JOINT CENTER FOR HOUSING STUDIES
of Harvard University

Examining Supply-Side Constraints to Low-Income Homeownership

LIHO-01.5

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Auhust 2001

Low-Income Homeownership
Working Paper Series

Thank you to Allegra Calder, Lincoln Institute of Land Policy, and Mark Duda, Harvard Joint Center for Housing Studies, for research assistance.

This paper was prepared for the Joint Center for Housing Studies' *Symposium on Low-Income Homeownership as an Asset-Building Strategy* and an earlier version was presented at the symposium held November 14-15, 2000, at the John F. Kennedy School of Government, Harvard University and at the 2001 AREUEA annual meeting. The Symposium was funded by the Ford Foundation, Freddie Mac, and the Research Institute for Housing America.

This paper, along with others prepared for the Symposium, will be published as a forthcoming book by the Brookings Institution and its Center for Urban and Metropolitan Policy.

Astract

Much of homeownership research and policy focuses on financial or information barriers that might frustrate low-income renter households from buying a home. Given existing subsidies and mortgage products, many low-income households may be in a position to overcome the wealth and income constraints to buying a home. Moreover, homebuyer education and counseling efforts by private and public entities provide potential buyers with information on how to negotiate the process of purchasing a first home. However, households may still be constrained by a lack of adequate housing units at an appropriate sales price in a desired location.

This paper provides a snapshot of the supply of affordable owner-occupied housing using National American Housing Surveys. Using one set of mortgage underwriting assumptions, it finds 44 percent of owner-occupied units are affordable for households with incomes below 80 percent of the area median in 1999, a decreasing share from 1997. Affordable units are older, smaller, and of a lower quality than higher-valued units. Although more than 500,000 new units were built in affordable price ranges from 1997 to 1999, 72 percent of these were mobile units, the majority of which defy traditional notions of homeownership because households do not own the land under the unit.

This paper also examines the transition of affordable homeownership units over a two-year time period. Approximately 78 percent of owner-occupied units affordable in 1997 continued to be affordable in 1999. Affordable homes for ownership are being lost to house price inflation and vacancies. A net 1.7 million homes became unaffordable because of increases in value, a net 153,000 became affordable because of tenure switching, and a net 157,000 were lost from the affordable stock because of vacancies. Overall, there were about a half-million fewer affordable owner-occupied homes in 1999 than in 1997.

Finally, this paper uses the 1995, 1996, and 1998 Metropolitan American Housing Surveys to examine if characteristics of the household, neighborhood, and metropolitan market constrain homeownership rates at the submetropolitan level. It finds factors related to housing supply play a significant role in homeownership rates among low-income households (defined as 50 to 80 percent of the area median income) in the peak home-buying years of age 40 to 65.

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I. Introduction

Homeownership is increasingly being utilized as a social policy believed to promote neighborhood health and stability, while also offering opportunities for low-income families to build financial assets through home equity. Between 1993 and 1997, mortgage lending grew by over 30 percent in low-income census tracts in metropolitan areas, compared to 20 percent overall (Can, Bogdon, and Tong 1999). The surge in home buying among low-income households in the 1990s raises questions about the sustainability of this boom. As the rate of house price appreciation proceeds at twice the rate of inflation in the late 1990s, one question often raised is if the existing supply of affordably-priced owner-occupied housing is adequate to meet the added demand these first-time homebuyers represent. The decision of low-income renter households (defined as earning less than 80 percent of the area median income as defined by the U.S. Department of Housing and Urban Development) to buy a home is contingent upon household financial status, the relative costs of owning and renting, as well as the availability of adequate housing units affordable to them and located in a place they desire to live. Given existing subsidies and affordable mortgage products, many low-income renter households may be in a position to overcome the wealth and income constraints to buying a home. However, households may still be constrained by a lack of adequate housing units at an appropriate sales price in a desirable location.

This paper focuses on three questions: (1) What are the characteristics of owner-occupied units affordable to a household earning less than 80 percent of area median income, and how do they compare to higher-value units? (2) How does the affordable owner-occupied stock change over time? (3) How does the availability and supply of affordable units affect the homeownership rate of low-income households?

The main sections in this paper:

1. Review existing literature on supply-side constraints to low-income homeownership and potential data sources available for studying affordable owner-occupied units;
2. Present a snapshot of the affordable owner-occupied stock in each year, Using the National (1997 and 1999) American Housing Surveys this paper;
3. Examine changes in the affordable, owner-occupied stock 1997 to 1999; and
4. Using the Metropolitan (1995, 1996 and 1998) American Housing Surveys, creates a sub-metropolitan-level specification (using 348 neighborhood-like zones) which examine how the supply of affordably-valued units impacts homeownership rates among low-income households aged 40 to 65, controlling for household, neighborhood and stock characteristics.

II. Review of Literature and Available Data

> With housing prices rising 25 percent from May 1999 to May 2000, the Galinsky's are afraid if they don't get a house now, they may never get one. They're worried they will wind up raising their baby in a studio apartment without a backyard.
>
> —*The San Francisco Chronicle, July 10, 2000*

The relatively strong housing markets that have characterized the last decade in much the nation have highlighted the issue of increasing prices and limited housing choices in many markets (Stegman, 2000). Despite concerns in the popular press, similar to those quoted from the *San Francisco Chronicle* above, there has been relatively little study of the supply of housing units available for low-income households to purchase, as noted by past studies on the subject (Mayer and Sommerville 1996; Mayer 1996; Gyourko and Tracy 1999).

Much of the theory of housing supply dynamics is based on the work of Grigsby (1963), who subdivided housing markets into a matrix of unit and household characteristics, and described the process of older units filtering down to lower-income households over time. More recently Galster (1996) and Downs (1994), have expanded on Grigsby's theoretical work to hypothesize that filtering down of units only works in areas where net housing unit construction exceeds net household formation—areas where new housing units outnumber new households. Markets with a constrained housing supply will result in fewer units filtering down to lower-income households. Clay (1992) argued the filtering down process no longer works effectively as new housing construction has not produced enough units to keep up with the shortage of affordable units created since the 1980s. Malpezzi and Green (1996), however, use metropolitan American Housing Surveys from the 1970s and 1980s to compare the change in lower-cost, substandard rental units (using the methodology refined by Thibodeau, 1992) to the additions to the supply, measured by building permits. Malpezzi and Green show an increase in the existing rental stock of 1.4 percent, due to new construction, will increase the number of lower-priced, substandard units by 2.5 percent, due to the impact new units have on the value distribution. Malpezzi and Green conclude that to the extent any new rental unit is added to the housing stock, regardless of its value, it will enhance the affordability of the existing rental stock by promoting downward filtering. How this might operate in the owner-occupied stock, which experiences lower turnover rates and higher transaction costs, however, remains unexplored.

