



## Is Timing Everything? Race, Homeownership and Net Worth in the Tumultuous 2000s

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We use the Panel Study of Income Dynamics to estimate how net worth was affected among low- and moderate-income households who became first-time homebuyers at different points during the volatile 2000s. We address selection using propensity score matching and estimating difference-in-difference models, and use quantile regressions to account for the skew in net worth outcomes. Results highlight the significance of race in the relationship between first-time home buying and net worth during the decade. Although timing was critical to the short-term trajectory of net worth for whites, total net worth declines for black first-time homebuyers regardless of economic climate. The most dramatic differences between black and white new homebuyers is their neighborhood locations, with blacks purchasing in predominantly black neighborhoods with lower housing prices and price appreciation, and lower and declining rates of homeownership.

The tumultuous 2000 decade took its toll on U.S. households, causing dramatic fluctuations in markers of economic well-being among all but the very wealthy. Between 2001 and 2010, household net worth fell by 27% (2010\$, Bricker *et al.* 2012). Homeowners were particularly hard hit. The median house price fell by 41%, in real terms, between 2005 and 2010,<sup>1</sup> leaving roughly 15% of homeowners underwater on their mortgages (JCHS 2013, 2011). Real home equity declined by nearly 58% between its 2006 peak and the end of the decade, accounting for 61% of the drop in household wealth over these five years (JCHS 2011). The value of the housing stock plunged \$4.4 trillion between 2006 and 2009 (Carson and Dastrup 2011),<sup>2</sup> and foreclosures spiraled from less than 500,000 per year in 2000 to nearly 4 million

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<sup>1</sup>Data pertain to existing single-family homes.

<sup>2</sup>Carson and Dastrup cite of the Federal Reserve Bank Federal Flow of Funds Account, September 17, 2009, Table B.100.

in 2011. The homeownership rate continued to fall for eight years from its historic high of 69.1% in 2004 to 65.0% in the second quarter of 2013 (U.S. Census Bureau 2013b).

All homeowners have not been affected equally. Minorities experienced more dramatic losses than whites, suffering a 20% decline in real median house prices between 2007 and 2009 compared with 13% for whites (JCHS 2011). But little is known about the experiences of lower-income first-time homebuyers, and particularly those who are black, who have constituted a primary target group of government policies to expand access to homeownership since at least the 1990s (Gabriel and Rosenthal 2005, Timiraos 2008, Brandlee 2011). First-time homebuyers represent roughly 40% of all buyers, and more than 60% have low or moderate incomes (Taylor 2013, Crowe 2014). An important rationale for these policies has been the role of homeownership in wealth accumulation.

In this paper, we take advantage of the natural experiment provided by the volatile macroeconomic conditions of the 2000s to study the relationship between homeownership and net worth of low- and moderate-income first-time homebuyers during good times and bad.<sup>3</sup> The analysis relies on the confidential geocoded version of the Panel Study of Income Dynamics (PSID), which includes rich data on net worth, both with and without home equity in the primary residence, substantial background information on sample households and, through geocode links, data on neighborhood and metropolitan area attributes such as poverty rates and house price indices. Panel data allow us to estimate the effect of first-time home buying on net worth for a representative sample of renters who became homeowners at different points of the housing cycle: in the wake of the 2001 recession, when the market was heating up (2003), at the height of the boom (2005), and at the outset of the Great Recession (2007). Because we focus on first-time homebuyers during the 2000 decade, we observe short-term effects for all first-time purchasers and medium-term effects for those who made their purchase early in the decade. To estimate longer-term effects, we present two simulations, one optimistic and one pessimistic, of how long it will take first-time homebuyers to recover from the economic turmoil of the 2000s and recoup on their investments. To address selection, we follow Heckman, Ichimura and Todd (1997) by applying propensity score matching and estimating difference-in-difference models, and we use quantile regressions to account for the skew in net worth outcomes.

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<sup>3</sup>Throughout this paper, we use the terms “net wealth” and “net worth” interchangeably.

Our results highlight stark disparities by race in the relationship between first-time home buying and net worth during the decade. For blacks and whites combined, median first-time homebuyers experienced a short-term decline in total net worth from the year of home purchase if the purchase occurred during or immediately before an economic recession. As expected, the decline is more pronounced during the Great Recession than the less severe 2001 recession. Less anticipated is that the steeper decline in total net worth for new homebuyers between 2007 and 2009 is driven by the dramatic losses among blacks. Blacks lost 43% of their net worth compared with 33% by whites.<sup>4</sup>

At least as striking are the results for the boom years. For blacks and whites combined, the median first-time homebuyer experienced virtually no change in net worth between either 2003 and 2005 or 2005 and 2007. But whites and blacks had essentially the opposite experiences, with whites enjoying substantial short-run gains across both pairs of years, while blacks suffered sizable losses. White gains were approximately 50% in each time period, while blacks lost 23% between 2003 and 2005, and 47% between 2005 and 2007.<sup>5</sup> Thus, during the 2000s, black first-time homebuyers did not benefit from the boom and were particularly hard-hit by the bust. For white first-time homebuyers, gains in net worth were short-lived, with short-term increases turning into decreases within four to six years. Depending on the trajectory of house price appreciation, simulations suggest it will take from three to more than 40 years to recoup net worth measured at the year of house purchase. This analysis also suggests that the racial divide in the neighborhood locations of black and white new homebuyers may have played an important role in the different outcomes of these two groups. Compared with whites, blacks purchased their first homes in predominantly black neighborhoods with lower housing prices and price appreciation, and lower and declining rates of homeownership.

The next section sets the context for this analysis by highlighting the often dramatic changes in indicators of economic well-being over the millennial decade. This is followed by a brief review of the literature on the relationship between homeownership and wealth accumulation. We then describe the conceptual model guiding the analysis, the data, and the methods. In the final two sections, we present the results and discuss their implications.

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<sup>4</sup>Authors' calculations based on median difference-in-difference estimates relative to net worth in the year the home was purchased.

<sup>5</sup>Authors' calculations based on median difference-in-difference estimates relative to net worth in the year the home was purchased.

### The Financial Context of the 2000 Decade<sup>6</sup>

Data from the Survey of Consumer Finances (SCF) capture the financial roller coaster ride of the last decade, and highlight the importance of homeownership particularly among lower-income families, who are the focus of this research.<sup>7</sup> SCF cross-section household surveys were conducted in 2001, 2004, 2007, and 2010, supplemented by a three-year panel survey covering 2007–2009.

Between 2001 and 2004, the economy moved from a mild recession to improvement in the financial status of most families. Median family net worth increased by 1.5%, fueled largely by the increasing rate of homeownership particularly among the low-income. The 2001–2004 trends generally continued during the 2004–2007 period. The advent of the Great Recession in late 2007 precipitated downward trends in most markers of family economic well-being during the 2007–2010 period. Median family income dropped by nearly 8%, median net worth declined by about 40%, and the rate of homeownership fell to 67.3% from its 2004 peak of 69.1%. The decrease in net worth was largely precipitated by the dramatic drop in housing prices, and was particularly severe for lower-income families whose main, if not sole, asset is their owned home. Thus, nearly 63% of families in the lowest-income quintile experienced a decline in wealth (Bricker *et al.* 2011, Table 2), and the rate of homeownership experienced its sharpest decline, particularly so among the poorest 20% of the population.

Our special tabulations of SCF cross-sectional data for black and white families demonstrate the well-documented fact of the considerably smaller wealth holdings of blacks compared with whites.<sup>8</sup> Less widely appreciated are the different patterns of declines in net worth by race. Although the patterns are

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<sup>6</sup>This section is based on periodic reports of analyses of the Survey of Consumer Finances prepared by researchers for the Board of Governors of the Federal Reserve as follows: <http://www.federalreserve.gov/econresdata/scf/scfindex.htm>

<sup>7</sup>As the SCF cautions, measures of change from individual cross-section surveys combine possible changes in the composition of the population sampled with changes in financial circumstances (Bricker *et al.* 2012). These may differ from the changes in financial conditions of a sample of the same households followed over time, which is the approach used in the current paper.

<sup>8</sup>This discussion of race differences is based on the authors' tabulations of SCF cross-sectional data. Because the SCF is conducted every three years, we calculate changes in net worth between surveys (*e.g.*, 2001–2004; 2004–2007). Those most likely to be retired are excluded by imposing 58 years of age as the upper age limit for this sample. We take the same approach in the analysis of the PSID. One cautionary note is that parsing the SCF sample results in small sample sizes, which may produce idiosyncratic results (Dynan 2013).

similar for blacks and whites when we exclude equity in the primary residence,<sup>9</sup> they diverge when equity is included. For whites, declines are limited to the bottom two quintiles alone until 2010, when they expand to all quintiles. For blacks, all except those with the highest incomes experience losses in net worth through 2007. By 2010, net worth declines apply to all income groups, including the highest quintile.

### **Literature Review: Homeownership and Wealth Accumulation**

At this writing, Mian and Sufi's (2009, 2014) work is the most relevant to this paper. Their analysis of the precipitants of the financial crisis demonstrates the strong correlation between zip codes and neighborhoods with concentrations of highly leveraged, poor and often black homeowning households whose wealth was mostly or entirely tied up in home equity, on the one hand, and areas with high rates of mortgage defaults and foreclosures, on the other. The authors illustrate this relationship with a few case studies. For example, they point to three Detroit neighborhoods (Five Points, Rosedale Park and Brightmoor) that are majority black and majority owner-occupied. Nearly 30% of mortgages defaulted in 2009 in these neighborhoods, more than 20% of homes went into foreclosure, and house prices fell by 50% between 2006 and 2009 and remained at this low level in 2012.<sup>10</sup> Mian and Sufi characterize these neighborhoods as "decimated by the mortgage default crisis" (p. 108). Another example is Prince Georges (PG) County, Maryland, in which 65% of the population is black, and 66% of homeowners are black (U.S. Census Bureau 2013a). Households with the lowest mean income live in PG County census tracts where the black homeownership rate is 90% or greater. Our analysis of Zillow zip code data for these tracts for the 2007–2011 period shows that large majority black zip codes had the lowest housing price index (HPI) values and experienced the highest foreclosure rates and greatest declines in housing values. We account for each of these factors in our analysis.

The remaining literature on homeownership and wealth covers either only a portion of the 2000 decade or predates the decade entirely. Because the peaks and troughs of the 2000–2010 housing cycle (and the macro-economy more generally) were unusually severe and rapid, the generalizability of findings about the net wealth effects of homeownership from studies of earlier time periods may be misleading.<sup>11</sup> With this caveat in mind, three largely consistent

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<sup>9</sup>Specifically, declines starting with reports in the 2004 survey and intensifying in the 2007 and 2010 surveys.

<sup>10</sup>Our analysis of 2007–2011 ACS census tract data.

<sup>11</sup>Observers have commented on the uniqueness of the housing bubble (*e.g.*, Mayer 2011).

results emerging from this literature are germane to our analysis. First, homeownership is the main vehicle for asset accumulation among lower-income and minority households. Second, even during robust economic cycles, the effect of homeownership on the net worth of lower-income blacks is significantly lower than their white counterparts. And finally, timing (when in the housing cycle the home was purchased), the holding period (how long it is owned), and the housing and economic conditions in the locale, each plays an important role in whether homeownership will increase the household's net worth. It should be noted, however, that no published papers focus on racial differences in the wealth effects of first-time home buying.

Loving, Finke and Salter (2012) is one of the few studies of the role of homeownership in net wealth accumulation that is based on a nationally representative sample, longitudinal household data, and model specifications that estimate net worth separately for blacks and whites. The authors use the National Longitudinal Survey of Youth 1979 sample to test for differences in net wealth accumulation among homeowners stratified by both income and race (specifically, black vs. white). Their main focus is whether the well-documented race-by-income differences in home equity appreciation that explain race-by-income gaps in wealth appreciation occurred in the 1994–2004 period, which experienced accelerated appreciation in house prices. Descriptive results show that blacks in the lowest three income quartiles experienced diminished home equity and reduced home equity growth over this period, although blacks in the highest-income quartile did not. Quantile regressions of the log change in net worth indicate an 11% lower growth in home equity for blacks compared with whites, contributing to racial differences in overall net worth growth. However, the authors calculate that even if blacks and whites experienced equivalent growth in home equity, a disparity in net worth growth between the races would persist.

Di, Belsky and Liu (2007) use a different nationally representative dataset, the Panel Study of Income Dynamics (PSID), to examine the effect of homeownership in 1989 and 2001 on net wealth in 2001, controlling for wealth accumulation during 1984–1989. Like Loving, Finke and Salter (2012), Di and colleagues, too, find a race effect, with blacks experiencing less wealth accumulation even in the case of long holding periods. The authors test for nonlinearities in the duration of homeownership to account for whether the household bought at the bottom of the cycle and should, therefore, see the greatest appreciation in home-equity wealth, and vice versa.

