

Federal Tax Reform and the Regional Character of the Municipal Bond Market

Of the various tax proposals that could affect the municipal bond market, reduction of marginal tax rates and repeal of state income tax deductibility require special attention. Analysts are aware that repeal of state income tax deductibility would increase the out-of-pocket, effective level of state taxation. They also know that lower federal marginal tax rates would reduce the value of federal tax exemption of municipal bonds.

That analysis is incomplete, however, because of two important characteristics of the municipal bond market. First, most states impose taxes on the income their residents earn from bonds issued out-of-state. Any increase in effective state income taxes would raise the value of in-state bonds to investors and equivalently penalize borrowers who need funds from out-of-state. Second, because the majority of municipal bonds are bought by local investors, the effects of reducing the value of a bond's federal tax exemption depend on how many investors are affected in each state.

Current federal tax law fosters some uniformity in the municipal bond market by limiting the variations across states due to these two market characteristics. Repealing deductibility and establishing fewer brackets at lower marginal rates would remove these limits. They would raise interest costs for borrowers in some states and lower costs for those in other states. Though these are only two of many reform proposals that affect the

municipal bond market, they are interesting because each state is affected differently.¹

In attempting to identify how widely the effects of reform may vary across states, this analysis begins by describing how state tax laws contribute to the regional character of the bond market. The second section describes the role of demand for bonds by state residents relative to in-state borrowing needs. State tax laws and populations in each tax bracket are then analyzed to contrast the effects of current federal law with those of the most recent Administration proposals. The findings suggest that these proposals may have effects on the cost of borrowing that vary widely from one state to another

¹Some other proposals may affect the bond market to a larger degree, but their effects should be roughly similar across all states. They would raise or lower interest rates about the same for one state as for another. But the overall combined effect of the other proposals is uncertain. Viewed in isolation, some may create upward pressures on yields across states while others may create downward pressures. For example, the proposed elimination of federal tax exemption on many types of revenue bonds may reduce supply and lower yields. At the same time, a reduced number of alternative tax shelters may increase the value of tax-exempt bonds, raise demand, and lower yields. However, eliminating special treatment of commercial bank investment in tax-exempt bonds is likely to move many banks out of the market, lower demand, and raise rates over time. On balance, it is difficult to know whether yields will rise or fall as a result. For detailed analysis of the influence of federal tax law on commercial bank investment in municipal bonds, see Allen J. Proctor and Kathleene K. Donahoo, "Commercial Bank Investment in Municipal Securities", this *Quarterly Review* (Winter 1983-84). For approximations of possible effects on the average national level of interest rates, see Andrew Silver, "Three Aspects of the Administration's Tax Proposal: Tax-Exempt Rates", this *Quarterly Review* (Summer 1985).

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State tax laws and the favored treatment of in-state bonds

The municipal bond market has a regional orientation for most borrowers. In general, local investors buy the bonds local borrowers issue and local market conditions determine their borrowing costs.²

There is also a more familiar national market, consisting of a relatively small number of nationally recognized borrowers who regularly issue large volumes of bonds. Investors throughout the country buy and sell their bonds, and national market conditions determine their borrowing costs

One factor shared by municipal bonds in both markets is exemption from federal income taxes. Because no bond income needs to be set aside to pay federal taxes, investors are willing to accept lower yields than they would on investments subject to federal tax. The ratio of tax-exempt to taxable yields is often used to identify the federal tax bracket of the marginal investor in the national market.

Outside the national market, state taxation of municipal bonds becomes an important reason for the cost of borrowing to vary from one state to another. Puerto Rican municipal bonds are not taxable in any state, but 38 states presently impose some form of tax on other municipal bonds. Of the remaining 12, seven have no tax on any form of income and five impose no taxes on municipal bond income (Table 1).

Thirty-five of the states that tax municipal bond income use their tax laws to create special preferences for in-state borrowers. In-state bonds are tax-exempt while out-of-state bonds are not. For example, an investor who lives in a state with tax preferences earns \$900 in annual aftertax income from a \$10,000 in-state bond paying a 9 percent yield. If the state income tax is 5 percent, an equivalent out-of-state bond would provide only \$855 of income after \$45 in state taxes was paid. To return the same aftertax income as the in-state bond, the outside borrower must offer a resident investor a before-tax yield of 9.47 percent.³ This preference creates an incentive for borrowers to sell their bonds in their home states. The preference also encourages residents to switch from out-of-state bonds to in-state bonds of equivalent value.

