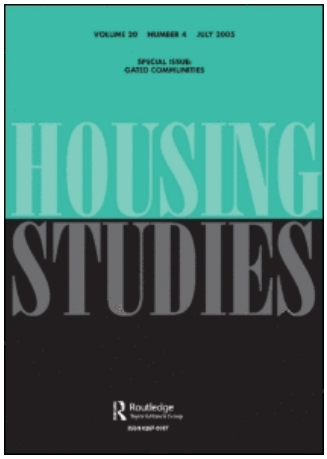

Housing Studies
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713424129

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To cite this Article: , 'The Determinants of Home Price Appreciation Among Community Reinvestment Homeowners', Housing Studies, 22:3, 381 - 408
To link to this article: DOI: 10.1080/02673030701254152
URL: http://dx.doi.org/10.1080/02673030701254152

Housing Studies,
Vol. 22, No. 3, 381–408, May 2007

Routledge
Taylor & Francis Group

The Determinants of Home Price Appreciation Among Community Reinvestment Homeowners

MICHAEL A. STEGMAN, ROBERTO G. QUERCIA & WALTER R. DAVIS
Center for Community Capitalism, University of North Carolina at Chapel Hill, USA

(Received December 2003; revised September 2006)

ABSTRACT *Homeownership is considered an effective wealth creation mechanism for low-income households. This study examines the appreciation of homes purchased with community reinvestment loans in a national pilot in the USA called the Community Advantage Program (CAP). Homes purchased between 1998 and 2002 are found to have appreciated at a median annual rate of 5.4% between the time of purchase and spring 2003. This is less than the national house price appreciation index of 7.0% (covering 1998–2003) but higher than other types of investments such as the Dow Jones Index (2.78% annual growth rate) and the average rate on a 6-month CD (4.34%) over the same time period. The median increase in net housing wealth of the Community Advantage homeowners is $17 492. Returns have been particularly impressive for the lowest-income borrowers. Borrowers with less than $20 000 in annual household income at the time of purchase had a median down-payment of $1790 and have experienced a median equity increase of $24 724. Price and equity appreciation rates for African Americans are solid, but are about 10% lower than for whites.*

KEY WORDS: Home price appreciation, low-income homeownership, negative

Introduction

Home equity is a significant source of household wealth, especially for those in the lower reaches of the income distribution (Belsky & Calder, 2004). This is why consumer advocates and policy makers celebrate the achievement of a record number of homeowners during the 1990s (US Census Bureau, 2002, Table 15). Despite a declining economy that dipped briefly into recession in 2000–01, historically low interest rates have propelled the national homeownership rate to a record high 67.4 per cent in 2002, with impressive gains by low- and moderate-income families (LMI), minorities, and non-traditional households. Between 1993 and 1997, for example, the number of home loans to families with incomes at or below 80 per cent of median increased by 38 per cent, compared with 27 per cent for loans to higher income families (Quercia *et al.*, 2003). For a roughly similar period (1994–2001), minorities accounted for 40 per cent of the national

Correspondence Address: Roberto Quercia, Department of City and Regional Planning, University of North Carolina, Chapel Hill, NC, 27599-3140, USA. Email: quercia@email.unc.edu

ISSN 0267-3037 Print/1466-1810 Online/07/030381–28 © 2007 Taylor & Francis
DOI: 10.1080/02673030701254152

net gain in homeowners, even though they account for just 25 per cent of all households (Joint Center for Housing Studies, 2002). Similarly, between 1997 and 2002—when the homeownership rate for all households increased by 3 per cent—householders under the age of 25 enjoyed a 30 per cent increase, including a 58 per cent gain for families headed by females under 25 (US Census Bureau, 2002, Table 15).

In addition to historically low interest rates, growth among these latter groups was accelerated by an aggressively supportive public policy environment that contributed to the widespread introduction of 'affordable' mortgage products during the latter part of the 1990s featuring flexible underwriting, including low down-payments, higher debt ratios and reduced cash reserves, combined with the use of non-traditional means of verifying creditworthiness (Quercia *et al.*, 2002). For example, home purchase loans requiring down-payments of 5 per cent or less were nearly four times (15 per cent) more common in 2001 than in 1990 (4 per cent) (Joint Center for Housing Studies, 2002). Freddie Mac's *Alt 97* mortgage, which is targeted to buyers with little savings but good credit, features 3 per cent down, with only part of the upfront cash having to come from the borrower's own resources.[1] Underscoring the potential impact of these new mortgage products, Quercia *et al.* (2003) estimate that the *Alt 97* mortgage could increase "the relative probability of homeownership for young households by 27.1 per cent, for black households by 21 per cent, and for center city households by 15 per cent" (pp. 29–30).

While homeownership is not just about building wealth, because of its significant potential to generate large returns on small amounts of invested capital, its role in helping families secure their financial futures is too important to ignore (Belsky & Calder, 2004). Using data from the Panel Survey of Income Dynamics, Di *et al.* (2003), for example, estimated that "the total net wealth on average in 1999 of owners in 1984 is 2.2 times that of renters in 1984, controlling for incomes and demographics" (p. 12).

Despite these dramatic findings, other researchers are less positively disposed toward housing as an investment good. For the period 1985–95, Goodman (1997) for example, found that "when all the costs of owning and renting are considered, a majority of families that bought a home in the mid-1980s would have saved money by renting comparable housing" (cited in Di *et al.*, 2003, p. 6). Relative to alternative investments, Goetzmann & Spiegel (2002) found home appreciation rates from 1990–99 to be much lower than the returns on stocks, bonds and mortgage-backed securities (cited in Di *et al.*, 2003). From a portfolio analysis perspective "Hurst, Luoh & Stafford found that the share of wealth a household held in home equity in 1984 had a negative relationship with total wealth in 1994, but that the share held in stocks had a positive relationship" (cited in Belsky & Calder, 2004, p. 8). For a similar period, but using different metrics, Marjamaa (2002) found that "the average stockholder earned $23 000 in the stock market during the past decade, while the average homeowner earned $44 000 in home equity" (cited in Di *et al.*, 2003, p. 4).

Although nominal home prices have never declined on a year-to-year basis since the National Association of Realtors began tracking sales data in 1968, Di *et al.* (2003) remind us that "national measures of home price appreciation have little practical meaning to an individual homeowner because he invests in a single asset instead of a national index, and this asset cannot be diversified" (p. 3).

Duelling researchers and conflicting findings notwithstanding, Americans have historically held an enormous amount of their collective wealth (a staggering $7.6 trillion in 2002) in their homes. For all households, home equity accounts for an average of 21 per cent of net household wealth, but for all homeowners the share is close to 50 per cent.

Housing's relative importance in household portfolios has grown considerably since the high-tech meltdown in 2001, when stock portfolios lost $1.4 trillion in value (Joint Center for Housing Studies, 2003). With housing outperforming the rest of the economy, home equity grew by more than $405 billion in 2001–02, raising the share of "stock-holding homeowners with more home equity than stock wealth from 60.5 per cent in 2001 to an estimated 66 per cent in 2002" (Joint Center for Housing Studies, 2003, p. 6).

Home equity has been particularly important for those with lower incomes, where the median net wealth of owners in the lowest income quintile was $68 000 in 2001, while that of similarly situated renters was only $500 (Joint Center for Housing Studies, 2003). Among these owners, home equity accounted for 80 per cent of net wealth in 2001, compared to 48 per cent for owners in the middle quintile and 26 per cent in the highest quintile (Belsky & Calder, 2004).

> For all homeowners, home equity represented 42% of their net wealth. But for lower income and minority households, home equity represented four-fifths (80%) of their net wealth. And for moderate-income, African American, and Hispanic households, home equity represented more than one-half of their net wealth. (Consumer Federation of America, 2003, p. 2)

Despite the importance of home equity to net household wealth, Case & Marynchenko (2001) remind us of the significance of timing and where in the local real estate cycle a family enters the market. In their local studies of low-income homeowners in Chicago, Boston and Los Angeles, these researchers found homeownership to be:

> an excellent vehicle for asset accumulation since the early 1980s in Boston, since 1987 in Chicago, and since 1995 in all three cities. They also found, however, that significant periods of decline have led to substantial losses for low-income households in Boston and to periods of substantial negative equity for low-income households in Los Angeles (p. 23).

This is why, for example, McCarthy *et al.* (2001) conclude that "homeownership offers much better financial security for wealthy owners than for low- and moderate-income and minority owners" partly because "lower-income and minority households hold more housing than is optimal in portfolio wealth, exposing them to higher risk" (cited in Di *et al.*, 2003, p. 7).

This paper describes the asset building potential of house price appreciation of an innovative homeownership partnership that has enabled homeownership for more than 25 000 credit-worthy low-income, low-wealth individuals who may not be effectively served by the conventional market. Through access to the proprietary valuation model that the Federal National Mortgage Association (Fannie Mae) uses to value the homes securing its mortgage portfolio, it is possible to estimate the paper equity accrued by thousands of families who have bought homes under a demonstration program launched by Fannie Mae, the Ford Foundation, and Self-Help, a North Carolina-based community development financial institution.

The paper proceeds as follows. First, the Community Advantage Secondary Market Demonstration Program (CAP) is described. Next, the stage is set for the empirical analysis that follows by a review of the literature on the wealth-building potential

of homeownership, with particular emphasis on lower-income families. The estimates of the paper equity accumulated by CAP homeowners are disaggregated by household type, race and ethnicity, and credit history, and are benchmarked against statewide appreciation rates and metropolitan price changes in individual housing markets in which there has been sufficient CAP activity to permit such analyses. While much of the paper is descriptive, providing appreciation rates for different groups of buyers, and for various locations, price changes are also modelled in the final empirical section, controlling for important differences in market conditions. The paper concludes with a discussion of the policy significance of the findings.

The Community Advantage Secondary Market Demonstration Program (CAP)

The goal of CAP is to provide tangible evidence to lenders, policy makers, and the secondary mortgage market that low-wealth borrowers are 'bankable', and that Fannie Mae (and by implication Freddie Mac) can significantly expand their purchase of affordable housing loans without compromising either their balance sheet or safety and soundness concerns. The CAP program reflects a partnership between the Ford Foundation, Fannie Mae and the Center for Community Self-Help, a leading Community Development Financial Institution in North Carolina. The original agreement between Fannie Mae and Self-Help stipulated that Fannie Mae would purchase $2 billion in CAP mortgages over a five-year period.