By contrast to both Loving, Finke and Salter (2012) and Di, Belsky and Liu (2007), Turner and Leua's (2009) study of the relationship between homeownership and wealth accumulation finds no effect of race on net wealth among

their lower-income subsample. Like Di, Belsky and Liu (2007), Turner and Leua's analysis uses the PSID, in this case looking at tenure in 1987–2001 and net wealth accumulation in 1994, 1999, and 2001. Also like Di, Belsky and Liu, they control for race (whether black) and income (whether low- or moderate-income) with right-hand side covariates, although they also test for an interaction effect between income and holding period. Turner and Leua find that homeownership has a sizable, statistically significant effect on wealth holdings, with each additional year of homeownership resulting in an 11% average increase in net worth. Although income-by-duration interactions demonstrate that the more affluent experience more than twice the appreciation in net wealth than low- and moderate-income households, being black is not statistically significant. Two methodological features of this analysis might positively bias the results. First, the authors apply a random effects model, their identification strategy, to only three time points. This requires an assumption of linear effects, but the net wealth distribution is positively skewed. Additionally, although the analysis sample includes some households with low incomes, it is dominated by higher-income households for whom homeownership is more strongly correlated with net wealth accumulation (*e.g.*, Di, Belsky and Liu 2007, Turner and Leua 2009).<sup>12</sup>

Boehm and Schlottmann's (2008) findings fall between those of Loving, Finke and Salter (2012) and Di, Belsky and Liu (2007), on the one hand, and Turner and Leua (2010), on the other. Boehm and Schlottmann use the PSID to test dynamic models of tenure choice in 1984–1992 to estimate the wealth-building effects of homeownership. They find that although homeownership is associated with wealth accumulation for all households including lower-income households regardless of race, average annual house price appreciation for low-income, minority households is substantially smaller than for all other groups. This analysis also demonstrates that low-income minorities exhibit a shorter holding period, with a 21% probability of exiting homeownership and returning to renting by the end of the observation period compared with 12% for low-income whites (Exhibits 6c, 6d).

Two additional papers highlight the importance of timing and of local economic conditions. Duda and Belsky (2001) analyze the change in the net asset value of home purchases and sales using repeat sales data from the Boston, Chicago, Denver, and Philadelphia metropolitan areas between 1982 and 1999. They emphasize the importance of timing with respect to the housing cycle, finding that whether purchases and sales occur when the housing

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<sup>12</sup>The authors' criterion for low or moderate income is an income below 120% of the state median in one of the three outcomes years. Also, most households who experience one out of three years of low income are not persistently low income (*e.g.*, Bane and Ellwood 1986, Duncan and Rodgers 1988).

cycle is on the upswing or the downswing has a major effect on whether the buyer or seller makes a profit, breaks even, or sustains a loss. Case and Morynchenko (2001) reaffirm the importance of timing in the profit-loss position of buyers and sellers, but also emphasize that regional and local conditions can loom even larger than national macroeconomic cycles. To demonstrate this point, they note that the appreciation of lower-priced housing during a boom-bust-recovery cycle varied substantially across the nation during the 1983–1995 period.

Two additional papers sound a cautionary note about the asset building capacity of homeownership for lower-income blacks. Bostic and Lee (2009) simulate the wealth accumulation effects for lower-income households, demonstrating the important contribution of the holding period and size of the down payment to the wealth-increasing effects of homeownership. However, few low-income households are able to make sizable down payments, and the holding periods of lower-income blacks are notably shorter than they are for whites (Boehm and Schlottmann 2008). Peng and Thibodeau (2010) explore house price risk segmentation in 99 Denver zip codes between 2002 and 2007. They find that low-income households experienced significantly more house price risk across this time period, which includes both the housing boom and the collapse of the housing market. The authors conclude that homeownership may not be the “ideal investment for low-income households” (p. 19).

## **Research Approach**<sup>13</sup>

### *Data and Samples*

The PSID, the primary database for the analysis, is an ongoing longitudinal survey of American households begun in 1968 by the University of Michigan Survey Research Center. Annual interviews were conducted through 1997, with biennial interviews thereafter. The original sample of 5,000 families has been followed over time, along with new families who split off from those families (*e.g.*, sample children forming their own households). The sample was adjusted in 1997 to reflect demographic changes resulting primarily from immigration. Low-income families were originally oversampled and, despite greater attrition among this subgroup, remain overrepresented. Statistical weights adjust for nonresponse and representativeness. The PSID is the main source of demographic and financial data on households, and geocodes enable us to attach additional data on neighborhood and housing market characteristics.

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<sup>13</sup>All estimates discussed in this section that are not reflected in figures or tables are documented in a technical appendix available from the authors on request.



We use several criteria to develop the analysis samples. The samples of first-time homebuyers (the “treatment group”) are limited to households who reported they were renters in at least three waves of the PSID prior to purchasing their primary residence. Thus, a first-time homebuyer in 2001 would have reported being a renter in 1999 and 1997 in order to be included in the analysis sample. This multiyear renter requirement reduces the likelihood that the household’s wealth is affected by a prior episode of homeownership.<sup>14</sup> To represent the different phases of the housing cycle during the decade, we focus on first-time home buying during the following four time periods: (1) between 1999 and 2001, with the home purchase occurring around the time of the 2001 recession; (2) between 2001 and 2003, with the home purchase occurring at the earliest part of the boom; (3) between 2003 and 2005, with the home purchase occurring as the boom heated up or reached its height; and (4) between 2005 and 2007, with the purchase occurring at the emergence of the Great Recession. In the first (or baseline) year, all sample households were renters. We follow these households over the next two years, during which some of them become first-time homebuyers. We then observe the wealth outcomes of these new owners and longer-term renters over all subsequent years available in the PSID data. For 2001 purchasers, we are able to analyze outcomes for the full range of years available, from 2003, which is two years post purchase, to 2011, which is 10 years post purchase. At the other extreme, for 2007 purchasers, we can evaluate only short-term wealth outcomes at two years (2009) and four years (2011). For first-time homebuyers in 2003 and 2005, the outcome period we can observe falls between these two extremes.<sup>15</sup> We retain only those households with data in the three waves or years that define the triplet of years we observe: the baseline year,  $T_1$ , before the first-time homebuyer purchases a home; the year of purchase,  $T_2$ , and the outcome year,  $T_n$ , where  $n$  varies from 2 years (for 2007 purchasers) to 10 years (for 2001 purchasers). Attrition rates for these samples range as high as 20%, but analyses reveal few statistically significant differences between those who drop out and those who remain, and attrition rates are comparable for renters versus new owners.

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<sup>14</sup>If the prior survey wave is missing, we determined rental status by checking housing tenure in the prior wave, which occurred two years earlier (*e.g.*, if a first-time homebuyer in 2003 was not interviewed in 1999, we examined housing tenure in 1997). This specification is sufficient to capture the very large majority of true first-time homebuyers: looking back eight years earlier, only 6–9% of whites and 3–4% of blacks reported being an owner (range reflects variations in the different analysis samples).

<sup>15</sup>Because the PSID collects data biennially, the length of time a household could own a home at  $T_3$  ranges from almost four years (if the home was purchased immediately after the baseline interview) to one month (if the home was purchased immediately before the Time 2 interview and sold right after the interview). The most common holding period is 2–3 years.

We also limit the samples by age and income. To exclude retirees who are likely to exhibit different homeownership and wealth accumulation behavior, we drop cases where the household head is older than age 58 at baseline or if the head or spouse reports being retired at baseline, regardless of their age. The samples are also restricted to those with incomes at or below 500% of the federal poverty line to focus on moderate- and lower-income households, who were the primary targets of policies to increase access to homeownership.<sup>16</sup> The resulting analysis dataset has complete information for roughly 99% of the cases, requiring no adjustments for missing data.

We analyze blacks and whites separately given our interest in the potentially disparate experiences of these two groups, which is supported by suggestive evidence from our cross-sectional SCF analysis noted earlier. Chow tests further confirm the importance of separate analyses by race because of substantial differences in the relationship between homeownership and wealth for these two racial groups.<sup>17</sup> However, we also present results for blacks and whites combined to provide a basis for comparison with prior work and the conventional wisdom about the effects on net worth of low- and moderate-income families who entered the homeownership market in the 2000s.<sup>18</sup> Power analyses indicate all sample sizes are sufficient to detect moderate (*Cohen's d* = .5) effects using a two-tailed test, with results from the difference-in-difference models (discussed later) able to detect even smaller differences.<sup>19</sup>

Because net worth is positively skewed, results could be distorted by outliers.<sup>20</sup> Therefore, we exclude the top and bottom 2.5% of cases from

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<sup>16</sup>All monetary values are expressed in 2009\$. In constant dollars, 500% of the FPL for a family of four is \$106,280, which is nearly twice the 2009 median income for 2-person households, the average household size in the analysis samples.

<sup>17</sup>Although interaction terms could be used when analyzing the black and white samples combined, such models assume that the error term is the same for each sample, which may not be accurate (Greene 1993).

<sup>18</sup>We run 42 analyses: five for 2001 purchasers; four for 2003 purchasers; three for 2005 purchasers; and two for 2007 purchasers = 14 analyses x three groups (blacks, whites, and both) = 42.

<sup>19</sup>Sample sizes are shown in Tables 1 and 2. The absolute number of black first-time homebuyers falls to a low of 41 cases in one analysis sample. However, there is sufficient statistical power to detect moderate effects, many results are statistically significant and none would reach statistical significance only as a result of increasing the number of these observations.

<sup>20</sup>The measure of skewness for net worth with and without home equity is extreme, always exceeding 1.

each sample, following common practice (e.g., Gittleman and Wolff 2004, Grinstein-Weiss *et al.* 2013, Belsky and Duda 2002).<sup>21</sup>

### Methods

The conceptual model is based on an intent-to-treat framework. Our objective is to compare households who become homeowners at  $T_2$  to those still renting at  $T_2$ , with no restrictions on housing tenure at  $T_3, \dots, n$  where  $n$  varies from two years post-purchase (for purchases in 2001, 2003, 2005 and 2009), to 10 years post-purchase (for purchases in 2001). The primary identification strategy is difference-in-difference (DiD) models. DiD controls for time-invariant differences, observed or unobserved, by computing the difference in outcomes before and after treatment for both the treatment (homebuyers) and comparison (renter) groups. With outcomes and covariates measured before and after treatment, the DiD model is estimated as:

$$y_{it} = \beta_0 + \beta_1 H_i + \beta_2 T_t + \beta_3 H_i T_t + \beta_4 X_{it} + \varepsilon \quad (1)$$

where the outcome ( $y$ ) for household  $i$  at time  $t$  is a function of whether the household purchased a home, the treatment status ( $H$ ), time ( $T$ ), the interaction of treatment by time ( $HT$ ), other covariates ( $X$ ), and an error term. The identification of a treatment effect in (1) is obtained based on the “parallel paths” assumption that the treatment group, first-time homebuyers, would experience the same changes as the comparison group, those who remain renters, if the treatment had not occurred (Angrist and Pischke 2009, Lechner 2011). The DiD estimate is the value of  $\beta_3$ , the treatment-by-time interaction term, which indicates how much the treatment group outcome at Time 3 differs from the expected outcome at Time 3 if the treatment group responded the same as the comparison group (we use  $T_3$  to represent the outcome year for simplicity). This is the equivalent of estimating outcomes at  $T_2$  and  $T_3$  separately for treatment and comparison groups, computing the difference over time in these estimated outcomes for each group ( $Treatment_3 - Treatment_2$ ) and ( $Comparison_3 - Comparison_2$ ), and then subtracting the differences in these differences:

$$B_3 = ((Treatment_3 - Treatment_2) - (Comparison_3 - Comparison_2)) \quad (2)$$

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<sup>21</sup>The exclusion of extreme values, along with the age and income restrictions, essentially eliminate high net worth families from the samples. Across all samples, for example, at least 95% of cases have total net worth including equity that falls below the 2011 median net wealth of all U.S. households (\$65,387) (2009\$) (Gottschalck, Vornovytzky and Smith 2013). The difference-in-difference method we rely on further accounts for the variation in net worth.

where  $Treatment_n$  and  $Comparison_n$  are the predicted outcomes for the treatment and comparison groups at time  $T_2$  and  $T_3$  as estimated using model (1).<sup>22</sup>

DiD models are based on the common support assumption; that is, that the treatment and comparison groups are similar (Lechner 2011, Duncan 2013). We use propensity matching modeling to account for possible selection bias of baseline differences between those who become first-time homebuyers and those who remain renters. The propensity model predicts whether a household purchases a home (H), given individual, household and locational characteristics (X):

$$p(H) = f(X) \quad (3)$$

The models create kernel scores for each comparison case (Heckman, Ichimura and Todd 1997). These scores are based on the “distance” between all treatment and comparison cases (computationally, the difference in their respective propensity scores,  $p(H)$ ). Each comparison case is assigned a weight based on the weighted average of the propensity score differences, and the weighted samples, using the kernel scores, are then used to estimate the DiD model (1). As Heckman, Ichimura and Todd state, this two-step approach “mimics features of the conventional econometric approach to selection bias.”

