of Housing Economics* 18.
- Van Zandt, S., Rohe, W., 2011. The Sustainability of Low-Income Homeownership: The Incidence of Unexpected Costs and Needed Repairs among Low-Income Home Buyers. *Housing Policy Debate* 21, 317–341.
- Wolfinger, R.D., 1999. Fitting Nonlinear Mixed Models with the New NLMIXED Procedure. *Proceedings of the 24th Annual SAS Users Group International Conference*, Paper No. 287.

Table 1: Baseline Demographics by Sample

Variable Name	Owners (620)		Renters (145)	
	n	%	n	%
Gender				
Male	272	44	41	28
Female	348	56	104	72
Age				
18-29 years old	165	27	6	4
30-39 years old	207	33	22	15
40-49 years old	159	26	37	26
50-64 years old	81	13	75	52
65 years old or more	6	1	5	3
Race				
White	385	62	80	56
Black	164	26	43	30
Hispanic	53	9	17	12
Other	18	3	4	3
Education attainment				
11th grade or less	39	6	31	21
High school diploma/GED	433	70	92	63
Bachelors degree	107	17	19	13
Graduate degree	41	7	3	2
Marital status				
Partner or Companion	62	10	4	3
Married	238	39	25	17
Widowed	17	3	11	8
Divorced	138	22	57	39
Separated	11	2	4	3
Never Married	154	25	44	30
Household size				
1	171	28	84	58
2	165	27	25	17
3	130	21	15	10
4	85	14	10	7
5+	69	11	11	8
Employment status				
Working	577	93	72	50
Looking for Work (Unemployed)	16	3	8	6
Retired	12	2	24	17
Out of Labor Force	16	3	41	28
Income				
Less than \$20,000	72	12	98	68
\$20,000-25,000	90	15	16	11
\$25,000-30,000	99	16	9	6
\$30,000-40,000	162	26	18	12
\$40,000-50,000	130	21	2	1
\$50,000 or more	67	11	2	1
Region				
Midwest	148	24	21	14
Northeast	19	3	0	0
South	425	69	103	71
West	28	5	21	14
State				
North Carolina	205	33	46	32
Ohio	82	13	11	8
Oklahoma	85	14	38	26
Sand States (CA, AZ, FL, NV)	30	5	20	14
Other States	218	35	30	21

Note: The income buckets are upward inclusive.

Table 2: Housing Characteristics by Sample

Variable Name	Owners (620)		Renters (145)	
	n	%	n	%
Residence Type				
Single-family	534	86	29	20
Condominium	36	6	1	< 1
Townhouse	32	5	3	2
Other	17	3	112	77
Bedrooms				
0-1	7	1	63	43
2	158	25	50	34
3	377	61	27	19
4+	78	13	5	3
Bathrooms				
0-1	218	35	115	79
1.5-2	349	56	27	19
2.5+	53	9	3	2
House Quality Rating (Scale of 1-10)				
1-4	9	1	6	4
5	20	3	14	10
6	32	5	17	12
7	106	17	32	22
8	232	37	36	25
9	98	16	20	14
10	123	20	20	14
Tract Median House Value				
less than \$50,000	42	7	12	8
\$50,000-80,000	225	36	56	39
\$80,000-100,000	188	30	41	28
\$100,000-150,000	135	22	26	18
\$150,000 or more	30	5	10	7

Table 3: Capitalization Rates, User Costs, and Equivalent Rents by Year and Region

Sample	Year	CapRate	Median Annual		Median Cumulative		
			UserCost	EquivRent	UserCost	EquivRent	
Nation ($N=620$)	2003	5.77	\$3,140	\$4,871	\$3,140	\$4,871	
	2004	5.77	\$2,968	\$5,048	\$5,954	\$9,982	
	2005	5.49	\$168	\$5,004	\$6,169	\$15,078	
	2006	5.22	\$1,770	\$4,993	\$8,288	\$20,138	
	2007	4.92	\$4,679	\$4,830	\$11,766	\$24,871	
	2008	5.43	\$8,865	\$5,151	\$19,382	\$30,050	
	2009	5.97	\$10,165	\$5,374	\$29,199	\$35,437	
	2010	6.07	\$7,098	\$5,515	\$35,712	\$40,984	
	West ($N=29$)	2003	3.91	\$-5,107	\$4,659	\$-5,107	\$4,659
		2004	3.91	\$-22,698	\$5,502	\$-24,623	\$10,033
2005		3.07	\$-41,395	\$5,579	\$-58,953	\$15,214	
2006		2.72	\$-8,843	\$5,219	\$-71,699	\$20,886	
2007		2.55	\$19,684	\$4,899	\$-45,480	\$25,736	
2008		3.57	\$46,076	\$5,676	\$-8,455	\$32,458	
2009		4.64	\$35,136	\$6,221	\$28,442	\$37,070	
2010		5.11	\$11,349	\$6,777	\$41,245	\$43,290	
Midwest ($N=148$)	2003	5.84	\$3,395	\$4,411	\$3,395	\$4,411	
	2004	5.84	\$3,811	\$4,569	\$6,568	\$9,101	
	2005	5.79	\$1,085	\$4,678	\$8,004	\$13,809	
	2006	5.81	\$5,208	\$4,630	\$12,629	\$18,595	
	2007	4.38	\$6,786	\$3,399	\$18,254	\$22,105	
	2008	5.92	\$11,373	\$4,400	\$29,607	\$26,427	
	2009	8.08	\$9,513	\$5,750	\$39,556	\$31,754	
	2010	7.89	\$6,977	\$5,489	\$46,891	\$36,978	
	South ($N=424$)	2003	5.83	\$3,277	\$5,104	\$3,277	\$5,104
		2004	5.83	\$3,005	\$5,279	\$6,173	\$10,381
2005		5.58	\$623	\$5,298	\$6,333	\$15,688	
2006		5.21	\$1,017	\$5,277	\$7,866	\$20,889	
2007		5.13	\$3,779	\$5,353	\$10,659	\$26,149	
2008		5.24	\$7,915	\$5,398	\$17,511	\$31,604	
2009		5.40	\$10,023	\$5,339	\$26,844	\$37,056	
2010		5.45	\$7,004	\$5,346	\$33,665	\$42,423	