Under this arrangement, Self-Help purchased existing portfolios of Community Reinvestment Act (CRA) loans from lenders that are otherwise unable to sell the loans in the secondary market.[2] Both sets of loans feature flexible underwriting and typically include one of the following features: low or no down-payment, higher debt-to-income ratios, approval of borrowers with varied credit records or no established credit, and waivers of private mortgage insurance and the usual requirement that a borrower have at least two months of loan payment available as a cash reserve at the time of closing. To be considered for purchase, CAP loans meet at least one of the following qualifying requirements: (1) the borrower's income is less than 80 per cent of MSA median income (AMI); (2) the borrower is a minority with income less than 120 per cent AMI; or (3) the borrower's income is below 120 per cent AMI and the home is located in a high minority (greater than 30 per cent) or low-income (less than 80 per cent AMI) census tract.[3]

By including multiple flexible underwriting features, CAP products would not be purchased by secondary market institutions. Under CAP, Self-Help purchases the loans and securitizes or sells them to Fannie Mae, effectively creating a traditional outlet for otherwise illiquid loans. Because Self-Help retains full recourse on all purchased loans, this model also satisfies Fannie Mae's charter issues and balance sheet concerns. With a Ford Foundation grant to underwrite a significant portion of its credit risk, Self-Help partnered with mortgage originators across the United States.[4]

The data used in this paper were collected as part of the authors' multi-year evaluation of CAP. The goals of the evaluation are to assess the replicability of the CAP model, the performance of more than a dozen innovative mortgage products designed to expand mortgage lending, and the social and wealth impacts of homeownership. A core element of our research design is a five-year panel survey of more than 3700 CAP borrowers, and a comparison group of low-income renters whose housing and other circumstances we are also tracking.

Table 1. Community advantage loans originated 1998 through 2002 compared with conforming loans bought by Fannie Mae and Freddie Mac in 2000

	Self-Help (%)	Fannie Mae (%)	Freddie Mac (%)
Race/ethnicity			
White	51.9	81.5	84.3
Black	19.9	4.0	3.9
Hispanic	20.7	7.2	5.9
Other	7.5	7.3	5.9
Income			
60% AMI[a] or lower	50.9	11.6	12.2
61–100% AMI	45.7	28.2	28.8
Over 100% AMI	3.4	60.2	59.0
Single women	26.9	17.8	17.8
Age			
Less than 30 years old	38.9	15.4	14.0
30–39 years old	32.1	29.7	25.9
40 years or older	29.0	41.2	34.7

Notes: Fannie Mae and Freddie Mac data are for purchases in 2000.
[a]AMI is Area Median Income, i.e. median income of the MSA or State for non-MSA areas.
Source: Self-Help Community Advantage, HUD Housing Finance Working Paper, HF-015, May 2002, and authors' calculations.

Who are the Homeowners?

By most definitions, CAP borrowers are as non-traditional as the loans they secured to buy their homes. Compared with borrowers whose conforming first mortgage loans were purchased by Fannie Mae and Freddie Mac in 2000, CAP homeowners are five times more likely to be African American, 2.5 times more likely to be Hispanic, more than four times more likely to have incomes below 60 per cent of area median, more likely to be single females, and more than twice as likely to be under 30 years of age (Table 1). More importantly, 35 per cent of all CAP families had blemished credit, reflected in credit (FICO) scores of less than 660. Moreover, over 4 per cent of all borrowers, including 11 per cent of all Hispanic buyers, had no credit score but were still approved for a mortgage loan (Table 2).

Using data from the baseline survey of over 3500 CAP homeowners, the family and employment situations of these borrowers can be looked at in greater detail. As a rule,

Table 2. Community advantage loans race/ethnicity by credit score, as of August 2003

	Missing (%)	No score (%)	≤620 (%)	621–660 (%)	661–720 (%)	720 + (%)
Race/ethnicity						
White	5.2	2.7	10.9	18.1	30.2	32.9
Black	8.3	2.5	31.4	25.1	20.6	12.1
Hispanic	7.6	11.3	15.7	18.5	28.5	18.4
Other	3.9	7.9	11.3	15.3	32.9	28.8
Total	6.3	4.6	16.1	19.4	28.1	25.4

Source: Self-Help Community Advantage, and authors' calculations.

Table 3. Community advantage loans employment status of borrowers and spouses for loans purchased before 1 January 2003

Number of interviews: 3727	(%)
Post-purchase employment history[a]	
Current unemployment (Borrower)	3.2
Current unemployment (Spouse)	6.4
Currently $>$ 1 job (Borrower)	16.0
Currently $>$ 1 job (Spouse)	10.5
Any unemployment since purchase (Borrower)	20.0
Any unemployment since purchase (Spouse)	59.3
Currently work full-time (Borrower)	95.8
Currently work $\geq$50 hours per week (Borrower)	27.8
Two-wage earner households (among married/partnered households)	75.1

Notes: [a]These estimates are based on data collected as part of the baseline survey of the Community Advantage Panel Survey, a 5-year study of 3727 CAP borrowers.
Source: Self-Help Community Advantage, Community Advantage Panel Survey and authors' calculations.

CAP families have strong commitments to the workforce, with two wage earners in more than three-quarters of all sampled households with married couples or partners. Sixteen per cent of all borrowers and 10 per cent of all spouses/partners that work have more than one job, including part-time, weekend and evening work. Ninety-six per cent of the surveyed borrowers work at least full-time (35 or more hours per week) and almost 30 per cent average at least 50 hours of paid work per week.

Despite the fact that the interviews were conducted in the midst of the economic slowdown, low unemployment rates were found among all borrowers (3.2 per cent) at the time, although much larger numbers of borrowers (20 per cent) and their spouses/partners (59.3 per cent) had experienced at least one period of joblessness lasting a week or more since closing on their loans (Table 3).[5] Because a greater percentage of surveyed black households (63 per cent) than whites (43 per cent) consist of single heads of household (with or without children) and just one wage earner (not shown), African Americans in the CAP program are more sensitive to even modest declines in the economy and more likely to experience declines or slower growth in income during an economic slowdown.

Thus, for example, while the median income of white CAP borrowers increased by nearly 18 per cent, from $31 000 to $36 500 between 6 months and 24 months after closing, the median income of black households increased by just 8 per cent, from $30 500 to around $32 900. This means that the relative income deficit of blacks, which was just $500 at closing, grew seven-fold in two years or less. While this makes homeownership a more challenging financial commitment for many minorities, especially those with just one wage earner, it also magnifies the potential importance of homeownership as a means of accumulating wealth and purchasing in areas with high appreciation potential. Whether blacks are as likely as whites to live in high-appreciation markets is a topic now looked at in greater detail.

The Wealth-building Potential of the Community Advantage Program

While many empirical studies of house price dynamics use commercially available property sales data to generate price change information, a proprietary valuation model is

used here to estimate current market values. As part of its participation in the CAP partnership, in October 2003 Fannie Mae provided then-current market-value estimates from its automated valuation model (AVM) for all properties in the Community Advantage Program. These estimated market values are used to compute 'paper' gains or losses experienced by CAP homebuyers.

Fannie Mae's AVM model consists of three individual models that independently estimate property values based on repeat sales data, property characteristics and tax assessments, respectively. Fannie Mae then uses a value reconciliation model to compute a best value estimate in the case of multiple model predictions where valuations vary. This aggregation of independent estimates also allows the AVM system to rank order prediction accuracy at the property level.[6] Each of these models depends both on Fannie Mae's own proprietary loan data as well as public tax record and purchased deed data, and each has been tested out-of-sample in ongoing Fannie Mae research efforts.[7]

Because of its use in risk management, AVM is also examined annually by Fannie Mae's regulator, the Office of Federal Housing Enterprise Oversight (OFHEO), which has consistently awarded high grades in regulatory audits. AVM is used to estimate the market value of each CAP property as of a single date, 30 September 2003, to calculate the price changes for homes purchased between 1 January 1998 and 31 December 2002. Thus, the term of ownership can vary from 9 months to 33 months.

To compare the experiences of CAP buyers to market averages, OFHEO's House Price Index (HPI) is used, which is published on a quarterly basis and tracks average house price changes in repeat sales or refinancings on the same single-family properties. OFHEO's index is based on analysis of data obtained from Fannie Mae and Freddie Mac from more than 23 million repeat transactions over the past 28 years. The HPI reflects price movements on a quarterly basis of sales or refinancings of single-family homes whose mortgages have been purchased or securitized by Fannie Mae or Freddie Mac (Office of Federal Housing Enterprise Oversight, 2003).

The two variables of primary interest in this paper are the price appreciation rate of the property and the equity appreciation rate for the borrower. The price appreciation rate is the annual appreciation rate (compounded monthly) calculated using actual purchase price at origination, the AVM-estimated value in October 2003, and the number of months between purchase and October 2003. The equity appreciation rate is the annual appreciation rate (compounded monthly) using the borrower's equity at time of origination, the equity as of October 2003 calculated as AVM-estimated value less current unpaid mortgage balance, and the number of months between purchase and October 2003. For loans with a loan-to-value (LTV) ratio greater than 100 (12.1 per cent of loans), initial equity was set at $500, which is the typical minimum buyer contribution required by most lenders for high LTV Community Advantage loan products.

Data on loan characteristics come from 21 497 CAP loans to LMI borrowers that were originated between 1 January 1998, and 31 December 2002, and that Self-Help purchased from participating lenders as part of the Community Advantage Program. These loans had a median original principal of $79 500. These loans constitute about 78 per cent of the more than 27 500 loans that make up the CAP historical book of business. There were too few pre-1998 loans in the database to estimate historical effects, while 2003 purchases had too little time to show any market effects. Another source of data, which is used in the final section for modelling price changes, is the 2000 Census. Because the lowest level of geography used in the AVM model is zip code, ZCTA-level Census data were used,

generated by software and data purchased from Geolytics, Inc. (Geolytics, 2002). Finally, data on the Dow Jones Index, monthly 6-month CD rates, monthly 10-year T-Bill rates, and monthly county-level unemployment rates were obtained from various sources (as cited).