Although propensity methods do not control for unobservables, a growing statistical literature demonstrates that including a rich set of covariates in the propensity model produces similar results to experiments (*e.g.*, Cook, Shadish and Wong 2008, Cook, Steiner and Pohl 2009, Steiner, Cook and Shadish 2011, Stuart 2010). To minimize the chance of bias from excluding potentially important covariates (Stuart 2010), the propensity model includes a broad array of controls (see Table A1).<sup>23</sup> Renters and new homeowners differ significantly from each other on multiple baseline characteristics before the match, but on none after matching, which increases confidence in the quality of the match.<sup>24</sup> The combination of the DiD and propensity weights addresses

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<sup>22</sup>The discussion of the DiD results,  $B_3$ , should not be confused with our subsequent discussion of the marginal differences for owners ( $Treatment_3 - Treatment_2$ ) and renters ( $Comparison_3 - Comparison_2$ ) separately.

<sup>23</sup>Unlike outcome models, the ratio of covariates to total cases in propensity models are not required to fall below a threshold (typically 10%). Because the purpose of the propensity model is to create balance between the treatment and control groups, concerns with model fit or multicollinearity do not exist. An “over-fitted” model would create less overlap between treatment and control cases, thereby reducing the likelihood of obtaining balance.

<sup>24</sup>Note that baseline characteristics are measured before a household becomes a homeowner, so these are features on which households differ, at  $p$  values of .10 or less, before becoming homeowners. See technical appendix for more details.

gaps left by either technique alone. DiD addresses time-invariant differences between those who become owners and those remaining renters and accounts for any common temporal trends in outcomes experienced by both groups; propensity weights address observable differences between these two groups at baseline.<sup>25</sup>

To examine whether the effect of first-time home buying on wealth accumulation differs across the wealth distribution, we estimate the DiD models using quantile regressions (Hao and Naiman 2007, Loving *et al.* 2012) using the 20th, 50th and 80th percentile cut points. In addition to being more robust to outliers than OLS, quantile regressions are semiparametric, making fewer assumptions about the error process.<sup>26</sup>

Although we considered estimating lag models,<sup>27</sup> such models are inappropriate if the treatment is correlated with net worth in the home purchase year, as is the case in this analysis. In particular, because we compare net wealth including home equity after a home has been purchased with net wealth two to ten years later, values at the time of purchase are, by definition, correlated with homeownership.

## Measures

### *Dependent Variables*

We examine two outcomes: net worth including equity in the primary residence, and net worth excluding equity in the primary residence. Net worth

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<sup>25</sup>Although this still leaves unobserved time-varying factors unaddressed, it is unlikely that such factors are completely unrelated to covariates included in the model. One potential confound of this sort is inheritance. However, only 4% of whites and less than 1% of blacks in these samples report any inheritance over the short-term, and these rates do not vary over the 2000s. Over the medium-term, roughly 10% of whites and 1–2% of blacks report inheritance.

<sup>26</sup>The alternative of computing the log of net worth for each household is less appealing because logs cannot be computed for zero or lower values, and each of the 12 analysis samples has at least 10% of cases with negative net wealth values (*i.e.*, households with more debts than assets). The options of discarding these cases or retaining them by assigning an arbitrary value could introduce bias.

<sup>27</sup>In a lag model, a later outcome is predicted by the outcome at an earlier point in time. Lag models have two advantages: they can control for time-varying factors; and the different assumptions between lag and DiD models can produce estimates that bracket the “true” causal effect (Guryan 2004, Angrist & Pischke 2009).

includes the sum of a wide array of assets minus debts.<sup>28</sup> All quantities are based on respondent self-reports.<sup>29</sup>

Home equity is the respondent's reported value of the home minus all mortgages or other home loans.<sup>30</sup> Thus, change in net worth including home equity between  $T_2$ , the year of the purchase, and  $T_n$ , the outcome year, is the difference between the respondent's report of value in  $T_2$  and  $T_n$ . Because both net worth measures are computed by subtracting debts (*e.g.*, credit card balances, student loans, medical or legal bills), either measure may be negative. For net worth excluding home equity, we difference between the baseline and outcome year. For net worth including home equity, we difference between the year of the purchase and the outcome year.

### *Independent Variables*<sup>31</sup>

As noted earlier, we specify the key policy variable as an interaction term, homeownership  $\times$  time, to distinguish the selection effects of the baseline characteristics of those who become homeowners from those of homeownership itself. Age is included because of its positive association with income and wealth (*e.g.*, Turner and Leua 2009, Loving *et al.* 2012). We specify both age and age-squared to capture linear and nonlinear life-cycle and cohort effects. Whether female head reflects the tendency for such households to have smaller net worth, and head's education taps the positive association of more years of education with income and wealth, and the relationship of educational attainment with race and with permanent income (*e.g.*, Boehm and Schlottmann 2008, Loving 2012 *et al.*).<sup>32</sup> We include three measures characterizing the composition and stability of the household because of their

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<sup>28</sup>For example, the value of businesses, stocks, and vehicles. See technical appendix for a full list of all assets and debts included in this calculation.

<sup>29</sup>Findings on the validity of self-reported wealth are mixed (Bound *et al.* 2001). However, aggregate estimates, which we rely on in the analysis, appear to be more accurate than itemized components of wealth (footnote 67). Further, Gittleman & Wolff (2004) highlight the low nonresponse rate to PSID wealth questions, which they characterize as "no small consideration given the reluctance of many families to divulge information on their net wealth."

<sup>30</sup>Reporting error arising from respondents self-reporting their home equity should be minimized because this report occurs within two years of purchase and because this was the respondents' first home purchase.

<sup>31</sup>Covariates in the propensity models predicting homeownership are listed in Appendix Table 1. As previously noted, they are wide-ranging in an effort to reduce omitted variable bias.

<sup>32</sup>Educational attainment may also tap the head's ability to decipher financial contracts and mortgage loan documents.

potential effects on wealth accumulation or decline: whether the head is married, whether the head is recently divorced, and whether there has been a recent change in the number of adults (*e.g.*, Gittleman and Wolff 2004, Di, Belsky and Liu 2007). Census region dummies allow us to control for geographic differences in access to capital and wealth accumulation (*e.g.*, Case and Marynchenko 2001, Loving *et al.* 2012).<sup>33</sup> Finally, in the models predicting net worth including home equity, we account for variation in house prices across housing markets by including the OFHEO (now FHFA) housing price index (*e.g.*, Herbert and Belsky 2006).<sup>34</sup> This is a weighted, repeat sales-index with the base period set at the first quarter of 1980. The sales are limited to single-family detached units financed by Fannie Mae and Freddie Mac.<sup>35</sup>

## Results

### *Sample Description*<sup>36</sup>

*Pre-Propensity Adjustment.* As shown in Table 1, the characteristics of the four samples (1999, 2001, 2003, 2005) are generally similar. For example, roughly one-third are black, mean age is 37, about 40% are female heads, and somewhat more than one third completed high school. The few statistically significant differences across the four samples are consistent with three possible explanations: the aging of renters who meet the sampling criteria (*e.g.*, age) because they remain in the sample over time; the more robust economic climate of 2005 (*e.g.*, self-employment); and the heated up housing market (*e.g.*, house price appreciation, mortgage rate decline).

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<sup>33</sup> Although past research strongly suggests that the effects of homeownership vary by income (*e.g.*, Green and White 1997, Galster *et al.* 2007), we do not include income in the outcome models for several reasons: income is included in the propensity model, income in one time period is highly correlated with income in a subsequent time period (and thus controlled for by the DiD model), and including income as an additional covariate in the outcome models produced similar results.

<sup>34</sup> FHFA (the Federal Housing Finance Agency) replaced OFHEO in 2008. To avoid confusion, we refer to OFHEO throughout the paper.

<sup>35</sup> We also control for metropolitan area rents using the U.S. Department of Housing and Urban Development's fair market rents (FMR) (U.S. Department of Housing and Urban Development 2007) and the Carrillo, Early and Olsen (CEO) quality-adjusted index of housing prices and rents combined (Carrillo, Early and Olsen 2012).

<sup>36</sup> The generalizability of the analysis samples is difficult to estimate because they are limited by age, race and income. Thus, by definition, blacks constitute a much larger share of these samples, mean age is younger than the population at large, and incomes reflect the bottom 80% of the income distribution. Using Taylor's estimates for selected attributes of first-time homebuyers from the national American Housing Surveys (AHS) in the odd years of the 2000 decade (Taylor 2013), the age of the household head in our sample is a few years younger (37 in our samples and 42 in the AHS) and household size is smaller (roughly 2.2 versus about 2.6, respectively).

**Table 1** ■ Characteristics of analysis samples.

	1999-01-03	2001-03-05	2003-05-07	2005-07-09
Total sample (unweighted)	870	869	986	1110
Outcomes				
Median wealth no equity, $T_1$	\$1,806	\$1,246	\$2,169	\$1,113
New homeowner, $T_1$ to $T_2$	12.9%	11.7%	14.1%	10.9%
Black	34.7%	32.6%	30.8%	32.3%
Age	36.1	36.6	37.4	37.7
Head female	45.2%	41.6%	39.3%	41.7%
Education < high school	24.9%	24.7%	21.3%	24.6%
Education = high school	34.7%	31.8%	35.3%	35.2%
Education = some college	20.7%	23.7%	25.5%	22.9%
Married	19.6%	19.8%	19.1%	18.6%
Head/spouse self-employed	3.2%	5.9%	6.0%	6.9%
Health rating (1 = excellent)	2.4	2.4	2.5	2.7
Any health limitation	17.3%	17.8%	18.5%	19.4%
# in household	2.2	2.2	2.1	2.1
# of children	0.8	0.8	0.7	0.7
Any recent births	6.8%	8.6%	7.1%	8.2%
Change in # of adults	17.5%	14.1%	14.9%	16.8%
Divorced/widowed	2.0%	4.3%	4.6%	5.3%
Change in hhld composition	14.6%	18.2%	17.1%	17.4%
Household income (SD)	\$32,065 (20033)	\$33,332 (20064)	\$30,367 (19131)	\$29,766 (20444)
Checking account	60.2%	63.5%	61.8%	57.4%



Table 1 ■ Continued.

	1999-01-03	2001-03-05	2003-05-07	2005-07-09
# of moves	3.7	0.9	1.0	1.1
Northeast	17.3%	19.5%	16.9%	17.1%
Midwest	27.7%	23.6%	28.8%	30.1%
West	37.6%	36.5%	35.8%	33.7%
FMR (SD)	\$588 (145)	\$657 (201)	\$705 (253)	\$737 (233)
Mortgage rate	7.14%	6.93%	5.69%	5.85%
CEO price index	97	1.03	1.05	1.12
OFHEO price index	131	148	169	201
Tract poverty rate	16.4%	16.9%	17.3%	18.5%
Metropolitan poverty rate	11.9%	12.0%	12.5%	13.1%

Notes: Weighted data, pre-propensity matching, 2009\$.

FMR = fair market rent index; CEO = Carrillo, Early and Olsen quality-adjusted index of prices and rents. The table displays characteristics for all observations in the first triplet of years. Most characteristics remain stable over the longer period of observation. See text for details.

For both races combined, 11–14% of renters at  $T_1$  became first-time homebuyers by  $T_2$ .<sup>37</sup> These fractions vary substantially by race, with rates for whites as much as two or three times those for blacks. Although the majority of low- and moderate-income first-time homebuyers in the 2000s remained homeowners over the decade, a sizable fraction of both whites and blacks returned to renting (not shown). Notably, for both groups, the return to renting was most likely to occur within the first two years of homeownership. But blacks were more likely to revert to renting than whites: roughly 30% compared with about 20%, respectively. Between 13–27% of new homeowners in the 2000s moved from their first owned home to a second owned home between  $T_2$  and  $T_3$ , with whites much more likely to make own-to-own moves in most years.<sup>38</sup>

As shown in Table 2, blacks and whites differ significantly on almost all characteristics, and the magnitudes of these differences persist over time. However, only a subset of these disparities are large and of substantive interest, and all suggest a more disadvantaged black sample. For example, twice as many blacks are female household heads compared with whites (roughly 60% and 30%, respectively), half as many are married (~12% vs. 23%, respectively), mean household income is 20% lower (~\$34,000 vs. \$26,000, respectively) and the census tract poverty rate is twice as high (~25% vs. 12%, respectively). Blacks are also more likely to live in metropolitan areas with somewhat lower house price appreciation as measured by the OFHEO housing price index.

First-time homebuyers and those who remain renters differ significantly on a range of socioeconomic and demographic characteristics including income, education, marital status, having a checking account, health and neighborhood poverty (not shown). Consistent with much of the literature on who becomes a homeowner, first-time homebuyers exhibit a more advantaged profile. Until the 2005 housing boom, these differences are driven largely by blacks, with few distinguishing characteristics among whites.<sup>39</sup> In 2005, however, the pattern reverses, with greater selection into first-time home buying among whites

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<sup>37</sup>The ranges reported in this section reflect differences across the decade.

<sup>38</sup>For example, between 2007 and 2009, more than one-third of white new owners moved to a second owned home compared with only about 6% of blacks.

<sup>39</sup>This pattern is the reverse of that reported in a recent PSID analysis, which found greater selection into homeownership among whites, not blacks (Holupka & Newman 2012). However, the earlier study analyzed a persistently low-income population becoming a homeowner during the 1986–2001 period. By contrast, the present analysis focuses on low- and middle-income first-time homebuyers during the 2000s.

