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

By

Erica Greulich
John M. Quigley

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Housing subsidies and tax expenditures: The case of mortgage credit certificates[☆]

Erica Greulich^a, John M. Quigley^{b,*}

^a Economists Incorporated, Emeryville, CA, United States

^b University of California, Berkeley, CA, United States

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ABSTRACT

In many developed countries, the most significant housing subsidy programs are funded by tax expenditures rather than direct appropriations. Beyond the subsidy to homeownership under the personal income tax, the U.S. tax code provides additional subsidies to specific groups of homeowners. For example, 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 California, the largest U.S. state. The paper also provides an economic analysis of the MCC program using micro data on more than 12 thousand program recipients in California. 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 estimate Poisson models of the geographic incidence of MCC subsidies across neighborhoods of varying socio-demographic composition and deprivation. Finally, we note 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.

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1. 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 one million dollars; *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. Many other developed countries also provide preferential treatment of homeownership through their systems of national taxation (see Englund, 2003, for an international comparison).

Beyond these subsidies to home ownership, which apply to all owner-occupants, the U.S. 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 which have been issued at the lower tax-exempt interest rate, rather than the market rate.

Finally, U.S. 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 which can be claimed by other homeowners. Subsidies distributed by states and cities under the MRB and MCC programs are subject to an aggregate cap prescribed in the tax code.

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, 1988). There is little economic analysis of the MCC program. (Indeed we were only able to find one paper describing the program. 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.

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* Corresponding author.

E-mail addresses: greulich_e@ei.com (E. Greulich), quigley@econ.berkeley.edu (J.M. Quigley).

This paper compares the economic characteristics of these two mortgage subsidy programs, presenting the salient features and the relative advantages of MCCs and MRBs in delivering targeted benefits to deserving recipients. In Section 2, we introduce the history of the programs. In Section 3 we deconstruct the mechanics of the subsidy programs. In this section we simulate the gross and net subsidies to participating households as a function of their incomes, housing choices, and macroeconomic conditions. From the viewpoint of the recipients, we compare the subsidies in terms of additional income and in terms of their affect upon the user cost of housing capital paid by recipients.

In Section 3 we analyze 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 3-year period, 1996 through 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. We also analyze the transactions costs of the MCC program in California in comparison to the MCC program.

Our analysis demonstrates that, at least in one U.S. state, the operation of the MCC program does provide highly targeted benefits to households differentiated by income, household size, housing type, and neighborhood. Beneficiaries of the program have household incomes which are, on average, 21% lower than those of the population at large. The households of beneficiaries are slightly larger, and they are more likely to be members of minority groups. Among recipient households, the amount of the subsidy increases very slightly with income and family size. These subsidies are somewhat more concentrated in deprived neighborhoods and subsidies are more likely to be concentrated in census tracts with larger minority populations. The subsidies are not concentrated in the lowest income or highest poverty neighborhoods, but rather in areas with low housing prices and with high homeownership rates.

In Section 3 we also present evidence on the large differences in transactions costs of MCC and MRB programs based upon interviews and surveys in California and the relevant Federal regulations. This facilitates a comparison of the productive efficiency of the programs, suggesting the differences in the number of households who can be subsidized in each program at equal cost to the federal treasury.

Our analysis suggests that there would be substantial benefits to expanding the MCC program at the expense of the MRB program. Credit certificates offer considerable advantages in terms of efficiency, flexibility responsiveness to local needs, and this subsidy can be highly targeted. We suggest that with one minor change, the credit certificate program would unambiguously dominate the bond program.

2. MRBs, MCCs and Private Activity Bonds

State Mortgage Revenue Bond Programs, authorized by the Revenue and Expenditure Control Act of 1968, permit state and local governments to issue tax-exempt bonds and to use the proceeds to provide below-market interest rate mortgages to “deserving” (i.e. low- and moderate-income) homebuyers. Mortgage payments retire the bond issues, which are guaranteed by state governments.

By the early 1980s, widespread dissatisfaction had developed with MRB programs. In 1983 the U.S. General Accounting Office (GAO) reported that only 26% of MRB costs to taxpayers subsidized deserving homebuyers, while the remaining 74% benefited governments, bond purchasers and market intermediaries (GAO, 1983b, 7). Bond proceeds were poorly targeted; 78% of 1982 recipients had incomes above the local median (GAO, 1983b, 8); most buyers assisted under MRB programs could have purchased the same homes at the same time without assistance (GAO, 1983b, 10). Further, MRB programs were inherently inflexible. Subsidies could not be adjusted if recipients' incomes changed after purchasing a home; the reduced mortgage interest rates were fixed for the term of the loan, despite fluctuating

market interest rates. Housing finance agencies (HFAs) could not select among loan applicants based on need (GAO, 1983b, 13).¹

Policymakers became concerned about the effects of MRBs on interest rates and the costs of other government programs. An Urban Institute study estimated that the interest rates of *all* tax-exempt bonds increased by 4–7 basis points with every billion dollars of new tax-exempt housing bond issues (GAO, 1983a, 9–10).