The primary reason for creating tax barriers against outside borrowers is to improve the balance of supply

²For a discussion of the regional and national segments of the municipal bond market, see Robert Lamb and Stephen P Rappaport, *Municipal Bonds: The Comprehensive Review of Tax-Exempt Securities and Public Finance* (1980), pages 27-50

³Local income taxes are not considered in this study. These taxes will enlarge the basis point disadvantage placed on out-of-state bonds. Factors other than yield will also affect an investor's decision to buy out-of-state bonds: diversification, familiarity with the borrower, credit risk, etc.

and demand between resident borrowers and investors. By making out-of-state entry into their markets more expensive, states hope to increase the demand for in-state bonds among resident investors. If demand for municipals by residents is large enough to meet borrowing needs, then in-state borrowers may be able to sell their bonds exclusively to residents and achieve the maximum reduction of borrowing costs that the tax barriers permit. If demand by resident investors remains too small to absorb the supply of in-state bonds, despite the state's encouragement of in-state investment, borrowers will need to attract investors from outside the state.

A municipal borrower who goes out of state to find enough funds, however, must compete in other borrowers' home markets and overcome whatever tax

Table 1

Effective State Income Taxes on Municipal Bonds

Type of security	No state tax*	All municipals exempt†	No tax preference for in-state bonds	Tax preference for in-state bonds
			No municipals exempt‡	Only in-state municipals exempt§
Out-of-state municipal	—	—	S (1 - F)	S (1 - F)
In-state municipal	—	—	S (1 - F)	—
Number of states	7	5	3	35

Key F = Federal marginal income tax rate
S = State marginal income tax rate
— = No income tax

The exact tax preference for in-state bonds depends on state tax rules (Appendix 1) and is generally equal to the state tax rate reduced by the federal deduction of state taxes.

*Alaska, Florida, Nevada, So. Dakota, Texas, Washington, and Wyoming

†Indiana, Nebraska, New Mexico, Utah, and Vermont

‡Illinois, Iowa, and Wisconsin. Iowa exempts only Iowa State Board of Regents bonds and Wisconsin exempts only Housing Authority bonds.

§Alabama, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Georgia, Hawaii, Idaho, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, New Hampshire, New Jersey, New York, No. Carolina, No. Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, So. Carolina, Tennessee, Virginia, and West Virginia. Colorado, Kansas, Ohio, and Oklahoma tax some types of in-state bonds.

Source: Hueglin and Ward, *op cit*

barriers may be imposed. The borrower needs an underwriter who has a broad and strong broker network that can convince individual investors to buy unfamiliar, out-of-state bonds. The bonds must also offer a taxable yield that provides at least the same aftertax return the investor can earn from untaxed in-state bonds.

For the 15 states without tax preferences, the advantage of borrowing from resident investors and the importance of resident demand and supply is less clear (Table 1). Resident investors in these "free access" states receive the same tax treatment on in-state and out-of-state bonds. Outside borrowers, therefore, face no barriers to seeking resident investors, and in-state borrowers must always compete against borrowers from the other 14 free-access states. This generally will raise the in-state cost of borrowing. Moreover, changes in resident demand for in-state bonds may not be symmetrical when there are nationwide changes in demand for municipal bonds. Out-of-state borrowers have access to resident investors to try to shift part of any increase in demand away from in-state borrowers. At the same time, they may shift any reduction of demand onto in-state borrowers by intensified bidding for resident investors.

Current effectiveness of tax preferences

Even though use of tax preferences is widespread, their current importance depends on the size of the tax barriers and the need for borrowers to cross the barriers. Federal tax law plays an important role in each.

Federal deductibility of state income taxes lowers in-state bond demand by reducing the out-of-pocket cost of state taxes. This reduction occurs because each dollar of state income tax is partially offset by a reduction of federal taxes for taxpayers who deduct state income taxes. Instead of a combined federal (F) and state (S) tax rate of $F + S$, taxpayers face a rate of $F - FS + S$, where FS represents the federal tax reduction from deduction of state taxes. The effective out-of-pocket cost of state taxes is $S - FS$, which is restated as $S(1 - F)$ in Table 1.

For example, an investor in the 25 percent federal tax bracket, who faces a 5 percent state tax on a \$10,000 out-of-state bond yielding 9 percent, can use deductibility to reduce his federal taxes by one-fourth of his \$45 state tax bill. Thus, he pays a \$33.75 state tax on the income from his out-of-state bond.

Deductibility increasingly blunts the effectiveness of tax barriers as the federal tax bracket increases. At the top federal bracket of 50 percent, for example, state taxes are reduced by half. If the resident investor with the \$10,000 bond and \$45 state tax bill were in this bracket, his effective state tax would be only \$22.50.

This federal offset also limits the yield an out-of-state

borrower would have to offer a resident to equal the aftertax return of a comparable in-state bond. In the example above, the out-of-state borrower would have to pay a top-bracket investor 9.23 percent to equal the aftertax return on a 9 percent in-state bond. However, this increase of 23 basis points is lower than the 47 basis points the outside borrower would have to pay without federal deductibility.