**Table 2** ■ Comparison of blacks and whites, 1999–2001–2003.

	Whites	Blacks	<i>t</i>
Total sample (unweighted)	330	540	
Outcomes			
Median wealth no equity, 1999	\$3,056	\$664	2.28*
New homeowner, T <sub>1</sub> to T <sub>2</sub>	14.9%	9.2%	2.41*
Age	35.5	37.3	-2.91**
Head female	36.5%	62.1%	-7.46***
Head education = < HS	22.4%	29.5%	-2.31*
Head education = HS	31.2%	41.2%	-2.96**
Head education = some college	21.8%	18.4%	1.19
Married	23.4%	12.4%	3.97***
Head/spouse self-employed	4.3%	1.3%	2.38*
Head health rating (1 = excellent)	2.3	2.6	-3.40***
Any health limitation	18.4%	15.4%	1.11
# in household	2.0	2.6	-6.76***
# of children	0.6	1.2	-8.46***
Any recent births	5.1%	10.0%	-2.72**
Change in # adults	13.8%	24.4%	-3.95***
Divorced/widowed	1.8%	2.3%	-0.57
Change household composition	11.6%	20.2%	-3.47***
Household income (SD)	\$34,820 (18357)	\$26,885 (21972)	5.66***
Checking account	71.7%	38.6%	10.04***
# of moves	3.7	3.8	-1.26
Northeast	17.6%	16.8%	0.33
Midwest	28.7%	25.9%	0.87
South	31.4%	49.3%	-5.29***
FMR (SD)	\$576 (140)	\$610 (152)	-3.23***
Mortgage rate	7.12%	7.16%	-2.66**
CEO price index	0.98	0.97	1.12
OFHEO price index	133	129	3.08**
Tract poverty rate	12.3%	24.0%	-13.89***
Metropolitan poverty rate	11.6%	12.5%	-4.91***
Total sample (unweighted)	342	527	
Outcomes			
Median wealth no equity, 2001	\$1,869	\$249	1.26
New homeowner, T <sub>1</sub> to T <sub>2</sub>	14.4%	5.9%	3.93***
Age	36.2	37.2	-1.48
Head female	31.8%	62.0%	-9.16***
Head education = < HS	21.9%	30.6%	-2.90**
Head education = HS	28.8%	38.0%	-2.86**
Head education = some college	24.4%	22.3%	0.72
Married	24.4%	10.1%	5.36***
Head/spouse self-employed	7.5%	2.8%	2.95**
Head health rating (1 = excellent)	2.3	2.5	-3.24***
Any health limitation	20.0%	13.0%	2.85**
# in household	2.0	2.5	-5.19***
# of children	0.6	1.1	-7.04***

Table 2 ■ Continued.

	Whites	Blacks	<i>t</i>
Any recent births	9.5%	6.7%	1.45
Change in # adults	11.7%	18.9%	-2.93**
Divorced/widowed	4.2%	4.4%	-10
Change household composition	16.9%	21.0%	-1.52
Household income (SD)	\$35,459 (19820)	\$28,924 (19889)	4.74***
Have checking account	75.6%	38.6%	11.75***
# of moves	1.0	0.9	1.75
Northeast	20.2%	18.1%	74
Midwest	23.2%	24.3%	-36
South	31.6%	46.8%	-4.57***
FMR (SD)	\$640 (200)	\$693 (198)	-3.86***
Mortgage rate	6.93%	6.93%	09
CEO price index	1.03	1.03	41
OFHEO price index	149	144	4.30***
Tract poverty rate	12.5%	25.9%	-18.28***
Metropolitan poverty rate	11.9%	12.4%	-2.77**
Total Sample (unweighted)	393	593	
Outcomes			
Median wealth no equity, 2003	\$2,531	\$1,175	1.28
New homeowner, T <sub>1</sub> to T <sub>2</sub>	17.1%	7.3%	4.47***
Age	36.8	38.5	-2.61**
Head female	30.2%	60.0%	-9.71***
Head education = < HS	16.6%	31.6%	-5.59***
Head education = HS	34.0%	38.1%	-1.32
Head education = some college	26.1%	24.3%	0.65
Married	22.9%	10.3%	5.13***
Head/spouse self-employed	6.6%	4.8%	1.19
Head health rating (1 = excellent)	2.4	2.6	-3.56***
Any health limitation	19.4%	16.4%	1.16
# in household	1.9	2.5	-7.05***
# of children	.5	1.1	-8.51***
Any recent births	5.5%	10.5%	-2.88**
Change in # adults	12.4%	20.5%	-3.43***
Divorced/widowed	4.6%	4.7%	-0.08
Change household composition	13.9%	24.2%	-4.16***
Household income (SD)	\$32,597 (18758)	\$25,353 (19047)	5.90***
Have checking account	69.4%	44.6%	8.03***
# of moves	1.1	1.0	1.60
Northeast	16.7%	17.4%	-31
Midwest	29.7%	26.8%	0.97
South	30.0%	48.7%	-6.05***
FMR	\$696	\$725	-1.75
Mortgage Rate	5.68%	5.69%	-1.06
CEO price index	1.058	1.048	2.58*
OFHEO price index	171	164	6.64***
Tract poverty rate	13.4%	26.0%	-17.96***
Metropolitan poverty rate	12.4%	12.7%	-1.83

Table 2 ■ Continued.

	Whites	Blacks	<i>t</i>
Total Sample (unweighted)	444	666	
Outcomes			
Median wealth no equity, 2005	\$1,586	\$453	0.52
New homeowner, T <sub>1</sub> to T <sub>2</sub>	11.5%	6.6%	2.70**
Age	37.2	38.9	-2.84**
Head female	33.1%	57.5%	-8.29***
Head education = < HS	24.1%	27.9%	-1.45
Head education = HS	32.6%	39.1%	-2.20*
Head education = some college	22.2%	25.1%	-1.13
Married	23.2%	10.2%	5.61***
Head/spouse self-employed	7.0%	6.6%	0.25
Head health rating (1 = excellent)	2.6	2.8	-2.49*
Any health limitation	21.3%	16.6%	1.94
# in household	2.1	2.3	-2.28*
# of children	0.6	0.9	-3.96***
Any recent births	7.9%	9.2%	-74
Change in # adults	16.2%	23.8%	-3.18***
Divorced/widowed	7.0%	6.5%	.30
Change household composition	15.7%	24.8%	-3.79***
Household income (SD)	\$32,203 (20270)	\$25,919 (20288)	5.02***
Have checking account	68.2%	35.0%	11.48***
# of moves	1.1	1.5	-93
Northeast	18.8%	14.7%	1.78
Midwest	29.4%	28.6%	.29
South	26.9%	47.9%	-7.34***
FMR	\$737	\$746	-62
Mortgage Rate	5.84%	5.88%	-5.61***
CEO price index	1.128	1.113	3.88***
OFHEO price index	206	193	6.72***
Tract poverty rate	15.0%	25.8%	-15.29***
Metropolitan poverty rate	13.1%	13.3%	-98

Notes: Weighted data, pre-propensity matching.

2009\$.

FMR = fair market rent index; CEO = Carrillo, Early and Olsen quality-adjusted index of prices and rents.

\*\*\* $p < 0.001$ , \*\* $p < 0.01$ , \* $p < 0.05$ .

than blacks.<sup>40</sup> Between 1999 and 2005, for example, the fraction of white female heads who became owners declined by about half (35% in 1999; 16% in 2005), self-employment increased from 1% to 6%, and income declined by about 10%. These compositional changes between 2005 and earlier years in

<sup>40</sup>This conclusion is based on t-tests of differences in the demographic attributes of first-time homebuyers compared with renters within each race.

the decade are consistent with the increasing relaxation of underwriting standards during the housing boom. This interpretation is further supported by a comparison of the characteristics of white and black first-time homebuyers in each of the four samples (not shown). The number of statistically significant and substantively important differences is far greater in 1999, 2001 and 2003 compared with 2005.

*Post-Propensity Adjustment.* As alluded to earlier in our discussion of the propensity technique, propensity modeling eliminates the effects of selection on observables. As a result, the separate analysis samples of whites and blacks reveal no differences in baseline characteristics between owners and renters.

Tables 3 and 4 show the propensity-adjusted median changes in the two net worth dependent variables for new homebuyers versus renters within, and across, the four time periods. These are descriptive results for owners and renters after adjusting for selection but prior to the multivariate analysis. As such, the tables elucidate the two key components of the DiD multivariate models: change in net worth over the 2000 decade for first-time homeowners (the treatment group), and change in net worth for renters (the comparison group).

In the first panel (A) of Table 3, which displays the total net worth for both racial groups combined, recent first-time home buying is associated with an increase in total net worth of about \$5,200 during the boom from 2003 to 2005, compared with those continuing to rent, who experienced less than half that increase at \$2,135. In the subsequent period, between 2005 and 2007, the housing market began to weaken and net worth for new homebuyers leveled off (from \$35,695 to \$35,123) and increased by 37% for renters. Unsurprisingly, in the 2007–2009 recessionary period, new homebuyers suffered a decline in net worth of roughly \$12,300 (more than one-third), while renters lost about 3% (only \$75).

The second and third panels, (B) and (C), present results separately for blacks and whites. Although both white and black new homebuyers suffered losses in the Great Recession, white first-time homebuyers experienced a sizable increase in net worth between 2003 and 2005, while black first-time homebuyers experienced a modest loss (+\$1,390 and -\$1,400, respectively). By contrast, the pattern for black and white renters was similar, with both experiencing small increases (\$1,990 and \$2,411, respectively). More dramatic is the comparison between white and black new buyers during the 2005 to 2007 period. Whites enjoyed a short-term \$24,000 gain in net worth compared with

**Table 3** ■ Propensity-adjusted median net wealth with equity (2009\$).

	1999	2001	2003	2005	2007	2009	2011
<b>A. All</b>							
Renter	\$3,870	\$2,662	\$5,616	\$7,142	\$8,240	\$5,000	\$7,410
Owner	\$7,485	\$33,880	\$17,550	\$20,900	\$21,012	\$22,100	\$12,825
Renter		\$2,541	\$2,925	\$5,060	\$7,725	\$5,300	\$5,700
Owner		\$3,025	\$23,400	\$28,600	\$32,445	\$27,500	\$25,175
Renter			\$2,983	\$3,014	\$4,120	\$3,500	\$3,800
Owner			\$3,803	\$35,695	\$35,123	\$23,000	\$19,000
Renter				\$2,750	\$2,575	\$2,500	\$2,874
Owner				\$3,300	\$32,754	\$20,500	\$10,165
<b>B. Whites</b>							
Renter	\$6,450	\$4,420	\$7,020	\$9,900	\$12,360	\$7,000	\$8,550
Owner	\$7,485	\$36,361	\$17,550	\$19,647	\$18,707	\$20,500	\$11,970
Renter		\$627	\$1,989	\$4,400	\$3,605	\$11,000	\$3,515
Owner		\$2,541	\$21,587	\$35,063	\$41,561	\$33,500	\$29,165
Renter			\$4,329	\$3,300	\$4,429	\$3,400	\$5,713
Owner			\$4,680	\$33,000	\$56,650	\$37,150	\$24,510
Renter				\$3,300	\$4,120	\$5,000	\$7,410
Owner				\$550	\$25,750	\$18,000	\$9,975
<b>C. Blacks</b>							
Renter	\$3,547	\$2,541	\$3,510	\$4,730	\$4,120	\$2,000	\$2,850
Owner	\$6,192	\$22,385	\$17,550	\$27,170	\$22,660	\$25,550	\$20,625
Renter		\$3,872	\$3,510	\$5,500	\$7,219	\$3,000	\$3,183
Owner		\$3,479	\$23,400	\$22,064	\$28,428	\$16,276	\$7,600
Renter			\$2,340	\$2,200	\$3,090	\$2,000	\$2,850
Owner			\$2,340	\$44,000	\$27,089	\$11,350	\$19,000
Renter				\$2,530	\$2,369	\$700	\$3,325
Owner				\$4,400	\$42,230	\$22,250	\$10,165

Note: See Table A1 for an illustrative propensity model.

a \$16,911 loss among blacks. Again, black and white renters enjoyed small increases of about \$1,000.<sup>41</sup>

As shown in Table 4, for the 2005–2007 period, the short-term patterns for net worth excluding home equity for whites, blacks, and both groups combined are more comparable, with an increase in non-equity net worth between 2005 and 2007 for both blacks and whites. Thus, the decrease in total net

<sup>41</sup>The only time period in which new white homebuyers experienced a larger decline in net worth than blacks is between 2001 and 2003 (-\$18,800 versus -\$4,800, respectively). Both groups have comparable net worth in 2003 of \$17,550. The much larger decline for whites occurs because their 2001 net worth was nearly \$14,000 larger than that of black new buyers.