Sommerville and Holmes (2000) also examine filtering in rental units using the metropolitan AHS over four year periods, finding 52 percent of affordable units remain affordable, 26 percent realize rent increases beyond affordable levels, 4 percent become owner-occupied and 7 percent are demolished (the authors find the remaining 10 percent receive government subsidy to maintain affordability). Sommerville and Holmes find that

changes in neighborhood quality are most predictive of a unit increasing in relative value, but that unit characteristics are most predictive of demolition and removal from the stock. Their analysis showed the filtering process was more sensitive to neighborhood and unit characteristics than short-term changes in market rents.

Gailbraith and Zigmund (1996) examined filtering using the Metropolitan American Housing Surveys, finding that depreciation of homes to affordable levels is slower than previously thought. Green (1993) concludes the supply of low-cost rental units has fallen in recent decades, but not as much as expected. Stegman, Querica, and McCarthy (2000) and Pare (1993) assert the supply of affordable quality housing is restricted because the filtering process is skewed by an increasingly expensive new stock. Pare cites the work of nonprofit housing developers, such as Nehemiah in New York City and Bridge Housing in San Francisco, as strategies to overcome the fixed costs of regulations and land use controls that often prevent for-profit developers from creating new affordable units.

Several researchers, examining the spatial mismatch between the affordable housing stock and employment opportunities, have studied constraints on housing supply in central cities. Kain and Quigley (1972) hypothesized a "supply restriction" due to racial discrimination against blacks limits their housing choices in the central city and suburbs. Bullard (1984) makes a case that minorities are hampered from home buying by restricted neighborhood options. In a revision of his previous work, Kain (1992) emphasizes a shortage of affordable housing for low-income and minority households. Herbert (1997) used 1990 Census data for 50 metropolitan areas to further examine the supply restriction imposed upon blacks, finding these restrictions were particularly evident in the Northeast and Midwest and the availability of detached single-family homes is a strong supply-side predictor of minority homeownership rates.

Gyourko and Linneman (1993) examined the American Housing Survey (AHS) and Census data from 1960 to the 1990s, finding that the predicted demographic boom in homeownership may not be realized because lower-skilled workers have experienced decreasing real wages simultaneous to increasing housing costs. Gyourko and Linneman initially found the quality of affordable units has significantly declined as real prices have increased. The authors note that as real household incomes of low-skilled workers have declined, occupants may defer or neglect the cost of major housing maintenance. However, Gyourko and Tracy (1999) revised this earlier finding concluding the quality of the low end of the housing market has declined less than previously suggested. Yet, the authors continued to find virtually no new housing in an affordable price range is being produced. Stegman, Quercia and McCarthy (2000) use 1998 Metropolitan American Housing Surveys to find a

severe shortage of units priced so that working families can afford them in 17 MSAs. This analysis, however, only looked at units vacant for sale at the time of the survey.

Several researchers have examined the supply-side constraints placed on new construction by strict building codes, approval delays, low-density zoning laws and impact fees (Gyourko and Linneman 1993; Wachter and Schill 1995; Obrinsky 1989). The Advisory Committee on Regulatory Barriers to Affordable Housing (1991) found code regulation and enforcement prevents housing units from filtering to more affordable levels by enforcing a minimum level of housing quality, truncating the filtering process. Malpezzi and Green (1996) explore excessive regulation as a possible reason that the supply of units at the bottom of the U.S. housing market is constricted. The authors do not find evidence of regulation directly impacting tenure choice, but do find increasing housing regulations increase homeownership costs relative to renting. Overall Malpezzi and Green conclude movement from a lightly regulated environment to a heavily regulated one decreases homeownership rates by 10 percent. Vandell (1994) created an index of regulatory barriers for selected metropolitan areas, one of several efforts well-documented by Malpezzi (1994).[1]

Eggers and Burke (1996) simulate demand for homeownership, projecting central cities in the United States would require 1.4 million owner-occupied units in the 1990s. The authors also found 3.7 million single-family rental units exist in these same areas which could be converted to homeownership. The authors assert there will not be a supply constraint limiting the projected central city homeownership boom if these units are allow to change tenure.

Available Data Sources

Although there are several data sources available for an analysis of the housing supply by market value, no dataset is sufficiently recent and detailed. Decenial Census public use micro sample (PUMS) data provide an estimate of owner-occupied housing units with owner-estimated market values and basic housing unit and occupant household characteristics by PUMAS (a collection of census tracts of approximately 100,000 people). However, as micro data, the Census has less detailed unit and household characteristics than the American Housing Survey (AHS). Moreover, Census data are also 10 years old at the time of this analysis. Local real estate agent associations' multiple listing services (MLS) of homes for sale and local government data on recorded real estate transactions are available from several vendors nationally. These data often have information on the unit's location and basic structural characteristics, such the number of bedrooms, year built and square footage. These data are also much more timely than Census data. However, these databases frequently only

[1] Malpezzi has posted a similar index at http://wiscinfo.doit.wisc.edu/realestate/realres1.htm

cover units involved in a transaction during a given period, rather than an estimate of the entire supply, and lack any detail on occupant characteristics. MLS data are further restricted to listings and sales involving real estate brokers, and do not include all transactions.

Home Mortgage Disclosure Act (HMDA) data, collected by the Federal Financial Institutions Examination Council (FFIEC), contain data on many home mortgage loans nationally, including applicant race, income, and the Census tract of the property being financed. Issued annually, these data are also timely. However, HMDA data do not capture the full universe of home mortgage loans, lack data on home value, and are at best an approximation of demand for mortgages rather than the supply of owner-occupied housing units.

The American Housing Survey (AHS) is published every two years by the U.S. Bureau of Census in conjunction with the Department of Housing and Urban Development using the same sample of housing units in the United States. The AHS tracks a panel of units over time, collecting over 500 data points on the unit and its current occupants. A problem with the national AHS, however, is that sample sizes are too small at the metro level, and no smaller areas are available for analysis. Despite its lack of specific geographic locations, because AHS data allow units to be tracked over time and provides rich detail from recent time periods, they are most useful for this analysis.

