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## MORTGAGE REVENUE BONDS

Housing Markets, Home Buyers and Public Policy

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## PROGRAM EFFECTIVENESS OF MORTGAGE REVENUE BONDS IN A CHANGING ECONOMIC ENVIRONMENT

David J. Gross

### INTRODUCTION

In a 1988 study, the U.S. General Accounting Office (GAO) reported that mortgage revenue bonds (MRBs) had not been, in recent years, effective instruments for providing interest rate subsidies that issuers felt would be required to make the program effective. In addition, GAO reported that two factors might hinder improvement of MRB effectiveness: (1) the Tax Reform Act of 1986, which might increase the yield of MRBs relative to tax-exempt bonds; and (2) the trend away from the high nominal interest rates that made the bonds so successful in the early 1980s (GAO 1988).

This chapter analyzes how these two factors have affected the ability of MRB programs to provide significant mortgage rate subsidies. The method of analysis is to develop a simple model of the financial market, based on the relationships of yields of long-term, risk-free taxable investments (i.e., Treasury bonds) to yields of (1) MRBs, (2) MRB-financed mortgages, and (3) conventional mortgages. This model will be used to show how the potential spread between MRB-financed and conventional mortgage rates is affected by an exogenous change in the ratio of tax-exempt to taxable bond yields and by changes in prevailing interest rates.

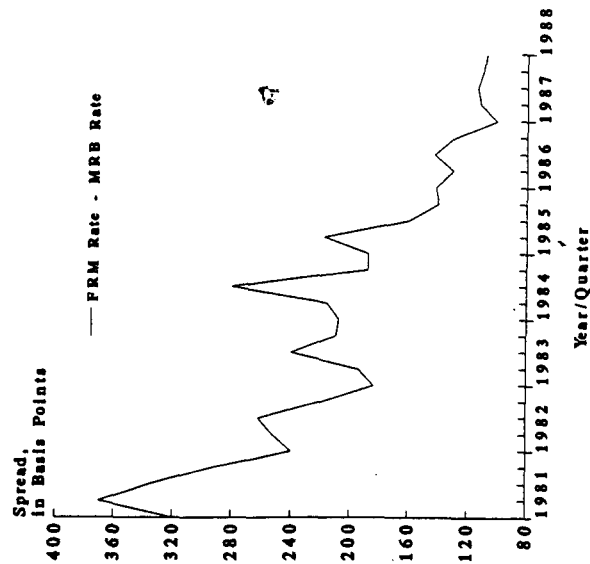
Following this analysis is an estimate of how these factors have affected the size of MRB-financed mortgage subsidies in the three years since the release of GAO's study. This examination suggests that the 1986 tax reform did not change the magnitude of MRB mortgage subsidies because it apparently did not affect the marginal tax rate of the marginal investor in tax-exempt bonds. However, the examination also suggests that the relatively low nominal interest rates that have persisted since 1988 likely have not contributed to substantially reduced MRB-financed mortgage rates.

### ESTIMATING POTENTIAL MRB SUBSIDIES: A SIMPLE MODEL

MRB subsidies are subject to great variation, and they are not always large enough to attract targeted households to the prospects of home ownership. According to a 1988 report by the U.S. General Accounting Office (GAO), most housing finance agencies with MRB programs seek to use MRBs to finance mortgages that bear interest rates of between 150 and 200 basis points (1.5-to-2 percentage points) less than conventional fixed-rate mortgages (FRMs).

These spreads were prevalent during the high interest rate environment of the early 1980's. As shown in figure 1, the spread between the average interest rate on conventional mortgages<sup>1</sup> and the average rate on MRB-financed mortgages<sup>2</sup> was between 150 and 250 basis points from mid-1983 to late 1984, when the program was approaching its peak level of activity. However, these spreads fell substantially in 1985, generally running at between 50 and 100 basis points (GAO 1988, 11).

