Institute of Business and Economic Research

Fisher Center for Real Estate and Urban Economics

PROGRAM ON HOUSING AND URBAN POLICY

WORKING PAPER SERIES

WORKING PAPER NO. W02-004

HOUSING SUBSIDIES AND THE TAX CODE: THE CASE OF MORTGAGE CREDIT CERTIFICATES

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April 2003

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April 2003

Abstract

The most significant U.S. housing subsidy programs are funded by tax expenditures through the Internal Revenue Code (IRC). Beyond the subsidy to homeownership provided to all owner occupants through the personal income tax, the IRC provides additional subsidies to specific groups of homeowners. The Mortgage Revenue Bond program (MRB) permits lower levels of government to issue tax-exempt debt, using the proceeds to supply mortgages at below-market interest rates to deserving households. States are also permitted to issue and distribute Mortgage Credit Certificates (MCCs) which entitle recipient homeowners to claim a tax credit for some portion of the mortgage interest paid rather than the tax deduction claimed by other homeowners.

This paper documents the wide variations in reliance upon MCCs and MRBs across U.S. states and the emergence of Mortgage Credit Certificates as the largest housing program administered by the State of California. The paper provides an economic analysis of the MCC program using micro data on more than 12 thousand program recipients in California during the period 1996-1998. We estimate the extent and distribution of MCC subsidies across income and demographic groups, measuring the dollar amount of federal subsidies and their effects upon the user cost of residential capital and the demand price of housing. We analyze the geographic incidence of MCC subsidies across neighborhoods of varying socio-demographic composition and deprivation. Finally, we note important differences in the administrative and programmatic costs of MCCs and MRBs, suggesting that there are clear reasons to favor Mortgage Credit Certificates as a means of subsidizing deserving households.

Keywords: Housing subsidy, mortgage credit certificates

I. Introduction

The most significant housing subsidy programs in the U.S. are funded by tax expenditures through the Internal Revenue Code. The special status of owner-occupied housing under the personal income tax is well-known: interest payments for home mortgages are deductible as personal expenses for the first and second homes of taxpayers, up to a limit of $1,000,000; *ad valorem* property taxes on owner-occupied houses are also deductible as personal expenses; the implicit rental income from occupying the house (the "dividend") is excluded from gross income; and capital gains are essentially untaxed.

Beyond these subsidies to home ownership, which apply to all owner-occupants, the tax code provides additional subsidies to specific groups of homeowners. These programs are managed by the states, but the source of the subsidy is federal tax expenditures. The tax code permits lower levels of government to issue tax-exempt debt and to use the proceeds for the benefit of specific mortgage holders through the Mortgage Revenue Bond (MRB) program. Recipients benefit by obtaining mortgages at a lower tax-exempt interest rate, rather than the market rate.

Finally, states are permitted to issue and distribute Mortgage Credit Certificates (MCCs), which entitle recipient homeowners to claim a tax credit for some portion of the mortgage interest paid, rather than the tax deduction claimed by other homeowners. Subsidies distributed by states and civil divisions of states under the MRB and MCC programs are subject to an aggregate cap prescribed in the Internal Revenue Code (IRC).

There is a rather extensive literature documenting the economics of income tax subsidies to homeowners (e.g. Berkovec and Fullerton, 1992), and there is a smaller literature on the operation of the MRB subsidy program (e.g. Ling and Smith, 1998). There is little economic

analysis of the MCC program. (Indeed we were only able to find one paper describing the program in any detail; see Stegman and Stebbens, 1992. There is a fleeting reference to the program in Green, 2001.) The MCC program is smaller, but it is by no means unimportant. For example, in the most populous state, California, Mortgage Credit Certificates represent the largest of all state-administered housing programs.

This paper analyzes the operation of the Mortgage Credit Certificate program using microeconomic data on program beneficiaries in California. We analyze data on recipients of subsidies under California's MCC program during the period from 1996 to 1998. The micro data include information on the characteristics of recipient households, their dwellings, and their residential locations. We analyze the geographical distribution of homeowner subsidies and the magnitude and distribution of benefits by location and demographic group.

Our analysis suggests that there would be substantial benefits to expanding the MCC program at the expense of the MRB program. The former program involves very low transactions costs and can be targeted in the same manner s the more complex bond subsidy program. Credit certificates offer considerable advantages in terms of flexibility and responsiveness to local needs. We suggest that with one minor change, the credit certificate program would unambiguously dominate the bond program.

Section II below reports the extent and distribution of private purpose subsidies permitted under the Internal Revenue Code, including MRBs, MCCs, and multifamily housing bonds. Section III describes the salient features of the MCC program—the substitution of a tax credit for a deduction – and its effect on consumers and on the costs of housing to recipients. Section IV presents a geographical and demographic analysis of the MCC program in California. Section V is a brief conclusion.

II. MCCs and private activity bonds

The MCC Program was established by the Deficit Reduction Act of 1984 and was modified by the Tax Reform Act of 1986. Under the law, states are awarded annual Private Activity Bond (PAB) allocations. The allocation to any state provides a cap on the volume of tax-exempt bonds that can be issued for "private purposes," e.g. those issued to benefit specific private entities, such as individual homeowners. The available cap for these subsidies was increased once since 1986. For 2002, the cap is set at the larger of $225 million per state or $75 for each resident of the state. Beginning in calendar year 2003, however, this ceiling is to be adjusted annually for inflation.

The private activity bond cap awarded to each state may be used to subsidize a variety of eligible programs specified in Sections 141 through 147 of the IRC. Eligible programs include Tax Exempt Facilities (to benefit public enterprises such as airports, sewage disposal facilities, etc.), Industrial Development Agencies (to develop industrial or commercial properties for the benefit of private owners), Student Loans (to finance higher education), and Housing Bonds. The latter can include bonds issued for the construction of multifamily housing as well as the MRB and MCC programs for homeowners described above. The allocation of the PAB bond cap among these programs is undertaken by each state, and the priorities among states may vary substantially.

Table 1 reports the national distribution of Private Activity Bonds between housing and other programs during the past decade. As the table indicates, of $134 B in newly available bond authority, about $51 B was allocated to uses other than housing, and about $35 B was unallocated by state authorities. The remainder, about $48 B, was allocated to housing

programs—45 percent to multifamily housing and 55 percent to homeownership programs. A third of the subsidy to homeownership, about $6.4 B, has been allocated through MCCs.

As the table indicates, the allocation of bond authority among programs has varied quite substantially over time. The division between housing programs and other qualified activities has gyrated, as has the division between multifamily housing programs and those supporting homeownership. Annual allocations to Mortgage Revenue Bonds have ranged between $496 M and $3,636 M across years; allocations to Mortgage Credit Certificates have ranged between $345 M and $1,413 M.[1]

This considerable variation over time is less pronounced than the geographical variation in the utilization of these forms of bond authority. Appendix Table A1 disaggregates reliance upon Mortgage Credit Certificates by state during this same period. Only 24 states allocated any PAB authority to MCCs. Five states—California, Indiana, Michigan, Oklahoma, and Texas—accounted for eighty percent of the MCCs issued during the period. One state, California, accounted for more than half the dollar value of all MCCs issued during 1992-2000.

III. MCCs and homeowner subsidies

As indicated above, MCCs and MRBs are substitutes in providing assistance to home purchasers. An MRB awarded to a "deserving" homebuyer permits the recipient to obtain a mortgage at a lower rate using the proceeds from the sale of tax exempt bonds; an MCC awarded to a "deserving" home buyer permits the recipient to claim some fraction of the interest paid on

[1] PAB authority is allocated to issuers of revenue bonds or credit certificates by state governments. Issuers of MCCs issue certificates whose aggregate authority-use value is one-fourth of the debt allocation received. (See IRC 26d.) The authority-use value of each certificate is its loan amount multiplied by its eligible tax credit rate. The rule of one fourth is a rough approximation to aggregate tax loss from a newly awarded certificate. (The annual subsidy declines as the loan is amortized, and the weighted average maturity of mortgage loans is 6-8 years.)

the first mortgage as a tax credit rather than a tax deduction. If the recipient itemizes deductions in filing federal income taxes, she must reduce her itemized deductions by the amount of interest claimed as a credit. Although most homeowners (especially recent purchasers) do itemize deductions, it is important to note that the credit can be claimed by any taxpayer in possession of an MCC, and it is not confined to households who itemize deductions.