The 1995, 1996, and 1998 Metropolitan AHS contains most of the variables in the national AHS, but also identifies smaller sub-market areas, called “zones,” of approximately 100,000 people each, depending on the city. Combined, the 1995–1998 data contain 33 metropolitan areas and 378 zones. A list of the MSAs included in the sample and the number of zones for each is provided in Figure 1.

The AHS asks owner-occupants to estimate the market value of their home, or, in the case of vacant units, uses the asking price for the unit. Previous analysis show that market value estimates by occupants are generally unbiased (Kain and Quigley 1972; Thibodeau 1982 cited in Gyourko and Linneman 1993), or may even slightly over-value homes. However, research shows little correlation in this over-estimation to unit or household characteristics (Goodman and Ittner 1992 cited in Gyourko and Linneman 1993). The U.S. Census Bureau conducted a thorough analysis of owner-estimated home values, finding households tend to under-estimate values, but again, without systematic bias (Walters 1974). Kiel and Zable (1999) study the 1978 to 1991 American Housing Surveys to find that the average owner overvalues their home by 5 percent. Although Keil and Zabel found owners who purchased their homes in the last 12 months inflated their home's value more than longer-term owners, the difference between actual and reported values are not related to

particular characteristics of the house, its occupants or the neighborhood. Since the bias is not systematic, AHS occupant estimates of value are reasonable to use in this analysis.

Figure 1

SMSA Name	No. of Zones	SMSA Name	No. of Zones	SMSA Name	No. of Zones
Atlanta	17	Indianapolis	9	Providence	8
Baltimore	17	Kansas City	10	Rochester	6
Birmingham	6	Memphis	7	Sacramento	10
Boston	26	Miami	14	Saint Louis	17
Charlotte	9	Minneapolis	14	Salt Lake City	5
Cincinnati	12	New Orleans	9	San Antonio	10
Cleveland	17	Norfolk/Newport News	6	San Francisco	12
Columbus	9	Oakland	10	San Jose	10
Denver	8	Oklahoma City	6	Seattle	13
Hartford	7	Pittsburgh	15	Tampa	12
Houston	15	Portland OR	8	Washington DC	24
				Total	**378**
Source: 1995, 1996, and 1998 Metropolitan American Housing Surveys					

III: Profile of the Affordable Owner-Occupied Housing Stock

An initial picture of the characteristics of the owner-occupied housing stock can be viewed by breaking down all units into quartiles (Figure 2). Each quartile can be examined for occupant household, unit, and neighborhood descriptive statistics. The distribution of house values in the 1999 AHS shows a predictable pattern of lower-valued homes more likely to be occupied by lower-income households, with mean owner income equal to 82 percent of the area median income, compared to 107 percent in the second quartile. It is also skewed toward minorities (84 percent white, compared to 86 and 89 percent in higher quartiles), as well as older and less-educated householders.

Lower-valued units are also more likely to exhibit lower unit quality, to be older in age, and smaller in size. The data also show lower-quartile units are more likely to be part of multi-unit properties, rather than single-family properties. These units are more likely to be in central city areas and to have problems noted by residents. Figure 2 also shows turnover rates may be slightly higher than would be expected given the older mean age of occupants, yet since these units are also likely to be entry-level units for younger households, such turnover may be consistent.

Figure 2

1999 American Housing Survey Profile of Owner-Occupied Housing Stock by Market Value Quartile											
		1st Quartile		2nd Quartile		3rd Quartile		4th Quartile		All Owner-Occupied Units	
	Median Market Value	$40,000		$80,000		$125,000		$230,000		$110,000	
Householder Characteristics	Variable	Mean	*Std. Err.*	Mean	*Std. Err.*	Mean	*Std. Err.*	Mean	*Std. Err.*	Mean	*Std. Err.*
	Householder age	53.0	0.221	52.6	0.204	51.7	0.167	51.4	0.157	52.1	0.093
	% White householder	83.8	0.005	85.9	0.004	89.3	0.003	89.4	0.003	87.3	0.002
	Householder high school grad	71.4	0.006	83.3	0.005	87.7	0.003	93.0	0.003	84.2	0.002
	Householder college grad	9.3	0.004	18.6	0.005	30.0	0.005	48.4	0.005	27.3	0.003
	% Median Income	82.4	0.010	107.0	0.011	138.1	0.013	206.5	0.020	135.5	0.008
Unit Characteristics	% First-time homeowners	55.1	0.006	51.6	0.006	41.0	0.005	29.3	0.005	43.7	0.003
	First occupant	11.0	0.004	7.0	0.003	12.4	0.003	18.4	0.004	12.4	0.002
	Annual maintenance $	$ 331	9.171	$422	10.032	$493	9.177	$760	14.051	$508	5.583
	% Inadequate	9.0	0.004	3.7	0.002	2.8	0.002	2.0	0.002	4.3	0.001
	Median decade built	1960		1960		1970		1970		1960	
	% Mobile	32.5	0.006	2.0	0.002	0.3	0.001	0.2	0.000	8.2	0.002
	% Single-family (includes mobile)	94.3	0.003	94.1	0.003	96.2	0.002	96.7	0.002	95.4	0.001
	% Detached SF	57.5	0.006	86.0	0.004	90.5	0.003	91.7	0.003	82.1	0.002
	Unit square feet	1,479	15.156	1,785	16.112	2,067	14.915	2,760	20.666	2,049	9.028
Neighbor-hood Characteristics	Rating of unit	8.0	0.023	8.3	0.019	8.5	0.015	8.8	0.014	8.4	0.009
	Central city	22.5	0.005	25.9	0.005	21.1	0.004	21.2	0.005	30.3	0.002
	Anything bothersome	15.4	0.004	15.3	0.004	14.4	0.004	14.6	0.004	14.9	0.002
	Moved last 2 years	16.6	0.005	13.7	0.004	14.4	0.004	18.0	0.004	15.7	0.002

Source: 1999 American Housing Survey Note: Standard error is the standard deviation of the sampling distribution of the mean, or : $\sigma_M = \frac{\sigma}{\sqrt{N}}$ where σ is the standard deviation of the original distribution and *N* is the sample size.