Table 4: Capitalization Rates, User Costs, and Equivalent Rents by Year and State

Sample	Year	CapRate	Median Annual		Median Cumulative	
			UserCost	EquivRent	UserCost	EquivRent
NC ($N=205$)	2003	5.66	\$3,995	\$5,018	\$3,995	\$5,018
	2004	5.66	\$3,376	\$5,174	\$7,589	\$10,182
	2005	5.69	\$1,387	\$5,399	\$8,872	\$15,655
	2006	5.40	\$1,638	\$5,373	\$10,420	\$21,014
	2007	5.06	\$2,049	\$5,265	\$12,338	\$26,539
	2008	4.90	\$7,403	\$5,121	\$18,944	\$31,514
	2009	5.20	\$9,994	\$5,206	\$27,983	\$36,624
	2010	5.17	\$7,168	\$5,096	\$34,166	\$41,720
OK ($N=85$)	2003	6.95	\$1,779	\$5,734	\$1,779	\$5,734
	2004	6.95	\$3,835	\$5,869	\$5,553	\$11,613
	2005	6.22	\$1,451	\$5,580	\$5,657	\$17,234
	2006	5.59	\$1,382	\$5,190	\$7,383	\$22,407
	2007	6.04	\$4,816	\$5,506	\$13,123	\$27,843
	2008	6.70	\$5,373	\$6,193	\$17,164	\$33,692
	2009	6.11	\$8,269	\$5,521	\$23,221	\$39,112
	2010	5.82	\$4,900	\$5,453	\$28,664	\$44,383
OH ($N=82$)	2003	5.52	\$3,482	\$3,818	\$3,482	\$3,818
	2004	5.52	\$3,861	\$3,832	\$6,857	\$7,631
	2005	5.39	\$1,857	\$3,924	\$8,535	\$11,465
	2006	5.34	\$6,412	\$3,922	\$13,030	\$15,382
	2007	3.90	\$6,569	\$2,913	\$19,071	\$18,298
	2008	5.10	\$9,383	\$3,628	\$29,727	\$22,098
	2009	7.42	\$8,676	\$5,098	\$38,746	\$27,179
	2010	7.18	\$5,861	\$4,812	\$46,891	\$32,155
Sand States ($N=30$)	2003	4.70	\$-10,526	\$5,619	\$-10,526	\$5,619
	2004	4.70	\$-23,068	\$6,971	\$-39,331	\$12,577
	2005	3.39	\$-51,102	\$6,555	\$-91,756	\$19,455
	2006	3.07	\$-9,142	\$6,914	\$-94,055	\$25,906
	2007	2.88	\$31,570	\$5,710	\$-62,841	\$31,677
	2008	3.79	\$49,999	\$5,723	\$-1,374	\$37,564
	2009	5.30	\$49,082	\$5,474	\$42,908	\$43,059
	2010	6.26	\$11,195	\$5,988	\$56,135	\$48,895
Other States ($N=219$)	2003	4.94	\$2,504	\$4,134	\$2,504	\$4,134
	2004	4.94	\$2,337	\$4,399	\$4,662	\$8,614
	2005	4.81	\$-1,973	\$4,464	\$3,506	\$13,077
	2006	4.72	\$958	\$4,663	\$2,539	\$17,757
	2007	4.53	\$5,678	\$4,555	\$8,726	\$22,200
	2008	4.73	\$11,797	\$4,573	\$17,483	\$26,976
	2009	5.32	\$12,319	\$4,790	\$27,818	\$32,066
	2010	5.87	\$7,544	\$5,327	\$33,920	\$37,438