**Table 4** ■ Propensity-adjusted median net wealth without equity (2009\$).

	1999	2001	2003	2005	2007	2009	2011
<b>A. All</b>							
Renter	\$3,870	\$2,662	\$3,510	\$3,630	\$3,914	\$5,000	\$3,420
Owner	\$6,773	\$5,445	\$4,095	\$4,503	\$3,863	\$5,000	\$3,420
Renter		\$2,541	\$2,925	\$4,400	\$4,120	\$2,110	\$3,040
Owner		\$3,025	\$4,680	\$4,620	\$2,060	\$5,025	\$7,600
Renter			\$2,983	\$3,014	\$3,090	\$2,000	\$2,850
Owner			\$3,803	\$5,500	\$9,270	\$5,000	\$5,605
Renter				\$2,750	\$2,575	\$2,000	\$2,451
Owner				\$3,300	\$6,180	\$2,000	\$3,800
<b>B. Whites</b>							
Renter	\$5,450	\$4,420	\$5,546	\$4,035	\$5,768	\$5,000	\$5,035
Owner	\$7,485	\$8,530	\$2,515	\$6,050	\$3,090	\$9,000	\$5,420
Renter		\$627	\$1,989	\$3,520	\$1,545	\$5,000	\$1,900
Owner		\$2,541	\$4,505	\$4,345	\$1,957	\$7,500	\$10,687
Renter			\$4,329	\$3,300	\$3,090	\$2,000	\$3,325
Owner			\$4,680	\$7,700	\$12,360	\$6,500	\$8,550
Renter				\$3,300	\$4,120	\$3,500	\$3,800
Owner				\$550	\$2,266	\$2,530	\$2,850
<b>C. Blacks</b>							
Renter	\$3,547	\$2,541	\$2,340	\$2,640	\$2,678	\$1,200	\$1,710
Owner	\$5,676	\$1,815	\$4,680	\$220	\$4,120	\$4,650	\$2,945
Renter		\$3,872	\$3,510	\$5,500	\$6,180	\$801	\$1,900
Owner		\$3,479	\$5,148	\$5,060	\$2,678	\$2,400	\$475
Renter			\$2,340	\$2,200	\$2,266	\$1,034	\$2,850
Owner			\$2,340	\$3,190	\$5,356	\$1,500	\$2,859
Renter				\$2,530	\$2,369	\$700	\$2,850
Owner				\$4,400	\$8,601	\$2,000	\$3,800

*Note:*

See Table A1 for an illustrative propensity model.

worth including equity for blacks between 2005 and 2007 discussed above (Table 3) is entirely attributable to equity loss. These results for net worth excluding equity are similar to those from the SCF noted earlier. Over the longer-term, however, white owners' net wealth excluding equity remained stable while black owners lost. The main message of the net wealth without equity figures is that non-housing wealth is modest while home equity is the predominant asset for low- and moderate-income households. The amount of net wealth without equity generally falls between \$2,000 and \$4,000, with no discernible trend over the decade.<sup>42</sup>

<sup>42</sup>A comparison of Tables 3 and 4 reveals no evidence of a decrease in wealth with equity being counterbalanced by an increase in wealth without equity. Further, there



*Difference-in-Difference Propensity-Adjusted Models.* Table A2 displays the full regression results for one of the analysis samples (2001–2003–2005) with outcomes at  $T_3$  (all years shown in technical appendix). We examine the DiD results from two perspectives: effect size differences across percentiles; and change in net worth relative to year of purchase. These are derived from quantile regressions on net wealth with, and without, equity at the 20th, 50th and 80th percentiles.<sup>43</sup>

*Effect Sizes.* Table 5 presents results for the shortest-term outcomes (two years post purchase) and the longest-term outcomes (10 years post purchase for the earliest purchasers) included in this analysis (all years shown in technical appendix). The results are expressed as both parameter estimates and in standard deviation terms to provide a sense of effect sizes, and represent the difference between owners and renters (*i.e.*, owner net worth minus renter net worth).<sup>44</sup> The dominant pattern is larger effect sizes at the 80th percentile of the change in net wealth between the year of purchase and the outcome year. The 80th percentile group includes predominantly middle-class families. Effect sizes at the 50th and 20th percentiles are typically much smaller and, in some cases, not statistically significant. Although this pattern of effect sizes applies to both whites and blacks, the pattern of gains and losses diverges dramatically between races.

Looking at the first set of columns in Table 5 displaying the changes in net worth including equity among whites, the results show that the relationship of first-time home buying to net worth varies with macroeconomic conditions. Regardless of net worth shortly after the purchase, entering homeownership in 2001 or 2007 in the midst of economic downturns was associated with a reduction in net wealth, while it was associated with increasing wealth for purchasers in the more robust years of 2003 and 2005. These patterns are consistent with the importance of timing in purchasing a home. Further, short-term decreases in net wealth associated with first-time home buying generally intensify over time; short-term increases are ephemeral, transforming into

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is no evidence that second mortgages for home improvement are driving up net worth without equity (the relationship between obtaining a second mortgage and spending more than \$10,000 on home improvements is not statistically significant).

<sup>43</sup>We also estimated the DiD models using OLS, which largely yielded results with similar signs and statistical significance as the median quantile regressions although point estimates differ.

<sup>44</sup>Specifically, the parameter estimate of the DiD interaction (time x homeownership) divided by the standard deviation. For example, for white first-time homebuyers in 2001 measured at the median, first-time home buying is associated with a decline of somewhat more than half a standard deviation in net wealth including equity (−54.1%) in 2003.

**Table 5** ■ Difference-in-difference estimates and effect sizes: net wealth with equity by race and wealth percentiles.

	Whites			Blacks			Whites and Blacks		
	20th	50th	80th	20th	50th	80th	20th	50th	80th
Two-year outcome for purchase year									
2001	<b>-12,836</b>	<b>-15,881</b>	<b>-22,562</b>	<b>4,239</b>	<b>-8,529</b>	<b>-35,202</b>	<b>-2,314</b>	<b>-12,544</b>	<b>-19,427</b>
	<b>-43.7</b>	<b>-54.1</b>	<b>76.8</b>	<b>17.6</b>	<b>-35.4</b>	<b>-146.2</b>	<b>-8.3</b>	<b>-44.8</b>	<b>-69.3</b>
2003	405	<b>12,153</b>	<b>5,686</b>	<b>-4,689</b>	<b>-6,805</b>	<b>20,358</b>	<b>-6,261</b>	<b>1,687</b>	<b>19,411</b>
	0.8	<b>24.0</b>	<b>11.2</b>	<b>-10.6</b>	<b>-15.4</b>	<b>46.0</b>	<b>-12.4</b>	<b>3.3</b>	<b>38.5</b>
2005	<b>-1,528</b>	<b>17,855</b>	<b>46,504</b>	<b>-11,933</b>	<b>-21,077</b>	<b>-39,924</b>	<b>-6,811</b>	<b>-772</b>	<b>13,482</b>
	<b>-2.3</b>	<b>27.1</b>	<b>70.7</b>	<b>-22.1</b>	<b>-39.0</b>	<b>-73.9</b>	<b>-10.5</b>	<b>-1.2</b>	<b>20.9</b>
2007	<b>-6,768</b>	<b>-8,307</b>	<b>-22,701</b>	<b>-15,733</b>	<b>-18,128</b>	<b>-40,519</b>	<b>-11,960</b>	<b>-14,797</b>	<b>-28,284</b>
	<b>-13.0</b>	<b>-16.0</b>	<b>-43.7</b>	<b>-34.2</b>	<b>-39.4</b>	<b>-88.0</b>	<b>38.9</b>	<b>-29.4</b>	<b>-56.2</b>
2011 outcome for purchase year									
2001	<b>-12,777</b>	<b>-26,658</b>	<b>-32,352</b>	<b>-6,793</b>	<b>-21,662</b>	<b>-37,449</b>	<b>-11,573</b>	<b>-22,008</b>	<b>-40,639</b>
	<b>-43.5</b>	<b>-90.8</b>	<b>-110.2</b>	<b>-28.2</b>	<b>-90.0</b>	<b>-155.6</b>	<b>-41.3</b>	<b>-78.5</b>	<b>-145.0</b>
2003	855	6,910	<b>-20,213</b>	<b>-13,854</b>	<b>-21,808</b>	4,994	<b>-13,295</b>	<b>-1,172</b>	<b>-12,241</b>
	1.7	13.6	<b>-39.9</b>	<b>-31.3</b>	<b>-49.3</b>	11.3	<b>-26.3</b>	<b>-2.3</b>	<b>-24.3</b>
2005	<b>-13,296</b>	<b>-19,939</b>	<b>-30,179</b>	<b>-15,315</b>	<b>-32,294</b>	<b>-60,065</b>	<b>-12,187</b>	<b>-23,841</b>	<b>-23,151</b>
	<b>-20.2</b>	<b>-30.3</b>	<b>-45.9</b>	<b>-28.3</b>	<b>-59.8</b>	<b>-111.2</b>	<b>-18.9</b>	<b>-36.9</b>	<b>-35.8</b>
2007	<b>-7,782</b>	<b>-14,531</b>	<b>-45,586</b>	<b>-25,180</b>	<b>-34,296</b>	<b>-55,740</b>	<b>-13,986</b>	<b>-20,788</b>	<b>-40,643</b>
	<b>-15.0</b>	<b>-27.8</b>	<b>-87.8</b>	<b>-56.1</b>	<b>-74.5</b>	<b>-121.1</b>	<b>-27.8</b>	<b>-41.3</b>	<b>-80.7</b>

Notes: Difference relative to net worth in year of purchase (2009\$).

Upper value = difference-in-difference parameter estimate, lower value = effect estimate as % of outcome SD.

Bold = statistically significant at  $p < 0.10$ .

decreases as a consequence of the Great Recession and subsequent sluggish recovery.

Purchasing a first home in the recessionary 2001 period, for example, was associated with the loss of roughly \$16,000 more for owners than renters after two years for those at the 50th percentile of wealth. This is more than half a standard deviation decline in the total net worth of these households, which is a moderate effect. After 10 years, the loss increases to nearly \$27,000 more than renters, which is nearly a one standard deviation decrease, a large effect. Those at the 80th percentile of net worth lost nearly \$23,000 more than renters after two years, which exceeds three-fourths of a standard deviation decrease (a large effect). After 10 years, this loss increases to nearly \$33,000 more than renters, which exceeds one standard deviation and is a very large effect.

By dramatic contrast, in 2005 during the period of the housing boom, the pattern reverses in the short-run, with increases in net wealth that reach more than \$46,000 for owners relative to renters for those at the 80th percentile of the wealth distribution (an increase of nearly three-fourths of a standard deviation, a large effect). Those at the 50th percentile also gained, though only about 30% as much (~\$18,000 more than renters), with less than 30% of a standard deviation, a relatively small effect. By 2011, these gains converted into losses. At the 80th percentile, homebuyers lost about 35% of their initial gains (a moderate effect at nearly half a standard deviation). For the median white first-time homebuyer, the loss exceeded the initial gain by roughly \$2,000 (a small effect at 30% of a standard deviation). Although short-run effects on net wealth were statistically insignificant for 20th percentile purchasers, owners' loss of roughly \$14,000 more than renters after six years is statistically significant (albeit a small effect at one-fifth of a standard deviation).

The pattern of gains and losses in net worth is substantially different for blacks, shown in the middle columns of the table. During the 2000 decade, black first-time homebuyers lost wealth virtually regardless of the timing of their home purchase or whether we look at short- versus long-term effects on net worth. The comparisons with whites are stark. For example, in the 2005 boom year, the 80th percentile white purchaser enjoyed a nearly \$47,000 increase in net wealth relative to renters within two years, whereas the comparable black purchaser suffered a roughly \$40,000 loss relative to what would have occurred if they had remained renters ( $-.74$  standard deviation, a large effect). After six years, the loss increased to \$60,000 more than for renters, a very large effect at more than one standard deviation. In 2007 at the start of the Great Recession, the median white purchaser lost about

\$8,000 more than comparable renters; the median black purchaser lost more than twice that amount, roughly \$19,000 more than comparable renters (.39 of a standard deviation, a moderate effect). Over the subsequent years, losses for both blacks and whites increased substantially, but more so for blacks (whites' losses increased by 75%, blacks' losses increased by 89%).

The third set of columns in Table 5 shows the results for whites and blacks combined. Despite the strong Chow test results indicating that whites and blacks should not be combined in this analysis, we provide the combined results so they can be compared with reports in the popular media and technical reports, which rarely present data separately by race. These combined estimates generally show short-run gains in net worth associated with first-time home buying in stronger economic times and losses in recessionary times. But this is essentially the story for whites, not for blacks.

Tables A3 and A4 report the results for net wealth excluding equity in the primary residence. Although, again, effect sizes are typically largest for the 80th percentile net worth group, far fewer estimates are statistically significant and the pattern over time is erratic. The results also do not follow a consistent pattern by race. The one possible exception is white first-time homebuyers in the 2005 housing boom period who experienced statistically significant and generally substantively meaningful increases in non-equity wealth across the wealth distribution. This ranges from a roughly \$6,000 increase among the 20th percentile group (15% of a standard deviation, a small effect) to approximately \$29,000 at the 80th percentile (.72 of a standard deviation, a large effect).