While Figure 2 describes all homeowners, the current market for potential low-income buyers may be better approximated by recent first-time homebuyers. Figure 3 shows all first-time buyers who recently purchased homes, as well as low-income first-time buyers from the 1999 AHS. Low-income buyers tend to purchase lower-cost homes, that are older, smaller, more urban and in poorer condition. Low-income buyers are also more likely to purchase mobile homes than other first-time buyers.

Figure 3

Units Recently Purchased (previous 2 calendar years) in 1999 AHS				
	All First-Time Buyers		First-Time Buyers with Incomes Below 80% of Area Median	
	Mean	*Std. Err.*	Mean	*Std. Err.*
Median Value	$ 90,000		$65,000	
Median Decade built	1970		1960	
% Inadequate	5.6	0.007	8.3	0.014
% Mobile	14.2	0.011	20.6	0.020
% Single-family	90.5	0.009	89.7	0.015
Unit square feet	1,729	45.269	1,493	72.948
Rating of unit	8.4	0.047	8.2	0.085

Central city	27.6	0.014	30.3	0.023
Anything bothersome in neighborhood	15.6	0.011	14.0	0.017
Source: 1999 American Housing Survey				

While lower-income homeowners are most likely to occupy mobile units, the share of homeowner units that are mobile varies by region. Figure 4 shows both 1997 and 1999 owner-occupied units by region, including homeownership rates and the share of mobile homes. Overall, the share of mobile homes occupied by low-income homeowners is increasing, particularly in the South. Mobiles are three times more likely to be the South than Northeast. Low-income homeownership rates appear to be dropping, especially in the higher-cost Northeast and Midwest.

Figure 4

	1997			1999		
All Regions	Owner-Occupied Units (000)	Percent Homeowner ship Rate	Percent Mobile Homes	Owner-Occupied Units (000)	Percent Homeowner ship Rate	Percent Mobile Homes
< 50% area median	16,622	47	8.4	15,517	48	8.7
50-80% srea median	10,753	60	8.1	11,338	59	7.2
80-120% area median	13,142	74	7.0	12,791	72	7.6
120% or more	24,958	88	3.1	29,134	88	3.6
Northeast	-			-		
< 50% area median	3,190	44	4.2	2,911	44	4.3
50-80% area median	1,904	56	3.7	1,872	53	3.2
80-120% area median	2,429	72	3.1	2,361	71	2.4
120% or more	4,716	87	1.0	5,497	86	1.4
Midwest (North Central)	-			-		
< 50% area median	3,956	50	5.9	3,854	52	6.9
50-80% Area Median	3,056	65	7.5	3,039	65	5.4
80-120% Area median	3,658	80	4.2	3,413	79	5.7
120% or more	6,229	92	2.1	7,259	92	2.1
South	-			-		
< 50% Area median	6,599	53	12.6	5,953	52	12.8
50-80% Area median	3,747	62	11.4	4,246	62	11.1
80-120% Area median	4,431	73	11.9	4,588	72	12.5
120% or more	8,868	88	4.7	10,400	88	6.2
West	-			-		
< 50% area median	2,877	38	8.1	2,799	39	8.1
50-80% area median	2,046	54	7.3	2,181	52	6.3
80-120% area median	2,623	70	6.2	2,430	65	6.4
120% or more	5,145	84	3.1	5,991	85	3.1

Source: 1997 and 1999 American Housing Surveys

Methodology for Calculating Target Affordable House Values

While a distribution of market values allows a gross analysis of homes that might be affordable to lower-income families, because of the large variance in regional income and home values the lower quartile of values nationally includes some homes that are priced well above affordable levels in low-housing cost markets. A more refined approach is to define a target affordable price for each metropolitan housing market based on the local median income. In addition, local median property taxes and hazard insurance rates also vary dramatically across the nation's metropolitan housing markets. In order to better estimate which homes are truly affordable to low-income families, a better approach is to estimate tax and insurance rates for each metropolitan area.

This analysis uses the AHS to determine a target affordable owner-occupied home value for each metropolitan area (MSA), and then categorizes each owner-occupied unit in the survey (with a value available) as being affordable to a family earning 80 percent or less of the area median income, or not using a dichotomous designation. In general, mortgage underwriters allow a maximum housing payment to income ratio, including the mortgage principal and interest, property taxes, and hazard insurance, (referred to as PITI). This paper uses a conventional, conforming loan underwriting "front-end" ratio of 28 percent. It also assumes a modestly aggressive loan-to-value ratio of 90 percent, resulting in a buyer contribution of a 10 percent downpayment in addition to closing costs. No mortgage insurance is assumed in this analysis, although this assumption is analyzed and discussed later in the paper. Throughout this analysis a 30-year, fixed-rate mortgage at the effective mortgage rate at of the time of the survey is used.

The target affordable value for each market is based on the amount of monthly mortgage debt service 80 percent of the area median income will support (based on U.S. Department of Housing and Urban Development estimated area median incomes for the relevant year). The monthly payment, of course, also includes property taxes and insurance, which are calculated as a percentage of the target affordable house value. In order to solve this simultaneous equation, a formula must be used to calculate the ratio of mortgage principal and interest to income for each metropolitan area, while still preserving a 28 percent maximum total front-end ratio. The share of income allocated to the mortgage principal and interest payment was calculated for each metro area. In non-metro or suppressed metro areas, regional values were substituted, broken down by metro status. Median property tax and hazard insurance rates for each area were also calculated using this same method.

The formula used to derive the mortgage principle and interest payment to income ratio is as follows:

L= Loan to Value Ratio

K= Mortgage Constant (annual for 360-payment, 30-year fixed-rate loan, see Figure 5 below)

R= Maximum housing-to-income ratio (assumed to be 28% = principal, interest, taxes, & insurance / income)

P = Area median property tax as a percent of median property value (calculated by MSA as median AMTX/ median VALUE)

H = Area median property hazard insurance as a percent of median property value (calculated by MSA as median AMTI/ median VALUE)

I = 80% * Income (area median income as provided by HUD, using 80 pecent as low-income cutoff)

X = Principle and interest payment-to-income ratio (variable due to local income, taxes, and insurance)

$$R\,I = \frac{P\,(XI)}{LK} + \frac{P\,(XI)}{LK} + XI \rightarrow LKR = PX + HX + XLK \rightarrow LKR = X\,(P + H + LK)$$

$$X = \frac{L\,K\,R}{(P + H + LK)}$$

The mortgage constant is calculated using a monthly payment for a 30-year, fixed-rate mortgage in the year of each survey using effective interest rates calculated from contract rates published by the Federal Home Loan Mortgage Corporation. The effective interest rates and mortgage constants used in this analysis are shown in Figure 5.