For each loan, the data include a full set of loan characteristics, some borrower characteristics, and the complete payment history from the time that Self-Help purchased the loan. The loans database is being compiled as part of the authors' ongoing multi-year evaluation of the Community Advantage Program that is designed to (1) measure loan performance by tracking delinquency, default, and foreclosure rates over the critical first five years of the mortgage term; (2) document the social and economic impacts of homeownership on borrowers; and, to the extent practicable, (3) assess the impacts of CAP on neighborhood conditions and housing market dynamics. As part of the evaluation, the authors have begun to build the Community Advantage Panel Survey, a five-year examination of over 3500 CAP homeowners. Some of the descriptive data cited above are from the baseline interviews of panel members.

Gains are Significant and Widespread, but not Universal

During a period in which the Dow Jones Index rose by just 2.78 per cent a year and CD rates averaged 4.33 per cent a year, based on AVM estimates as of 30 September 2003, CAP families who bought their homes between 1998 and 2002 enjoyed an average annual appreciation rate of 5.4 per cent[8] (Figure 1). This is close to the long-term average annual increase in nominal house prices of 6.3 per cent for the country as a whole for the period 1968–2001 (Di *et al.*, 2003). Overall, the median 'paper' gain for all CAP owners was $16 433, while fewer than 2 per cent of all homes fell below their original purchase price (Table 4). Just over 5 per cent of all CAP buyers fared worse than the Dow, while 26 per cent experienced gross returns that were below those they might have earned from investing in CDs (Table 5).

Timing is Important

In general, the absolute change in price increases with length of ownership and with the median increase in price, the highest for families who bought their homes in 1998

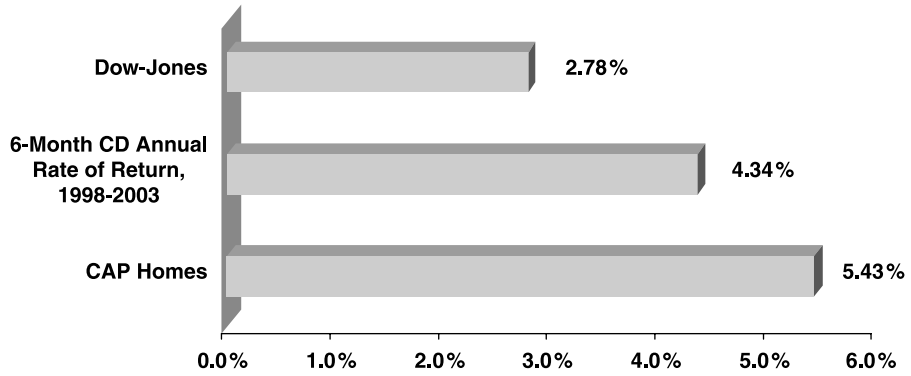

Figure 1. Median annual change in home price vs. rates of return for other investments, 1998–2003

Table 4. House price appreciation, 1998–2002 by year of origination CAP loans, as of September 2003

	N	Change in value ($)	Change in value (%)	Annual appreciation rate	% with negative value change
All	19 163	16 433	19.7	5.43	1.65
1998	3218	20 198	25.3	4.29	0.71
1999	3112	18 660	22.4	4.81	1.00
2000	4610	12 666	15.7	4.50	1.30
2001	5388	17 079	19.4	7.62	1.50
2002	2835	14 204	13.7	9.27	4.27

Notes: Reported values are medians, except in the last column. The Annual Appreciation Rate is compounded monthly.
Source: Self-Help, Fannie Mae, authors' calculations.

Table 5. House price appreciation rates compared to Dow Jones and CD rates by origination year CAP loans, as of September 2003

	Below Dow Jones		Below CD rates	
	N	(%)	*N*	(%)
All	994	5.2	5051	26.4
1998	397	12.3	1570	48.8
1999	11	0.4	1252	40.2
2000	10	0.2	1474	32.0
2001	91	1.7	472	8.8
2002	485	17.1	283	10.0

Notes: For each CA property, the appreciation rate is compared to (1) the appreciation in the Dow Jones Index between the month of origination and 30 September 2003 and (2) the value of a 6-month CD purchased in the month of origination and rolled over every 6 months through September 2003.
Source: Self-Help, authors' calculations.

($20 198) and lowest for those who bought in 2002 ($14 204). More recent borrowers have bought homes during a time of generally higher appreciation rates—annual percentage gains for families who closed on their homes in 2001 and 2002 are greater than gains for those who bought between 1998 and 2000—but over time, their experiences may become more similar to those who bought in earlier times. Nevertheless, 98 per cent of all CAP families who bought their homes between 1999 and 2001 outperformed the Dow, while only 83 per cent who bought in 2002, as the stock market recovered, had annual returns above the Dow (Table 5).

Conversely, only about half of all families who bought in the early years of the program, between 1998 and 2000, saw the prices of their homes grow at faster rates than the CD rate. As interest rates plummeted in 2001 and 2002, at least 90 per cent of CAP homes outperformed the CD index.

So is Geography

As expected, value gains varied significantly across the country, with the greatest average gains, of at least 13 per cent a year, experienced by CAP families in Maryland, California and Florida. The smallest increases, all below 4 per cent a year, were in North Carolina,

Table 6. House price appreciation, 1998–2002 for selected states' CAP loans, as of September 2003

	N	Change in value ($)	Change in value (%)	Annual appreciation rate	% with negative value change
All	19 163	16 433	19.7	5.43	1.6
MD	290	58 438	40.7	18.16	0.3
CA	3469	83 981	59.6	16.70	0.1
FL	570	26 079	30.4	13.16	1.4
VA	796	34 928	36.9	11.23	0.5
IL	497	29 943	28.4	8.50	0.2
AZ	468	13 557	15.4	6.65	2.6
NV	242	21 902	21.0	7.42	2.1
TX	522	12 895	16.5	5.70	5.2
MI	321	13 693	17.0	5.52	0.3
OK	762	9958	13.8	5.10	0.9
GA	699	15 556	15.8	4.99	1.9
TN	306	9086	12.8	4.38	3.6
OH	727	7688	11.0	4.19	3.2
MS	575	8920	13.2	3.94	0.2
NC	6476	11 554	14.2	3.38	2.5
SC	1003	10 269	13.7	3.29	1.7
Other States	1440	16 268	18.9	6.65	1.3

Notes: Reported values are medians, except in the last column. The Annual Appreciation Rate is compounded monthly.
States are in descending order of price appreciation rate.
Source: Self-Help, Fannie Mae, authors' calculations.

South Carolina and Mississippi (Table 6 and Figure 2). In three of the ten states with the greatest number of CAP loans—California, Virginia, and Florida—Community Advantage families experienced gains that exceeded average statewide increases in home prices by significant margins (Figure 3).

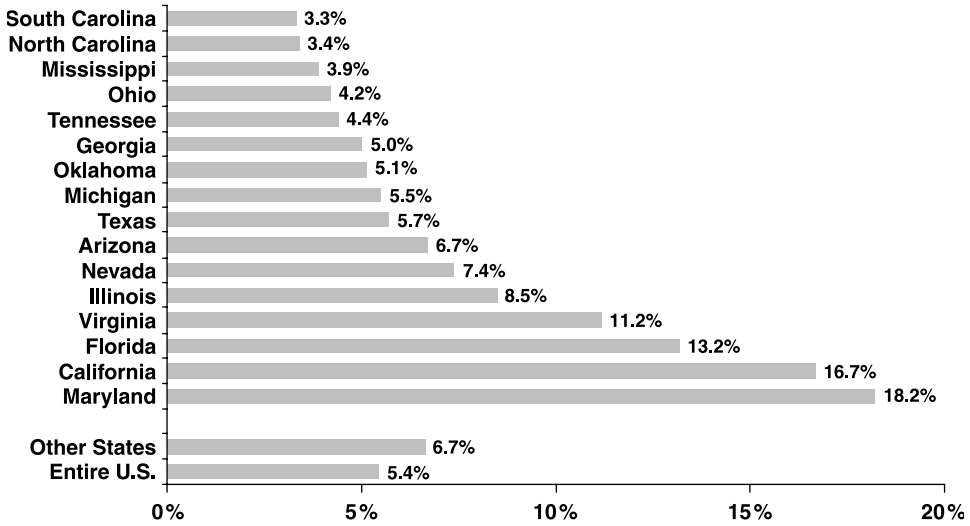

Figure 2. Median annual appreciation rate in price of homes purchased between 1998–2002

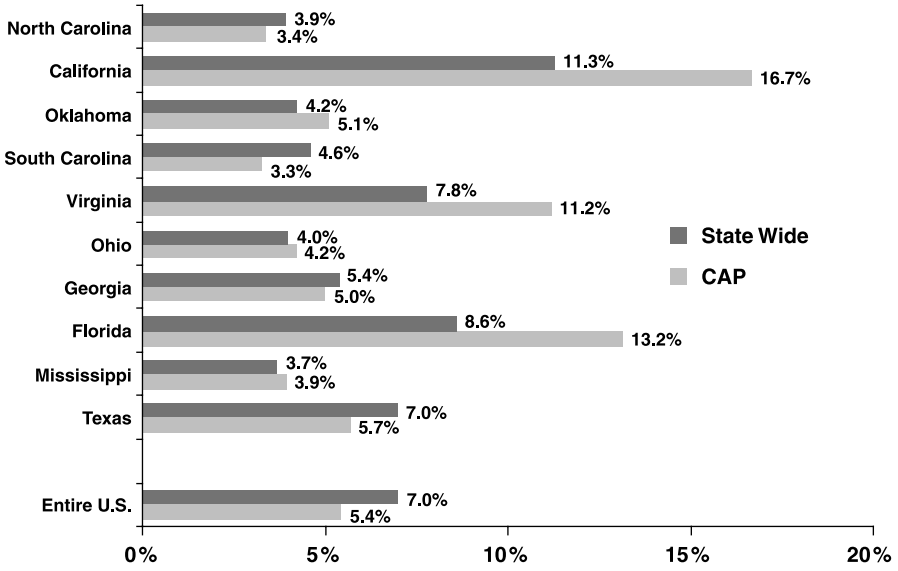

Figure 3. Median appreciation rates for CAP homes and state index, top 10 CAP states, 1998–2003

On a more localized basis, price gains were highest in Los Angeles and Riverside, California, and in metropolitan Washington DC where advances of CAP family homes outpaced metropolitan increases (Figure 4). In these 'hot' metro markets, median annual appreciation rates for CAP homes were 16 per cent or higher.