Eligibility—the definition of a "deserving" homebuyer—is the same under the MRB and MCC programs. Eligible households may not have been homeowners within the three years prior to the award of an MRB or MCC. Their incomes may not generally exceed 115 percent of the area median income (100 percent for one- or two-person households); the value of the house purchased may not exceed 90 percent of the average home price in the area. Eligible households may buy single-family housing, multifamily housing (for up to four families), condominiums, or certain forms of cooperative housing.

These household eligibility standards may be relaxed for MCCs used to purchase dwellings in "target" areas.[2] Targeted areas are defined by income criteria published by HUD at the census tract level or are designated by state governments.

Mortgage Credit Certificates may be granted to provide federal tax credits at rates varying from 10 to 50 percent of the mortgage interest paid per year. At rates exceeding 20 percent, the credit for any homeowner is capped at $2,000 per year. The credit is non-refundable but may be carried forward by a recipient taxpayer for up to three years.

The subsidy provided to a recipient of an MCC depends on the size of the mortgage obligation incurred, the mortgage details (the interest rate and term, which determine the schedule of interest payments for a level payment mortgage), and on the income of the recipient

(which determines the relevant marginal tax rate, τ). The arithmetic is slightly complicated by the self-amortizing feature of home mortgage. The appendix indicates how the subsidy provided by an MCC in any month j, after mortgage origination can be calculated for a taxpayer who itemizes deductions.

This subsidy has income and substitution effects. An MCC reduces the net out-of-pocket costs for a given gross monthly expenditure on housing. This increases demand and also permits households to qualify for larger mortgages and thus to afford to spend more on housing.[3] An MCC also reduces the net price of housing to the recipient, the user cost of housing capital. The user cost represents the net after-tax cost of a dollar of housing capital used by a recipient in any period. (See Poterba, 1992, or Quigley, 1998.) Absent taxes, depreciation and dynamics, the annual user cost of a unit of capital is the real interest rate, i. The value of the periodic flow of housing services, R, is related to the value of the home, V, by the equation

$$R = iV. \tag{1}$$

Housing rent, R, is the opportunity costs of using capital for one period, iV; alternatively, the capitalized value of Rent, R/I, equals the value of the property, V. With mortgage interest deductible at the marginal tax rate, τ,

$$R = (i[1-\tau])V. \tag{2}$$

The term in parentheses, the user cost, represents the after-tax cost of the homeowner's mortgage payment and the after-tax opportunity cost of the homeowner's equity. Suppose L is

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[2] For certificates issued for these areas, the houses purchased may have values up to 110 percent of the area average. Up to one-third of MCCs issued for targeted areas need not be subject to income restrictions; the other two-thirds can go to households whose incomes are 140 percent of the area median.

[3] This arises because lenders typically use rules of thumb in determining the largest mortgage for which a household may be entitled. A standard underwriting rule specifies a maximum a net housing-payment-to-income ratio. Thus, households with MCCs qualify for larger mortgages.

the initial loan-to-value ratio of a mortgage. If the homeowner's mortgage is not amortized, then the expression in parentheses can be disaggregated

$$R = (i[1-\tau]L + i[1-\tau][1-L])V, \tag{3}$$

where the first term in the parentheses is the after-tax cost of the mortgage payment of iL. With an MCC, some fraction x of the annual mortgage payment is a tax credit, not a tax deduction. Thus the user cost of housing capital is reduced by the difference between the credit gained (xLV) and the deduction lost (τxLV).

$$R = (i[1-\tau][1-x]L + i[1-\tau][1-L])V, \tag{4}$$

$$= (i[1-\tau]\,[1-xL])\,V$$

If instead, the mortgage is self-amortizing, the arithmetic is slightly more complicated; the user cost varies as the loan is amortized.[4] Finally, the user cost of capital is affected by the deductibility of property taxes, by depreciation, capital gains, and inflation.[5]

Tables 2 and 3 illustrate the effects of a Mortgage Credit Certificate on the annual housing payments and the user costs of capital for various homeowners. Table 2 reports the effects for a household with an annual income of $31,900; Table 3 reports the effects for a household with an annual income of $46,750. For each household we simulate the effects for house purchases valued at $105,000, $130,000, and $160,000 with a mortgage for eighty percent of the purchase price of the house.[6]

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[4] Using the notation in the appendix, the user cost in any month j after mortgage is

(N1) $R = \left(i[1-\tau]\left[(1-x)\,I(j) + (1-LP\{i, T, j\})\right]\right)V$.

[5] With deductible property taxes (at rate t), depreciation (at rate d), inflation (at rate a) and untaxed capital gains (at rate g), the expression for the user cost of capital in period j is

(N2) $R = (i\,[1-\tau]\,[(1-x)\,I(j) + \{1-LP(i, T, j)\}]) + t[1-\tau] + d - g - a)\,V$.

See Green and Malpezzi (2003, 55-60) for a detailed discussion.

[6] The house values reported in the tables approximate the 25th, 50th, and 75th percentiles of the sample of micro data for California analyzed in Section IV below. The income levels in Tables 2 and 3 are the 25th and 75th percentiles, respectively, of the micro data.

The next three columns present the value of the subsidy provided by the MCC at current federal income tax rates and at three credit rates: 10, 20 and 40 percent of interest paid. Amounts are reported for the first year of the subsidy and also for the present value of the subsidy over 30 years. (The latter calculation assumes constant incomes and tax rates over the period, with a discount rate of 7.45 percent, the mean market rate for 30-year mortgages during the 1996-1998 period[7]). These calculations are based upon equation (A6) in the appendix. As the tables indicate, possession of a Mortgage Credit Certificate represents a substantial housing subsidy for recipient households. Depending upon the interest rate, house value, and MCC credit rate, the subsidy in the first year varies from $415 to $1,660 for the lower income household and slightly more for the higher-income household. The present value of the subsidy varies from $4,000 to $19,000 for the lower-income household, and up to $18,500 for the higher income household. In general, the MCC subsidy increases with the MCC credit rate,[8] the mortgage interest rate, and the purchase price.

The tables also report the effects of an MCC on the user cost of housing capital.[9] These calculations are based on equation (N2) above. The tables confirm the substantial house price reductions associated with the award of an MCC. Under reasonable conditions, user costs in the first year are reduced by at least 15 percent and up to 90 percent, depending upon the MCC rate,

[7] This calculation overstates the value of the subsidy since homeowners do move, on average, every eight years. But, with self amortizing mortgages, the subsidy is front loaded, and receipt of an MCC probably reduces the subsequent mobility of homeowners. This effect is even less important in the empirical analysis presented in Section IV since Proposition 13 has substantially reduced homeowner mobility in California, increasing mortgage duration.

[8] Without the caps and carry-forward provisions described above, the subsidy would vary linearly with the credit rate.

[9] These calculations assume an initial loan to value ratio of 80% on a 30-year mortgage with annual property tax rates of 1 percent, depreciation rates of 1 percent, capital gains of 3 percent and inflation rates of 2 percent. The calculations reported are similar to those illustrated in equation (N1), except that the camp and three-year carry-forward are accounted for.

the mortgage interest rate, income and house value. Because interest payments are larger in the early years of a mortgage, the amounts of the subsidy and the reductions in user cost are larger in the early years.

These hypothetical calculations suggest that the MCC program can have large effects upon the circumstances of recipient households and their housing consumption.

IV. The MCC program in California

As noted in Section II, decisions about the use of MRBs, MCCs and other Private Activity Bonds are decentralized; they are made by state authorities, or by local authorities under the oversight of state governments. Thus, understanding the net effect of MCC subsidies on households and locations is complicated by these institutional features of the program. Decisions relating to the extent of subsidies, their geographical coverage, and the rates at which credits are awarded are made by state and local housing finance agencies or state tax credit allocation commissions; agencies and commissions may make very different decisions within the framework of eligible programs specified in the Internal Revenue Code. Recall that in 2000, 39 states chose not to issue MCCs at all, preferring to allocate tax credit subsidies to housing through MRBs and multifamily housing bonds.

California has been the largest state sponsor of MCCs during the past decade; about 55 percent of the volume of MCC activity in the U.S. during the 1990s was authorized in California. Table 4 reports the distribution of Private Activity Bond authority in California during the period 1990-1999. During the 1990s, the California Debt Limit Allocation Commission (CDLAC, an agency of the State's Treasury Department) allocated some $15.5 B in bond authority. More than two-thirds, about $11.9 B, was allocated to housing. The allocation varied substantially

over time among the MRB, MCC and the Multifamily Bond programs. In total, about $4.3 B was allocated to MRBs, $4.1 B to MCCs and $3.5 B to multifamily housing. A third of the PAB authority used for housing in California went to MCCs.