Figure 5

Year	Total Effective % Rate	Annual Mortgage Constant [2]
1995	8.19	0.0897
1996	8.06	0.0889
1997	7.86	0.0872
1998	7.09	0.0806
1999	7.58	0.0847

Source: Freddie Mac Primary Mortgage Market Survey

[2] Mortgage Constant = *monthly interest rate* / [1 - (1 / (1 + monthly *interest rate*) ^{360}], for a 30-year mortgage.

Examination of Affordable Stock Given Metropolitan Median Income, Taxes and Insurance

Figure 6 presents a snapshot of the affordable stock, including and excluding mobile units, compared to the universe of all owner-occupied units and unaffordable units. Nationally, 47.3 percent of existing owner-occupied units were affordable to a low-income family in 1997. The affordable share decreased to 44.2 percent in 1999. Compared to the rest of the owner-occupied stock, occupants of affordable units are more likely to be older in age, more likely to be of a non-white race, less likely to be a high school graduate, lower income, and likeliest to be first-time homebuyers. Affordably units are more likely to be in central cities, lesser quality neighborhoods, and closer to the occupant's employment. Affordable units are also older, more likely to be severely or moderately inadequate, smaller in size, less likely to be single-family, detached units, and more likely to be mobile.

Figure 6

			All Owner-Occ Units		Affordable Units		Affordable - Excluding Mobiles		Above Affordable	
		Year	Mean %	*Std. Err.*	Mean %	*Std. Err.*	Mean %	*Std. Err.*	Mean %	*Std. Err.*
Occupant Characteristics	As % of all owner units	1997	100.0		47.3		43.3		52.7	
		1999	100.0		44.2		39.4		55.8	
	Mean householder age	1997	52.0	*0.100*	52.6	*0.156*	53.2	*0.167*	51.5	*0.128*
		1999	52.1	*0.093*	52.8	*0.153*	53.6	*0.165*	51.6	*0.114*
	Percent white	1997	88.2	*0.002*	85.4	*0.003*	84.5	*0.004*	90.8	*0.002*
		1999	87.3	*0.002*	83.9	*0.003*	82.8	*0.004*	89.9	*0.002*
	% high school grad	1997	83.7	*0.002*	76.8	*0.004*	78.0	*0.004*	89.9	*0.003*
		1999	84.2	*0.002*	77.0	*0.004*	78.4	*0.004*	89.9	*0.002*
	% median income	1997	113.2	*0.005*	82.5	*0.006*	84.4	*0.006*	140.8	*0.008*
		1999	135.5	*0.008*	91.4	*0.007*	93.3	*0.008*	170.4	*0.012*
	% first-time homeowners	1997	46.6	*0.003*	56.5	*0.004*	58.8	*0.005*	37.7	*0.004*
		1999	43.7	*0.003*	54.3	*0.004*	56.8	*0.005*	35.3	*0.004*
Unit and Neighborhood Characteristics	% central city	1997	22.8	*0.003*	26.1	*0.004*	30.2	*0.004*	19.8	*0.003*
		1999	22.5	*0.002*	25.5	*0.004*	30.2	*0.004*	20.2	*0.003*
	% citing neighborhood problems	1997	15.0	*0.002*	16.1	*0.003*	16.3	*0.004*	14.1	*0.003*
		1999	14.9	*0.002*	15.7	*0.003*	15.7	*0.003*	14.2	*0.003*
	Median time to work (avg. all workers in household)	1997	20		17		15		20	
		1999	20		19		18		20	
	Median decade built	1997	1960		1960		1950		1970	
		1999	1960		1960		1950		1970	
	% Inadequate	1997	4.4	*0.001*	6.5	*0.002*	6.6	*0.002*	2.6	*0.001*
		1999	4.3	*0.001*	6.4	*0.002*	6.5	*0.002*	2.6	*0.001*
	Rating of neighborhood	1997	8.1	*0.012*	7.9	*0.018*	7.8	*0.02*	8.4	*0.014*
		1999	8.2	*0.010*	7.9	*0.017*	7.9	*0.018*	8.4	*0.012*
	Unit square feet	1997	1,966	*6.374*	1,605	*8.097*	1,708	*8.951*	2,268	*8.62*
		1999	2,049	*9.028*	1,608	*11.183*	1,709	*12.84*	2,383	*12.68*
	% Detached single-family	1997	82.1	*0.002*	71.5	*0.004*	85.1	*0.003*	91.6	*0.002*
		1999	82.1	*0.002*	69.6	*0.004*	85.1	*0.003*	92.0	*0.002*
	% Mobile homes	1997	8.0	*0.002*	15.9	*0.003*	0.0	*0*	0.9	*0.001*
		1999	8.2	*0.002*	18.2	*0.003*	0.0	*0*	0.3	*0*
	% Built in last 2 years	1997	3.1	*0.001*	2.2	*0.001*	0.8	*0.001*	4.0	*0.002*
		1999	2.7	*0.001*	1.8	*0.001*	0.7	*0.001*	3.4	*0.001*
	% Moved last 2 years	1997	20.2	*0.002*	19.1	*0.004*	16.7	*0.004*	21.2	*0.003*
		1999	20.6	*0.002*	19.3	*0.003*	16.6	*0.004*	21.5	*0.003*

Source: 1997 and 1999 American Housing Survey

While house values and incomes are closely correlated, households also obtain homes without tapping into income, or purchase homes at earlier points in the income life cycle. As a result, many affordable units are not occupied by low-income households. Likewise, due to house price inflation and lower incomes in retirement, lower-income households might also own high-value homes. Figure 7 presents the share of units that are affordable to households with incomes below 80 percent of the area median, by the income group of the occupant. While lower-income households are most likely to live in housing units that are valued affordably, one-quarter to one-third of high-income households also live in homes that they value in an affordable range. A larger share of homes occupied by lower-income households are actually valued at levels that could be deemed unaffordable to them in the current period.