Congress responded to these concerns in the Deficit Reduction Act of 1984, creating the Mortgage Credit Certificate (MCC) alternative and allowing HFAs to substitute MCCs for MRB authority. Congress intended MCC programs to be more efficient, less costly and less prone to interest rate risk than their MRB counterparts. Since MCCs do not require underwriters, forward commitment fees or loss reserves, they have lower transactions costs. A greater percentage of the subsidy's benefits thus go to the intended recipients.

The Tax Reform Act of 1986 (TRA86) affected the MRB and MCC programs by introducing a state ceiling on the annual volume of activity and by introducing further targeting restrictions. TRA86 combined existing bond volume caps into a single Private Activity Bond (PAB) allocation. The PAB allocation to any state limits the amount of tax-exempt bonds that can be issued for “private purposes,” e.g., those issued to benefit specific private entities, such as individual homeowners. Until 2002, the cap was set at the larger of \$225 million per state or \$75 for each resident of the state. Beginning in the fiscal year 2003, this ceiling has been adjusted annually for inflation.

The Private Activity Bond cap awarded to each state may be used to subsidize housing and a variety of eligible programs.² Housing bonds include those 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 determined freely 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 period 1992–2003. As the table indicates, of \$202 B in newly available bond authority, about \$71 B was allocated to uses other than housing, and about \$51 B was unallocated by state authorities. The remainder, about \$80 B, was allocated to housing programs—49% to multifamily housing and 51% to homeownership programs. One-fourth of the subsidy to homeownership during this period allocated through MCCs, with the remainder allocated through MRBs.

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 changed frequently, as has the division between multifamily housing programs and those supporting homeownership. Annual allocations to Mortgage Revenue Bonds have ranged between \$496 M and \$4641 M across years; allocations to Mortgage Credit Certificates have ranged between \$345 M and \$1413 M.³

This considerable variation over time is less pronounced than is the geographical variation in the utilization of these forms of bond authority.

¹ The inadequate targeting of subsidies meant that many recipients would have soon become homebuyers even without MRB assistance; the lower-rate mortgages simply sped up their buying process or else allowed them to purchase greater amounts of housing services. GAO's 1998 study of MRB recipients reported that 23 out of 25 HFAs interviewed admitted that they did *not* try to direct MRB loan subsidies to households who could not otherwise buy homes. (GAO, 1998, 4).

² Programs eligible to use private activity bonds 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. These programs are specified in Sections 141 through 147 of the IRC.

³ 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).

Table 1

State allocations of new private activity bond authority, 1992–2003 (millions of current dollars).

Year	Annual bond cap	Housing bonds			Non-housing bonds**
		MRB	MCC	Other*	
1992	\$14,532	\$2052	\$702	\$735	\$5649
1993	14,594	496	1149	954	5391
1994	14,711	1777	1413	650	3571
1995	14,827	2573	719	1883	6818
1996	14,827	2708	789	2277	5783
1997	15,044	2731	542	3109	5403
1998	15,148	2387	345	3191	6128
1999	15,261	1814	388	4063	5849
2000	15,376	3636	393	4635	6712
2001	19,686	4387	496	4739	6850
2002	23,871	4641	356	6336	6786
2003	24,185	4051	485	6472	6540
Total	\$202,062	\$33,353	\$7777	\$39,044	\$71,480

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: *The Bond Buyer*, various years.

Appendix Table A1 disaggregates reliance upon Mortgage Credit Certificates by state during this same period. Less than half of the U.S. states allocated any PAB authority to MCCs. Five states—California, Indiana, Michigan, Oklahoma, and Texas—accounted for 80% 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.

3. MRBs, 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” homebuyer permits the recipient to claim some fraction of the interest paid on the first mortgage as a tax credit rather than a tax deduction.

In order to target MRB and MCC subsidies to lower-income households, the TRA86 imposed income limitations and strengthened purchase-price limitations. The act defined eligibility—the definition of a “deserving” homebuyer—identically for both programs. Currently, only those households who have not have been homeowners within the 3 years are eligible for the award of an MRB or MCC. Their incomes must generally not exceed 115% of the area median income (100% for one- or two-person households); the value of the house purchased may not exceed 90% of the average home price in the area.⁴

These household eligibility standards may be relaxed for MRBs and MCCs used to purchase dwellings in “target” areas.⁵ Mortgage Revenue Bond proceeds are directed to state or local HFAs, who use the funds to offer below-market interest rates on mortgages. The law caps MRB-financed mortgage loan rates at 1.125 percentage points plus the net costs of borrowing to the HFA.⁶ A homebuyer with an MRB-financed mortgage receives the subsidy for the duration of the mortgage.