For the state of California, we were able to obtain raw data on the individual households assisted by the MCC program between 1996 and 1998. The raw data contain observations on 12,617 recipients of MCCs in California during the period; the ten cities and 28 counties with CDLAC-approved MCC programs during this three-year period originally supplied these data to the CDLAC.[10] The raw data contained errors, and some information was simply missing. The most important limitations for the analyses reported below were missing or undecipherable census tract numbers, which preclude matching a recipient to geographical and neighborhood information, and missing or inaccurate mortgage terms and interest rates, which preclude computing the subsidy actually provided to an MCC recipient. While this is the most complete data set assembled on the MCC program for any state, the coverage is not perfect.

We use these data to analyze the two key justifications presented for the MCC program. First, we examine the extent and distribution of subsidies among recipients, and thus the distribution of public subsidies among "deserving" households. We then analyze the spatial distribution of subsidies and the implicit targeting of benefits to "deserving" geographical areas.

A. The distribution of subsidies among households

Figures 1 and 2 summarize the distribution of subsidies provided by the California MCC program across recipient households. These figures are based upon the 5,566 MCCs issued during 1996-1998 for which information about transactions prices, mortgage terms and interest

[10] The data were assembled by Michael Smith-Heimer, who kindly supplied us with the data.

rates was available.[11] Figure 1 reports the distribution of the first-year subsidy and the present discounted value of the annual stream of the MCC subsidy, respectively; Figure 2 indicates the effect of the MCC subsidy program on the user cost of capital to recipient home purchasers.

As depicted in Figure 1, the mean first-year subsidy to MCC recipients is about one thousand dollars ($1,068), while the mean present discounted value of the entire subsidy is more than ten thousand dollars ($10,407) per recipient household. The two distributions are similar, slightly skewed toward the lower bound of zero, and both have a maximum value ($2,782 and $27,458, respectively) slightly exceeding 250 percent of the mean. It is clear that MCC program recipients in California receive substantial benefits. The distributions for the reductions in user cost shown in Figure 2 are tri-modal: the first-year reduction has maxima near 15, 22 and 30 percent, while the overall percent reduction is more compressed, peaking near 10, 15 and 20 percent. The median recipient household gets a reduction of almost one-fifth in the user cost of residential capital.

Figure 3 presents scatter diagrams of the relationship between the subsidies provided to households and their annual incomes. Figure 3a graphs the subsidy as a fraction of income. By this measure, the subsidy declines with income and the variance in the subsidies is reduced as income increases. Figure 3b indicates quite clearly that the amount of the subsidy to California recipients increases with income (within eligibility limits), and the variance of the subsidy also increases.

Figure 4 reports the relation between the percentage reduction in user costs of recipients and their annual incomes. These is little difference in average user cost reductions with income,

[11] The figures also make the same assumptions about property taxes, capital gains, inflation, and depreciation used in providing the estimates in Tables 2 and 3.

but recipient households of the same income can receive very different reductions in their housing costs through the program.

Table 5 presents summary regressions of the relationship between incomes, family size and subsidy amounts by race. As noted in the table, there are small differences in the average MCC subsidy by income – about $150 for an additional ten thousand dollars in household income. *Ceteris paribus*, larger family sizes receive larger subsidies. Other things constant, on average white households receive slightly larger MCC subsidies. Appendix Table A2 presents more detail on the distribution of MCC subsidies. It presents the means of selected household characteristics and MCC benefits by race and household size.

B. The distribution of subsidies across neighborhoods

We matched the neighborhood (census tract) of the dwelling qualifying for a Mortgage Credit Certificate for the observations on California MCC subsidies during 1996-1998. This permits us to analyze the link between the extent of MCC program subsidies in a neighborhood and the characteristics of that neighborhood. Table 6 reports the estimates of a series of count models relating the probability distribution of the number of subsidized dwellings to neighborhood characteristics. The Table reports the estimated coefficients, β, of poisson models relating the probability, that the count y_i of MCC-subsidized units in census tract i is equal to j, to neighborhood characteristics x:

(5) $$\text{prob}[y_i = j] = e^{-\lambda i}\lambda_i^j / j! \quad .$$

where

$$\lambda_i = \sum^k \beta_k X_{ik}$$

The models are estimated using the 6,816 California MCCs issued during 1996-1998 for which the street address or sensus tract was available. Street addresses were matched to 1990 census tracts, and the poisson regressions are based upon census tract data for 1990.

Model (1) includes of a single variable introduced by Mincy, *et al.* (1990) to measure the relative deprivation of a census tract.[12] The incidence of MCC-subsidized units is higher in more deprived census tracts. Model (2) reports that the incidence of subsidized units is higher in census tracts with lower household incomes. The results of models (3), (4), and (5) suggest that the incidence of MCC-subsidized units is higher in census tracts with a larger percentage of minority households, but is lower in census tracts which have the highest concentrations of the very poorest households. Models (6) and (7) indicate the incidence of MCCs is higher in census with lower valued housing but with larger factions of homeowners.

Overall, these results are consistent with state and local policies that target MCC benefits at least implicitly to neighborhoods of lower income, with lower house values, and with larger fractions of minority residents. But these programs are not targeted to the worst neighborhoods with the highest poverty rates. MCC subsidies are more likely to be exercised in lower-income neighborhoods with higher homeownership rates, presumably where the quality of neighborhoods are less likely to decline over the term of the mortgage (and where the subsidy may help to stabilize a neighborhood). MCC subsidies are highly concentrated by census tract.[13]

[12] This deprivation index is composed of normalized indicators of four census tract percentages: adults who have not completed high school; working age males not regularly employed; households on public assistance; female-headed households.

[13] Of the 5,577 California census tracts, 3,714(67 percent) had no recorded MCCs during 1996-1998, 671 had one MCC, and only 29 census tracts had 5 or more MCCs. But 4,086 (60 percent) of the MCCs issued during the period were directed to census tracts with 5 or more MCCs.

C. Transactions costs and administrative costs

The transactions costs of distributing MCCs and administering the program in California are remarkably low. All dollars of PAB authority allocated by the debt allocation commission (CDLAC) go into home finance in the form of issued certificates. Local governments who issue MCCs incur some administrative costs (e.g., staff time, advertising, application to CDLAC, etc.). These are financed from two sources: fees from MCC applicants, and fees from mortgage lenders. Fees from MCC applicants, called "reservation fees," may average $150 with the same fee charged upon refinancing a mortgage. Fees from lenders may average $300.[14] In the aggregate, these administrative costs amount to more than about 4 percent of benefits to recipients.

In contrast, the administrative and transactions costs of the mortgage revenue bond program are substantial. All dollars of PAB authority allocated by CDLAC for MRBs do not go into direct home finance. As specified in the Internal Revenue Code (IRC, Section 1439(a)2A(i)), these proceeds may be allocated into three categories: direct home finance, reserves, and issuance costs.

Issuance costs may include: "underwriters' spread; counsel fees; financial advisory fees; rating agency fees; trustee fees; paying agent fees; bond registrar, certification and authentication fees; accounting fees; printing costs for bond and offering documents; public approval process costs; engineering and feasibility study costs; guarantee fees, other than for qualified guarantees…and similar costs" (IRC, Sec. 124).

In the aggregate, for bonds to qualify for PAB status, these fees must be limited to 2 percent of the proceeds of the issue (3.5 percent for small issues under $20 M). In California, the

[14] These fees are representative. The specific fees noted above are charged by the County of Sacramento Tax Credit Program in 2002. (Conversation with Carla Christina, Program Administrator.)

issuer typically includes a covenant in the origination agreement with investors not to exceed this statutory cap.

Note that this restriction does not apply to all administrative costs. For example, HUDs regulations governing the use of Community Development Block Grant funds specifically allow such funds to be used for various "program administrative costs," including "the cost of issuance and administration of mortgage revenue bonds used to finance the acquisition, rehabilitation or construction of housing" (24 CFR 570.206(g)(5)).

Note, finally, that a transactions cost of one percent on the proceeds of the issue under the MRB program is *not* comparable to a transactions cost of four-tenths of a percent of the subsidy under the MCC program. At an interest rate of 7 percent and a 3 percent spread between the taxable and tax exempt bond rates, a one percent issuance cost reduces the net subsidy by almost 32 percent.

V. Implications

During the period 1992-2000, states and localities used about $26 billion in private activity bond authority to subsidize particular homeowners. About a quarter of this was used to supply Mortgage Credit Certificates under state and locally designed programs.