Estimates of the size of tax preferences in each state show that current law with federal deductibility results in relatively modest barriers to outside borrowers.⁴ Using comprehensive measures of effective state tax rates, Steven Hueglin and Karyn Ward calculate the aftertax return of equivalent bonds in each of the states with tax preferences. In about one-third of the states, the aftertax return of an equivalent outside bond is less than 30 basis points below an in-state bond. In all but five states, state taxation lowers the return on out-of-state bonds by less than 50 basis points. The states with larger barriers to outside borrowers are Delaware (61), Minnesota (89), Montana (52), New York (63), and West Virginia (71).⁵

Whether borrowers need to cross these tax barriers depends on the demand for their bonds in their home states. Each state's tax schedule and specific tax rules provide a unique schedule of effective tax rates by income bracket. Based on these tables and the actual interest rates on municipal, Treasury, and corporate bonds, it is possible to specify those investors who would prefer in-state municipal bonds to all other bonds. This pool of potential investors can be characterized as all taxpayers above a certain income tax bracket, which varies by state.

In California in 1984, for example, in-state municipal bonds provided the highest average aftertax returns for residents with taxable incomes above \$24,600. Based on the tax formulas in Appendix 1, the average Treasury bond yielding 12.46 percent and the average medium grade corporate bond yielding 14.14 percent gave a California investor in that tax bracket aftertax returns of 9.35 percent and 10.07 percent, respectively. By comparison, the average California bond in 1984 yielded 10.11 percent. At higher tax brackets, the superiority of in-state municipals would widen. At lower tax brackets,

⁴Presumably all municipal bond investors lower their effective tax rates through deductibility. Seventy percent of all married taxpayers filing joint returns with taxable incomes over \$30,000 deduct state and local income taxes. This income level coincides closely with the minimum taxable income for resident investors in most states.

⁵Steven Hueglin and Karyn Ward, *Guide to State and Local Taxation of Municipal Bonds* (1981). Their calculations are based on a 9 percent coupon bond selling at par using approximations of the formulas presented in Appendix 1. They also include personal property taxes for states that have such taxes. Since they performed their calculations, Connecticut has introduced taxation on out-of-state bonds.

corporate bonds would have a higher aftertax yield than both California municipals and Treasury bonds.

In other states with different tax schedules, rules, and average yields, the aftertax return on in-state bonds becomes superior at different income levels. These brackets are presented in Table 2 (column 1) based on 1984 tax laws and interest rates. In Alabama, for example, the average in-state yield becomes superior to other yields above the \$35,200 income bracket.

The need for borrowers to go outside the state to find sufficient investors can be approximated by the ratio of total municipal borrowing in the state and the number of potential resident investors.⁶ A high dollar value per investor suggests a high probability that borrowers in that state often cross state lines and possibly encounter tax barriers. This may occur because the state has few high-income residents to demand the bonds or because its borrowing needs create a relatively large supply of bonds. Conversely, a low value suggests that a state is able to function as a self-sufficient market in which all supply is taken up by resident demand. This may occur because demand is high owing to a large high-income population or because supply is low owing to relatively limited borrowing needs.

The estimates of bonds issued per potential resident investor range from a high of \$60,700 in Wyoming to a low of \$2,800 in Ohio and Indiana (Table 2, column 3). There is no particular level of per capita borrowing at which a state becomes self-sufficient. However, results from a study by Kidwell, Koch, and Stock suggest that at this time the majority of states are self-sufficient.⁷ The

⁶The number of investors is approximated by the number of federal tax returns above the minimum taxable income level for each state. For this article, the alternative investments available to an investor are limited to U S Treasury bonds and corporate bonds. For other types of investments it is assumed that other factors, such as capital gains taxes or depreciation rules, are more important in calculating return than are income taxes, which are the focus of this article. See Appendix 1 for a discussion of how aftertax returns are calculated for each type of bond. An alternative measure of the ability to sell exclusively to residents is the ratio of dollars issued to the aggregate income of potential resident investors. Use of this measure does not alter the results appreciably.

⁷David Kidwell, Timothy Koch, and Duane Stock, "The Impact of State Income Taxes on Municipal Borrowing Costs", *National Tax Journal* 37 (December 1984) pages 551-562. Their study examines yields on general obligation bonds of less than \$5 million which were bid competitively in 1980. The study finds that tax preferences on average are successful in reducing the cost of borrowing for in-state borrowers relative to outside borrowers. Significantly, however, the average reduction is a fraction of the value of the tax preferences. This partial effect may occur if the marginal investors for some of the bonds are not state residents and therefore do not benefit from tax preferences. In that sense, these results confirm that, while some municipal bonds are sold in-state (where tax preferences lower the cost of borrowing), a significant proportion of municipal bonds are sold out-of-state, where tax preferences raise the cost of borrowing.

estimates in Table 2, then, are one way to sort out which states lower their costs through tax preferences by being self-sufficient and which see their costs raised because they must cross other states' tax barriers.