Figure 7

Percent Affordable for Low-income Household				
	Percent Share Affordable Including Mobile		Percent Share Affordable Excluding Mobile	
Household Income	**1997**	**1999**	**1997**	**1999**
< 50% Area Median	65.3	62.3	60.9	56.3
50-80% Area Median	61.8	59.1	57.9	54.7
80-120% Area Median	51.0	50.1	47.1	45.3
120% or more	27.1	26.1	25.0	23.3
All Owner Occupied	**47.3**	**44.2**	**43.3**	**39.4**
Source: 1997 and 1999 American Housing Surveys				

Figure 8 shows the regional share of homes that are affordable given local market conditions. The West, where less than one in four non-mobile homes is affordable, declined dramatically in affordable share from 1997 to 1999. The share of homes locally affordable is highest in the South and Midwest, although much of the South's affordable stock appears to be concentrated in mobile units.

Figure 8

	Percent Share Affordable Including Mobile		Percent Share Affordable Excluding Mobile	
Region	**1997**	**1999**	**1997**	**1999**
Northeast	40.9	37.8	38.9	35.4
Midwest (North Central)	54.8	50.2	52.2	47.3
South	53.8	52.2	48.5	45.7
West	31.4	27.2	26.0	21.3
All Owner Occupied	**47.3**	**44.2**	**43.3**	**39.4**
Source: 1997 and 1999 American Housing Surveys				

The calculations used in this analysis assume a 10 percent downpayment, and a 28 percent housing cost-to-income ratio (front-end). It is also assumed that all closing costs are not to be financed but are instead paid for out of borrower assets. Although 90 percent loan-to-value ratio mortgages may require mortgage insurance until the equity in the home increases to 20 to 30 percent of the house value, this analysis does not include mortgage insurance costs. This is reasonable, since, given the ratios used, it is not uncommon in recent years for such loans not to require mortgage insurance. However, underwriting ratios and interest rate assumptions clearly have an impact on affordability estimates. To examine the impacts of the assumptions used in this paper, the following three scenarios are modeled: (1) An 80 percent loan-to-value (LTV) ratio with a 28 percent front-end ratio, and a 7.6 percent effective interest rate (the average rate at the time of the survey); (2) the scenario used throughout the rest of this paper, a 90 percent LTV with 28 percent front-end ratio and no mortgage insurance; and (3) a more aggressive approach, using a 97 percent LTV, with a 33 percent front-end ratio and mortgage insurance providing 30 percent coverage, estimated to cost 50 basis points, and resulting in a total effective interest rate of 8.1 percent.[3]

As shown in Figure 9, the more aggressive the model, the higher the share of units that are affordable to low-income households. The impacts are generally scalar, however. Other than shifts in relative magnitudes, the trends concluded using the Model 2 approach (a 90 percent LTV and 28 percent front-end ratio) will remain relevant regardless of the assumption used. Of course, as more aggressive approaches categorize more of the stock as affordable, this subgroup will more resemble the entire population of units, muting differences between homes valued at affordable and unaffordable levels.

Figure 9

		Percent in Region			
Underwriting Criteria	*All*	*Northeast*	*Midwest*	*South*	*West*
Model 1: 80% LTV, 28% FE ratio, 7.6% rate	43	36	49	51	26
Model 2: 90% LTV, 28% FE ratio, 7.6% rate	44	38	50	52	27
Model 3: 97% LTV, 33% ratio, 8.1% rate (w\ MI)	52	46	59	61	34
Source: 1999 American Housing Survey					

[3] This is similar to the Fannie Mae affordable lending product called Fannie97. Underwriting scenarios based on *2001 MGIC Mortgage Underwriting Guidelines* < www.mgic.com >. The cost of mortgage insurance varies by state and coverage.

IV: Units Added to Affordable Stock

Simplistically, there are three modes through which additional affordably-valued units may be added to the housing stock:

1. New units are built at affordable price levels (with or without subsidy), mobile units are placed, existing ownership units are subdivided into lower-priced ownership units (such as condominiums or cooperatives), or vacant units are converted into affordable ownership units;
2. Units decline in value ("filter down") due to deteriorating unit or neighborhood conditions, as well as the dynamics of market-wide supply and demand for housing; and
3. Rental units are converted to homeownership units at affordable price levels.

New Units 1997–1999

Figure 10 shows that approximately 30 percent of new units (built from 1997 through 1999) were valued in the AHS at a level that would be affordable to a household earning 80 percent or less of area median income. Over a half million units were added to the affordable stock. Most of these new units (69 percent), however, are mobile units, of which two-thirds do not include ownership of land. Given the importance placed on homeownership as an asset-building mechanism, these units without land are of concern. It is not clear this non-conventional form of unit-ownership without land-ownership is consistent with the social and financial benefits ascribed to homeownership policies.

Figure 10

Owner Occupied Units (in thousands) in 1999 AHS by Year Built and Mobile Home Type									
	2 or More Years Old			Built Last 2 Years			Total		
	All	*All Mobile*	*Mobile-No Lot*	*All*	*All Mobile*	*Mobile-No Lot*	*All*	*All Mobile*	*Mobile-No Lot*
Above affordable value	37,110	99	11	1,290	14	5	38,400	113	95
Affordable value	29,840	5,160	2,548	540	375	251	30,381	5,535	2,721
Total units	66,950	5,259	2,559	1,830	390	257	68,780	5,648	2,816
Affordable as % of total	44.6	98.1	99.6	29.5	96.3	97.9	44.2	98.0	97

Source: 1999 American Housing Survey. Note: approximately 1.1 million mobile units Are defined as rental units and excluded from this figure.

Transition and Filtering of Affordable Units 1997 to 1999

The panel nature of the AHS allows matching affordable units from the 1997 survey to the 1999 survey. As Figure 11 shows, this exercise reveals that nearly four out of five of the units affordable to low-income households in 1997 remained affordable in 1999. Meanwhile, 13 percent of units valued above affordable levels in 1997 became affordable by 1999.

More existing units are filtering up than down; 1.4 units increase in value for every one that decreases in value. On net, 1.7 million units that were affordable in 1997 became unaffordable by 1999 due to changes in value.

Approximately 1.4 million units were converted from rentals to affordable owner-occupied units in 1999. However, 1.25 million owner-occupied units in 1997 were converted to rental by 1999. As a result, a net of only 153,000 units were added to the affordable stock from conversions.