*Net Worth Relative to Year of Purchase.* Another way to examine changes in net worth associated with becoming a first-time homebuyer is to estimate gains or losses relative to the family's net worth position after purchasing the home. Net worth after purchase is measured by the predicted net worth in the year the home was purchased estimated by the DiD regressions. This differs from the effect size calculation, which is based on the change in net worth divided by the standard deviation in net worth. The effect size, therefore, will vary depending on the variance around net worth, with large standard errors shrinking the effect size. By contrast, the ratio of change in net worth between  $T_2$  and  $T_{3, \dots, n}$  is not affected by the variance.

As shown in Table 6, this analysis reveals that, two years post-purchase, gains are lower and losses are higher for the 20th percentile group, while these short-term gains are higher and losses are lower for the 80th percentile group. For example, relative to renters, among whites who purchased their

**Table 6** ■ Difference-in-difference estimates: net wealth with equity by race and wealth percentiles.

	Whites			Blacks			Whites and Blacks		
	20th	50th	80th	20th	50th	80th	20th	50th	80th
	Two-year outcome for purchase year								
2001	<b>-12,836</b>	<b>-15,881</b>	<b>-22,562</b>	<b>4,239</b>	<b>-8,529</b>	<b>-35,202</b>	<b>-2,314</b>	<b>-12,544</b>	<b>-19,427</b>
	<b>-90.5%</b>	<b>-39.8%</b>	<b>-28.6%</b>	<b>181.1%</b>	<b>-34.4%</b>	<b>-42.3%</b>	<b>-39.4%</b>	<b>-39.8%</b>	<b>-27.9%</b>
2003	405	12,153	5,686	4,689	6,805	20,358	6,261	1,687	19,411
	5.5%	50.7%	12.4%	56.3%	23.3%	41.9%	70.2%	6.3%	38.2%
2005	-1,528	17,855	46,504	-11,933	-21,077	-39,924	-6,811	-772	13,482
	-15.8%	49.6%	65.0%	-82.9%	-47.0%	-40.0%	-58.9%	-2.0%	16.5%
2007	<b>-6,768</b>	<b>-8,307</b>	<b>-22,701</b>	<b>-15,733</b>	<b>-18,128</b>	<b>-40,519</b>	<b>-19,601</b>	<b>-14,797</b>	<b>-28,284</b>
	<b>-40.7%</b>	<b>-33.0%</b>	<b>-27.6%</b>	<b>-104.3%</b>	<b>-42.5%</b>	<b>-36.3%</b>	<b>-186.8%</b>	<b>-43.6%</b>	<b>-29.6%</b>
2011 outcome for purchase year									
2001	<b>-12,777</b>	<b>-26,658</b>	<b>-32,352</b>	<b>-6,793</b>	<b>-21,662</b>	<b>-37,449</b>	<b>-11,573</b>	<b>-22,008</b>	<b>-40,639</b>
	<b>-90.1</b>	<b>-66.8</b>	<b>-41.0</b>	<b>-290.2</b>	<b>-87.5</b>	<b>-44.8</b>	<b>-197.2</b>	<b>-69.9</b>	<b>-58.3</b>
2003	855	6,910	20,213	13,854	21,808	4,994	13,295	1,172	12,241
	11.5	28.8	44.0	166.6	74.8	10.3	149.1	4.4	24.1
2005	<b>-13,296</b>	<b>-19,939</b>	<b>-30,179</b>	<b>-15,315</b>	<b>-32,294</b>	<b>-60,065</b>	<b>-12,187</b>	<b>-23,841</b>	<b>-23,151</b>
	<b>-36.9</b>	<b>-55.4</b>	<b>-83.8</b>	<b>-34.1</b>	<b>-72.0</b>	<b>-133.8</b>	<b>-31.8</b>	<b>-62.1</b>	<b>-60.3</b>
2007	<b>-7,782</b>	<b>-14,531</b>	<b>-45,586</b>	<b>-25,180</b>	<b>-34,296</b>	<b>-55,740</b>	<b>-13,986</b>	<b>-20,788</b>	<b>-40,643</b>
	<b>-46.8</b>	<b>-57.4</b>	<b>-181.3</b>	<b>-171.1</b>	<b>-80.3</b>	<b>-130.6</b>	<b>-133.3</b>	<b>-61.2</b>	<b>-119.7</b>

Notes: Difference relative to net worth in year of purchase (2009\$).

Upper value = difference-in-difference parameter estimate, lower value = parameter estimate as percent of purchase year.

Bold = statistically significant at  $p < 0.10$ .

first home in the housing boom of 2005, the 20th percentile group lost 16% of their net worth in the two years after they purchased the home, while the 80th percentile group gained 65% additional net worth. The initial loss in net wealth by the 20th percentile group persists and intensifies over the subsequent four years, more than doubling to 37% of net worth. For the 80th percentile net worth group, relative to renters, the short-run 65% increase in net worth they enjoyed in the first two years after purchasing their house transformed into an 84% loss. During the Great Recession, 20th percentile purchasers in 2007 lost 41% of their net worth by 2009, while the 80th percentile group lost 28%. Over the next two years, the loss in wealth for the lowest wealth group, relative to renters, increased modestly to 47%, but grew nearly sevenfold for the highest wealth group to 181%.

As noted, blacks lost net worth across nearly the entire decade and nearly the full wealth distribution.<sup>45</sup> Over the short-run, blacks do not generally follow the same pattern of gains or losses relative to the purchase year net worth as whites. By contrast with whites, there is little difference between the 50th and 80th percentiles of purchase year net worth, with losses for both groups in the range of 40%. However, as is the case with whites, losses are substantially greater among the lowest income group. Over the longer-run, both races suffered the effects of the Great Recession, but in virtually all cases, blacks lost more both in absolute dollar terms and as a greater share of their purchase year net worth compared with whites. Other covariates in the models reveal additional differences between white and black first-time homebuyers over the decade. In general, the timing of the house purchase is the strongest predictor of total net worth for whites, with demographic attributes playing little or no role. By contrast, for blacks, both education and marital status are consistently and significantly associated with total net worth. Having less than a college degree is strongly associated with loss in net worth, while being married is associated with gain in net worth. Greater education presumably is helpful in understanding contractual and financial matters. However, even college educated blacks who became first-time homebuyers in 2003 and 2005 did not experience the short-term gains in total net worth that were enjoyed by whites. Because blacks' marital status is also a strong and significant predictor of wealth net of equity, it suggests the better financial circumstances of married couples. Additional analysis reveals that the association between first-time home buying and total net worth varies by income, with poorer new homeowners doing worse than those with higher incomes. This income variation does not apply to net worth excluding equity, suggesting that the

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<sup>45</sup>The sole exception is blacks at the 80th percentile who purchased their home in 2003. This subgroup reported a 42% gain in total net worth in 2005. Six years later, the change in net worth was 10% but no longer statistically significant.

relationship is linked to the change in home equity and not the ability to acquire other assets.

Beyond demographics, house appreciation is a strong, positive, and significant predictor of net worth for whites who purchased their first home in 2001 and 2007, both recessionary years. Thus, whites who were living in markets that were not badly affected by these economic downturns reaped the benefits of their locations. House price appreciation was not a significant predictor for whites during the robust economic period of 2003 and 2005, perhaps because there was less dramatic differentiation in appreciation in home values across markets. House price appreciation in the metropolitan area does not significantly predict net worth for blacks.

*Simulations.* In addition to modeling net worth effects of first-time home buying by race over the 2000 decade, we also run simulations. The objective is to roughly estimate, over the longer run, how long it will take black and white families to return to their levels of total net worth including home equity at year of purchase. These simulations use predicted total net worth (including home equity) from the median quantile regressions in the year of the home purchase and two to ten years later, depending on the analysis sample. We focus on analysis samples in which the median first-time homebuyers reported losses in total net wealth in the first two years after they bought their home, and run two simulations using different assumptions about house price appreciation. The optimistic scenario assumes household net worth increases 1.105% per year, which is the largest annual increase reported for the OFHEO index since 2001.<sup>46</sup> The pessimistic scenario assumes a 0.8% increase in net wealth per year, based on an analysis of OFHEO's national price index from 1975 to 2012 (Herbert, McCue and Sanchez-Moyano 2013).<sup>47</sup> Within each scenario, the high and low values of the 95% confidence interval around the predicted differences for each outcome year are virtually identical.<sup>48</sup> There-

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<sup>46</sup>This is based on our analysis of national OFHEO statistics from the past decade, and pertains to the change between 2004 and 2005.

<sup>47</sup>Another option is Shiller's nominal real home price index since 1890, which yields an estimate of 1.1% (see Figure 2.1 in his book *Irrational Exuberance* at [www.irrationalexuberance.com](http://www.irrationalexuberance.com)). His data show a nominal home price value of 136.7 for the first quarter of 2013, which yields an annual rate of 1.1% since the base year of 1890.

<sup>48</sup>The 95% confidence interval uses the marginal predictions and their standard errors. For example, for blacks in the 2007 and 2009 comparison, predicted total net worth in 2007 is \$42,687 and \$22,934 in 2009. The calculations use the difference in means formula:  $M_2 - M_1 \pm (t_{cl})(s_{m1-m2})$ , where  $M_1$  is the predicted marginal value in the year of home purchase,  $M_2$  the predicted marginal value in the outcome year,  $t_{cl}$  is the t-value for the 5% confidence level and  $S_{m1}$  and  $S_{m2}$  are the standard errors of the predicted marginal value.

**Table 7** ■ Simulated number of years to recoup housing investment.

Sample and purchase year	Years till follow-up	# years to recoup investment at annual appreciation of	
		10.5%	0.8%
Whites, 2001	2	9	>40
	4	NS	NS
	6	9	>40
	8	7	>40
	10	13	>40
Whites, 2007	2	3	32
	4	9	>40
Blacks, 2001	2	3	36
	4	NA	NA
	6	2	23
	8	4	>40
	10	8	>40
Blacks, 2003	2	5	>40
	4	5	>40
	6	8	>40
	8	>18	>40
Blacks, 2005	2	6	>40
	4	12	>40
	6	10	>40
Blacks, 2007	2	7	>40
	4	14	>40

*Notes:* NS = Difference between purchase and outcome year is not statistically significant.

NA = Net worth in outcome year is higher than in purchase year.

Estimates based on first-time homebuyers at 50th percentile of net worth (2009\$).

All estimates statistically significant at  $p < 0.10$  or better.

fore, we provide only a single simulation estimate for each outcome year for each of the two scenarios.

Table 7 summarizes the results at the 50th percentile of net worth including equity. Because black first-time homebuyers lost net worth two years after the purchase in all four time periods while white first-time buyers experienced losses in only two, the table includes four rows of estimates for blacks and two rows for whites. Although we expect disparities between the projected number of years to recoup net worth under the optimistic versus pessimistic simulations, the magnitude of these differences is dramatic. Under the most optimistic scenario, whites who purchased homes right before the Great Recession would need three years to return to their net worth soon after they



purchased their first home, but 32 years under the pessimistic scenario. Those who purchased in the midst of the 2001 recession would need nine years to recoup their financial position in the purchase year but more than 40 years under the pessimistic scenario. Although first-time homebuyers who are black lost net worth in all years, the estimated time for them to recoup their financial position in the short run under the optimistic scenario is actually six years shorter than for whites for 2001 first-time buyers (three years versus nine years for blacks versus whites, respectively) but four years longer than for whites for 2007 purchasers (seven years for blacks, three years for whites). Under the pessimistic scenario, both black and white first-time homebuyers will need roughly four decades to regain their financial position. The estimates in Table 7 also indicate that, under the optimistic scenario, it is generally the case that the number of years to recoup on the purchase increases with the passage of time from the point of purchase. This suggests that the pessimistic scenario is closer to reality, at least thus far.

Emrath (2013) estimates that, between 1985 and 2011, first-time homeowners remained in their homes for about 11.5 years.<sup>49</sup> The advent of the Great Recession has almost certainly increased this duration, because a substantial fraction of low- and moderate-income first-time homebuyers are underwater on their mortgages and the economy is still recovering.<sup>50</sup> These estimates suggest that a significant increase in holding period is required for first-time homebuyers to recoup on their investments. The financial challenge for blacks is particularly severe because, as noted earlier, we estimate that nearly 30% of these samples of black first-time homebuyers during the 2000 decade returned to renting within just a few years of their housing purchase.

## Discussion

This paper uses PSID data, enriched with neighborhood and housing market indicators, to study how nonelderly first-time homebuyers fared financially during the volatile economic climate characterizing the 2000 decade. We focus on low- and moderate-income families because they were a particular target group of public policies to expand homeownership in the U.S. and of the relaxed underwriting standards during the housing boom. We analyze blacks and whites separately because some past research and SCF data suggest disparities in the asset accumulation effects of homeownership between these races, and because Chow tests using our analysis samples strongly indicate the

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<sup>49</sup>Emrath uses the longitudinal data from the biennial American Housing Survey, which follows housing units, not households.