⁴ Eligible households may buy single-family housing, multifamily housing (for up to four families), condominiums, or certain forms of cooperative housing. There is a recapture provision for recipients who sell the home within the first nine years of ownership, if their income has risen more than 5% above the area limit.

⁵ For certificates issued for these areas, (defined by income criteria published by the Federal Government at the census tract level or else designated by state governments), the houses purchased may have values up to 110% 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% of the area median.

⁶ If issuance costs exceed this amount, the HFA must make up the difference using its own funds. During the peak of MRB activity in 1983–1984, the spread between the average conventional mortgage interest rate and the average MRB-financed mortgage interest rate was 150–250 basis points. When this spread dropped to 50–100 basis points in ensuing years many HFAs were unable to offer below-market mortgages at all.

Mortgage Credit Certificates may be granted to provide federal tax credits at rates varying from 10 to 50% of the mortgage interest paid per year. At rates exceeding 20%, the credit for any homeowner is capped at \$2000 per year. The credit is non-refundable but may be carried forward by a recipient taxpayer for up to 3 years. Not all income-eligible recipients will have income tax liabilities large enough to maximize use of their MCCs. Thus HFAs might not offer MCC programs where recipient income tax liabilities are low, and they might not offer MRB-financed mortgages if the spread between conventional and below-market MRB mortgage rates is sufficiently small.

As noted below, direct comparisons between MRB and MCC subsidies to recipients and costs to taxpayers are a bit complicated.⁷ In addition, the benefit of MRB subsidies to homebuyers is confounded by the potential capitalization of these subsidies into selling prices. In some instances, MRB funds have been set aside for particular developers, who can then use the availability of reduced-rate financing as a marketing feature in selling the units, enabling them to raise prices (see Cooperstein, 1992, Durning and Quigley, 1985).

The subsidy provided to a recipient of an MCC or MRB 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 conventional level-payment mortgage), and on the income of the recipient (which determines the relevant marginal tax rate). This subsidy has income and substitution effects. An MRB or 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.⁸ These subsidies also reduce the net price of housing, the “user cost” of housing capital to the recipient (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

$$R = iV. \quad (1)$$

Housing rent, R , is the opportunity cost 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 ,

$$R = (i[1-\tau])V. \quad (2)$$

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 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

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

where the first term in the parentheses is the after-tax cost of the mortgage payment of iL . With a mortgage revenue bond at the

⁷ There is, however some comparative evidence on the targeting of these programs in practice. For example, the GAO analyzed 1994 state HFA data to determine if MCCs and MRB funds reached the intended “deserving” populations. 74% of MCC recipients had incomes below 80% of their area median income, compared to 63% of MRB-assisted buyers. More MCC recipients were minorities (30% vs. 22%) and purchased homes in urban areas (81% vs. 74%). Fewer MCC recipient households were single-parent (12% vs. 16%). The average mortgage amount for MCC recipients (\$61,127) was 90% of that for MRB-assisted buyers (\$67,711) (GAO, 1996).

⁸ 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 net housing-payment-to-income ratio for mortgage qualification.

subsidized interest rate r , the after-tax cost of the mortgage payment is lower, and the user-cost relation is

$$R = (r[1-\tau]L + i[1-\tau][1-L])V, \quad (4)$$

In contrast, for an MCC, some fraction x of the annual mortgage payment at the market interest rate i is a tax credit, not a tax deduction. Thus the user cost of housing capital is reduced by the difference between the credit gained ($xiLV$) and the deduction lost ($\tau xiLV$).

$$R = (i[1-\tau][1-x]L + i[1-\tau][1-L])V, \\ = (i[1-\tau][1-xL])V. \quad (5)$$

If the mortgage is self-amortizing, the arithmetic is slightly more complicated; the user cost varies as the loan is amortized. The user cost of capital is also affected by the deductibility of property taxes, by depreciation, capital gains, and inflation.⁹

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 80% of the purchase price of the house.¹⁰

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% 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%, the mean market rate for 30-year mortgages during the 1996–1998 period).¹¹ These calculations are based upon Eqs. (A6) and (A9) 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 \$1660 for the lower-income household and slightly more for the higher-income household. The present value of the subsidy varies from \$4000 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,¹² the mortgage interest rate, and the purchase price.

The tables also report the effects of an MCC on the user cost of housing capital.¹³ These calculations are based on Eqs. (A5) and (A9). 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% and up to 90%, depending

⁹ See Green and Malpezzi (2003:55–60) for a discussion of these issues. The exact formula for the user cost of capital is presented in equation (A6) in the appendix. The formulas for calculating the subsidies for self-amortizing mortgages are presented in Eqs. (A7) and (A8) in the appendix.

¹⁰ 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.

¹¹ 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.

¹² Without the caps and carry-forward provisions described above, the subsidy would vary linearly with the credit rate.