About 30 of the 35 states with tax preferences may have enough resident investors to be self-sufficient for in-state borrowing needs if around \$10,000 of borrowing per investor were the cutoff point. These may be the states, then, that are able to lower their borrowing costs by imposing taxes on out-of-state bonds.

On the other hand, Michigan, New Jersey, North Carolina, and North Dakota may not benefit from their taxation of out-of-state bonds. Borrowers in these four states issue much more than \$10,000 per resident investor. They are more likely, therefore, to require additional investors from outside the state.

Most of the 15 states which do not protect their in-state borrowers have low borrowing needs relative to their investor pool. Their borrowers are probably able to avoid the increased costs of crossing the tax barriers of other states.

In sum, under present law, demand and supply conditions in most states do not indicate that a great deal of interstate borrowing is occurring in the municipal bond market. Local borrowing from local investors appears sufficient to satisfy financing needs in most states. For the relatively few borrowers who may depend on out-of-state sales, the effective state taxes they may encounter seem to be relatively modest.

Tax reform and its effect on interstate competition for investors

Federal tax reform has important effects on interstate differences in the municipal bond market. Resident demand for in-state bonds is sensitive to any change in federal tax rates, and the size of tax preferences is sensitive to any change in federal deductibility of state income taxes. Most proposals for federal tax reform will change at least one of these provisions. The remainder of this article uses the *President's Tax Proposals to the Congress for Fairness, Growth, and Simplicity* (Treasury II) to illustrate what the effects of these two provisions would be on regional municipal bond markets and why the effects would vary widely across states.

Increased need to borrow out-of-state

The federal tax reform proposal is structured so that tax rate cuts are not the same for every state pool of potential resident investors. Treasury II proposes marginal tax rates of 15 percent for incomes to \$29,000, 25 percent for incomes to \$70,000, and 35 percent for incomes over \$70,000. In states like Colorado, present marginal investors in the resident pool have taxable incomes under \$30,000. For them,

the marginal tax rate will remain unchanged at 25 percent. In other states like Alabama, the marginal investor at current interest rates has taxable income of \$35,200. The proposal reduces that investor's tax rate from the current level of 33 percent to 25 percent. And in states like New Jersey where the taxable income of the marginal investor is \$45,800, the marginal tax rate declines from 38 to 25 percent.

These lower tax rates will reduce the appeal of municipal bonds relative to taxable bonds. Many of today's marginal investors will drop out of the market, causing demand for in-state bonds to decline and the minimum income level of the remaining potential investors to be higher. Estimates of these new income levels are presented in Table 2 (column 2) for current rates of interest.

For most states, the return on in-state municipal bonds will no longer appeal to residents earning less than \$70,000. The current before-tax yield spread between in-state municipals and taxable bonds is too wide for most residents in the proposed middle tax bracket. In only nine states (Arkansas, California, Colorado, Delaware, Hawaii, Idaho, Maryland, Montana, and Oregon) do state and federal taxes on Treasury and corporate bonds combine to make current in-state municipal yields attractive to the middle-bracket investor earning between \$29,000 and \$70,000.

Estimates of the percentage of current potential investors who will continue to demand in-state municipals are presented in Table 2 (column 5). The nine states where middle-bracket investors are likely to remain in the market at current yields should face only