Figure 1.  
Spread Between FRM and Estimated  
MRB-Financed Mortgage Rates, 1981-1988



Observations on the relationship of changes in these interest rates can be used to develop a model that shows how an exogenous change in interest rates, or in one of the yield ratios (that is, the ratio of yields between two securities) affects an issuing housing authority's ability to use MRBs to provide a significant interest-rate subsidy. To understand the development of this model, suppose, for example, that the coupon rate on MRBs is a constant 90 percent of the yield on 30-year Treasury notes. Thus, if the Treasury notes are being offered with a ten-percent coupon rate, then MRBs would have to yield a nine-percent coupon rate to be attractive to the marginal investor. Assuming that the issuing agency collects the maximum allowable arbitrage fee allowed by law, 112.5 basis points (to cover issuing costs), then the nine-percent MRB could be used to finance mortgages at rates no lower than 10 1/8 percent.

Whether the MRB program can successfully provide mortgage subsidies depends on the difference between the mortgage rate on MRB-financed loans and rates on conventional FRMs. Assuming that the yield ratio of FRMs to 30-year Treasury notes is 1.13 (its average from 1983 through 1990), then a ten-percent rate on Treasury notes would correspond to an FRM rate of about 11 1/8 percent. Thus, the 10 1/8 percent mortgage financed by MRBs would provide home buyers with a subsidy of 100 basis points over the conventional mortgage rate.

The mortgage subsidy offered by MRB financing falls if there is an exogenous increase in the ratio of tax-exempt and taxable bond yields. Suppose that such an increase (say, perhaps, because of a change in tax laws), causes an increase in the yield ratio between MRBs and Treasury notes from 0.9 to 0.95. Assuming that the taxable-bond yield remains unchanged at ten percent, then the yield on the special-purpose revenue bond would have to rise to 9.5 percent to make them equally attractive to the marginal investor. This higher MRB rate would allow participating housing agencies to issue subsidized mortgages at a rate no greater than 10 5/8 percent.<sup>3</sup> This higher rate is only 50 basis points below the conventional rate—far below the 150- to 200-basis point spread sought by housing finance agencies. Thus, if the bond market faced conditions similar to those mentioned in the above examples, issuers might be reluctant to issue MRBs.

This analysis can be used to develop a model that simulates the impact of changing financial market conditions on MRB effectiveness. Mathematically, the model can be expressed through the following system of equations:

$$(1) r_{MRB} = (A)(r_{TAX})$$

$$(2) r_{SUBS} = r_{MRB} + ARB$$

$$(3) r_{CONV} = (B)(r_{TAX})$$

$$(4) S = r_{CONV} - r_{SUBS},$$

where:

- $r_{MRB}$  = yield on MRBs,
- $r_{TAX}$  = yield on long-term, taxable bonds,
- $r_{SUBS}$  = interest rate on subsidized mortgages funded by MRBs,
- $r_{CONV}$  = interest rate on 30-year conventional fixed-rate mortgages,
- ARB = issuing costs and arbitrage fee for MRB issuers,
- A = parameter representing ratio between yields on corporate bond and special purpose revenue bonds (i.e., MRBs),
- B = parameter representing ratio between corporate bond yields and conventional mortgage rates, and
- S = spread between conventional mortgages and those subsidized mortgages funded through the use of MRBs.

Equation (1) relates the prevailing rates on MRBs to the prevailing rates on long-term taxable bonds. The parameter A represents the ratio of MRB yields to the returns on taxable bonds. Equation (2) shows how MRB rates are translated into subsidized mortgage rates through the addition of the arbitrage fee to cover issuance costs. Equation (3), in a manner similar to that of equation (1), relates the rates on conventional-rate mortgages over time to those on taxable bonds. Equation (4) simply relates the subsidy that can be provided to home buyers through the use of MRBs.