¹³ These calculations assume an initial loan-to-value ratio of 80% on a 30-year mortgage with annual property tax rates of 1%, depreciation rates of 1%, capital gains of 3% and inflation rates of 2%. The calculations reported are similar to those illustrated in Eqs. (A5) and (A9), except that the cap and three-year carry-forward provisions are accounted for.

Table 2

MCC subsidy amounts and reductions in user costs for households with income of \$31,900.

MCC rate (percent)			Amount of subsidy			Percent reduction in user cost		
Purchase price	Mortgage rate	Annual mortgage payment	10%	20%	40%	10%	20%	40%
<i>A. Subsidy in first year</i>								
\$105,000	6%	6043	416	832	1660	21.9%	43.8%	87.3%
	7%	6706	486	972	1660	17.5%	35.1%	57.8%
	8%	7396	556	1111	1660	15.3%	30.5%	42.4%
\$130,000	6%	7482	515	1030	1660	21.9%	43.8%	67.1%
	7%	8303	601	1203	1660	17.5%	35.1%	43.9%
	8%	9157	688	1376	1660	15.3%	30.5%	31.8%
\$160,000	6%	9209	634	1268	1660	21.9%	43.8%	51.1%
	7%	10,219	740	1481	1660	17.5%	35.1%	33.0%
	8%	11,271	847	1693	1660	15.3%	30.5%	23.5%
<i>B. Present discounted value of subsidy</i>								
\$105,000	6%	6043	3934	7868	15,731	14.1%	28.3%	56.6%
	7%	6706	4687	9373	17,461	11.7%	23.4%	44.3%
	8%	7396	5459	10,917	18,221	10.5%	20.9%	35.8%
\$130,000	6%	7482	4870	9741	17,526	14.1%	28.3%	52.1%
	7%	8303	5802	11,605	18,288	11.7%	23.4%	37.9%
	8%	9157	6758	13,517	18,701	10.5%	20.9%	29.4%
\$160,000	6%	9209	5994	11,989	18,262	14.1%	28.3%	44.4%
	7%	10,219	7141	14,283	18,714	11.7%	23.4%	31.1%
	8%	11,271	8318	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), $g = 3\%$ (capital gains), $a = 2\%$ (inflation), $d = 1\%$ (depreciation). The computations are similar to those illustrated in Eqs. (A6), (A8) and (A9), except that the cap and the 3-year carry-forward provision are accounted for in the calculation.

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

Table 3

MCC subsidy amounts and reductions in user costs for household with income of \$46,750.

MCC rate (percent)			Amount of subsidy			Percent reduction in user cost		
Purchase price	Mortgage rate	Annual mortgage payment	10%	20%	40%	10%	20%	40%
<i>A. Subsidy in first year</i>								
\$105,000	6%	6043	406	812	1620	23.2%	46.3%	92.3%
	7%	6706	474	948	1620	18.2%	36.4%	59.7%
	8%	7396	542	1085	1620	15.7%	31.4%	43.2%
\$130,000	6%	7482	503	1005	1620	23.2%	46.3%	70.4%
	7%	8303	587	1174	1620	18.2%	36.4%	45.0%
	8%	9157	671	1343	1620	15.7%	31.4%	32.0%
\$160,000	6%	9209	619	1237	1620	23.2%	46.3%	53.1%
	7%	10,219	722	1445	1620	18.2%	36.4%	33.3%
	8%	11,271	826	1653	1620	15.7%	31.4%	23.3%
<i>B. Present discounted value of subsidy</i>								
\$105,000	6%	6043	3839	7678	15,352	15.0%	30.0%	60.0%
	7%	6706	4574	9147	17,040	12.4%	24.5%	46.1%
	8%	7396	5327	10,654	17,781	10.8%	21.5%	36.9%
\$130,000	6%	7482	4753	9506	17,104	15.0%	29.9%	55.0%
	7%	8303	5663	11,325	17,847	12.1%	24.3%	39.1%
	8%	9157	6595	13,191	18,250	10.8%	21.5%	30.0%
\$160,000	6%	9209	5850	11,700	17,822	15.0%	29.9%	46.7%
	7%	10,219	6969	13,939	18,263	12.1%	24.3%	31.9%
	8%	11,271	8117	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), $g = 3\%$ (capital gains), $a = 2\%$ (inflation), $d = 1\%$ (depreciation). The computations are similar to those illustrated in Eqs. (A6), (A8) and (A9), except that the cap and the 3-year carry-forward provision are accounted for in the calculation.