Table 2

State Characteristics of the Regional Municipal Bond Market

State	Minimum tax bracket of resident investors* In dollars		Dollar borrowing per potential resident investor† In thousands of dollars		Retention of potential resident investors under proposed law‡ In percent
	1984 law (1)	Proposed law (2)	1984 law (3)	Proposed law (4)	(5)
Alabama	35,200	70,000	8.7	79.1	11.0
Alaska	29,900	70,000	24.8	116.4	21.3
Arizona	29,900	70,000	8.1	66.9	12.1
Arkansas	29,900	29,000	3.3	3.3	\$
California	24,600	29,000	7.0	7.0	\$
Colorado	24,600	29,000	8.7	8.7	\$
Connecticut	50,000	70,000	11.0	18.4	59.6
Delaware	24,600	29,000	7.8	7.8	\$
Florida	32,500	70,000	11.1	70.2	15.8
Georgia	29,900	70,000	9.5	77.7	12.2
Hawaii	24,600	29,000	6.1	6.1	\$
Idaho	29,900	29,000	3.9	3.9	\$
Illinois	45,800	70,000	15.8	27.2	58.2
Indiana	35,200	70,000	2.8	28.4	9.9
Iowa	45,800	70,000	19.2	33.5	57.1
Kansas	35,200	70,000	7.0	53.3	13.1
Kentucky	35,200	70,000	8.8	78.7	11.2
Louisiana	29,900	70,000	8.4	61.1	13.7
Maine	35,200	70,000	4.2	39.8	10.6
Maryland	29,900	29,000	3.7	3.7	\$
Massachusetts	35,200	70,000	4.6	33.5	13.8
Michigan	45,800	70,000	13.7	24.4	56.0
Minnesota	35,200	70,000	7.5	63.8	11.8
Mississippi	29,900	70,000	5.8	49.3	11.7
Missouri	29,900	70,000	5.3	44.3	11.9
Montana	24,600	29,000	10.5	10.5	\$
Nebraska	29,900	70,000	5.3	44.6	11.8
Nevada	35,200	70,000	7.1	52.2	13.6
New Hampshire	35,200	70,000	3.2	27.7	11.5
New Jersey	45,800	70,000	18.4	32.1	57.2
New Mexico	35,200	70,000	8.9	73.7	12.0
New York	29,900	70,000	5.3	34.2	15.6
North Carolina	45,800	70,000	21.7	37.1	58.5
North Dakota	35,200	70,000	16.9	136.1	12.4
Ohio	35,200	70,000	2.8	25.6	11.1

a small change in demand. All other states may face a significant loss of investors.⁸

The effect of these changes on the cost of borrowing in each state depends on how much demand falls short of local borrowing needs. Table 2 (column 4) presents estimates of the amount of borrowing per investor if 1984 borrowing needs continue. Virtually all the 41 states losing middle-bracket investors will have per capita borrowing levels that exceed current levels.

New York provides an illustration of the consequences of losing a large number of investors in the critical

\$29,000 to \$70,000 range. New York borrowers currently issue about \$5,000 in bonds per potential resident investor annually. This is low, but middle-bracket investors represent all but 15 percent of the investor pool. This is the very group that is likely to drop out of the market at current yields. If New York borrowers were to lose middle-bracket investors, their sales to resident investors would need to average \$34,000 per potential investor. At present, only two states issue such a large amount of debt per capita.

The reduced pool of investors may not absorb so much debt at current yields. Evidence cited earlier suggests that the states with per capita borrowing above \$10,000 may currently rely on out-of-state investors for at least part of their borrowing needs. Short of reducing their future bond issuance substantially, borrowers in the

⁸The current spread between municipals and taxable bonds is larger at short maturities than at longer-term maturities. The loss of in-state demand will be largest at the maturities with the largest spreads along the future yield curve.

Table 2

State Characteristics of the Regional Municipal Bond Market, *continued*

State	Minimum tax bracket of resident investors* In dollars		Dollar borrowing per potential resident investor† In thousands of dollars		Retention of potential resident investors under proposed law‡ In percent
	1984 law (1)	Proposed law (2)	1984 law (3)	Proposed law (4)	(5)
	Oklahoma	35,200	70,000	5.6	38.5
Oregon	29,900	29,000	4.7	4.7	§
Pennsylvania	35,200	70,000	5.3	45.5	11.6
Rhode Island	35,200	70,000	11.2	95.7	11.7
So Carolina	35,200	70,000	10.1	94.5	10.7
So Dakota	35,200	70,000	11.5	115.8	9.9
Tennessee	35,200	70,000	5.5	46.7	11.8
Texas	35,200	70,000	8.3	53.2	15.6
Utah	35,200	70,000	21.2	215.0	9.9
Vermont	45,800	70,000	30.6	55.0	55.6
Virginia	35,200	70,000	4.1	28.4	14.3
Washington	29,900	70,000	3.5	28.3	12.3
W Virginia	35,200	70,000	4.4	46.0	9.7
Wisconsin	35,200	70,000	3.6	36.3	10.0
Wyoming	45,800	70,000	60.7	104.4	58.1

*The minimum taxable income in 1984 at which the Public Securities Association estimates of the average net interest cost on in-state municipal bonds exceeds both the aftertax return on ten- and 20-year Treasury bonds (whose 1984 yields averaged 12.46 percent) and the aftertax return on Baa corporate bonds (whose 1984 yields averaged 14.14 percent). See Appendix 1 for the formulas used to calculate combined federal and state income taxes. State and federal tax schedules are available from the authors on request. Use of narrower yield spreads in the calculations would result in lower minimum income levels. Calculations under the proposed law take into account both revised income tax brackets and repeal of federal deductibility, except for Iowa (see footnote below).