Table 5: Break-Even Appreciation Rate (%) Quintiles by Year and Region

Sample	Year	5th Percentile	25th Percentile	Median	75th Percentile	95th Percentile	
Nation ($N=620$)	2003	-0.20	1.25	2.54	4.87	10.38	
	2004	-2.11	0.01	1.23	2.69	7.46	
	2005	-7.38	-4.54	0.54	2.16	6.35	
	2006	-1.61	0.36	1.61	3.33	8.14	
	2007	-1.62	0.19	1.41	3.18	8.21	
	2008	-2.66	-0.19	1.23	3.34	8.27	
	2009	-2.71	-0.46	1.05	3.11	8.31	
	2010	-2.88	-0.47	1.09	3.13	8.22	
	West ($N=29$)	2003	0.49	2.18	2.97	4.51	8.87
		2004	-1.20	-0.45	0.73	2.04	2.77
2005		-5.05	-4.42	-1.43	1.15	2.86	
2006		-0.33	0.38	1.12	2.48	2.98	
2007		-0.39	0.45	1.47	2.28	4.47	
2008		-1.53	0.51	1.66	2.67	5.56	
2009		-1.82	0.56	2.27	4.32	6.55	
2010		-1.83	0.14	2.19	4.09	6.59	
Midwest ($N=148$)	2003	0.41	1.94	3.19	5.39	11.99	
	2004	-3.86	1.04	2.10	4.23	10.39	
	2005	-7.67	-6.12	0.50	2.47	7.07	
	2006	-0.76	1.19	2.45	4.46	9.07	
	2007	0.37	2.25	3.65	5.79	11.23	
	2008	-1.24	1.21	2.99	5.10	10.92	
	2009	-2.90	-0.72	1.25	3.94	7.93	
	2010	-2.42	-0.39	1.55	4.61	8.42	
South ($N=424$)	2003	-0.33	1.13	2.24	4.45	9.17	
	2004	-1.56	-0.10	0.98	2.16	6.58	
	2005	-7.50	-2.76	0.54	1.89	5.77	
	2006	-1.40	0.29	1.29	2.63	7.08	
	2007	-1.64	-0.10	0.98	2.34	6.33	
	2008	-2.43	-0.33	0.87	2.49	6.80	
	2009	-2.19	-0.18	1.09	2.62	7.34	
	2010	-2.42	-0.10	1.25	2.74	6.71	

Table 6: Break-Even Appreciation Rate (%) Quintiles by Year and State

Sample	Year	5th Percentile	25th Percentile	Median	75th Percentile	95th Percentile
NC ($N=205$)	2003	-0.58	1.14	1.99	4.05	7.59
	2004	-1.53	0.08	1.16	2.04	5.03
	2005	-7.55	-3.08	0.66	1.79	4.55
	2006	-1.14	0.09	1.09	2.13	5.78
	2007	-1.55	-0.12	0.82	1.83	5.62
	2008	-1.84	-0.08	1.00	2.36	6.04
	2009	-2.51	-0.19	1.01	2.18	5.77
	2010	-2.60	-0.01	1.29	2.38	5.14
OK ($N=85$)	2003	-0.46	0.67	1.64	3.65	8.58
	2004	-1.75	-0.84	-0.21	0.84	5.57
	2005	-8.07	-0.55	0.21	1.30	5.58
	2006	-0.43	0.48	1.19	2.19	6.71
	2007	-1.79	-0.49	0.42	1.38	6.20
	2008	-2.66	-1.27	-0.12	1.08	6.67
	2009	-1.45	-0.48	0.89	2.19	6.37
	2010	-1.43	0.01	1.11	2.45	6.95
OH ($N=82$)	2003	1.21	2.39	3.78	5.97	10.99
	2004	-0.39	1.39	2.30	4.76	8.58
	2005	-6.88	-4.91	1.05	2.66	6.70
	2006	0.86	1.58	2.91	5.14	8.44
	2007	1.38	2.80	4.01	6.44	12.20
	2008	0.14	2.04	3.67	6.34	9.96
	2009	-2.00	-0.01	1.97	4.62	7.37
	2010	-1.63	0.03	2.23	4.71	8.27
Sand States ($N=30$)	2003	-0.30	1.40	2.55	4.16	6.33
	2004	-1.99	-1.23	0.08	1.27	4.22
	2005	-5.36	-4.97	-3.40	-0.83	1.73
	2006	-0.69	-0.07	0.93	2.04	3.53
	2007	-1.29	0.29	1.50	3.01	6.58
	2008	-2.42	0.34	1.81	3.70	6.77
	2009	-2.48	0.41	2.56	4.35	9.05
	2010	-3.64	-0.83	2.00	3.81	6.27
Other States ($N=219$)	2003	0.77	2.24	3.70	6.26	12.39
	2004	-1.39	0.70	2.32	4.16	9.37
	2005	-6.80	-4.31	0.64	3.28	8.25
	2006	-1.16	0.58	2.56	4.64	9.74
	2007	-1.69	0.42	2.42	4.57	8.77
	2008	-2.55	0.29	2.67	5.14	9.88
	2009	-2.55	0.21	2.15	4.55	9.74
	2010	-3.50	-0.35	1.89	4.48	9.54