4. The MCC program in California

As noted in Section 2, 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 was the largest state sponsor of MCCs during the decade of the 1990s; about 55% 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 1990–2007. During this period, the California Debt Limit Allocation Commission (CDLAC, an agency of the State’s Department of Finance) allocated some \$36.2 B in bond authority. Almost 80%, about \$28.5 B, was allocated to housing. The allocation varied substantially over time among the MRB, MCC and the Multifamily Bond programs. In total, about \$8.8 B was allocated to MRBs, \$5.2 B to MCCs and \$14.5 B to multifamily housing. Three eighths of the PAB authority used for single-family housing in California went to MCCs (see Gordon et al., 2007 for a discussion).

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 all 12,617 recipients of MCCs in California during the period; the ten cities and 28 counties with CDLAC-approved MCC programs during this 3-year period originally supplied these data to the CDLAC.¹⁴ The raw data contained errors, and some information was simply missing. The most important limitations for the analyses reported below arise from 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 “deprived” geographical areas.

4.1. The distribution of subsidies among households

Figs. 1 and 2 summarize the distribution of subsidies provided by the California MCC program across recipient households. These figures are based upon the 5566 MCCs issued during 1996–1998 for which information about transactions prices, mortgage terms and interest rates was available.¹⁵ Fig. 1 reports the distribution of the first-year subsidy and the present discounted value of the annual stream of the

Table 4

California allocation of private activity bond authority, 1990–2007 (millions of current dollars).

Year	Annual bond cap	Housing bonds			Non-housing bonds**
		MRB	MCC	Other*	
1990	\$1453	\$760	\$263	\$167	\$264
1991	1453	679	363	273	138
1992	1519	52	565	136	766
1993	1543	198	614	75	655
1994	1560	355	1004	56	145
1995	1572	658	356	172	386
1996	1572	499	427	353	293
1997	1594	455	253	516	370
1998	1613	330	99	853	332
1999	1633	319	150	892	272
2000	1657	349	150	910	248
2001	2117	426	145	1197	349
2002	2588	421	186	1468	513
2003	2634	424	263	1474	473
2004	2839	659	155	1521	503
2005	2872	917	85	1313	556
2006	2891	574	81	1590	646
2007	3099	755	66	1560	718
Total	\$36,209	\$8830	\$5225	\$14,526	\$7627

Notes: **“Other Housing Bonds” may include multifamily housing and small unallocated reserves.

**“Non-Housing Bonds” include Industrial Development Bonds, Exempt Facilities Bonds, and Student Loans.

Source: California Debt Limit Allocation Committee.

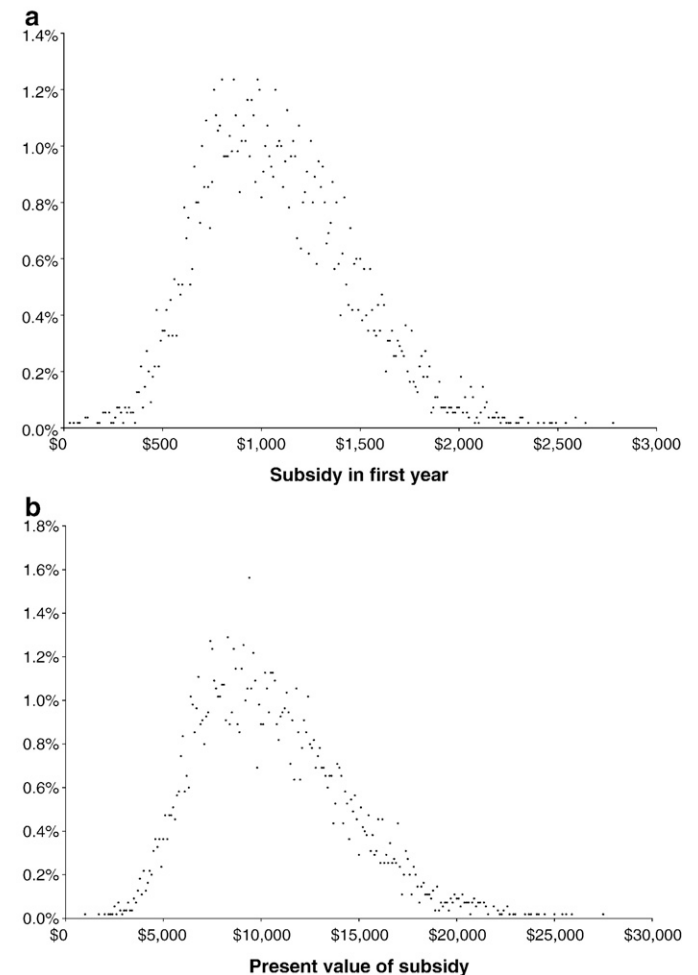


Fig. 1. a. Distribution of first-year subsidy to MCC recipients in California, 1996–1998. b. Distribution of PDV of subsidy to MCC recipients in California, 1996–1998.

¹⁴ The files were assembled by Michael Smith-Heimer, who kindly supplied us with the data.

¹⁵ The figures also make the same assumptions about property taxes, capital gains, inflation, and depreciation used in producing the estimates in Tables 2 and 3.