†For states with minimum taxable income levels up to \$35,200 the number of potential investors is approximated by the number of federal returns with adjusted gross income (AGI) above \$30,000. For states with minimum taxable income levels of \$45,800 or \$50,000 the proxy is the number of returns with AGI above \$50,000. For a taxable income level of \$70,000, the number of returns with AGI over \$70,000 is computed as all returns above \$100,000 AGI and one half the returns between \$50,000 and \$100,000 AGI. These estimates assume that 1984 levels of borrowing continue. Some other tax proposals may reduce future borrowing from current levels.

‡The estimated number of potential resident investors under the proposed law as a percentage of current potential resident investors.

§Virtually all potential resident investors will be retained.

¶If deductibility is repealed, the spreads used in the calculations are too large for in-state municipals to be attractive to residents at any income level. Therefore, the effect of repeal of deductibility is not reflected here.

Sources: Public Securities Association, Hueglin and Ward, *op cit*; Internal Revenue Service, *Statistics of Income*, Advisory Commission on Intergovernmental Relations, and Federal Reserve Bank of New York staff estimates.

majority of states, therefore, would have two options.⁹

- They could increase yields by enough to induce the remaining resident investors to increase their holdings of in-state bonds.
- They could sell their bonds out-of-state and pay premium yields to overcome the tax barriers other states may impose.

Table 3 (column 1) presents estimates for selected states of the increased yields necessary to replace the lost investors. For states losing investors, the estimated increases range from 4 to almost 60 basis points. For example, for New York borrowers to sell all their bonds to the remaining resident investors, they would need to increase the average yield by an estimated 46 basis points over the 1984 average interest cost of 9.04 percent reported by the Public Securities Association. In dollar terms, this increased yield would raise the debt service on a \$10 million, 20-year bond issue by \$920,000 over the life of the issue.

An important reason some states may need larger increases in yields than others is the difference in the share of resident demand for in-state bonds which middle-bracket residents now represent. Appendix 2 presents a method for estimating these shares.

In states with the largest estimated cost increases, middle-bracket residents currently represent a disproportionately large share of demand compared with top-bracket residents. To replace middle-bracket demand, the remaining top-bracket investors must be induced by large increases in yields to raise the share of their income being invested in local bonds.

By contrast, states in which top-bracket residents already account for most resident demand would have an easier time replacing their middle-bracket resident investor pool. For example, even though middle-bracket residents comprise about 90 percent of Utah's pool of potential resident investors, they have only an estimated 73 percent of the income of the pool. Utah may have to give only a 4-basis-point increase in yields to convince its top-bracket residents to invest enough additional income in local bonds.

As an alternative, borrowers may try to attract out-of-state investors. In outside markets they will have to compete with more borrowers, some of whom are facing the same problem. In addition, they may need to attract investors from states that tax the income on out-of-state bonds. Repeal of federal deductibility of state income taxes will have important

effects on their cost of going out-of-state.

Increased barriers against out-of-state borrowing

Repeal of federal deductibility of state income taxes would remove the moderating role of federal tax law on state tax preferences. Effective state taxes on out-of-state bonds would rise, placing outside borrowers at a much greater yield disadvantage than they currently face relative to in-state borrowers.

Estimates of the increased size of these preferences are shown in Table 3 (column 2) for selected states. Since states differ in their tax rates and rules, repeal of federal deductibility would have different effects across states on the value of tax preferences.

For example, for a New York resident, repeal of deductibility would reduce the aftertax return of an out-of-state municipal bond by 35 basis points.¹⁰ An outside borrower would have to increase the before-tax yield it pays by at least that much before it could compete with comparable New York borrowers for New York investors. This increase comes in addition to the 63-basis-point disadvantage out-of-state borrowers currently face in attracting New York residents.¹¹

Some in-state borrowers in the 35 states with tax preferences may benefit from the increased barriers against outside borrowers. The increased value of state tax exemption may allow some in-state borrowers to reduce the yields they offer to residents. Residents who now hold out-of-state bonds may also replace some of them with in-state bonds and soften the effect of the loss of middle-bracket investors

Combined effects of federal changes

The majority of municipal bonds are already sold on a regional basis in the United States. Revision of federal tax rates and repeal of deductibility would reinforce and possibly strengthen this local orientation of municipal financing. Repeal of deductibility would increase the incentive for borrowers to rely exclusively on resident demand for their bonds. At the same time, the possible loss of middle-bracket demand because of reduced federal tax rates would create a need for more intensive regional marketing of bonds in order to ensure enough resident investors for current borrowing needs

Self-sufficiency in financing local borrowing with local investment, however, will be far easier for some states than for others. The combined effects of federal tax reduction and repeal of deductibility divide the states into three classes according to the

⁹A reduction of borrowing may occur in some states as a result of proposed restrictions on certain types of municipal bonds. Data are not available to permit estimation of possible reductions by state

¹⁰New York City residents will be affected to a greater extent because they also pay local income taxes on out-of-state bonds