By combining the four equation system in one equation, it can be shown that the likelihood of achieving a desirable rate spread S (i.e., a spread of 150 to 200 basis points) is a function of the yield ratios A—the ratio between tax-exempt revenue bonds and taxable bonds—and B, the ratio between conventional mortgage rates and taxable bonds. For instance, equations (1) and (2) can be combined to express the rate on subsidized mortgages as a function of the taxable bond rate:

Similarly, equations (3) and (5) can be inserted into equation (4) to obtain

$$(5) r_{SUBS} = (A)(r_{TAX}) + ARB$$

$$S = (B)(r_{TAX}) - (A)(r_{TAX}) - ARB,$$

or

$$(6) S = (B-A)(r_{TAX}) - ARB.$$

#### ESTIMATES OF MRB SUBSIDIES UNDER DIFFERENT SCENARIOS

Table 1 shows how changes in the ratio between tax-exempt and taxable bond yields affect the ability of the bond program to operate under different economic conditions. Calculations in the table rely on the market assumptions presented above—in particular, that interest rates on conventional mortgages are, on average, 13 percent higher than the yield on 30-year Treasury notes<sup>4</sup>; that the arbitrage fee on MRB-financed mortgages is 112.5 basis points; and that the yields on MRBs and 30-year Treasuries are proportional. Calculations are provided for three different tax-exempt/taxable bond yield ratios: 0.90, the average ratio from 1983-1986, 0.95, which could occur if a subsequent exogenous factor lowered the tax advantages of MRBs to the marginal investor, and 0.85, which could occur if an exogenous factor raised the tax advantages of MRBs to the marginal investor.

The top panel of table 1 shows the correspondence of estimated interest rates on MRB-financed mortgages that would exist with any given FRM rate, using the relationship derived in equation (6). For instance, assuming that the yield ratio between MRBs and Treasury notes was 0.90, then eight-percent subsidized mortgages might be expected to co-exist with nine-percent FRMs; 8 7/8 percent subsidized mortgages with ten-percent FRMs, and so forth. The lower panel of the table shows the size of the potential mortgage subsidy—roughly 100 basis points at a nine-percent FRM, 125 basis points at a ten-percent FRM, and so on.

According to these estimates, as long as the MRB/Treasury note yield ratio stays at 0.9, issuers could achieve the desired 150 basis-point subsidy when conventional mortgage rates reached about 11 percent, and a 200 basis-point subsidy for conventional rates of 13 percent. In recent financial history,

conventional mortgage rates were over 11 percent from the late 1970's to late 1985. According to bond data collected by the GAO, from mid-1983 to mid-1984, when fixed-rate mortgage rates ranged between 12 and 13 percent, the rates on MRB-financed loans were 150-or-more basis points less.

**Table 1. How the Ratio Between Taxable and Tax-Exempt Bond Rates Affects the Potential Subsidized Mortgage Rates**

FRM Rate	Subsidized Mortgage Rate if the Ratio Between MRB and 30-Year Treasury Bill Rates Is:		
	0.85	0.90	0.95
9%	7.6%	8.0%	8.4%
10%	8.3%	8.8%	9.2%
11%	9.0%	9.5%	10.0%
12%	9.8%	10.3%	10.8%
13%	10.5%	11.0%	11.6%

FRM Rate	Subsidy in Basis Points If the Ratio Between MRB and 30-Year Treasury Bill Rates Is:		
	0.85	0.90	0.95
9%	139	101	63
10%	167	125	82
11%	195	149	102
12%	223	172	121
13%	251	196	141

Assumptions: (1) Average FRM rate is 118 percent of the yield on 30-year Treasury notes, and (2) interest rates on MRB-financed mortgages are 112.5 basis points above average MRB yield.