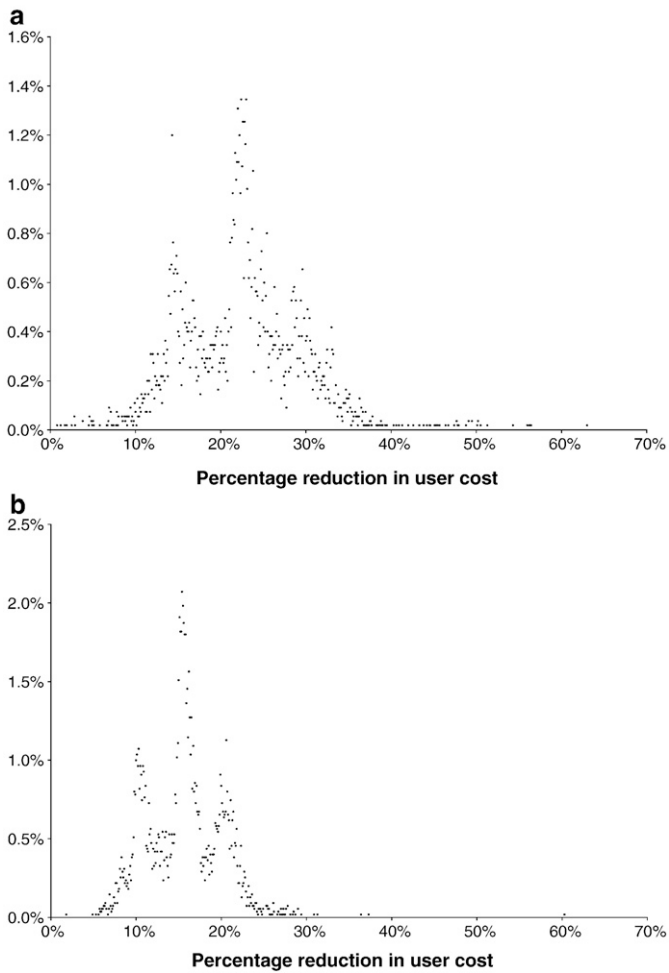


Fig. 2. a. Distribution of percentage reduction in user cost during the first year for MCC recipients in California, 1996–1998. b. Distribution of percentage reduction in user cost during the entire mortgage term for MCC recipients in California, 1996–1998.

MCC subsidy, respectively; Fig. 2 indicates the effect of the MCC subsidy program on the user cost of capital to recipient home purchasers.

As depicted in Fig. 1, the mean first-year subsidy to MCC recipients is about one thousand dollars (\$1068), 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 (\$2782 and \$27,458, respectively) slightly exceeding 250% 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 Fig. 2 are tri-modal: the first-year reduction has maxima near 15, 22 and 30%, while the overall percent reduction is more compressed, peaking near 10, 15 and 20%. The median recipient household gets a reduction of almost one-fifth in the user cost of residential capital.

Fig. 3 presents scatter diagrams of the relationship between the subsidies provided to households and their annual incomes. Fig. 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. Fig. 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 as well.

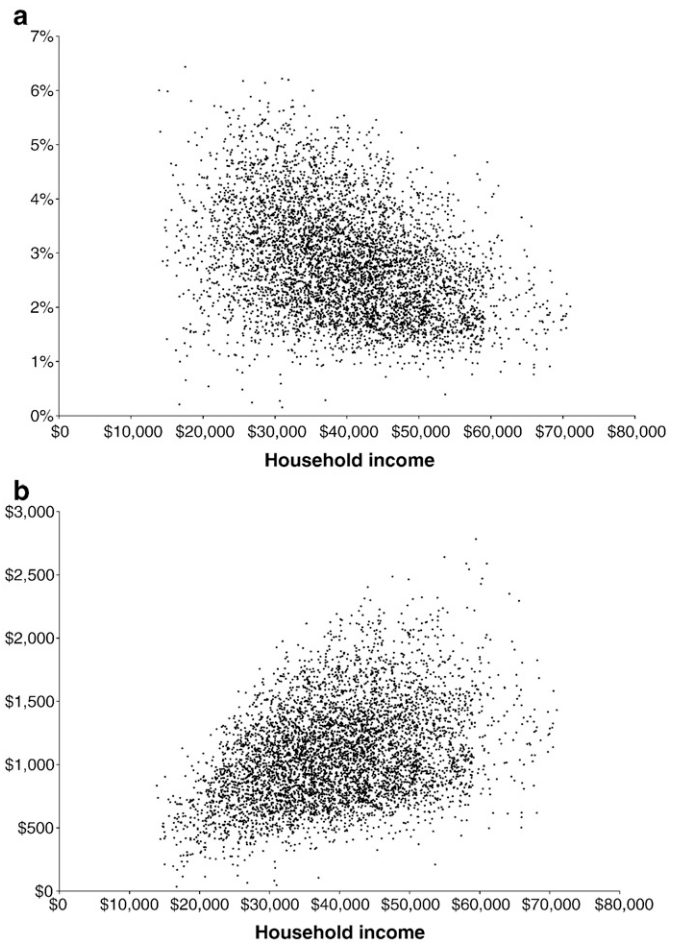
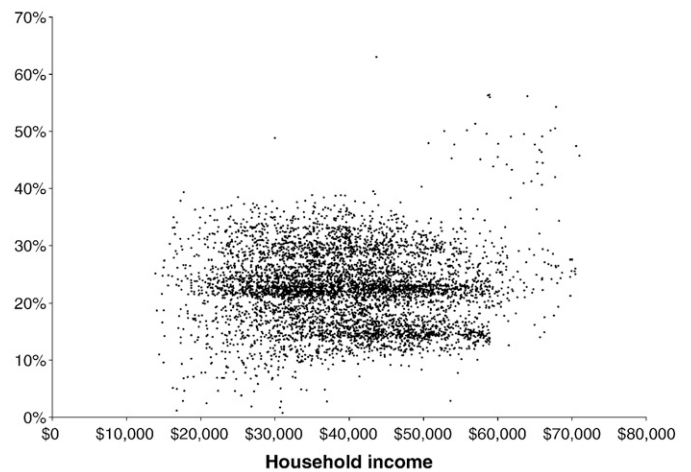