<sup>50</sup>Emrath notes that mobility rates plummeted starting in 2007, with the duration of occupancy of a single-family home increasing to 16 years on average through 2011.

two groups should not be pooled. To address selection into homeownership, we use propensity score matching and difference-in-difference models, and address the skew in the outcome, net worth, by using quantile regressions. Although all analyses are subject to possible omitted variable bias, the fact that first-time home buying in this analysis has a consistent, statistically significant relationship with net wealth including home equity—but not with net wealth excluding equity—suggests that the influence of home purchase on the total net worth outcome is not simply an artifact of selection. To estimate how long it will take first-time homebuyers to recoup their investment, we conduct two simple simulations using optimistic and pessimistic assumptions about future house price appreciation.

After accounting for differences between those who became first-time homebuyers and those who remained renters during the decade, we find that macroeconomic conditions played a significant role in the net worth status of white homebuyers. The pattern of the relationship is what we would expect: Whites enjoyed a short-term increase in total net worth if they purchased their first house in the economically robust years of 2003 and 2005. The increase lasted until 2009, when the Great Recession reversed the trajectory and net worth began to decline. Consistent with the effects of the macroeconomy, whites lost net worth in both the short- and medium-term if the purchase occurred in the recessions of 2001 and 2007. Thus, for whites during the 2000 decade, timing was critical to the short-term trajectory of net worth. Whites living in housing markets that were relatively unscathed by the housing crisis also avoided losses in net worth. By contrast, total net worth declines for black first-time homebuyers regardless of economic climate, and these losses do not systematically increase across the wealth distribution in worse versus better economic periods.

These results suggest that becoming a homeowner was not a fruitful asset accumulation strategy for low- and moderate-income black families in the 2000 decade, in either the short- or medium-term. In fact, in most years and across the wealth distribution, blacks would have been better off had they remained renters, as shown in Tables A5 and A6. These tables unpack the difference-in-difference results (see Tables 5 and 6, and Tables A3 and A4) by showing the estimated dollar amount of gain or loss in net worth with, and without, equity for renters and owners in the short- and medium-run after purchasing the home. Looking at Table A5 for net worth including equity, at the median, blacks who purchased their first home in 2005 lost nearly \$20,000 within two years and nearly \$30,000 after six years, for example. Had they remained renters, their net worth would have been about \$1,300 within two years and \$2,700 within six years. For whites, owning was a better pathway to growing net worth but primarily in the short-run. White 2005 purchasers

enjoyed a roughly \$18,000 gain in net worth within two years that became a \$13,000 by year six. Had they remained renters, they would have had a minimal loss of \$118 within two years but a roughly \$6,600 gain within six years. White renters at the 80th percentile appear to have weathered the Great Recession with their net worth intact and, in some instances, increasing.

Three factors could have played a role in the disparate patterns between blacks and whites: differences in financing, holding periods and the location of the home. Although the PSID does not collect data on whether respondents have traditional versus exotic mortgages, it is possible that subprime and other nontraditional mortgages might have contributed to the distinct outcomes for blacks versus whites because of the prevalence of such lending among minorities (*e.g.*, Herbert *et al.* 2013). However, there are no statistically significant differences in interest rates reported by black and white first-time homebuyers, nor differences in the length of the loan, the likelihood of refinancing, or of taking on a second mortgage or home equity loan (HELOC). Nor are there statistically significant differences in wealth without equity for blacks and whites with, and without, a second mortgage or HELOC.

Blacks also would be expected to suffer greater short-term losses if they had significantly shorter holding periods. Although our data indicate that blacks are more likely to sell their first homes within two to three years compared with whites, the difference is relatively small (29% vs. 22%, respectively).

The third factor, residential location, reveals the sharpest distinctions between black and white new buyers. Across the decade, blacks purchased homes in more disadvantaged neighborhoods than whites, and in neighborhoods that continued to deteriorate over the decade, as shown in Tables 8 and 9. Table 8 compares the characteristics of the neighborhoods at the time of purchase by white and black first-time homebuyers, respectively, while Table 9 compares these neighborhood differences in 2010. Both tables rely on indicators often associated with neighborhood quality.<sup>51</sup>

The most important metric is house value or price because it theoretically capitalizes all features of the residential location. Median housing values

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<sup>51</sup>All estimates are from Census data with additional data on median house value from Zillow. Each of these data sources has its strengths and weaknesses. Census data reflect the attributes of the census tract, which is often used to represent a neighborhoods. But Census data must be interpolated between 2000 and the first 5-year estimates from the ACS, which represent the average values for the 2005–2009 period. For 2007 (and 2010, shown in Table 9), we must rely on ACS 5-year averages, which are particularly problematic given the fluctuating economic conditions of the decade. Zillow data are annual but only available at the zip code level. Census tracts average about 4,000 residents, while zip codes can encompass as many as 100,000 individuals ([http://proximityone.com/tracts\\_zips.htm](http://proximityone.com/tracts_zips.htm)).

**Table 8 ■** New homebuyers by race: neighborhood characteristics by purchase year.

	2001			2003			2005			2007		
	White	Black	p-val	White	Black	p-val	White	Black	p-val	White	Black	p-val
% black	7	51	0.000	8	49	0.000	6	51	0.000	6	48	0.000
Med. HH inc	\$53.9	\$45.3	0.012	\$54.4	\$48.6	0.111	\$52.9	\$46.3	0.080	\$52.4	\$45.1	0.014
% own occ	70	64	0.115	72	63	0.016	71	69	0.449	73	65	0.007
% vacant	8	10	0.048	8	12	0.012	10	13	0.005	10	13	0.052
Median value Census	130	\$106	0.022	\$146	\$135	0.450	\$166	\$122	0.006	\$178	\$136	0.012
Zillow	\$126	\$106	0.115	\$162	\$129	0.042	\$190	\$153	0.102	\$201	\$164	0.153
% poor fam	9	16	0.000	9	15	0.004	10	16	0.000	9	16	0.000

*Notes:* Census variables obtained by interpolating from 2000 Decennial Census and 2005–2009 American Community Survey.

All dollar values in 1,000s, CPI adjusted to 2011\$.

% black = % of tract population that is black.

Med. HH inc = median household income of tract.

% own occ = % of total housing units in tract owner-occupied.

% vacant = % of total housing units in tract vacant.

Med. val = median value of owner-occupied housing units in tract (Census) or in zip code (Zillow).

% poor fam = % of families in census tract with total household income at or below Federal poverty line.

**Table 9 ■** New homebuyers by race: 2010 neighborhood characteristics by purchase year.

	2001			2003			2007		
	White	Black	p-val	White	Black	p-val	White	Black	p-val
% black	11	51	0.000	6	55	0.000	5	58	0.000
Med. HH inc	\$50.1	\$40.9	0.031	\$48.7	\$38.5	0.012	\$49.1	\$37.6	0.001
% own occ	67	61	0.204	71	56	0.001	72	64	0.010
% vacant	11	14	0.074	11	17	0.020	11	16	0.001
Median value Census	\$149	\$139	0.597	\$155	\$147	0.668	\$155	\$106	0.002
Zillow	\$148	\$129	0.304	\$173	\$137	0.034	\$160	\$121	0.021
% poor fam	12	17	0.026	11	19	0.002	12	20	0.000
							8	54	0.000
							\$48.2	\$38.6	0.004
							71	64	0.032
							10	15	0.036
							\$155	\$110	0.008
							\$166	\$124	0.010
							10	20	0.000

Notes: Census variables obtained from 2008 to 2012 American Community Survey.

All dollar values in 1,000s, CPI adjusted to 2011\$.

% black = percent of tract population that is black.

Med. HH inc = median household income of tract.

% own occ = percent of total housing units in tract owner-occupied.

% vacant = percent of total housing units in tract vacant.

Med. val = median value of owner-occupied housing units in tract (Census) or in zip code (Zillow).

% poor fam = percent of families in census tract with total household income at or below Federal poverty line.

in the neighborhood locations of black purchasers are significantly lower than those for white buyers. Census tract estimates range from 20% lower in the early years of the decade to 38% lower at the end of the boom, while, as expected, Zillow estimates have a narrower 10–24% range given the larger geography of zip codes compared with census tracts. Black buyers also purchased in neighborhoods with less housing price appreciation between the year of purchase and 2011, particularly those who purchased their home at the inception of, and during, the Great Recession. Although both white and black first-time buyers bought homes in predominantly owner-occupied neighborhoods, the homeownership rate is always lower in the black buyers' neighborhoods ( $p$  values in the 0.01–.11 range). Further, the decline in the tract homeownership rate over the decade in black new owners' tracts is roughly twice that of white new owners.<sup>52</sup>

The racial divide between the neighborhoods chosen, or settled for, by white and black new owners is also clear in the neighborhood racial composition. White buyers purchased homes in majority white neighborhoods with typically with fewer than 10% black residents, while blacks purchased homes in neighborhoods that were majority black.

Other key attributes also vary dramatically between white and black first-time homebuyer neighborhoods. Median household income levels are consistently lower in neighborhoods where blacks purchase homes, neighborhood poverty rates for blacks are nearly twice those for whites (on average, 23% vs. 12%, respectively), and vacancy rates are consistently and significantly higher in neighborhoods of black new buyers ( $p$  values between 0.005 and 0.05). Table 9 demonstrates that all of the disparities discussed in this section continued and in some cases intensified over the decade.

Among first-time homebuyers who did not re-sell their home, white owners were also more likely than black owners to report an increase in house values between 2003–2005 and 2005–2007.<sup>53</sup> This pattern is consistent with the higher metro area OFHEO appreciation rates and FMRs and lower poverty rates of the locations of new white owners relative to black owners, and is also consistent with the literature on the differential returns to homeownership

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<sup>52</sup>The difference in neighborhood owner-occupancy rates for black versus white new buyers is not statistically significant in 2005, in the midst of the housing boom.

<sup>53</sup>Specifically, total net worth increased for 73% of whites and 61% of blacks from 2003 to 2005. The comparable figures for the 2005–2007 period are 61% for whites and 43% for blacks. The value of the homes purchased by black first-time homebuyers are also considerably lower than whites in all years, differing by as much as \$60,000 among 2005 purchasers.

between blacks and whites (e.g., Loving, Finke and Salter 2012, Krivo and Kaufman 2004).<sup>54</sup>

Our crude simulations under optimistic versus pessimistic assumptions about house price appreciation suggest that it will take anywhere from three to more than 40 years for both groups to recoup on their housing investments, depending on whether house prices appreciate substantially and quickly, or nominally and slowly. The anemic recovery of the housing sector through 2011 extends the period for recouping on the home purchase over time even under the optimistic scenario and regardless of whether the purchase occurred during better or worse economic conditions.

The analyses also show that changes in total net wealth associated with first-time home buying vary across the wealth distribution for both blacks and whites. During economic downturns, purchasers with lower net worth fared worse over the short-run than those with great wealth; during more robust periods, the less wealthy experienced essentially no short-run increases. Over the medium-term encompassing the Great Recession, however, everyone lost across the wealth distribution.

This paper provides a cautionary note about interpreting aggregate statistics characterizing the financial effects of the volatile 2000 decade on family finances. Statistics that combine families with greater and lesser net worth wrongly assume they shared the same experience. Similarly, combining whites and blacks conveys the “timing” story for white first-time homebuyers observed over the short- and medium-term. This story does not apply to blacks.

This analysis is limited to net worth outcomes two to 10 years after home purchase. Purchasing a home is typically viewed as a long-term investment and the gain/loss profile could change over a longer period. How these first-time homebuyers will actually fare over a 20 or 30 year time horizon is an intriguing question for future work. Nonetheless, the 2000s represented the best of times and the worst of times for those entering the homeownership market. That low- and moderate-income blacks experienced losses in net worth even when their purchase timing was impeccable gives one pause about homeownership *per se* as a universal asset building strategy.

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<sup>54</sup>We find no appreciable effects of racial (black vs. white) dissimilarity at the metropolitan area level for the roughly 70% of cases for which we have metropolitan-level dissimilarity data (data provided by P. Jargowsky).

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## Appendix

**Table A1** ■ Propensity model results for illustrative year and sample: whites, 2001–2003–2005.

Variables	Coefficient	Robust SE	<i>p</i> -Value
Age	−0.112	(0.167)	0.499
Age <sup>2</sup>	0.001	(0.002)	0.660
Head female	0.278	(0.497)	0.576
Head education = < HS	−0.707	(0.532)	0.183
Head education = HS	−0.560	(0.457)	0.220
Head education = some college	−0.189	(0.481)	0.694
Married	1.857	(0.577)	0.001
Head/spouse self-employed	−0.181	(0.820)	0.825
Head health rating (1 = excellent)	0.045	(0.195)	0.817
Any health limitation	0.582	(0.520)	0.264
# in household	−0.659	(0.464)	0.156
# of children	0.138	(0.497)	0.782
Any recent births	−0.370	(0.760)	0.627
Change in # adults	0.509	(0.657)	0.439
Divorced/widowed	−0.326	(0.739)	0.659
Change household composition	0.083	(0.603)	0.891
Household income	0.291	(0.114)	0.011
Checking account	0.635	(0.484)	0.190
# of moves	−0.247	(0.234)	0.290
Northeast	−0.094	(0.801)	0.906
Midwest	−0.602	(0.686)	0.380
South	−0.205	(0.645)	0.750
FMR	0.000	(0.001)	0.817
Mortgage rate	−2.512	(2.560)	0.326
CEO price index	−13.572	(6.052)	0.025
OFHEO price index	0.009	(0.010)	0.367
Tract poverty rate	−0.192	(2.260)	0.932
Metropolitan poverty rate	−10.442	(8.743)	0.232
Wealth w/o equity (10,000)	−9.940	(8.670)	0.252
Constant	31.454	(20.407)	0.123
Number of observations	338		
Pseudo <i>R</i> <sup>2</sup>	0.19		

*Notes:* Propensity regression results for all years and samples shown in technical appendix.