Our analysis of the largest state-organized MCC program suggests that it provides substantial benefits to recipient households – averaging about $1,100 in the first year and $10,400 in present value terms over the life of a thirty-year mortgage. These subsidies decreased the user cost of housing to recipients by an average of more than twenty percent.

Recipients of MCCs have household incomes that tare about twenty percent lower than that of the population as a whole. 10.3 percent of recipient households were black and 38

percent were Hispanic. In the population as a whole, 7.6 percent of households are black and 23.6 percent are Hispanic. Amongst recipient households, the subsidies are larger for those of higher incomes and family sizes. *Ceteris paribus*, minority recipients receive subsidies in the first year that are lower by about $100, or nine percent.

The price reduction afforded by the program leads to a substantial increase in the housing consumption of recipients. With a price elasticity of housing demand of –1 or –2/3 (See Goodman, 1989), these subsidies increase the uncompensated demand for housing by 20 percent or 14 percent among the recipients of MCCs. These are sizeable effects.

An analysis of the census tracts in which MCCs have been awarded suggests that they have been targeted to neighborhoods with lower incomes and housing prices, but not to neighborhoods with the highest poverty rates. MCCs are more likely to be awarded in neighborhoods with higher fractions of minority households and higher rates of homeownership.

It is worth comparing the salient features of the MCC program with the better-known program which distributes the proceeds of Mortgage Revenue Bonds. Both programs have similar eligibility rules, and both are administered by state governments or by local governments under state oversight. Both programs reduce the net cost of housing to recipients, increasing their demand for housing. The net housing expenditures of recipients are easily computed by lenders under both program, and this permits recipients of lower gross incomes to qualify for homeownership. Outreach for either program can be accomplished by state and local governments and by private lenders, real estate agents and other market participants. Our empirical analysis suggests that the proceeds of the MCC program are well-targeted by income and neighborhood.

The principal difference between the programs appears to be in transactions costs and in the flexibility to carry forward subsidies. Under the MRB program, governmental entities must bring bond issues to market – employing bond counsel and underwriters, establishing public funds and paying agents and providing oversight. These functions are quite expensive. In contrast, under the MCC program all that is required is the award by government of a "certificate" to a household verifying eligibility, based on income, homeowner status, and the location of the property. Armed with this certificate, the recipient household need only check line 49 of IRS Form 1040 and complete the one-page Form 8396 to receive an annual tax credit. The contrast in transactions costs is striking.

The other difference between the programs is in the ability to carry forward the subsidy. Under the MRB program, the recipient household obtains the benefit of lower mortgage interest rates contemporaneously. Under the MCC program, households without tax liabilities in any year receive no benefit in that year. They may carry forward the tax credit, but only for three years. It would seem that an extension of the carry forward provision would improve the equity of the MCC program relative to revenue bonds.

If the credit were simply made refundable (in the same manner as the Earned Income Tax Credit), the MCC program would unambiguously dominate the more costly program of issuing revenue bonds to subsidize housing purchases by qualifying households.

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Appendix

The subsidy provided by an MCC can be calculated from the interest rate, i, of the mortgage, the term, T, the marginal tax rate of the recipient, the value of the house purchased, V, and the initial loan-to-value ratio, L.

The level monthly payment M which amortizes a mortgage of value LV at a monthly interest rate i with a term of T months is

$$M = \frac{LV}{F(i, T)}, \tag{2}$$

where

$$F(i, T) = \frac{1 - \left(\frac{1}{(1+i)^T} \right)}{i}. \tag{3}$$

With equal monthly payments of M, the proportion of the loan outstanding after j months, P(i,T,j), is

$$P(i, T, j) = \frac{F(i, T - j)}{F(i, T)}. \tag{4}$$

These expressions permit the interest and principal components of payment streams to be calculated. For example, during month j the outstanding balance is reduced from LVP(i, T, j-1) to LVP(i, T, j), so the interest paid to the lender, I(j), as a fraction of the house value, is

$$I(j) = \frac{M}{V} - L[P(i, T, j-1) - P(i, T, j)] \tag{5}$$

$$= L\left[\frac{1 - \{F(i, T - j - 1) - F(i, T - j)\}}{F(i, T)} \right]$$

Under the personal income tax, the interest paid on home mortgage, I(j), generates a deduction $\tau I(j)$ whose value depends upon the marginal tax rate τ of the mortgage holder. However, if the

mortgage holder possesses an MCC, she receives an annual tax credit of x percent of interest paid and loses the tax deduction associated with that fraction of the mortgage interest. The subsidy, S is:

(6) $$S = x(1-\tau)I(j)V$$

$$= s(LV, i, T, \tau, j, x) \quad .$$

S is the amount by which tax liabilities are reduced through possession of an MCC.

Table 1

State Allocations of New Private Activity Bond Authority,
Millions of Current 1992-2000Dollars

Year	Annual Bond Cap	Housing Bonds			Non-Housing Bonds**
		MRB	MCC	Other*	
1992	$14,532	$2,052	$702	$735	$5,649
1993	14,594	496	1,149	954	5,391
1994	14,711	1,777	1,413	650	3,571
1995	14,827	2,573	719	1,883	6,818
1996	14,827	2,708	789	2,277	5,783
1997	15,044	2,731	542	3,109	5,403
1998	15,148	2,387	345	3,191	6,128
1999	15,261	1,814	388	4,063	5,849
2000	15,376	3,636	393	4,635	6,712
Total	$134,320	$20,174	$6,391	$21,497	$51,304

Notes: * "Other Housing Bonds" include multifamily housing and housing bonds not elsewhere classified.

* "Non Housing Bonds" include Industrial Development Bonds, Exempt Facilities Bonds and Student Loans.

Source: Compiled by Chris Neale from *The Bond Buyer*, various years. Some corrections to the data reported in *The Bond Buyer* were obtained from the Office of the Treasurer, State of California. The most recent data appear in *Kinnander*, 2001.

Table 2
MCC Subsidy Amounts and Reductions in User Costs
For Households with Income of $31,900

MCC RATE			0.1	0.2	0.4	0.1	0.2	0.4
Purchase Price	Mortgage Rate	Annual Mortgage Payment	Amount of Subsidy			Percent Reduction in User Cost		
A. Subsidy in first year								
$105,000	6%	6,043	416	832	1,660	21.9%	43.8%	87.3%
	7%	6,706	486	972	1,660	17.5%	35.1%	57.8%
	8%	7,396	556	1,111	1,660	15.3%	30.5%	42.4%
$130,000	6%	7,482	515	1,030	1,660	21.9%	43.8%	67.1%
	7%	8,303	601	1,203	1,660	17.5%	35.1%	43.9%
	8%	9,157	688	1,376	1,660	15.3%	30.5%	31.8%
$160,000	6%	9,209	634	1,268	1,660	21.9%	43.8%	51.1%
	7%	10,219	740	1,481	1,660	17.5%	35.1%	33.0%
	8%	11,271	847	1,693	1,660	15.3%	30.5%	23.5%
B. Present discounted value of subsidy								
$105,000	6%	6,043	3,934	7,868	15,731	14.1%	28.3%	56.6%
	7%	6,706	4,687	9,373	17,461	11.7%	23.4%	44.3%
	8%	7,396	5,459	10,917	18,221	10.5%	20.9%	35.8%
$130,000	6%	7,482	4,870	9,741	17,526	14.1%	28.3%	52.1%
	7%	8,303	5,802	11,605	18,288	11.7%	23.4%	37.9%
	8%	9,157	6,758	13,517	18,701	10.5%	20.9%	29.4%
$160,000	6%	9,209	5,994	11,989	18,262	14.1%	28.3%	44.4%
	7%	10,219	7,141	14,283	18,714	11.7%	23.4%	31.1%
	8%	11,271	8,318	16,636	18,978	10.5%	20.9%	23.5%

Note: These computations assume an 80% initial loan-to-value ratio on a 30-year mortgage with t=1% (property tax), g=3% (captial gains), a=2% (inflation), d=1% (depreciation). The computations are similar to those illustrated in equation (N1) except that the cap and the three-year carry-forward provision are accounted for.