Fig. 3. a. First-year percentage gain in income to MCC recipients in California, by household income. b. First-year dollar gain to MCC recipients in California, by household income.

Fig. 4 reports the relation between the percentage reduction in the user costs to recipients and their annual incomes. There is little difference in average user-cost reductions with income, but recipient



Note: excludes observations for which the percent reduction exceeds 100 (8 observations).

Fig. 4. First-year percentage reduction in user cost to MCC recipients in California, by household income.

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.

4.2. 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 issued 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 in each census tract to neighborhood characteristics. The table reports the estimated coefficients, β , of Poisson models relating the probability, that the count y_i of newly subsidized MCC-subsidized households in census tract i is equal to j , to neighborhood characteristics X :

$$\text{prob}[y_i = j] = e^{-\lambda_i} \lambda_i^j / j! \tag{6}$$

where

$$\lambda_i = \sum_k \beta_k X_{ik} \tag{7}$$

The models are estimated using the 6816 California MCCs issued during 1996–1998 for which the street address or census tract was available. Street addresses were matched to 1990 census tracts, and the Poisson regressions are based upon 1990 data for the 5577 California census tracts.

Table 5
Summary of MCC subsidies by income, family size and race (for MCCs issued in California 1996–1998).

	Mean values ^a	Regressions ^b		
		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)	5.552			-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

^a Standard deviations in parentheses.
^b t-ratios in parentheses.

Table 6
Poisson regressions relating neighborhood characteristics to the location of MCC-subsidized units^a (5577 California Census Tracts).

Census tract measure	Model						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Deprivation index ^b	0.033 (7.95)						
Median household income ($\times 10^6$)		-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 (17.02)	1.586 (22.85)	1.498 (21.93)		
Fraction Hispanic			0.620 (12.41)	1.282 (19.78)	1.090 (18.42)		
Median value of owner-occupied housing ($\times 10^6$)						-2.055 (17.76)	
Fraction of housing owner-occupied							0.229 (4.40)
Chi-square statistic	43,649	43,688	41,000	42,514	42,917	44,073	45,605

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 .
^a t-ratios in parentheses.

^b 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 Mincy et al., 1990, for details.

Model (1) includes a single variable introduced by Mincy, et al. (1990) to measure the relative “deprivation” of a census tract.¹⁶ The incidence of MCC-subsidized units is clearly 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 that the incidence of MCCs is higher in census with lower valued housing but with larger fractions 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 clearly not targeted to the worst neighborhoods or these 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 is 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.¹⁷

¹⁶ 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.

¹⁷ Of the 5577 California census tracts, 3714 (67%) 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%) of the MCCs issued during the period were directed to census tracts with 5 or more MCCs.

4.3. Transactions costs and administrative costs

The transactions costs of distributing MCCs and administering the program are remarkably low, at least in California. 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 (i.e., about 15% of the average first-year subsidy), with the same fee charged upon refinancing a mortgage. Fees paid by lenders may average \$300.¹⁸ In the aggregate, these administrative costs amount to about 0.4% 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.

Reserve costs include funds set aside for anticipated losses, mortgage pool insurance, or other forms of credit enhancement. 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). Note that the costs of administering MRB programs at the state level and for local HFAs are paid out of bond proceeds which would otherwise be used to subsidize deserving households.