Approximately 1.2 million affordable units in 1997 became vacant by 1999. Fewer vacant units from 1997 were re-occupied as affordable units by 1999. On net, 157,000 units were lost from the affordable stock due to vacancies.

Overall, units are only being added to the affordable owner-occupied supply via new construction (most of which are mobile homes, as shown in Figure 10) and a small number of rental unit conversions.

Figure 11

Affordable Owner-Occupied Units: 1997 to 1999	
	Units (000)
1997 Affordable Owner ->1999 Not Affordable Owner	5,675
1997 Not Affordable Owner -> 1999 Affordable Owner	3,987
Net Filtering	**(1,689)**
1997 Affordable Owner -> 1999 Rental	1,247
1997 Rental ->1999 Affordable Owner	1,400
Net Conversion from Rental	**153**
1997 Affordable Owner -> 1999 Vacant	1,152
1997 Vacant >1999 Affordable Owner	995
Net Conversion from Vacant	**(157)**
Grand Totals	
1997 Affordable Owner -> 1999 Affordable Owner	**20,650**
1999 New Units Added at Affordable Values	540
Net Filtering	(1,689)
Net Conversion from Rental	153
Net Conversion from Vacant	(157)
Total 1999 Matched Affordable Owner Occupied	**19,498**

Source: 1997 and 1999 American Housing Surveys. Note: Affordable categories include only valid interviews where respondents provide estimates of property values in both 1997 and 1999.

Conversion of Rental Units to Affordable Units 1997 to 1999

Units converted from rental to ownership are of particular interest, as these units are an obvious source of supply for increased low-income ownership. Figure 12 shows only 56 percent of these converted units were detached single-family units in 1997. Units converted to affordable ownership units are also much smaller in size than units converted to higher-value owner-occupied units. A surprisingly large share of rental units are converted to higher-priced homeownership units.

Figure 12

Transition	Units (000)	% Single-family Detached	Mean Square Footage
1997 Rental ->1999 Affordable Owner	1,400	56	1,350
1997 Rental -> 1999 Not Affordable Owner	993	75	1,964
1997 Affordable Owner -> 1999 Rental	1,247	58	1,406
1997 Not Affordable Owner -> 1999 Rental	601	74	1,857

Source: 1997 and 1999 American Housing Surveys Note: Figure uses 1997 weights

V: Stock Effects on Sub-Market Homeownership Rates

Homeownership rates are impacted by a variety of household, unit, neighborhood and market characteristics. This analysis focuses on mean homeownership rates among households aged 40 to 65 earning 50 to 80 percent of the area median income in each zone in the 1995 to 1998 Metropolitan American Housing Surveys (378 zones total). Homeownership rates for this restricted low-income population of peak home-owning age can be modeled using aggregated household characteristics for this population at the neighborhood (zone) level, as well as housing stock and location characteristics. An MSA level variable can be used to control for larger-market influences on homeownership.

Using an regression with Huber-White robust estimations of variance (to account for heteroskedastic MSA-zone relationships) with zone homeownership rates for low-income 40-65 year old households, this model seeks to provide evidence of supply characteristics that have a statistically significant impact on homeownership rates.

Household factors include the percent of low-income 40- to 65-year-old households in the zone that are white, as a measure of cultural or racial effects, and the percent of this subpopulation that are high school graduates, as crude measure of permanent income. Unit characteristics include the property and unit size, the percentage of single and multifamily units built in last two years, resident satisfaction ratings, unit adequacy (moderately or severely in adequate), and the share single-family, multifamily, and condominium units. Neighborhood characteristics include the zone's central city status and mean resident ratings.

Market characteristics, such as house price appreciation, regulations, and interest rates, are captured by MSA dichotomous variables. Of the 33 MSAs in the 1995 to 1998 surveys, 32 are included in the specification. Norfolk/Newport News is left to the residual. Figure 13 provides descriptive labels and statistics for the variables used (the MSA dummies are omitted—see Figure 1 for a list of MSAs and zones).

Figure 14 shows the results of this specification. *Ceteris paribis*, movement from a neighborhood that has a lower share of homes that are affordable to lower-income households, to one with a larger share of affordable homes, is associated with higher homeownership rates for lower-income households of peak home-buying years. Housing stock variables explain much of the variation on homeownership rates for 40- to 65-year-old low-income households. Single-family units, both in the owner-occupied (non-mobile) and rental stock, are most significant. Also, a greater share of units built in the last two years is a statistically significant factor in low-income homeownership rates.

Figure 13: Descriptive Statistics for 1995-1998 Metropolitan American Housing Survey Zone-Level Dataset

Variable Definition	Obs	Mean	Std. Dev.	Min	Max
Homeownership rate for low-income homeowners age 40-65	363	0.57	0.18	0.0	0.9
Share of owner-occupied units in zone at affordable values	378	0.37	0.25	0.0	1.0
Percent white for low-income homeowners age 40-65	372	0.76	0.29	0.0	1.0
Percent high school graduates for low-income homeowners age 40-65	372	0.81	0.19	0.0	1.0
Percent units inadequate (mod or sev) for owner-occupied units in zone	378	0.05	0.05	0.0	0.4
Median unit size (000) for owner-occupied in zone	378	1.73	0.37	0.1	3.5
Median lot size (000) for owner-occupied in zone	378	57.98	193.27	2.5	1000.0
Percent single-family units built in last two years in zone	378	0.02	0.02	0.0	0.1
Percent multi family units built in last two years in zone	378	0.01	0.01	0.0	0.0
Single-family as a share of rental stock in zone	378	0.40	0.18	0.0	1.0
Single-family share of owner-occupied, non-mobile stock in zone	378	0.82	0.16	0.2	1.0
Condo share of multi-family stock in zone	378	0.10	0.09	0.0	0.6
Central city status of zone	378	0.32	0.47	0.0	1.0
Mean rating of neighborhood as place to live in zone	378	7.86	0.58	5.9	8.9
Percent incomes <80% of MSA median in zone	378	0.43	0.14	0.2	0.8

Malpezzi's regulatory index is shown in parenthesis next to each MSA variable, although the index does not cover all of the MSAs listed. While several of the MSA-level variables are significant, there is little correlation between markets considered by to be highly regulated and constricted low-income homeownership rates.