Table 3
MCC Subsidy Amounts and Reductions in User Costs
For Household with Income of $46,750

MCC RATE			0.1	0.2	0.4	0.1	0.2	0.4
Purchase Price	Mortgage Rate	Annual Mortgage Payment	Amount of Subsidy			Percent Reduction in User Cost		
A. Subsidy in first year								
$105,000	6%	6,043	406	812	1,620	23.2%	46.3%	92.3%
	7%	6,706	474	948	1,620	18.2%	36.4%	59.7%
	8%	7,396	542	1,085	1,620	15.7%	31.4%	43.2%
$130,000	6%	7,482	503	1,005	1,620	23.2%	46.3%	70.4%
	7%	8,303	587	1,174	1,620	18.2%	36.4%	45.0%
	8%	9,157	671	1,343	1,620	15.7%	31.4%	32.0%
$160,000	6%	9,209	619	1,237	1,620	23.2%	46.3%	53.1%
	7%	10,219	722	1,445	1,620	18.2%	36.4%	33.3%
	8%	11,271	826	1,653	1,620	15.7%	31.4%	23.3%
B. Present discounted value of subsidy								
$105,000	6%	6,043	3,839	7,678	15,352	15.0%	30.0%	60.0%
	7%	6,706	4,574	9,147	17,040	12.4%	24.5%	46.1%
	8%	7,396	5,327	10,654	17,781	10.8%	21.5%	36.9%
$130,000	6%	7,482	4,753	9,506	17,104	15.0%	29.9%	55.0%
	7%	8,303	5,663	11,325	17,847	12.1%	24.3%	39.1%
	8%	9,157	6,595	13,191	18,250	10.8%	21.5%	30.0%
$160,000	6%	9,209	5,850	11,700	17,822	15.0%	29.9%	46.7%
	7%	10,219	6,969	13,939	18,263	12.1%	24.3%	31.9%
	8%	11,271	8,117	16,235	18,521	10.8%	21.5%	23.7%

Note: These computations assume an 80% initial loan-to-value ratio on a 30-year mortgage with t=1% (property tax), g=3% (captial gains), a=2% (inflation), d=1% (depreciation). The computations are similar to those illustrated in equation (N1) except that the cap and the three-year carry-forward provision are accounted for.

Table 4

California Allocation of Private Activity Bond Authority
1990-1999
Millions of Current Dollars

Year	Annual Bond Cap	Housing Bonds			Non-Housing Bonds**
		MRB	MCC	Other*	
1990	$1,453	$760	$263	$167	$264
1991	1,453	679	363	273	138
1992	1,519	52	565	136	766
1993	1,543	198	614	75	655
1994	1,560	355	1,004	56	145
1995	1,572	658	356	172	386
1996	1,572	499	427	353	293
1997	1,594	455	253	516	370
1998	1,613	330	99	853	332
1999	1,633	319	150	892	272
Total	$15,512	$4,305	$4,094	$3,493	$3,621

Notes: * "Other Housing Bonds" include multifamily housing.
** "Non Housing Bonds" include Industrial Development Bonds, Exempt Facilities Bonds, and Student Loans.

Source: http://www.treasurer.ca.gov/cdlac/news/awards1990-1999.pdf

Table 5

Summary of MCC Subsidies by Income,
Family Size and Race

	Mean Values*	Regressions** Dependent variable: First Year Subsidy		
		1	2	3
Income (thousands)	39.439 (10.31)	14.801 (29.61)	14.801 (29.61)	14.249 (28.40)
Household Size	2.949 (1.70)		-0.013 (0.00)	9.035 (8.77)
White (Percent)	41.520			
Black (Percent)	10.295			-103.041 (6.14)
Hispanic (Percent)	38.052			-98.970 (8.26)
Asian (Percent)				-81.730 (3.75)
Constant		484.543 (19.218)	484.563 (19.80)	535.070 (20.41)
Observations on MCCs	5566	5566	5566	5566
R^2		0.150	0.151	0.164

Notes:
*Standard deviations in parentheses.
**t-ratios in parentheses.

Table 6

Poisson Regressions Relating Neighborhood Characteristics to the Location of MCC-Subsidized Units*

Census tract measure	Model (1)	(2)	(3)	(4)	(5)	(6)	(7)
Deprivation index[1]	0.033						
	(7.95)						
Median household income ($x10^6$)		-8.812					
		(11.33)					
Fraction of individuals below poverty line				-2.628			
				(15.25)			
Fraction of individuals below half of poverty line					-5.277		
					(13.86)		
Fraction black			1.073	1.586	1.498		
			(17.02)	(22.85)	(21.93)		
Fraction Hispanic			0.620	1.282	1.090		
			(12.41)	(19.78)	(18.42)		
Median value of owner-occupied housing ($x10^6$)						-2.055	
						(17.76)	
Fraction of housing owner-occupied							0.229
							(4.40)
Number of observations (Census tracts)	5577	5577	5577	5577	5577	5577	5577
Chi-square statistic	43649	43688	41000	42514	42917	44073	45605

Notes:

Table reports estimates of β in the Poisson model:

$$\text{prob}[y_i = j] = e^{-\lambda_i}\lambda_i^j / j!$$

$$\lambda_i = \sum^k \beta_k X_{ik}$$

Where y_i, the number of MCC subsidized units in census tract i, is equal to j.

[1]The deprivation index is composed of four normalized Census tract percentages: adults who have not completed high school; working-age males not regularly employed; households on public assistance, and female-headed households. See Miney, et al., 1990, for details.

*t-ratios in parentheses.

Appendix Table A1
States Using Mortgage Credit Certificates, 1992-2000
Millions of Current Dollars

State	1992	1993	1994	1995	1996	1997	1998	1999	2000	Total
Alabama					1					$1
Arizona		73			59	46		20		$197
Arkansas									44	$44
California	565	615	1,004	356	427	253	99	150	106	$3,574
Colorado	32	91	8	4		3			3	$140
Hawaii						12				$12
Idaho									3	$3
Indiana	66	79		50	48	18	25	58	45	$389
Iowa				65	44	0	40	31	0	$180
Kansas					55					$55
Kentucky			18		6					$24
Louisiana	10			5						$15
Michigan		75	40	110			49		107	$381
Minnesota			100	21	14	8	5		8	$156
Mississippi			1							$1
Missouri									12	$12
Ohio			100	24	3	95				$222
Oklahoma	25	107	39	24	19	33	29	33	33	$341
Oregon		8								$8
Pennsylvania	4					10				$14
Rhode Island		40	23							$63
Texas		61	30	55	39	64	40	47	32	$368
Vermont							8			$8
West Virginia			50	5	74		50			$180
Total	$702	$1,147	$1,413	$719	$789	$541	$346	$338	$392	$6,386

Source: See Table 1.

Figure 1a
Distribution of first-year subsidy to MCC recipients in California, 1996-1998