¹¹Hueglin and Ward, *op cit*

Table 3

Possible Effects of Personal Income Tax Reform on In-State Borrowing Costs

In basis points

State	Increased cost of in-state borrowing*	Increased tax barriers against out-of-state borrowers†
Alabama	14	15
Arkansas	0	19
California	0	13
Delaware	0	19
Florida	17	0
Hawaii	0	21
Indiana	59	0
Kentucky	19	18
Maryland	0	20
New York	46	35
Ohio	54	17
Oregon	0	27
Texas	25	0
Utah	4	0
Wisconsin	39	0‡

*The increase in in-state borrowing costs necessary to maintain current resident demand if federal tax rates become 15 percent for incomes to \$29,000, 25 percent for incomes to \$70,000, and 35 percent for incomes over \$70,000

†The decrease in a resident investor's aftertax return on an out-of-state bond relative to an equivalent in-state bond if federal deductibility of state income taxes is repealed

‡The repeal of federal deductibility will reduce the resident investor's aftertax return on both in-state and out-of-state bonds by about 30 basis points. Because this state taxes both in-state and out-of-state municipal bonds, however, the repeal of deductibility will not affect the spread between the two types of bonds for a resident investor. A similar effect will occur in Iowa and Illinois

Source: Federal Reserve Bank of New York staff estimates

probable future cost of financing public projects

- states which are most likely to face *increased* borrowing costs because of a large decline in middle-bracket demand and an absence of tax barriers to discourage residents from financing out-of-state projects,
- states that are most likely to become more autonomous with *reduced* borrowing costs because of a continued large potential resident investor pool and increased tax barriers to discourage out-of-state investment, and
- states that may become more autonomous but with *varying* changes in borrowing costs because a reduced resident investor pool will face increased barriers to investing out-of-state.

The 15 states without tax preferences will be the markets of choice for borrowers from out-of-state who need to replace their lost middle-bracket investors. The increased number of borrowers competing for a reduced investor pool may create substantial pressures on borrowers to raise yields.

For example, Texas borrowers may need to increase yields by an estimated 25 basis points in order to induce top-bracket resident investors to replace the demand of middle-bracket residents. If more out-of-state borrowers also try to attract investors in this state, the larger supply may force yields even higher for in-state borrowers. This effect could be limited if tax preferences were introduced.¹²

By contrast, nine states would encounter no loss of resident demand and their protection from outside competition would increase. For example, Oregon borrowers would increase their yield advantage over outside competition by an estimated 27 basis points while their borrowing needs would remain at the low level of \$4,700 per resident investor. One consequence is that they might be able to reduce the yields they offer residents.

Twenty-six states may encounter the third class of effects. reform would increase the benefits of financial self-sufficiency at the same time that it would erode their ability to be self-sufficient. New York best represents this conflicting situation. In-state borrowers would be protected from outside competition for funds by one of the largest increases in tax preferences for in-state resident investment. At the same time, the predominance of middle-bracket residents in the New York investor pool would cause one of the largest decreases in resident demand. If the latter effect is larger, as estimated in Table 3, enhanced tax barriers would be of little benefit, and local borrowers might need to go out-of-state. They would have to find new markets, introduce unfamiliar New York local bonds to new investors, and possibly pay high enough yields to offset out-of-state taxation.

A final issue in evaluating federal tax reduction and repeal of deductibility is the effect of increased reliance on regional municipal bond markets. Under current law, states with large borrowing needs but relatively small high-income populations can seek investors in other states usually at little additional cost. These tax pro-

¹²The benefits of introducing tax preferences would be especially large in Wisconsin, Iowa, and Illinois which may lose resident demand as a result of each federal tax proposal. These states currently have no tax preferences because in-state bonds are taxed at the same rate as out-of-state bonds. Uniquely for them, repeal of deductibility would reduce resident aftertax returns on *in-state* bonds—by as much as 30 basis points in Wisconsin. Exemption of in-state bonds would prevent this effect and limit the problem to the replacement of middle-bracket demand.

posals would encourage states to tax out-of-state investment and to solve their financing needs more completely in local markets. Because of the variety of

state tax laws and the diverse abilities of states to be financially self-sufficient, however, not all regional markets would fare equally well.