This model remains a preliminary approach. Future research could be refined using an instrumental variable and two-stage regression approach with a larger number of zones from more surveys and richer data on local market conditions. Issues of constraints introduced by regulation could be better explored by integrating zone level data on regulatory conditions. However, this prefatory analysis provides evidence that a reduction in the share of units that are affordable for households with incomes below 80 percent of the area median may result in decreased low-income homeownership rates.

Figure 14

Dependent Variable:				
Homeownership rate for low-income (50-80% of AMI) homeowners aged 40-65	**Coef.**	**Robust Std. Err.**	**t**	**P>|t|**
Share of owner-occupied units in zone at affordable values	0.20	0.10	2.01	0.05
Percent white for low-income homeowners age 40-65	0.00	0.04	-0.09	0.93
Percent high school graduates for low-income homeowners age 40-65	0.08	0.06	1.29	0.20
Percent units inadequate (mod or sev) for owner-occupied units in zone	0.01	0.31	0.04	0.97
Median unit size (000) for owner-occupied in zone	-0.06	0.04	-1.35	0.18
Median lot size (000) for owner-occupied in zone	0.00	0.00	0.97	0.33
Percent single-family units built in last two years in zone	0.88	0.38	2.34	0.02
Percent multi family units built in last two years in zone	0.87	1.04	0.83	0.41
Single-family as a share of rental stock in zone	0.18	0.07	2.64	0.01
Single-family share of owner-occupied, non-mobile stock in zone	0.29	0.10	2.82	0.01
Condo share of multi-family stock in zone	-0.01	0.14	-0.08	0.94
Central city status of zone	-0.06	0.02	-2.60	0.01
Mean rating of neighborhood as place to live in zone	0.04	0.03	1.54	0.13
Percent incomes <80% of MSA median in zone	-0.24	0.15	-1.53	0.13
Salt Lake City(19)	0.30	0.05	5.59	0.00
Minneapolis(.)	0.23	0.07	3.14	0.00
Boston(26)	0.20	0.07	3.04	0.00
Providence(.)	0.17	0.07	2.33	0.02
Seattle(.)	0.14	0.07	2.09	0.04
Rochester(20)	0.14	0.08	1.78	0.08
Oakland (.)	0.11	0.06	2.04	0.04
Tampa(17)	0.11	0.06	1.86	0.06
Denver(17)	0.09	0.06	1.36	0.18
Washington DC(.)	0.09	0.06	1.46	0.15
Indianapolis(21)	0.08	0.06	1.24	0.22
San Jose(25)	0.08	0.06	1.24	0.22
Columbus(.)	0.07	0.07	1.07	0.29
Kansas City(19)	0.07	0.08	0.86	0.39
Cleveland(21)	0.07	0.07	1.02	0.31
Hartford(19)	0.07	0.06	1.18	0.24
Pittsburgh(23)	0.06	0.08	0.74	0.46
Baltimore(20)	0.06	0.06	1.07	0.29
Birmingham(20)	0.06	0.06	0.96	0.34
Cincinnati(22)	0.06	0.06	1.03	0.31
Oklahoma City(18)	0.05	0.08	0.56	0.57
Saint Louis(16)	0.05	0.07	0.79	0.43
New Orleans(17)	0.03	0.08	0.36	0.72
Portland OR(19)	0.03	0.07	0.47	0.64
Sacramento(26)	0.03	0.07	0.47	0.64
Charlotte(.)	0.02	0.07	0.33	0.74
Memphis(21)	0.02	0.07	0.31	0.76
San Francisco(.)	0.01	0.07	0.15	0.88
Miami(24)	0.00	0.08	-0.02	0.98
Atlanta(20)	0.00	0.07	0.01	1.00
Houston (18)	-0.01	0.07	-0.16	0.87
Houston(21)	-0.03	0.10	-0.30	0.77
_cons	-0.10	0.30	-0.33	0.74
Number of obs	F(46, 316)	Prob > F	R-squared	Root MSE
363	10.44	0	0.441	0.14135

Source: Author's calculations using the zone-level data from the Metropolitan American Housing Surveys.
Note: Shaded variables are significant at the 90 percent level. Malpezzi's regulatory index, when available, is in parentheses next to each MSA.

VI. Conclusions

Many low-income renter households may be in a position to overcome the wealth and income constraints to buying a home, but will still be constrained by a lack of adequate housing units at an appropriate sales price in a desirable location. Supply-side constraints to homeownership deserve greater attention from researchers and policymakers.

Consistent with their means, low-income homeowners and homebuyers live in and purchase less expensive homes, smaller homes, more mobile homes, more condos, and homes with more problems. The share of homes locally affordable is highest in the South and Midwest and lowest in the West. Much of the South's affordable stock appears to be concentrated in mobile units. It is important to remember the correlation between house prices and incomes is far from perfect. A large share of affordably valued units are occupied by households with moderate and high incomes.

Affordable homes for ownership are being lost to house price inflation and vacancies. A net 1.7 million homes became unaffordable because of changes in value, a net 153,000 became affordable because of tenure switching, and a net 157,000 were lost to the affordable stock because of vacancies. On net there were about a half-million fewer affordable owner-occupied homes in 1999 than in 1997. As a result, based on one set of underwriting assumptions, the share of owner-occupied homes affordable to low-income households fell from 47 percent to 44 percent of the stock from 1997 to 1999. The homeownership rate for households with incomes between 50 and 80 percent of local area median fell in several regions, while overall rates increased. This pattern of homeownership rates being suppressed by a lack of affordable units is consistent with multivariate analysis of neighborhood level data.

Mobile homes make up a majority of the affordable units added to the stock. The share of affordable units that were mobile homes increased from 15.9 percent to 18.2 percent. Two-thirds of mobile homes do not include the ownership of land, which challenges conventional notions of homeownership. More research into the costs and benefits of owning a mobile home on owned and leased/rented land is needed.

When adjustments for variables that usually affect homeownership are made, the stock of homes plays a significant role in determining homeownership for low-income households. The presence of single-family homes and of new homes contributes to higher homeownership by low-income households. Yet, very few non-mobile units are being added to the stock at affordable levels. Policymakers need to recognize the failure of filtering as a mechanism to expand the supply of affordable homes. New schemes that encourage conversion of vacant and rental units into affordable homeownership, as well the production

of new units, may deserve consideration. Further research may also be useful into the role of regulation in constraining production of, and conversion to, affordable homeownership units.

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