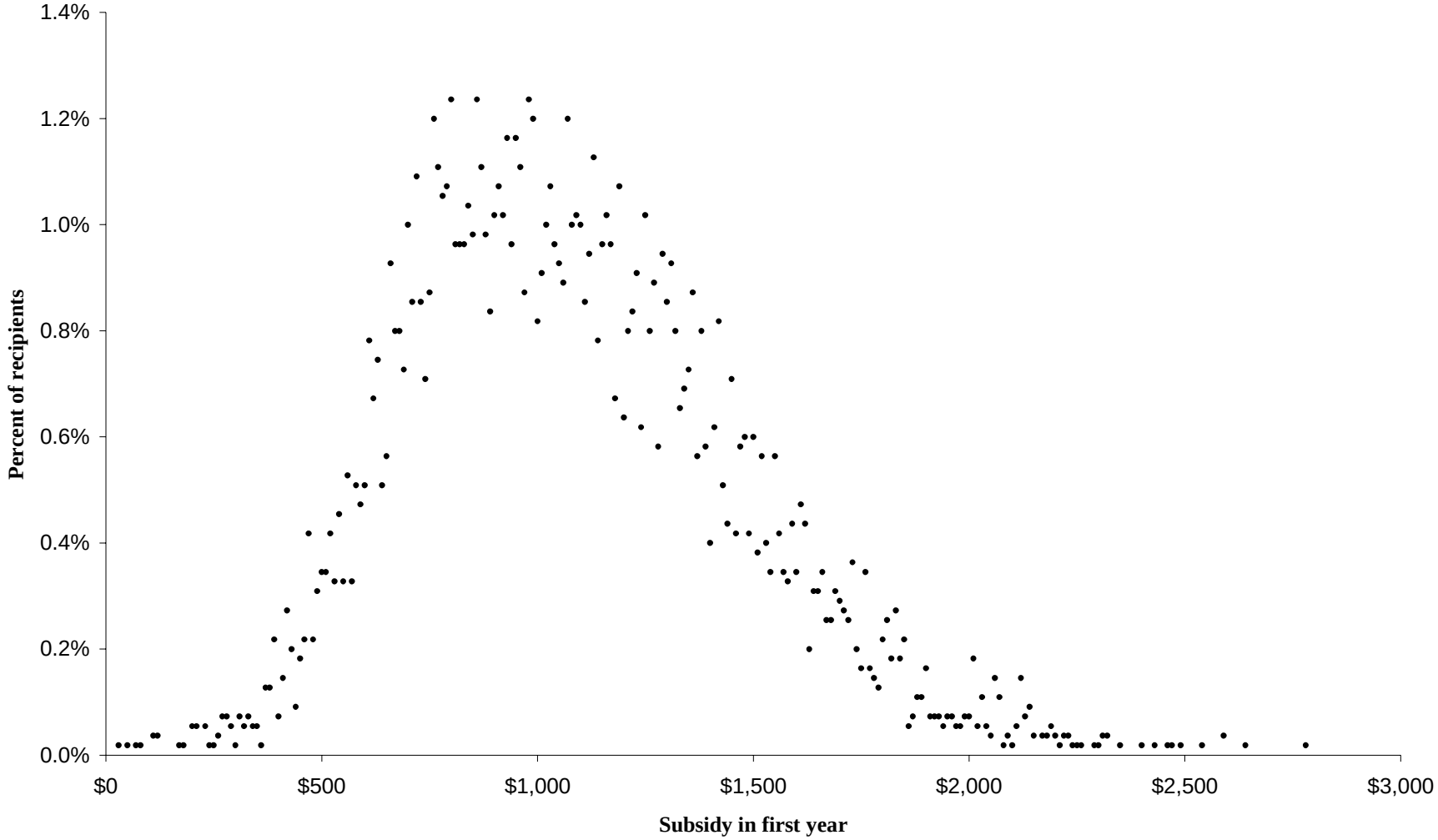


Figure 1b
Distribution of PDV of subsidy to MCC recipients in California, 1996-1998

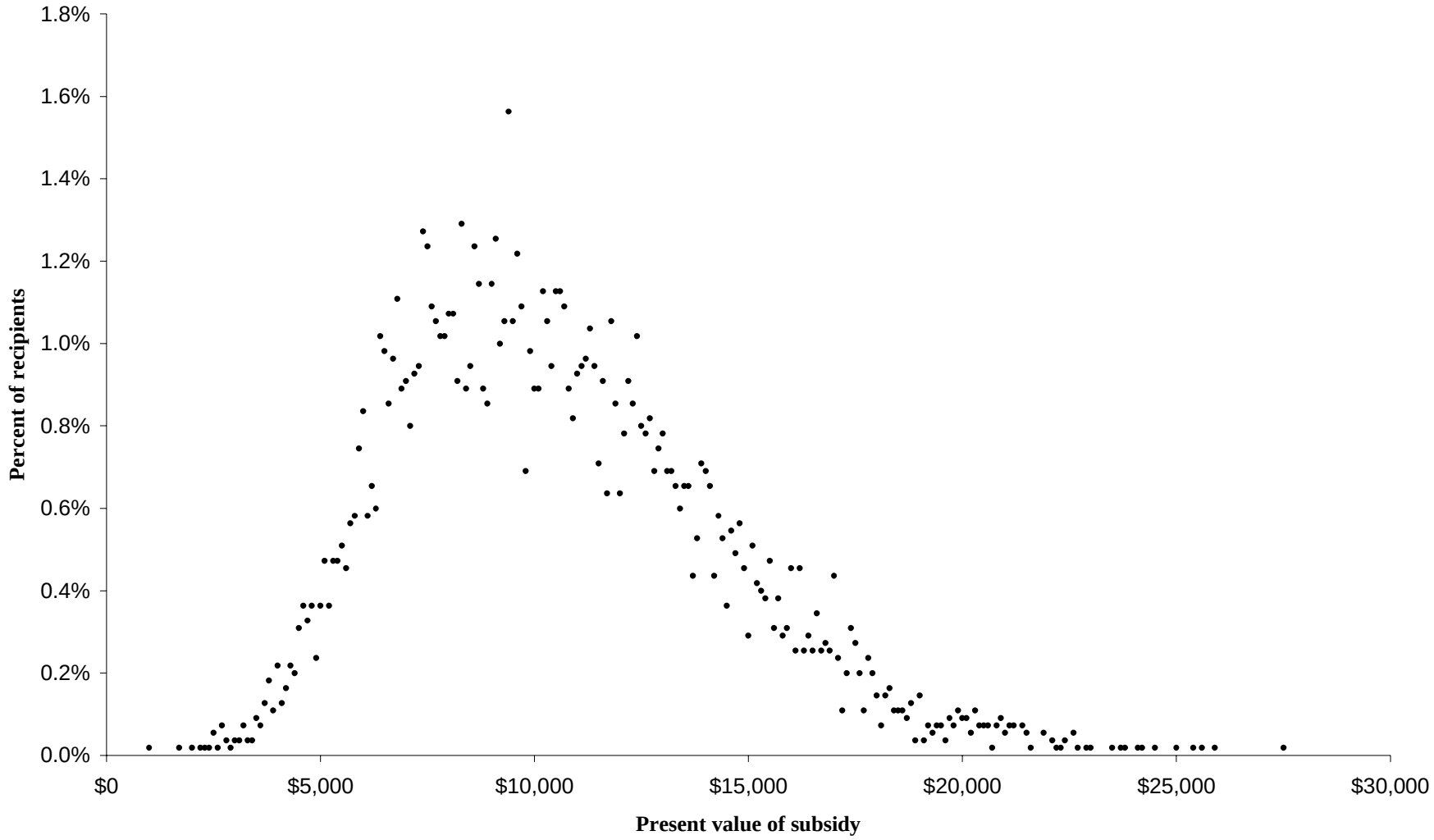


Figure 2a
Distribution of percentage reduction in user cost during the first year for MCC recipients in California, 1996-1998