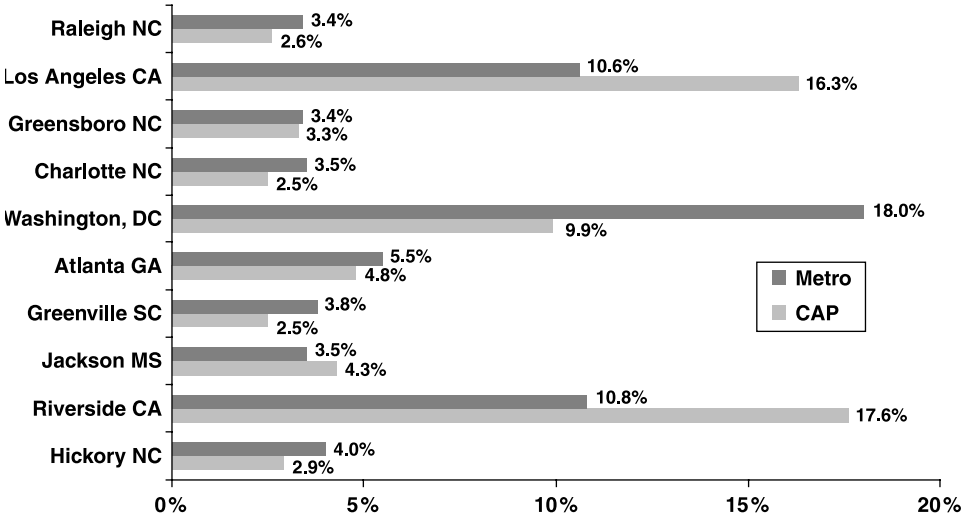

Figure 4. Median appreciation rates for CAP homes and Metro Index, top 10 CAP metro areas, 1998–2003

But not Everybody Wins

While prices rose on the vast majority of all CAP homes, just below 2 per cent lost value. Disproportionately large numbers of families in three of the 15 states with the largest number of CAP borrowers experienced paper losses, including almost 6 per cent in Texas, 3.6 per cent in Tennessee and 3.2 per cent in Ohio. From a historical standpoint, the worst year so far has been 2002, where 4 per cent of all homes bought that year fell in price, but this number will probably decline over time.

Increases Turn Relative Losers into Winners

Because of exceptional increases—most CAP loans required very modest amounts of upfront cash—average returns to initial equity exceed overall value increases by wide margins. This means that most families whose homes appreciated more slowly than either the Dow or the CD composites saw their initial equity investments grow at far faster rates than either of these benchmarks. Across all CAP families, the average annual increase in initial equity was nearly 70 per cent; the increase exceeded 90 per cent in three states and 100 per cent in four states (Figure 5).

In absolute terms, CAP homeowners gained a median $17 500 in housing wealth (current home value minus outstanding mortgage balance minus initial down-payment). CAP homeowners in California enjoyed median gains in housing wealth of nearly $84 000; in Maryland more than $56 000; in Illinois about $33 000; and in Virginia $32 000 (Table 7).

Families with Varied Credit Fared Well

Significantly, households with blemished credit or no credit history, who might not have been able to qualify for a prime mortgage loan were it not for CAP, as well as those who

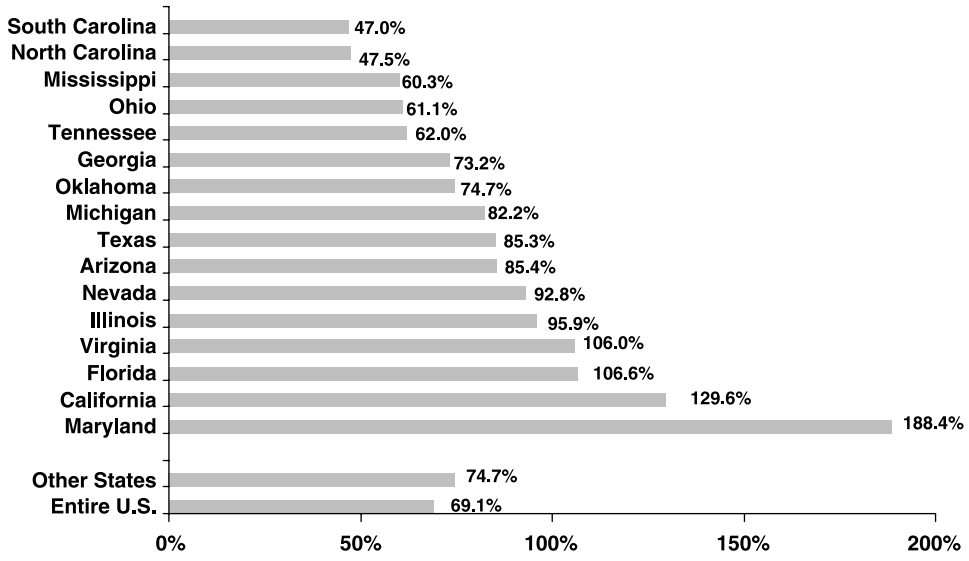

Figure 5. Median annual appreciation rate of initial equity, by state, 1998–2003

Table 7. Equity appreciation, 1998–2002 by year of origination and selected states' CAP loans, as of September 2003

	N	Current housing wealth ($)	Change in housing wealth ($)	Annual appreciation rate[a] (%)	% with negative equity change
All	11 971	22 890	17 492	69.1	1.2
MD	130	62 763	56 733	188.4	0.0
CA	2030	96 530	83 889	129.6	0.0
FL	316	34 689	27 640	106.6	1.6
VA	449	35 764	31 579	106.0	0.7
IL	268	37 277	33 241	95.9	0.4
AZ	310	18 592	15 283	85.4	2.9
NV	153	30 577	22 209	92.8	2.0
TX	255	19 833	13 827	85.3	2.0
MI	154	13 854	11 066	82.2	0.0
OK	664	9874	11 498	74.7	0.6
GA	323	19 922	16 588	73.2	0.6
TN	258	13 136	10 638	62.0	3.1
OH	493	9159	7234	61.1	2.8
MS	513	12 861	10 477	60.3	0.2
NC	4190	18 365	14 172	47.5	1.6
SC	607	15 715	12 901	47.0	0.7
Other states	858	17 883	14 839	82.2	1.2

Notes: Reported values are medians, except in the last column. The Annual Appreciation Rate is compounded monthly.
[a]For loans with an LTV of 100 or greater, a $500 down-payment was assumed. States are in descending order of equity appreciation rate.
Source: Self-Help, Fannie Mae, authors' calculations.

missed one or more mortgage payments during their relatively brief period of ownership, also enjoyed significant gains. The median annual equity appreciation rate for homeowners who had no credit score was 89 per cent, while those with a FICO score of 620 or less enjoyed an annual median increase in initial equity of 64 per cent a year, compounded monthly (see Table 8 and Figure 6).

Regardless of delinquency history, families experienced annual median equity gains of about 70 per cent. These findings suggest that if they can gain a foothold in the homeownership market, even families with varied credit histories or who are new to the credit system can build substantial assets through homeownership. For families who fall behind in their payments and skirt with default, these results suggest that there is usually significant accumulated equity in homes to allow for preventive servicing and creative approaches to help families keep their homes, if their defaults are due to temporary setbacks.

Minority Gains Lag but are still Impressive

Perhaps the most positive findings are those related to the paper gains experienced by minorities who were able to buy a home through the Community Advantage Program. However, consistent with other research (Ambrose & Goetzmann, 1996; Di *et al.*, 2003), it was also found that black-owned homes appreciated about 10 per cent less a year, at the

Table 8. House price and equity appreciation, 1998–2002 by urban and rural location, credit score and delinquency history CAP loans, as of September 2003

	Price appreciation			Equity appreciation		
	N	Annual price appreciation rate	% with negative value change	*N*	Annual equity appreciation rate[a]	% with negative equity change
Urban	11 430	6.34	1.8	6604	67.2	1.3
Rural	6106	4.16	1.5	4075	66.3	0.9
Credit score						
Missing credit score	1212	4.87	3.7	802	88.6	3.3
No credit score	885	9.61	1.7	647	87.5	1.4
≤620	3082	5.05	1.5	2331	63.8	1.0
621–660	3725	5.54	1.5	2456	67.6	1.0
661–720	5383	5.61	1.3	3153	70.7	0.8
> 720	4876	5.10	1.6	2503	65.6	0.1
Worst delinquency						
Never delinquent	15 810	5.32	1.4	10 410	69.6	1.0
30 days delinquent	820	4.96	1.5	601	73.8	1.2
60 days delinquent	234	4.77	0.0	187	67.2	0.0
90 days delinquent	773	4.03	3.8	694	69.6	3.4

Notes: Reported rates are medians. The appreciation rates are compounded monthly.
[a]For loans with an LTV of 100 or greater, a $500 down-payment was assumed.
Source: Self-Help, Fannie Mae, authors' calculations.