Achieving a 150-to-200 basis-point subsidy becomes even more difficult when the ratio between tax-exempt and taxable bond rates increases. The far right column in table 1 shows how potential subsidized mortgage rate spreads are affected when the yield ratio rises from 0.9 to 0.95. At every level, issuers have to offer a higher tax-exempt yield to make their bonds marketable. Assuming the same arbitrage fee, this increase is felt through the lower subsidy that can be offered at every interest rate. According to this model, issuers cannot reach a 150 basis-point subsidy even at conventional rates of 13 percent. Such high rates have not been charged since interest rates peaked the middle 1980s; since then, mortgage interest rates have remained substantially under 13 percent. As a result, if the yield ratio has been 0.95, the spread between MRB-financed loans and conventional loans has been far less than the desired level.

Alternatively, MRB programs can more easily provide the desired subsidy if the MRB/taxable bond yield ratio falls. This situation is shown in the far left column of table 1, which corresponds to a yield ratio between tax-exempt and taxable bonds of 0.85. As can be seen, a 150 basis-point subsidy can be achieved when conventional mortgage rates are about 9.5 percent. A 200 basis-point spread can be obtained when conventional mortgage rates are about 11 percent. Thus, if the ratio of tax-exempt to taxable bond yield fell, issuers seeking to provide a 150 basis-point mortgage subsidy could provide such a subsidy under the interest-rate environment that existed in late 1988.

#### FACTORS AFFECTING SUBSIDY LEVELS

The size of the subsidy offered by MRB programs may be affected by exogenous changes either in the nontaxable/taxable bond yield ratio or by changes in market interest rates. In this section, I examine whether the 1986 tax reform likely effected the yield ratio and, thereby, changed the size of MRB subsidies. Then, I discuss how changes in nominal interest rates have affected the magnitude of MRB subsidies.

#### Tax Reform

The Tax Reform Act of 1986 had the potential to reduce the effectiveness of MRBs to the extent that they reduced the marginal tax rate of the marginal investor in tax-exempt bonds. Tax-exempt bonds must offer the marginal investor a yield identical to the after-tax return on comparable taxable investments (Ayanian 1983; Peek and Wilcox 1986). If the new tax policy lowered the marginal tax rate of the marginal revenue-bond investor, then

issuers have to offer a higher yield in order to make the bonds competitive with taxable investments. By contrast, if the tax policy raised the marginal tax rate of the marginal investor, then the issuer could lower the bond yield while remaining competitive with taxable investments.

The available evidence suggests that tax reform likely has had little impact on MRB effectiveness: it has not reduced the spread between MRB-financed loans and conventional mortgage loans. Despite predictions by some researchers (for example, Galper, Lucke, and Toder 1986) that tax reform would increase the ratio between yields on general-purpose tax-exempt bonds and taxable bonds, the yield ratio between these bonds has not increased since 1987. For example, the ratio between special-purpose revenue bonds and 30-year Treasury notes has remained at about 0.90—the same average ratio that persisted from 1983 through 1986. This unchanging ratio confirms the prediction of Petersen (1987b), who suggested that the effects of lower tax rates for some investors might be completely offset by an increase in the demand for tax-exempt bonds caused by the elimination of other tax loopholes for other investors.

#### Low Prevailing Interest Rates

The analysis in the previous section showed that low interest rates reduce the magnitude of the MRB subsidy. This reduction occurs because the yield ratio is applied to a lower base; for example, a 0.9 yield ratio will yield a greater subsidy when prevailing mortgage interest rates are at 13 percent than when they are at nine percent.

Interest rates have remained low since 1986, relative to rates in the early 1980's. Given that the ratio between tax-exempt and taxable bonds has not changed, MRB programs should have difficulty achieving substantial subsidies with MRBs. As table 1 shows, when conventional mortgage interest rates are in the nine- to ten-percent range, MRB subsidies are likely to be in the range of 50-to-100 basis points, rather than the 150-to-200 basis points sought by housing finance agencies.