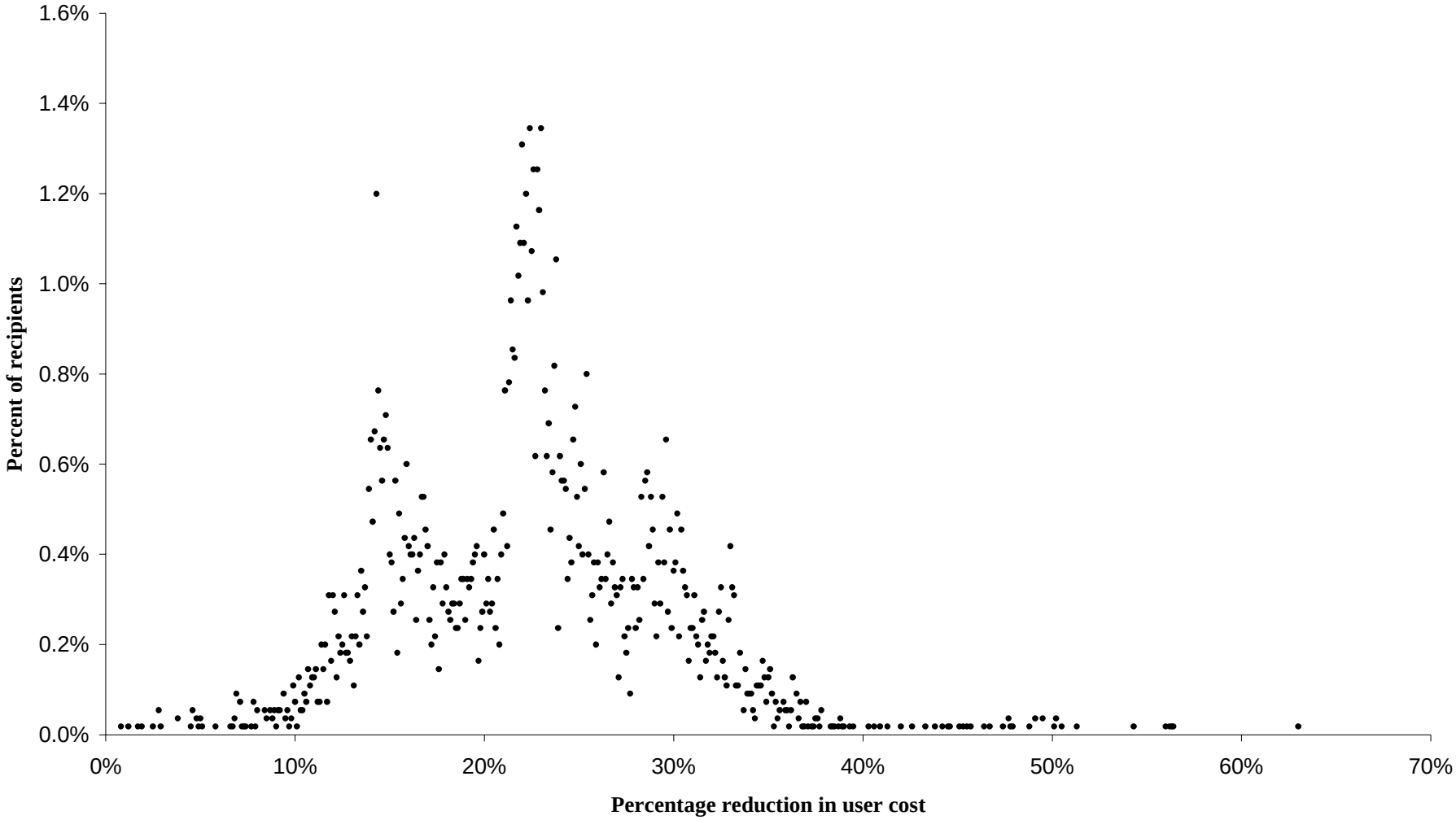


Figure 2b
Distribution of percentage reduction in user cost during the entire mortgage term for MCC recipients in California, 1996-1998

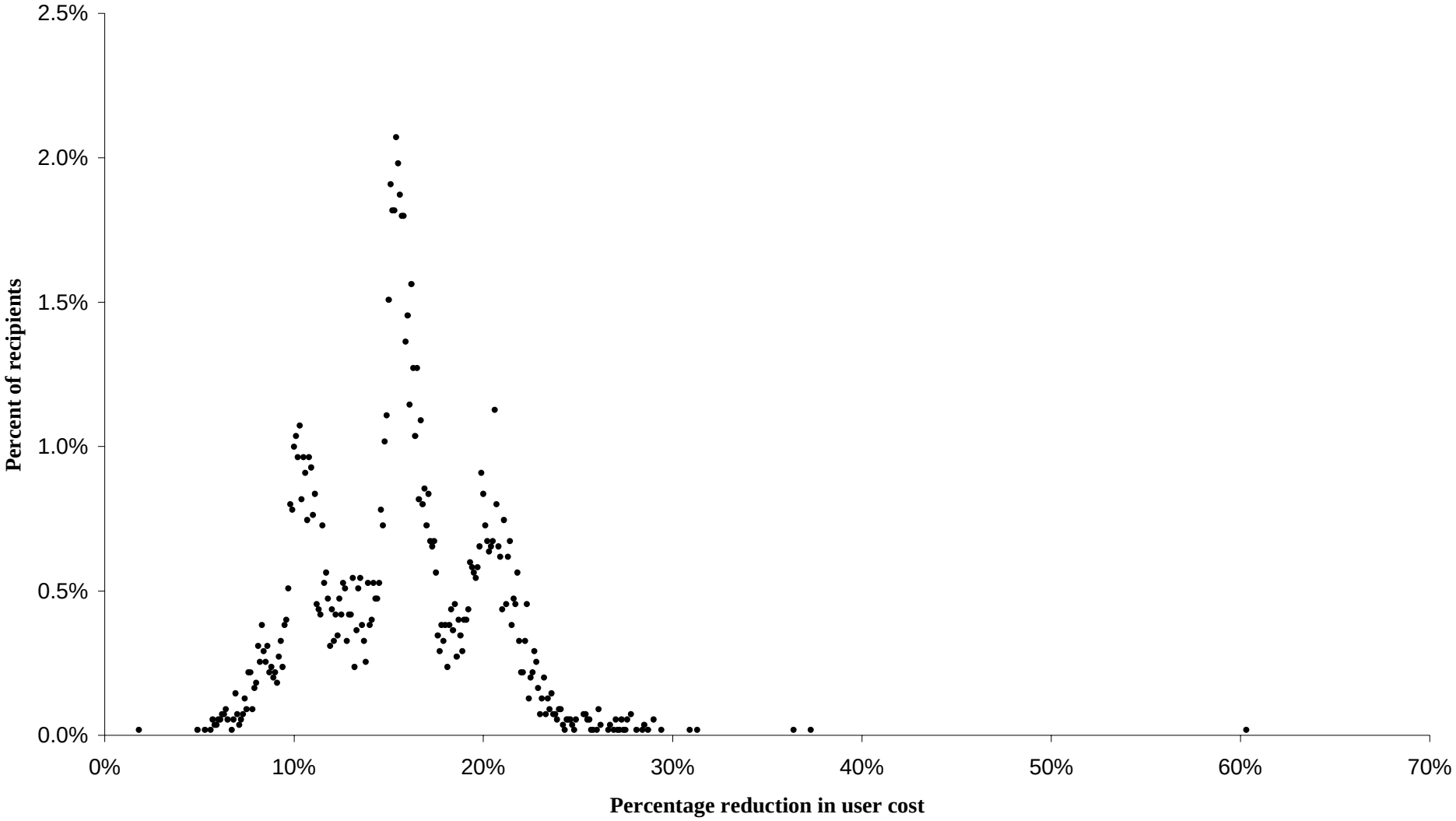


Figure 3a
First-year Percentage gain in income to MCC recipients, by household income