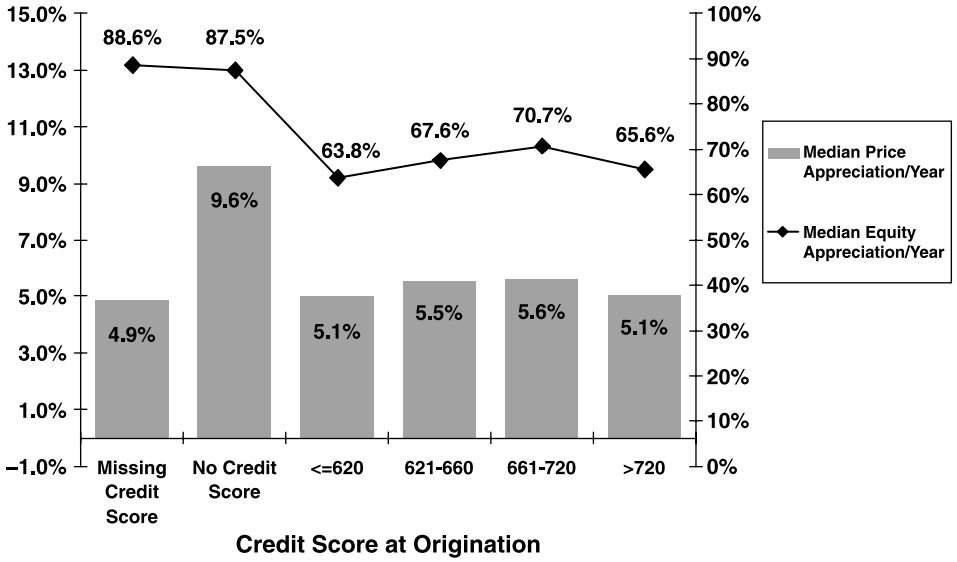

Figure 6. Median annual price and equity appreciation rates, by credit score at origination, 1998–2003

median, than houses owned by whites (Figure 7). These differences translate into lower annual equity appreciation rates: 57 per cent for black CAP borrowers compared with 66 per cent for white CAP participants.

Due largely to their concentration in 'hot' markets such as California, Hispanic and Asian buyers experienced much greater annual gains in wealth than did whites. The median annual price appreciation rate for Hispanics was 13.7 per cent and for

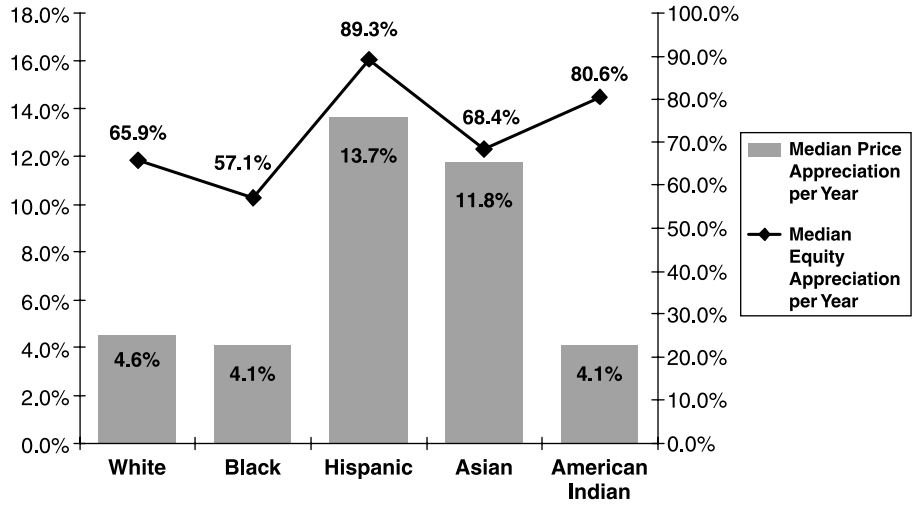

Figure 7. Median annual price and equity appreciation rates, by race and ethnicity, 1998–2003

Asian/Pacific Islander 11.8 per cent, which correspond to median annual equity appreciation rates of 89 per cent and 68 per cent, respectively.

With minority homeownership rates on the rise—from 42 per cent in 1990 to 48 per cent in 2003—experiences like those reported in this paper might help to further trim the wealth deficit that has been narrowing in recent years. According to the Consumer Federation of America & BET.com (2003), from 1989 to 2001, "the ratio of median black household wealth to median US household wealth rose from 9.1% to 22.1" (p. 1).

Home Equity in Household Wealth

The authors' future plans include collecting detailed wealth data for a subsample of the panel of CAP homebuyers, which will make it possible to determine the role of home equity in household wealth. However, at this time, at best it has been possible to relate the estimates of household wealth to gross household income at the time of loan closing. Throughout the study period, homeownership appears to have been a solid investment for all income groups, including those with the most modest incomes (Figure 8). Homebuyers with incomes of less than $20 000 experienced a median increase in 'paper equity' of almost $25 000, just $2000 less than the gain enjoyed by families with incomes between $40 000 and $50 000 (Figure 9).

Including California loans, the median increase in home equity for the lowest income families amounted to about 1.4 times household income at the time of origination, while for families with incomes of $50 000 or more, equity gains amounted to 86 per cent of household income. While excluding California reduced gains for both groups, reductions were proportionately greater for the highest income families (Tables 9 and 10).

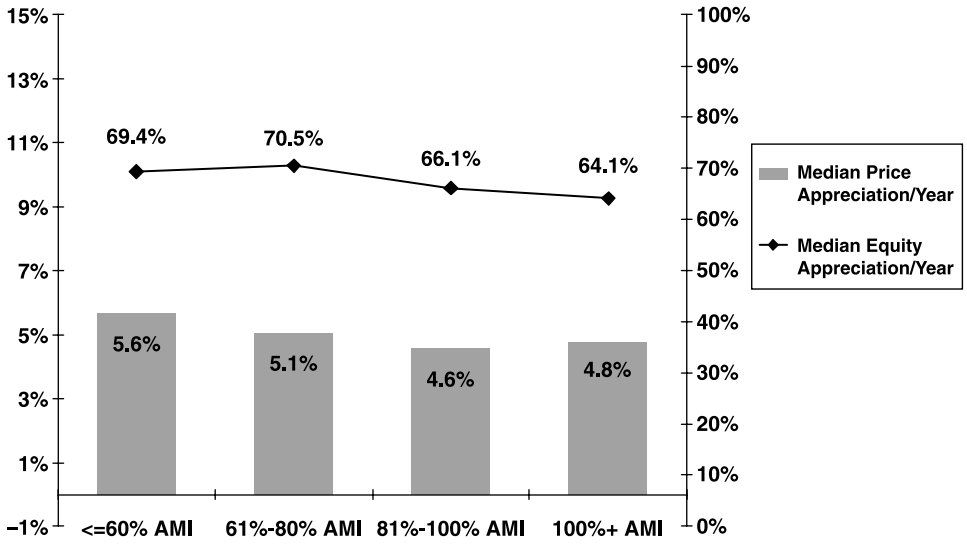

Figure 8. Median annual home price and equity appreciation rates, by household income, 1998–2003

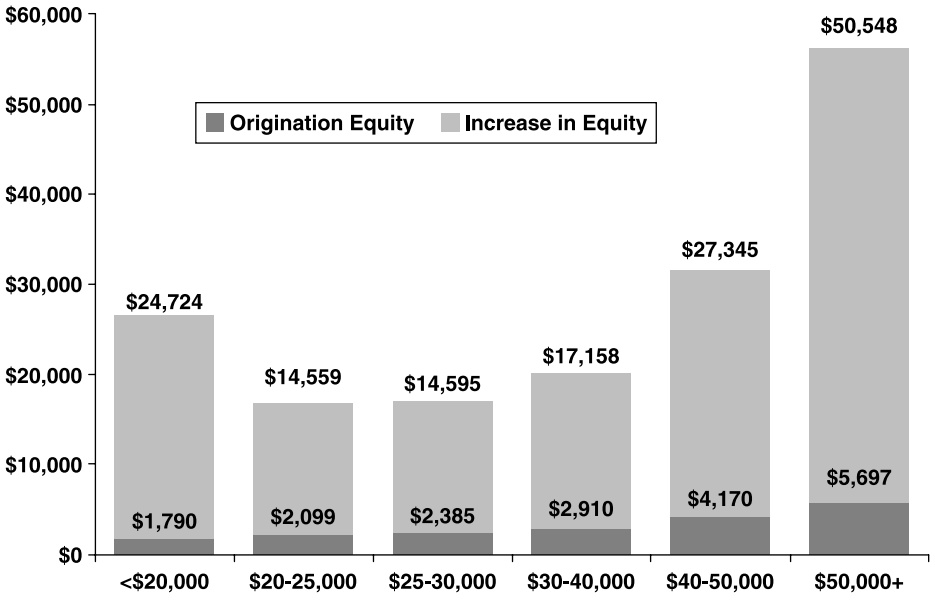

Figure 9. Origination equity and current equity by income CAP loans originated 1998–2002

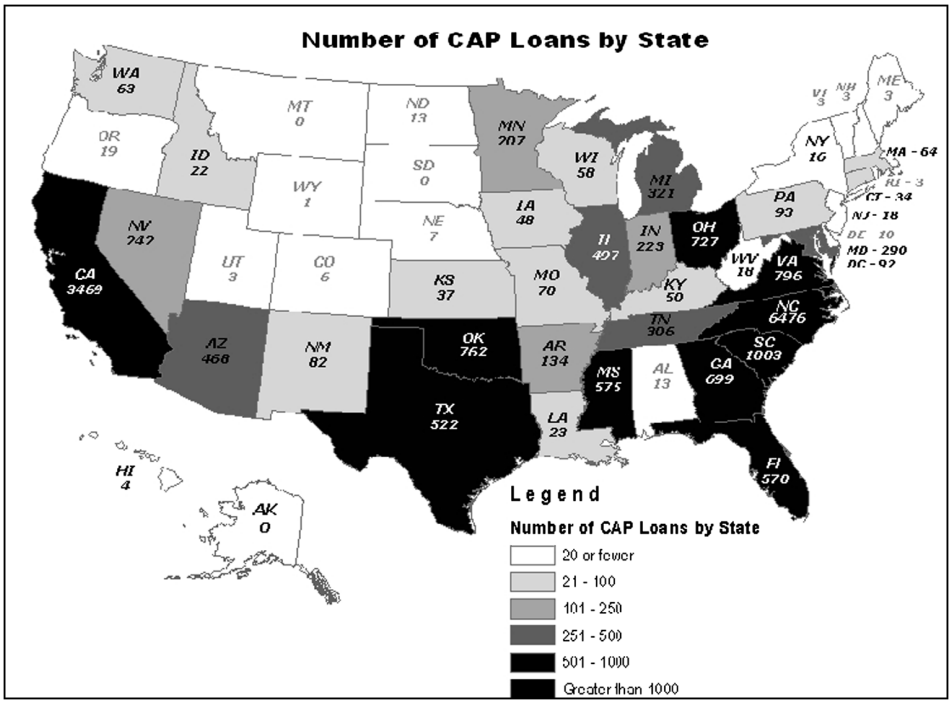

Figure 10. Number of CAP loans by state

Table 9. Median equity change to income ratio by raw income CAP loans, as of September 2003