Household income is expressed in \$1000.

FMR = fair market rent; CEO = Carrillo, Early and Olsen quality-adjusted index of prices and rents.

**Table A2** ■ DiD median quantile regression results for illustrative year and sample: whites, 1999–2001–2003.

Variables	Coefficient	Robust SE	<i>p</i> -Value
Ownership	2723.710	(3948.005)	0.000
Time	-6632.431	(4178.250)	0.113
Ownership x time	-15880.620	(5485.421)	0.004
Age	-216.289	(1429.416)	0.880
Age <sup>2</sup>	15.782	(18.122)	0.384
Head female	-4848.762	(4435.304)	0.275
Head education = < HS	-7607.198	(4671.365)	0.104
Head education = HS	2877.528	(4013.130)	0.474
Head education = some college	1280.811	(4506.030)	0.776
Married	-1752.937	(3954.398)	0.658
Divorced/widowed	5127.364	(4976.793)	0.303
Change household composition	2491.728	(3180.213)	0.434
OFHEO price index	194.199	(81.312)	0.017
Northeast	-10963.010	(6007.658)	0.069
Midwest	-5475.064	(4610.359)	0.235
South	-4109.586	(5294.484)	0.438
Constant	-28566.140	(31461.830)	0.364
Number of Observations	641		
Pseudo <i>R</i> <sup>2</sup>	0.1553		

*Note:* Median, 20th and 80th percentile quantile regression results for all years and samples shown in the technical appendix.

**Table A3 ■** Difference-in-difference estimates and effect sizes: net wealth without equity by race and wealth percentiles.

	Whites			Blacks			Whites and Blacks		
	20th	50th	80th	20th	50th	80th	20th	50th	80th
Two-year outcome for purchase year									
2001	-4,228	-2,255	<b>16,193</b>	<b>2,037</b>	1,480	3,368	501	<b>-2,932</b>	-5,903
	-21.5	-11.5	<b>82.4</b>	<b>17.6</b>	12.8	29.0	2.8	<b>-16.3</b>	-32.9
2003	2,987	17	-1,708	-2,185	116	<b>12,460</b>	-1,225	-85	1,111
	14.4	0.1	-8.3	-5.8	0.3	<b>33.1</b>	-4.9	-3	44.4
2005	<b>6,206</b>	<b>9,043</b>	<b>28,597</b>	464	<b>2,273</b>	2348	942	<b>4,620</b>	<b>14,769</b>
	<b>15.6</b>	<b>22.8</b>	<b>72.1</b>	1.6	<b>8.1</b>	8.3	2.5	<b>12.0</b>	<b>38.5</b>
2007	5,326	711	6,112	<b>-4,689</b>	-256	<b>6,059</b>	-1,125	-104	2,112
	15.1	2.0	17.3	<b>-18.4</b>	-1.0	<b>22.9</b>	-3.4	-3	6.3
2011 outcome for purchase year									
2001	-4,236	<b>-7,158</b>	2,198	-2,650	<b>4,229</b>	-5,037	<b>-4,867</b>	-677	-2,168
	-21.6	<b>-36.4</b>	11.2	-22.8	<b>36.9</b>	-43.4	<b>-27.1</b>	-3.8	-24.3
2003	<b>11,488</b>	<b>9,230</b>	<b>11,396</b>	-663	-130	3,792	3,220	<b>4,216</b>	<b>8,858</b>
	<b>55.5</b>	<b>44.6</b>	<b>55.1</b>	-1.8	-3	10.1	12.9	<b>16.9</b>	<b>35.4</b>
2005	-4,730	-4,395	-6,134	-3,412	-478	-2,656	-507	519	963
	-11.9	-11.1	-15.5	-12.1	-1.7	-9.4	-1.3	1.3	2.5
2007	5,171	<b>3,549</b>	9,105	-895	-1,874	96	270	-88	1,858
	14.6	<b>10.0</b>	25.8	-3.4	-7.1	.4	.8	-3	5.6

Notes: Difference relative to net worth at baseline (2009\$).

Upper value = difference-in-difference parameter estimate; lower value = effect estimate as percent of outcome SD.

Bold = statistically significant at  $p < 0.10$ .

**Table A4 ■** Difference-in-difference estimates relative to baseline: net wealth without equity by race and wealth percentiles.

	Whites			Blacks			Whites and Blacks		
	20th	50th	80th	20th	50th	80th	20th	50th	80th
	Two-year outcome for purchase year								
2001	-4,228	-2,255	<b>16,193</b>	<b>2,037</b>	1,480	3,368	501	<b>-2,932</b>	-5,903
	-3,778.0%	-27.1%	<b>69.3%</b>	<b>1,039.3%</b>	34.2%	18.8%	45.1%	<b>-35.4%</b>	-26.8%
2003	2,987	17	-1,708	-2,185	116	<b>12,460</b>	-1,225	-85	1,111
	28.8%	0.7%	-5.9%	-367.8%	1.9%	<b>89.4%</b>	-20.5%	-1.9%	59.1%
2005	<b>6,206</b>	<b>9,043</b>	<b>28,597</b>	464	<b>2,273</b>	2,348	942	<b>4,620</b>	<b>14,769</b>
	<b>222.0%</b>	<b>143.6%</b>	<b>127.7%</b>	116.9%	<b>60.4%</b>	12.0%	63.7%	<b>95.8%</b>	<b>71.0%</b>
2007	5,326	711	6,112	<b>-4,689</b>	-256	<b>6,059</b>	-1,125	-104	2,112
	51.1%	56.4%	39.0%	<b>-204.9%</b>	-4.6%	<b>32.8%</b>	-24.6%	-2.8%	12.3%
2011 outcome for purchase year									
2001	-4,236	<b>-7,158</b>	2,198	-2,650	<b>4,229</b>	-5,037	<b>-4,867</b>	-677	-2,168
	-949.3%	<b>-86.2%</b>	9.4%	-1352.0%	<b>97.6%</b>	-28.1%	<b>-438.1%</b>	-8.2%	-9.8%
2003	<b>11,488</b>	<b>9,230</b>	<b>11,396</b>	-663	-130	3,792	3,220	<b>4,216</b>	<b>8,858</b>
	<b>110.7%</b>	<b>375.5%</b>	<b>39.4%</b>	-111.6%	-2.1%	27.2%	53.8%	<b>95.6%</b>	<b>47.1%</b>
2005	-4,730	-4,395	-6,134	-3,412	-478	-2,656	-507	519	963
	-75.1%	-69.8%	-97.4%	-90.7%	-12.7%	-70.6%	-10.5%	10.8%	20.0%
2007	5,171	<b>3,549</b>	9,105	-895	-1,874	961	270	-88	1,858
	49.6%	<b>281.7%</b>	722.6%	-37.7%	-33.6%	0.7%	5.9%	-2.4%	50.0%

Notes: Difference relative to net worth at baseline (2009\$).

Upper value = difference-in-difference parameter estimate; lower value = parameter estimate as percent of baseline net worth.

Bold = statistically significant at  $p < 0.10$ .

**Table A5** ■ Difference-in-difference estimates for renters and owners: net wealth with equity by race and wealth percentiles.

	Whites			Blacks		
	20th	50th	80th	20th	50th	80th
	Two-year outcome for purchase year					
2001 Renter	<b>-\$1,477</b>	<b>-\$6,633</b>	<b>-\$9,865</b>	<b>\$1,438</b>	<b>\$2,457</b>	<b>-\$1,471</b>
2001 Owner	<b>-\$14,313</b>	<b>-\$22,513</b>	<b>-\$32,428</b>	<b>\$5,676</b>	<b>-\$6,072</b>	<b>-\$36,673</b>
2003 Renter	\$2,835	\$1,975	\$21,490	\$382	-\$2,814	-\$6,184
2003 Owner	\$3,240	\$14,127	\$27,176	-\$4,306	-\$9,619	\$14,174
2005 Renter	\$1,052	-\$118	\$277	\$696	\$1,346	\$817
2005 Owner	-\$476	\$17,736	\$46,781	-\$11,238	-\$19,730	-\$39,107
2007 Renter	<b>-\$2,247</b>	<b>\$2,737</b>	<b>\$9,369</b>	<b>-\$640</b>	<b>-\$1,626</b>	<b>-\$2,198</b>
2007 Owner	<b>-\$9,015</b>	<b>-\$5,571</b>	<b>-\$13,333</b>	<b>-\$16,373</b>	<b>-\$19,753</b>	<b>-\$42,718</b>
2011 outcome for purchase year						
2001 Renter	<b>-\$2,162</b>	<b>-\$1,384</b>	<b>-\$7,118</b>	<b>-\$1,384</b>	<b>\$1,541</b>	<b>\$17,702</b>
2001 Owner	<b>-\$14,939</b>	<b>-\$28,042</b>	<b>-\$39,470</b>	<b>-\$8,176</b>	<b>-\$20,121</b>	<b>-\$19,746</b>
2003 Renter	-\$1,303	\$3,103	\$25,357	-\$2,805	-\$183	\$2,089
2003 Owner	-\$449	\$10,012	\$5,143	-\$16,659	-\$21,991	\$7,083
2005 Renter	<b>\$950</b>	<b>\$6,649</b>	<b>\$15,871</b>	<b>-\$683</b>	<b>\$2,720</b>	<b>\$664</b>
2005 Owner	<b>-\$12,346</b>	<b>-\$13,290</b>	<b>-\$14,308</b>	<b>-\$15,998</b>	<b>-\$29,574</b>	<b>-\$59,401</b>
2007 Renter	<b>-\$4,369</b>	<b>\$874</b>	<b>\$20,102</b>	<b>-\$887</b>	<b>\$348</b>	<b>\$2,570</b>
2007 Owner	<b>-\$12,150</b>	<b>-\$13,657</b>	<b>-\$25,484</b>	<b>-\$26,067</b>	<b>-\$33,948</b>	<b>-\$53,170</b>

Notes: Difference relative to net worth in year of purchase (2009\$).

Bold = statistically significant differences between renter and owner at  $p < 0.10$ .

**Table A6** ■ Difference-in-difference estimates for renters and owners: net wealth without equity by race and wealth percentiles.

		Whites			Blacks		
		20th	50th	80th	20th	50th	80th
Two-year outcome for purchase year							
2001	Renter	-\$3,420	-\$1,136	<b>-\$22,395</b>	<b>-\$591</b>	\$354	-\$3,103
	Owner	-\$7,649	-\$3,391	<b>-\$6,202</b>	<b>\$1,446</b>	\$1,833	\$265
2003	Renter	-\$281	\$2,128	\$12,627	-\$492	\$335	<b>\$1,377</b>
	Owner	\$2,707	\$2,145	\$10,918	-\$2,677	\$451	<b>\$13,836</b>
2005	Renter	<b>-\$2,760</b>	<b>-\$1,822</b>	<b>-\$2,111</b>	-\$307	<b>\$293</b>	\$2,307
	Owner	<b>\$3,446</b>	<b>\$7,221</b>	<b>\$26,487</b>	\$156	<b>\$2,566</b>	\$4,656
2007	Renter	-\$2,798	\$866	-\$917	<b>-\$685</b>	-\$2,653	<b>-\$7,635</b>
	Owner	\$2,529	\$1,576	\$5,195	<b>-\$5,554</b>	-\$2,908	<b>-\$1,577</b>
2011 outcome for purchase year							
2001	Renter	\$5,139	<b>\$8,369</b>	-\$1,739	-\$3,171	<b>-\$4,286</b>	-\$5,771
	Owner	\$903	<b>\$1,211</b>	\$458	-\$5,821	<b>-\$56</b>	-\$10,808
2003	Renter	<b>-\$6,339</b>	<b>-\$1,175</b>	<b>\$1,200</b>	-\$3,147	\$1	-\$4,892
	Owner	<b>\$5,147</b>	<b>\$8,055</b>	<b>\$12,596</b>	-\$3,809	-\$129	-\$1,100
2005	Renter	\$811	\$1,878	\$2,247	-\$554	\$391	\$1,925
	Owner	-\$3,919	-\$2,517	-\$3,887	-\$3,965	-\$87	-\$730
2007	Renter	-\$2,046	<b>-\$1,043</b>	\$950	-\$1,270	-\$502	-\$2,910
	Owner	\$3,125	<b>\$2,505</b>	\$10,055	-\$2,165	-\$2,377	-\$2,814

Notes: Difference relative to net worth at baseline year (2009\$).

Bold = statistically significant differences between renter and owner at  $p < 0.10$ .