It should be noted that the timing of bond issuance can be as important a factor as current interest spreads when attempting to maximize a MRB-loan subsidy. The preceding analysis makes a simplifying assumption that bond issuance and mortgage availability occur simultaneously. Of course, this is not the case. Because of the timing involved in bond issuance, a lag of two to three months generally occurs between the time when the decision is made to issue bonds and when funds are available for the mortgages. When interest rates are rising or falling, this delay has an effect on spreads. In particular, if conventional rates are falling, as they did from 1984 to early 1987, and again

in early 1988, it becomes more difficult to use funds from a bond issued two to three months ago to compete with a conventional mortgage issued at currently low rates. Likewise, if rates rise sharply, a larger subsidy can be offered, as yesterday's cheaper MRB funds are used to compete with today's more expensive money.

#### CONCLUSION

This chapter provides an empirical framework for evaluating the circumstances under which MRBs can be used to provide significant mortgage rate subsidies. The analysis suggests that under current market conditions, MRBs are unlikely to provide subsidies of 150 to 200 basis points over conventional mortgage rates. Such subsidies are unlikely to be obtained unless conventional rates rise to their pre-1985 levels, or unless there is a change in the relationships between tax-exempt and taxable bond rates, or between conventional mortgage and taxable bond rates.

MRBs would be even less effective if issuers were forced to raise MRB rates relative to rates offered on taxable bonds. Alternatively, they might be effective at current interest rates if the yields fell relative to taxable bonds—something that might occur if there were an increase in federal income taxes for higher income households.

Similarly, MRBs might be temporarily effective if interest rates rise sharply over a brief period of time, as issuers could use cheaper funds to make mortgages in a high interest rate environment. However, such periods are difficult to forecast and it would not be good policy to plan issuances based on predictions of interest-rate movements.

A caveat for this evaluation is that the model is based on a very simple proportional relationship between bond rates. The true relationship is probably much more complex, being dependent on lagged interest rates, and possibly other factors as well. As such, the results from this model should be treated with some caution. However, it does provide a framework for evaluating bond effectiveness, and provides general guidance on the predictability of the potential size of MRB-provided subsidies.

#### ENDNOTES

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1. For the purpose of this analysis, conventional mortgages are defined as 30-year, fixed-rate mortgages. Elsewhere in this chapter, these mortgages may be referred to as FRMs.
2. The average rates on MRB-financed mortgages are drawn from a GAO survey of over 177,000 MRB-financed mortgage loans. While this sample is selective and therefore not necessarily statistically valid, it covers over 1/3 of the total loans made during the period 1984-1987 and covers a wide distribution both of regions and of housing market size. See GAO 1988, 16.
3. 9 1/2 percent plus the 112.5 basis-point arbitrage fee.
4. 30-year Treasury notes are being used as a proxy for taxable bond rates.

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## AN ALTERNATIVE TO MORTGAGE REVENUE BONDS: AN EVALUATION OF THE MORTGAGE CREDIT CERTIFICATE PROGRAM IN NORTH CAROLINA

Michael A. Stegman with the  
assistance of David Stebbins

### INTRODUCTION

In this chapter, we present our findings about the operation of the North Carolina Housing Finance Agency's (NCHFA) Mortgage Credit Certificate (MCC) Program, and we recommend how the program could be changed to serve better first-time buyers who need financial assistance. Our findings and recommendations are based on the analysis of data from four sources:

- NCHFA regulations regarding the Mortgage Credit Certificate Program;
- NCHFA files containing detailed data on the characteristics of nearly 800 buyers and the homes they purchased with the assistance of an MCC;
- telephone interviews with 34 participating lenders who, collectively, have originated more than 80 percent of the MCCs that NCHFA has issued under its initial allocation of mortgage credit authority; and
- a mail survey of a representative sample of 250 first-time home buyers who received MCC-assisted mortgage loans.

This chapter has six sections. We begin by discussing Congress' rationale for creating a federal MCC option for housing finance agencies in 1984; then we examine why the NCHFA implemented its own MCC program in late 1987. In section two, we briefly describe the characteristics of MCC-assisted mortgage loans in North Carolina, the housing units financed under the program, and the buyers who acquired them. Where comparable data exist, we present MCC program characteristics along with data for home loans