Income	*N*	Equity change to income ratio
Less than $20 000	1704	1.38
$20 000–24 999	2157	0.65
$25 000–29 999	2425	0.53
$30 000–39 999	3677	0.50
$40 000–49 999	1298	0.61
$50 000 or more	675	0.87

Table 10. Equity change to income ratio by raw income CAP loans, as of September 2003 excluding California loans

Income	*N*	Equity change to income ratio
Less than $20 000	1504	1.09
$20 000–24 999	1952	0.59
$25 000–29 999	2178	0.49
$30 000–39 999	2990	0.41
$40 000–49 999	918	0.36
$50 000 or more	370	0.37

A Note on Prepayment

It was noted earlier that one of the limitations of this paper is that the methodology only permits the measure of paper gains and losses, since the price data are estimates of market value rather than actual sales prices. Another methodological limitation is that while all price estimates are as of 30 September 2003, more than 6000 CAP loans included in the analysis were actually prepaid or terminated prior to that date (Table 11).[9] This means that an unknown number of families might not have actually accrued the full gains (or losses) in housing wealth that is estimated here. From an analytical perspective, the good news is that no difference was found in the median annual appreciation rate of active and prepaid loans, with just one exception. However, the market values of the small number of homes on which a CAP mortgage was foreclosed did increase more slowly than all other loans: 7 per cent of foreclosed homes lost value compared with less than 2 per cent of all active and other prepaid or terminated loans.

Table 11. House price appreciation, 1998–2002 by prepayment and foreclosure status CAP loans, as of September 2003

	N	Annual appreciation rate	% with negative value change
Active loans	12 210	5.38	1.9
Prepaid loans	6604	5.72	0.9
Foreclosed loans	144	3.98	7.6
Returned	295	3.88	2.7

Putting it all Together: Modelling Price Appreciation

Thus far, the paper has described price trajectories for various homebuyer groups and estimated price changes and paper gains and losses in home equity. This final analytic section attempts to model the appreciation process and identify the relationship between price appreciation and neighborhood characteristics, defined at the zip code level. While the multivariate models of the price appreciation rate fit comfortably within an established empirical literature, among the unique elements of this work is that the entire sample consists of low- and moderate-income homeowners, with greater concentrations of women and minority buyers than most similar analyses (see, for example, Ambrose & Goetzmann, 1996; Case & Marynchenko, 2001; Kim, 2000; Oliver & Shapiro, 1997). The exclusion of high-income homeowners from the database limits the generalizability of the findings to the lower end of the income distribution. This is also a strength of the work, since there is little empirical analysis of the experiences of this important population.

As indicated above in the descriptive analysis, both price and equity appreciation were examined. The multivariate models focus only on the price appreciation rate. Because of the highly skewed distribution of the price appreciation rate, the dependent variable in the models is defined as:

$$y_i = ln(1 + r_i)$$

where r_i is the annual appreciation rate for home i.

The goal of the models is to investigate the impact of local characteristics (here defined at the level of zip code) on house price appreciation. A mix of fixed-effects and random-effects models was used to try to capture as much local variation in price appreciation as possible. In addition, all of the models use fixed effects to control for differences due to loan origination year (i.e. year of purchase and length of tenure), the reliability of the AVM estimate (a variable provided by Fannie Mae), and their interaction. Further, estimation of separate error variances for each level of reliability is required because the variation in appreciation rates increases as the reliability of the current value estimates declines. Unfortunately, due to computational difficulties, these separate variances were only added to the final model. The following series of models are estimated:

$$\text{Model 1}: \quad y_{ij} = \alpha_O O_{ij} + \alpha_R R_{ij} + \alpha_{O.R} O_{ij} R_{ij} + e_{ij}$$

$$\text{Model 2}: \quad y_{ij} = \alpha_O O_{ij} + \alpha_R R_{ij} + \alpha_{O.R} O_{ij} R_{ij} + \alpha_Z Z_{ij} + e_{ij}$$

$$\text{Model 3}: \quad y_{ij} = \alpha_O O_{ij} + \alpha_R R_{ij} + \alpha_{O.R} O_{ij} R_{ij} + \alpha_Z Z_{ij} + \beta_m X_{mij} + e_{ij}$$

$$\text{Model 4}: \quad y_{ij} = \alpha_O O_{ij} + \alpha_R R_{ij} + \alpha_{O.R} O_{ij} R_{ij} + \gamma_k C_{ki} + \beta_m X_{mij} + \upsilon_j + e_{iR} R_{ij}$$

Where i subscripts individual properties ($i = 1$ to N_j); j subscripts the zip code the property is located in ($j = 1$ to J) and:

$\alpha_O O_{ij}$ is a set of fixed effects for the origination years (1998–2002);
$\alpha_R R_{ij}$ is a set of fixed effects for the AVM reliability scores (scores $= 1$ to 4);
$\alpha_{O.R} O_{ij} R_{ij}$ is a set of fixed effects for the interaction of origination year and reliability;
$\alpha_Z Z_{ij}$ is a set of fixed effects for zip code (i.e. a dummy variable for each zip code);

$\beta_m X_{mij}$ is a set of independent variables (X_{mij} for m = 1 to M and all i,j) with fixed coefficients (in this case X is a mix of property-level, county-level, and national-level variables);[10]
$\gamma_k C_{ki}$ is a set of zip code-level characteristics (C_{ki}, for k = 1 to K and j = 1 to J) with fixed coefficients that replace the fixed effects for zip code in Model 4;
e_{ij} is a random error term, normally distributed with a mean of 0 and a variance of σ^2;
$e_{iR} R_{ij}$ is a set of reliability-specific random error terms, that is, separate error variances (σ_R^2) for each of the 4 levels of reliability; and,
υ_j is a random effect for zip code with a mean of 0 and a variance of τ.

Model 1 serves as a baseline model and controls only for appreciation differences by origination year, the reliability of the AVM estimate, and their interaction. Model 2 assesses the extent to which price appreciation varies across zip codes. Using fixed effects for zip codes absorbs the maximum amount of variance in price appreciation due to local variations.

In Model 3 variables are added to help explain variation in price appreciation that is not captured by the zip code-level differences. Ideally, a larger number of characteristics of the individual homes would be entered, but the choices are limited due to data availability (e.g. number of bedrooms is missing for a large portion of the data). The purchase price of the property is included to capture differences among properties when purchased. The reason for including this variable is that empirical studies have found that, other things equal, lower priced houses tend to appreciate at faster rates than higher-priced properties (Case & Mayer, 1995).

The mean of the 10-year T-bill rate between the month of purchase and October 2003 is also included to proxy macro-economic conditions and the state of the housing market.[11] A sustained period of low interest rates over the study period should have a positive effect on price appreciation, since lower mortgage interest rates will increase homeownership demand. Because of the historically low interest rates that have been experienced over the past few years, it is recognized that this can lessen the generalizability of the results.

In addition, the mean of the county unemployment rate between the month of purchase and October 2003 is added to Model 3 to account for local economic conditions.[12] High local unemployment is likely to lower homeownership demand. The a priori expectations are based on the proposition that because CAP borrowers are more likely than those with higher incomes to live in low- and moderate-income neighborhoods, these places might be more hard hit by economic downturns, which should depress house prices.

Finally, Model 4 provides a substantive assessment of the local variation in price appreciation rates by replacing the fixed effects for zip code with a set of zip code-specific variables, plus a random effect for zip code.[13] Using 2000 Census data, three broad sets of zip code-level characteristics for local housing attributes, demographics, and other relevant factors are included. It is recognized that Model 4 will explain less of the variation in price appreciation than Model 3 because the array of zip code-level characteristics will not explain all of the local variation that exists, while the random effect will not absorb as much variation as the fixed effects. Nevertheless, Model 4 will provide a greater substantive explanation of local factors affecting price appreciation than any of the preceding models.

For local housing characteristics, the zip code's homeownership rate, median house value and median housing age is included. Areas with high levels of homeownership and high median house values are generally considered among the most desirable neighborhoods in which to live, which should increase property values. Median housing age could have either a negative or positive impact on appreciation, depending upon how 'trendy' a neighborhood is, whether there is significant demand for older homes to renovate, etc., which is dependent upon the neighborhood's type of housing, location and demand.

Among the ZIP-LEVEL demographic variables included in Model 4 are the percentage of the population that is below poverty, the mean unemployment rate over the study period, the percentage of the population that is African American and Hispanic, and population density in 2000. Other things equal, higher local poverty and unemployment rates would be expected to be associated with lower price appreciation rates. The empirical literature also suggests that, other things equal, appreciation rates are lower in high-minority neighborhoods (Ambrose & Goetzmann, 1996; Kim, 2000). Whether or not this relationship will hold when all households in the sample have low- and moderate-incomes is an open question.

In an attempt to assess the potential impact of other neighborhood demographic characteristics, the percentage of the population that is foreign born and the percentage that are single parents are also included. Because of the large Hispanic immigrant population among CAP buyers, the interaction of percentage Hispanic with percentage foreign born is included. Finally, population density for exploratory reasons is included, with no a priori expectations of sign. Finally, the model includes a dummy variable for properties located in California because of the exceptionally high appreciation rates that CAP homeowners have experienced in that state.

Models 1–3 are standard linear models, estimable using ordinary least squares OLS. Model 4 can be estimated using a mixed linear model (to capture the random effect of zip code). Mixed linear models use a maximum-likelihood estimator to estimate models with both fixed and random effects and can estimate the type of heteroskedasticity captured in the reliability-specific error terms[14] (e.g. see McCulloch & Searle, 2000). SAS v.8 PROC MIXED was used to estimate these models (Littell *et al.*, 1996; SAS Institute, 2000).