In the aggregate, for bonds to qualify for PAB status, these fees must be limited to 2% of the proceeds of the issue (3.5% for small issues under \$20 M). In California, the issuer typically includes a covenant in the origination agreement with investors not to exceed this statutory cap.

However, this restriction does not apply to all administrative costs. For example, 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 1% 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% and a 3% spread between the taxable and tax-exempt bond rates, a 1% issuance cost reduces the net subsidy by almost 32%—much more.

5. 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 \$1100 in the first year and \$10,400 in present value terms over the life of a 30-year mortgage. These subsidies decreased the user cost of housing to recipients by an average of more than 20%.

Public finance economists will be quick to notice that subsidizing housing by reducing the user cost of homeownership entails a substantial deadweight loss as compared to other forms of subsidy, and it changes household behavior in the housing market as well. Most of the evidence (e.g., Sinai, 2000; Rosen and Rosen, 1980) suggests that the price effects on homeownership are quite small, but 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% or 14% among the recipients of MCCs. These are sizeable effects.

Of course, this reduction in the user cost of capital afforded to selected households through the MCC program is precisely the same analytically as the much more well-known reductions in the user cost of owner-occupied housing afforded under the personal income tax in the U.S., and in many other industrialized countries as well. The effects of these price reductions on welfare and in the housing market have been the subject of intense investigation by economists.¹⁹ The issues with the MCC are identical.

Recipients of MCCs have household incomes that are about 20% lower than that of the population as a whole. 10.3% of recipient households were black and 38% were Hispanic. In the population as a whole, 7.6% of households are black and 23.6% are Hispanic. Among recipient households, the subsidies are larger for those with higher incomes and larger family sizes. *Ceteris paribus*, minority recipients receive subsidies in the first year that are lower by about \$100, or 9%.

The price reduction afforded by the program leads to a substantial increase in the housing consumption of recipients.

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 lowest incomes or the highest poverty rates. MCCs are more likely to be awarded in neighborhoods with higher fractions of minority households and higher rates of homeownership.

The salient features of the MCC program and the better-known program which distributes the proceeds of Mortgage Revenue Bonds are comparable. 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 programs, 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 insurance funds and paying agents, and also 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 on the

¹⁸ These fees are representative. The specific fees noted above were charged by the County of Sacramento Tax Credit Program in 2002.

¹⁹ See Rosen (1985) for the canonical treatment.

standard income tax form (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 3 years. A simple 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 deserving households.

Appendix A. Computing the subsidy with self-amortizing mortgages

For a level-payment self-amortizing mortgage, the subsidy provided by an MCC in any month, *j*, after origination can be calculated from the interest rate, *i*, of the mortgage, the term, *T*, the marginal tax rate of the recipient, τ , the value of the house purchased, *V*, and the initial loan-to-value ratio, *L*. The user cost of housing capital in that month also depends upon property taxes, depreciation, capital gains, and inflation.

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

$$M = \frac{LV}{F(i, T)}, \tag{A1}$$

where

$$F(i, T) = \frac{1 - \left(\frac{1}{(1+i)^T}\right)}{i}. \tag{A2}$$

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

$$P(i, T, j) = \frac{F(i, T-j)}{F(i, T)}. \tag{A3}$$

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*(*i*, *j*), as a fraction of the house value, is

$$I(i, j) = \frac{M}{V} - L[P(i, T, j-1) - P(i, T, j)] \\ = L \left[\frac{1 - \{F(i, T-j-1) - F(i, T-j)\}}{F(i, T)} \right] \tag{A4}$$

Under the personal income tax, the interest paid on home mortgage, *I*(*i*, *j*), generates a deduction τI (*i*, *j*) whose value depends upon the marginal tax rate τ of the mortgage holder.

If the borrower is subsidized by an MRB at interest rate *r*, the user-cost relation is

$$R = ([1-\tau]I(r, j) + i[1-\tau] [1-LP\{r, T, j\}])V \tag{A5}$$

If the borrower is subsidized by an MCC, she receives a credit of *x* percent of interest paid and loses the tax deduction associated with that fraction of the mortgage payment. With this subsidy, the user-cost expression is

$$R = (i[1-\tau][(1-x)I(j) + (1-LP\{i, T, j\})])V \tag{A6}$$

Under an MRB, the net subsidy *S* in any period is

$$S = [I(i, j) - I(r, j)][1-\tau]V, \tag{A7}$$

while under an MCC, the net subsidy is

$$S = x[1-\tau]I(i, j)V \tag{A8}$$

With deductible property taxes (at rate *t*) depreciation (at rate *d*), inflation (at rate *a*), and tax free capital gains (at rate *g*), the user-cost expressions under each program, (A5) and (A6), should be increased by

$$(t[1-\tau] + d - g + a)V. \tag{A9}$$

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	1004	356	427	253	99	150	106	\$3574
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	\$1147	\$1413	\$719	\$789	\$541	\$346	\$338	\$392	\$6386

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