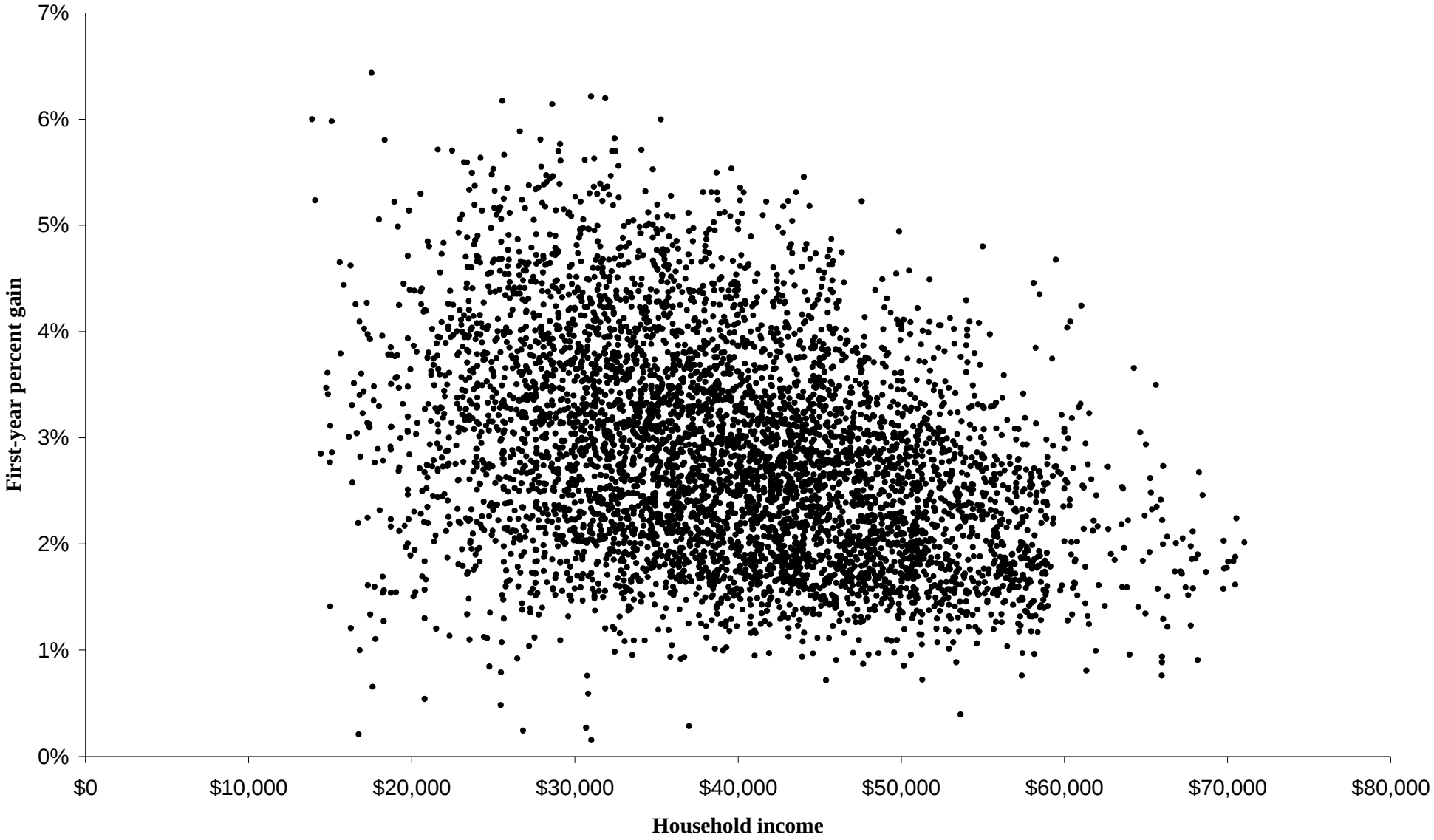


Figure 3b
First-year income gain to MCC recipients, by household income

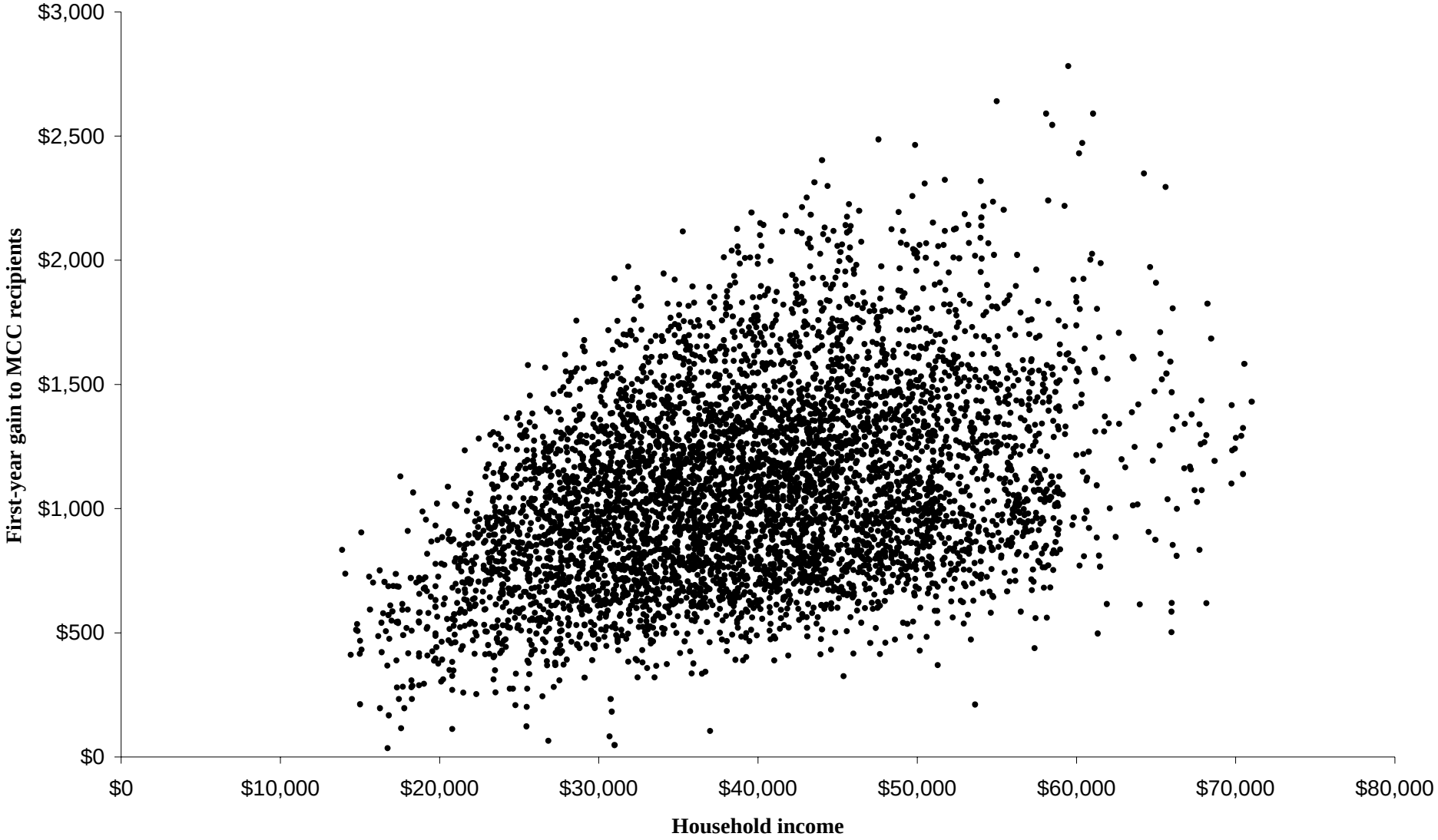
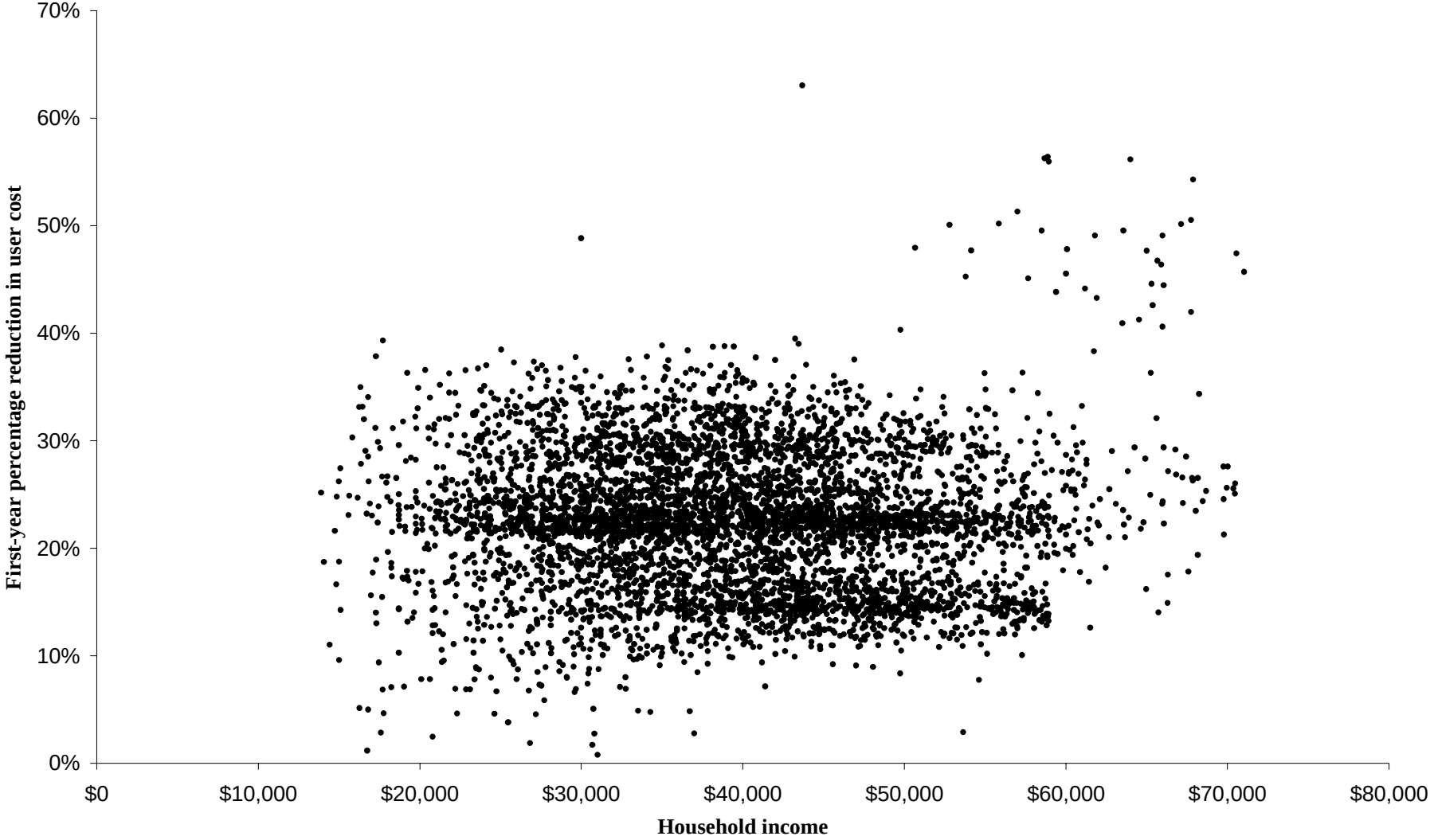


Figure 4
First-year percentage reduction in user cost, by household income



Note: excludes observations for which % reduction exceeds 100% (8 such observations).