Data for the models are limited to properties located in zip codes that have at least five total Community Advantage properties (after removing observations with missing data).[15] This created a sample size of 11 524 properties in a total of 821 zip codes. To assess the impact of the five-property cutoff, Model 4 was re-estimated limiting the data to properties in zip codes with at least 10 and at least 20 CAP loans and obtained substantively similar results.

Model Results

Frequencies, means and standard deviations for the substantive model variables are presented in Table 12. A natural log transformation was performed on several variables because they had highly skewed distributions. While it is not the purpose of this paper to fully describe the neighborhoods in which CAP properties are located, Table 12 contains several numbers worth highlighting. Sampled CAP properties had an average purchase price of about $93 000 and are in zip codes with about average homeownership and

Table 12. Descriptive statistics for mark-to-market mixed models 11 524 community advantage properties in 821 zip codes loans originated 1998–2002, appreciation through Q3 2003

	Mean	SD	(%)
Dependent variable			
ln(1 + appreciation rate)	0.0828	0.086	
Property-level variables			
Purchase price[a]	$92 792	$41 465	
National/regional economic characteristics			
Mean of 10-year T-bill rate between purchase and October 2003	4.74	0.34	
Mean county-level unemployment rate between purchase and October 2003	5.25	1.65	
Zip-level characteristics			
Housing			
Homeownership rate	63.13	13.99	
Median house value[a]	$109 860	$45 00	
Median housing age	31.53	10.99	
Demographics			
Per cent African American[a]	22.97	21.77	
Per cent Hispanic[a]	16.26	23.24	
Per cent foreign born[a]	12.30	13.80	
Per cent single-parent families	16.53	6.43	
Poverty and other characteristics			
Per cent below poverty	14.51	7.66	
Population density in 000s[a]	2.78	4.18	
Categorical variables			
Origination year			
1998			21.2
1999			18.1
2000			25.2
2001			23.9
2002			11.6
AVM reliability score			
1 = highest reliability			9.2
2			14.4
3			43.4
4 = lowest reliability			33.1
California			19.2

Note: [a]Variable is logged in the model.
Source: Community Advantage, Fannie Mae, 2000 Census, economy.com and authors' calculations.

poverty rates and above average minority presence relative to the nation as a whole. CAP communities also have significant levels of foreign-born residents.

The results of the models are summarized in Table 13. As mentioned earlier, Model 1 includes only the control variables for year of origination, the AVM reliability index, and the interaction of the two. These control variables account for 19 per cent of the local variation in estimated appreciation rates.[16] Two other measures of model fit, Akaike's Information Criterion (AIC) and Bayes' Information Criterion (BIC), are presented. These measures are most useful in comparing the fit of two models with the main difference between the two measures being that BIC penalizes more heavily for degrees of freedom. Smaller values (or in this case negative values of larger magnitude) are better. Finally,

Table 13. Appreciation rates as a function of property and zip-level characteristics summary of model results community advantage loans originated 1998–2002, appreciation through Q3 2003

	$R^{2\dagger}$	Akaike's information criterion	Bayes' information criterion
Model 1	0.190	−26 163	−26 009
Model 2	0.553	−31 376	−25 259
Model 3	0.643	−33 967	−27 828
Model 4	0.601	−36 077	−35 894
$N = 11\,524$ properties in 812 zip codes			

Notes: All models include fixed effects for Origination Year, AVM Reliability Score, and their interaction. Model 2 also includes a fixed effect for zip code. Model 3 adds the natural log of property value and the mean and standard deviation of the 10-year T-Bill rate between purchase and October 2003. Model 4 replaces the fixed effect for zip code with zip-level characteristics and a random effect for zip code.
†The R^2 is approximated as the square of the correlation between the predicted value and the observed value of the dependent variable.
Source: Community Advantage, Fannie Mae, 2000 Census, economy.com and authors' calculations.

Wald *F*-tests show that each set of control fixed effects is statistically significant (not presented).

Model 2 adds fixed effects for zip codes. This model makes it possible to assess how much local variation there is, after controlling for origination year and AVM reliability. The zip code fixed effects are statistically significant overall and explain an additional 36 per cent of the variation in estimated appreciation rates, raising the explanatory power of the price change model to 55 per cent. Comparing the fit of Model 2 to Model 1, the AIC shows a marked improvement but the BIC is in fact rather worse, suggesting that although the overall fit is better, this model is not parsimonious. The fixed effects for origination year, the AVM reliability index and their interaction remain significant.

Model 3 adds the natural log of the purchase price, the mean of the 10-year T-bill rate between time of purchase and the third quarter of 2003, and the mean county-level unemployment rate over the same period. These variables will be discussed in more detail in Model 4, but all three are significant and these variables explain an additional 9 per cent of the variation, raising the model's explanatory power to 64 per cent. Both the AIC and the BIC improve slightly compared to Model 2.

Model 4 removes the zip code fixed effects and replaces them with zip-level Census variables (which have fixed effects) and a random effect for zip code. As explained above, it is known before estimation that this model will explain less of the total variation than Model 3, however, it provides insight as to which local characteristics drive price appreciation for low-income borrowers. Detailed results for Model 4 are presented in Table 14.[17]

The natural log of the purchase price has a significantly negative impact, which means that the lowest-priced houses are, on average and controlling for other variables in the model, appreciating at a faster rate.

The mean of the monthly 10-year T-bill rates between purchase and October 2003 has a significant negative effect as would be expected. Higher interest rates make it harder for people to buy homes, leading to lower demand and thereby lower appreciation rates. The mean county-level unemployment rate between purchase and October 2003 also has a significant negative effect, as expected.

Table 14. Appreciation rates as a function of property and zip-level characteristics fixed and random effects model results community advantage loans originated 1998–2002, appreciation through Q3 2003

Variables	Model 4
Property-level variables	
ln(Purchase Price)	−0.0723**
National/regional economic characteristics	
Mean of 10-year T-bill between purchase and October 2003	−0.0246**
Mean county-level unemployment rate between purchase and October 2003	−0.0069**
Zip-level characteristics	
Housing	
Homeownership rate	0.0009**
ln(Median House Value)	0.0260**
Median housing age	0.0010**
Demographics	
ln(Per cent African American)	0.0030
ln(Per cent Hispanic)	−0.0160**
ln(Per cent Foreign Born)	0.0090*
ln(Per cent Hispanic) * *ln*(Percent Foreign Born)	0.0063**
Percent single-parent families	0.0024**
Poverty and other characteristics	
Per cent below poverty	−0.0014**
ln(Population Density in 000s)	−0.0004
Geographic identifier	
California	0.0920**
$N = 11\,524$ properties in 821 zip codes	

Notes: Model includes fixed effects for Origination Year, AVM Reliability Score, and their interaction, all statistically significant. The model also includes a random effect for zip code and the AVM Reliability Score, both statistically significant.
*$p < 0.05$; **$p < 0.001$.
Source: Community Advantage, Fannie Mae, 2000 Census, economy.com and authors' calculations.

Focusing on the zip code-level measures, consistent with many other studies, it was found that appreciation of CAP homes is higher in areas with high levels of homeownership and high median house values (Case & Marynchenko, 2001). High neighborhood house values raise appreciation rates, but given that relative price gains are greater for lower priced properties, the results confirm the adage that it is better to own the lowest-priced house in the neighborhood than the highest-priced house. In this sample, older neighborhoods are also appreciating at slightly faster rates.

In the Community Advantage sample, the relationship between price appreciation and the race and ethnicity of the local population is not straightforward after controlling for other neighborhood characteristics. Contrary to much previous research (Ambrose & Goetzmann, 1996; Kim, 2000) the percentage of the population in the zip code that is African American does not have a significant effect on price appreciation.

To assess price appreciation in Hispanic neighborhoods, the interaction of the percentage of the population that is Hispanic and the percentage of the population that is foreign born were included. The former has a significant and negative effect while the interaction term has a significant and positive effect. This means that CAP properties located in zip codes with a high percentage of Hispanic population, and a low percentage of foreign-born population, experienced lower appreciation rates. One plausible

explanation for this is that second- or higher-generation Hispanic neighborhoods are appreciating at a slower rate than first-generation Hispanic neighborhoods. The percentage of the population that is foreign born also has a significant positive effect on price appreciation even in zip codes with a low percentage of Hispanic population.[18]

As expected, the poverty rate in the zip code is negatively associated with price appreciation and is significant. The population density was not significant.

It will be recalled that Model 4 also included a control for California properties, which, as expected, was strongly positive and significant. It included a random effect for zip code and allowed for separate error variances for each level of the AVM reliability index. A chi-square test shows that these terms significantly improve the fit of the model. The fixed effects for origination year, the AVM reliability index, and their interaction were all significant.

Model 4 explains about 60 per cent of the variation in price appreciation of CAP homes (Table 13), nearly as much as Model 3. This suggests that the zip-level characteristics (and the dummy variable for California) included in the model capture nearly all of the local variation, although the significant random effect of zip code means that significant unexplained local variation remains. Comparing the fit of Model 4 to that of Model 3, the AIC shows a solid improvement and the BIC shows a substantial improvement, so both tests suggest that this is a more parsimonious model and is preferred to Model 3.

Conclusions

Over time, it will be possible to substitute actual sales data for estimated price changes and collect detailed data on CAP family assets through in-home wealth surveys and refine and extend this analysis. However, based on the preliminary analysis, it can be reported that the vast majority of CAP families realized substantial gains in paper wealth as a result of their transition from renting to owning. While gains were lower for blacks than whites, the concentration of Hispanic and Asian buyers in rising California housing markets helped these minority families to realize near triple-digit annual increases in equity appreciation. The analysis also found that families with varied credit records, or no established credit history at all, accrued significant gains in gross wealth, which underscores the importance of preparing more of these families to gain a foothold in the homeownership market. Controlling for national and local economic conditions over the study period, and local housing market characteristics such as homeownership rate and racial make-up, approximately two-thirds of the variation in estimated price appreciation experienced by CAP homeowners can be explained.

While there are many caveats and qualifications that surround these early analyses—including that the end prices are estimates and not the result of actual sales, and that the interest rate environment throughout the study period was especially favorable—there is no evidence in the work to suggest that national housing policy should reduce its emphasis on homeownership as a vehicle for potential wealth accumulation by low- and moderate-income families. Indeed, the authors would argue the contrary position. The ongoing evaluation of the Community Advantage Program suggests that prudent efforts to expand the array of affordable mortgage products to underserved populations and housing markets should continue unabated.

Notes

[1] Fannie Mae's *Flexible 100* mortgage allows for no down-payment but does require a contribution of 3 per cent to the closing costs.

[2] Community Reinvestment Act (CRA) loans refer to those loans that a depository institution can use to meets its CRA obligations. Under CRA, depository institutions are evaluated on a periodic basis for the degree to which they meet the credit needs of the communities in which branches are located, particularly the credit needs of low-income borrowers and borrowers in underserved communities. The regulators administering CRA exams then reference these evaluations when considering an institution's application for deposit facilities, particularly applications for merger and acquisition. While the examinations differ by regulatory body and include multiple means for banks to show reinvestment in their communities, most banks develop and implement affordable mortgage products and programs as one component of their CRA strategy.

[3] These requirements mirror the definition of affordable mortgage used by Fannie Mae and Freddie Mac.

[4] Although not quite national in scope, CAP's geographic reach is impressive; CAP includes loans from 47 states and the District of Columbia. Because the program originated in Self-Help's home state, North Carolina lenders have originated 34 per cent of all CAP loans, with lenders in California accounting for 18 per cent and those in South Carolina a distant third at 5 per cent (Figure 10). Virginia, Ohio and Oklahoma each account for about 4 per cent of all loans in the 1998–2002 sample. It should be noted that selection into the CAP program is not a random assignment process. It is likely that the over-sampling of North Carolina relative to the population, if anything, understates the average appreciation rate; however, the study does not attempt to correct for such sampling issues, as the mechanism of selection into CAP is not random assignment.

[5] Post-purchase joblessness among spouses includes those who are not in the labor force.

[6] Scores are grouped into five buckets that categorize the confidence level of predictions, where each successive bucket is characterized by a flatter and more widely dispersed distribution. Because of substantially higher mean and median rate and variance of price appreciation for the least reliable confidence category, it was decided to omit those loans from the analysis.

[7] Each of these models depends both on Fannie Mae's own proprietary loan data as well as public tax record and purchased deed data, and each was tested out-of-sample in ongoing Fannie Mae research efforts. Testing the fitness of a proposed model by verifying that it works well on a separate data sample not used in its development, that is, out-of-sample data, is a common practice to mitigate the over-fitting problem. In other words, it is possible that factors and models perform well on a particular sample of data by chance alone, and optimizing parameters of the models on that sample increases this probability. Verifying that a proposed model works well on out-of-sample data mitigates this risk.

[8] To estimate changes in the Dow Jones Index, the Dow value was taken on 1 January 1998 and 30 September 2003, and the appreciation rate (on an annual basis, compounded monthly) was calculated. The CD annualized rate of return from January 1998 to September 2003 assumes a 6-month CD purchase in January 1998 and rolled over every six months at the national average CD rate in that month (CD rates downloaded from http://mortgage-x.com/general/indexes/default.asp).

[9] Because of time and resource constraints, it was not possible to run the AVM separately for each prepaid loan marking to market all house values on their respective loan termination dates.

[10] For the sake of notational simplicity, measures based on 10-year T-bill rates were assigned to the 'property-level' variables although these are in fact characteristics of the month in which the property was purchased.

[11] Historical T-bill rates were downloaded from the 'Data Buffet' at economy.com on 13 June 2004 (Economy.com, 2004). The original source is the Federal Reserve Board.

[12] Historical monthly county-level unemployment rates, non-seasonally adjusted, were downloaded from the 'Data Buffet' at economy.com on 13 June 2004 (Economy.com, 2004). The original source is the Bureau of Labor Statistics.

[13] As presented, Model 4 is a trimmed model. Other zip-level variables in the full model included the percentage of housing units with incomplete kitchen and/or plumbing, percentage of crowded housing units, percentage of population without a high school diploma, percentage of population with a college degree, and percentage of the population receiving some public assistance. None were significant, and they were removed due to concerns with collinearity and model estimation time.

[14] The reliability-specific error terms are imposed to correct for heteroskedasticity caused by different levels of precision in the AVM scores. In addition to producing the AVM score, Fannie Mae's AVM model assigns each score a reliability value of 1, 2, 3 or 4. Accordingly, the variance of the AVM scores increases with each group. Model 4 includes a fixed effect for each reliability level in order to normalize each group to the same mean value. Because the variance of the error term clearly varies with these fixed effects, a correction is necessary. The reliability-specific error terms refer to the structure imposed on the variance-covariance matrix; observations are grouped by reliability score, but otherwise the matrix is left unstructured. This choice is consistent with the known heteroskedasticity caused by the reliability score fixed effects, but can also be compared to other potential covariance matrix structures using the Akaike Information Criterion (AIC) or a similar measure of fit.

[15] Kreft & DeLeeuw (1998) survey simulation studies addressing the issue of power in mixed linear models. They report that for data with 150 macro-units with 5 micro-units each, the model has a power of 0.90 for detecting cross-level effects. They also report that variance component estimates show no bias with 300 or more macro-units. The data used for the model consist of 11 524 properties in 821 zip codes.

[16] The R^2 is approximated as the square of the correlation between the predicted value and the observed value of the dependent variable.

[17] See footnote 10.

[18] Without the interaction of Hispanic and foreign born, the percentage of the population that is Hispanic does not have a significant effect, while the percentage of the population that is foreign born has a positive and significant effect.

References

Ambrose, B. W. & Goetzmann, W. N. (1996) Risks and incentives in underserved mortgage markets. Available at http://viking.som.yale.edu/will/house/underserved.html (accessed 25 June 2004).

Belsky, E. & Calder, A. (2004) *Credit Matters: Low-Income Asset Building Challenges in a Dual Financial Service System*. BABC 04-1 (Cambridge, MA: Joint Center for Housing Studies, Harvard University).

Case, K. E. & Marynchenko, M. (2001) *Home Price Appreciation in Low- and Moderate-Income Markets*. LIHO-01.7 (Cambridge, MA: Joint Center for Housing Studies, Harvard University).

Case, K. E. & Mayer, C. J. (1995) The housing cycle in eastern Massachusetts: variations among cities and towns, *New England Economic Review (Federal Reserve Bank of Boston)*, March/April, pp. 24–40.

Consumer Federation of America (2003) Study concludes that homeownership is the main path to wealth for lower income and minority Americans. Available at http://www.consumerfed.org/americasaveshome ownership121603.pdf (accessed 25 June 2004).

Consumer Federation of America & BET.com (2003) More African-Americans save and begin to close wealth gap. Available at http://www.consumerfed.org/102903blackamsaves.pdf (accessed 25 June 2004).

Di, Z. X., Yang, Yi & Liu, X. (2003) *The Importance of Housing to the Accumulation of Household Net Wealth*. W03-5 (Cambridge, MA: Joint Center for Housing Studies, Harvard University).

Economy.com (2004) Data Buffet. Available at http://www.economy.com (accessed 13 June 2004).

Geolytics, Inc. (2002) *Census CD 2000 Long Form version 2.0* (East Brunswick, NJ).

Goetzmann, W. N. & Spiege, M. (2002) Policy implications of portfolio choice in underserved mortgage markets, in: N. P. Retsinas & E. S. Belsky (Eds) *Low-Income Homeownership: Examining the Unexamined Goal* (Cambridge, MA: Joint Center for Housing Studies).

Goodman, J. (1997) The costs of owning and renting housing: 1985–1995. National Multi Housing Council Working Paper.

Hurst, E., Luoh, M. C. & Stafford, F. (1998) Wealth dynamics of American families: 1984–1994, *Brookings Papers on Economic Activity*, 98(1), pp. 267–338.

Joint Center for Housing Studies (2002) *The State of the Nation's Housing 2002* (Cambridge, MA: Harvard University).

Joint Center for Housing Studies (2003) *The State of the Nation's Housing 2003* (Cambridge, MA: Harvard University).

Kim, S. (2000) Race and home price appreciation in urban neighborhoods: evidence from Milwaukee, Wisconsin, *Review of Black Political Economy*, 28(2), pp. 9–28.

Kreft, I. G. G. & de Leeuw, J. (1998) *Introducing Multilevel Modeling* (London and Thousand Oaks, CA: Sage).

Littell, R. C., Miliken, G. A., Stroup, W. W. & Wolfinger, R. D. (1996) *SAS System for Mixed Models* (Cary, NC: SAS Institute, Inc).

Marjamaa, L. (2002) Home equity: the cornerstone of wealth. *Community Banker*, September.

McCarthy, G., Van Zandt, S. S. & Rohe, W. (2001) *The Economic Benefits and Costs of Homeownership: A Critical Assessment of the Research* (Chapel Hill: Center for Urban and Regional Studies, University of North Carolina at Chapel Hill).

McCulloch, C. E. & Searle, S. R. (2000) *Generalized, Linear, and Mixed Models* (New York: John Wiley & Sons, Inc).

Office of Federal Housing Enterprise Oversight (2003) *OFHEO Releases Second Quarter 2003 House Price Index*. Available at http://www.ofheo.gov/media/pdf/2q03hpi.pdf (accessed 25 June 2004).

Oliver, M. L. & Shapiro, T. M. (1997) *Black Wealth/White Wealth: A New Perspective on Racial Inequality* (New York: Routledge).

Quercia, R. G., Stegman, M. A., Davis, W. R. & Stein, E. (2002) Performance of community reinvestment loans: implications for secondary market purchases, in: N. P. Retsinas & E. S. Belsky (Eds) *Low Income Homeownership: Examining the Unexamined Goal* (Washington, DC: The Brookings Institution Press. Co-published with the Joint Center for Housing Studies, Harvard University).

Quercia, R. G., McCarthy, G. W. & Wachter, S. M. (2003) The impacts of affordable lending efforts on homeownership rates, *Journal of Housing Economics*, 12, pp. 29–59.

SAS Institute (2000) *SAS version 8.01* (Cary, NC).

US Census Bureau (2002) *Survey of Income and Program Participation* (Washington, DC).