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Appendix 1: State Tax Formulas

This appendix presents the formulas used to calculate effective state and federal income tax rates on municipal, corporate, and Treasury bonds. These formulas are applied to taxable bond yields to determine the minimum income tax bracket for potential resident investors in each state (Table 2). They are also used to calculate the effect of repeal of deductibility on aftertax returns of out-of-state municipal bonds (Table 3, column 2). Tax rates on fixed income securities for states can be divided into six groups on the basis of their deductibility formulas. The formulas use the following symbols:

- F = Federal marginal income tax rate
- S = State marginal income tax rate
- d = Deductibility of state and local income tax from the federal tax base:
 - d = 1 under 1984 tax law
 - d = 0 under proposed federal tax law
- C = Effective combined federal and state income tax rate on corporate bonds
- T = Effective combined income tax rate on Treasury bonds
- M = Effective combined income tax rate on out-of-state municipal bonds

Under current law, taxpayers who itemize on their federal returns may deduct their state and local income tax from their federal taxable income, for states that impose a state tax. In those states that do not, only the federal tax rate, F, applies to both Treasury and corporate bonds, and the effective tax rate on all municipal bonds is zero. These states are Alaska, Florida, Nevada, South Dakota, Texas, Washington, and Wyoming.

For many states, deduction of state and local income tax from federal taxable income reduces the effective state tax rate. These are their formulas:

$$C = F + [S(1 - dF)]$$

$$T = F$$

$$M = S(1 - dF)$$

These tax formulas apply to Arkansas, California, Connecticut, Delaware, Georgia, Idaho, Illinois, Indiana, Maine, Maryland, Massachusetts, Michigan, Mississippi, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Oregon, Pennsylvania, South

Carolina, Tennessee, Virginia, West Virginia, and Wisconsin. For Illinois and Wisconsin, the formula is the same for out-of-state municipals and in-state municipals.

Some states seek to lessen the tax burden further by also allowing the deduction of federal income taxes from state taxable income. For Alabama, Arizona, Iowa, Kentucky, Louisiana, Montana, and Oklahoma these tax formulas apply:

$$C = F + \frac{[(1 - dF)(S - FS)]}{(1 - dFS)}$$

$$T = F - \frac{[(1 - dF)(FS)]}{(1 - dFS)}$$

$$M = \frac{[S(1 - dF)]}{(1 - dFS)}$$

For Iowa the formula for out-of-state municipals also applies to in-state municipals.

In other states, however, the additional tax savings from state deductibility of federal taxes are reduced because all state and local income taxes that were subtracted from the federal tax base must be added back into the state tax base. As a consequence, Colorado, Kansas, Minnesota, Missouri, North Dakota, and Utah use these formulas:

$$C = F + \frac{[(1 - dF)(S - FS)]}{(1 - dFS - dS)}$$

$$T = F - \frac{[(1 - dF)(FS)]}{(1 - dFS - dS)}$$

$$M = \frac{[S(1 - dF)]}{(1 - dFS - dS)}$$

In some states, income tax is calculated as a percentage of federal income tax. For Nebraska, Rhode Island, and Vermont, one formula applies to both corporate and Treasury bonds:

$$C = T = [F(1 + S)] / (1 + dFS)$$

Tax treatment of municipal bonds differs among the three. Since Rhode Island exempts only in-state municipals from income tax, it has a separate tax formula for out-of-state municipals:

$$M = [FS(1 - dF)] / (1 + dFS)$$

On the other hand, Nebraska and Vermont exempt all municipal bonds, so that the effective combined tax rate on these securities is zero.

Finally, in Hawaii, state income tax is deductible from the state income tax base as well as from the federal tax base. As a result, Hawaii has unique tax formulas:

$$C = F - \frac{[dFS/(1 + S)] + [S/(1 + S)]}{1 + S}$$

$$T = F$$

$$M = [S/(1 + S)] - \frac{[dFS/(1 + S)]}{1 + S}$$

Appendix 2: Estimating Resident Demand

This appendix summarizes the methodology for estimating the demand for in-state bonds by resident investors. It also explains the calculation of the interest rate effects presented in Table 3 (column 1). In order to estimate the aggregate demand of potential investors in a given state two problems must be overcome. First, data on aggregate state income by bracket are provided for adjusted gross income (AGI). In contrast, taxable income is the basis for determining the minimum income of a potential investor. Consequently, the minimum taxable income levels in Table 2 must be converted to AGI. The initial AGI estimate is based on the ratio of AGI and taxable income for each state and the ratio nationally for each AGI bracket. This estimate is further adjusted by the average amount of state and local income tax deducted by the average taxpayer at that level of AGI.

The second problem occurs in estimating the aggregate AGI of residents above this minimum level. Internal Revenue Service (IRS) data on state aggregate AGI by income level use bracket ranges that are larger than the range of most of the income levels examined in this study. As a result, interpolating aggregate income within the published income brackets requires estimating an income distribution function for each state using the following procedure:

Based on IRS data on the number of returns and the value of income in each AGI bracket, we plotted two cumulative logarithmic distribution functions for each state: the cumulative percentage of returns by AGI

bracket and a Lorenz curve of cumulative percentage AGI and cumulative percentage returns. We located the estimated minimum AGI levels along each distribution function with a cubic spline function and then converted the results into the total state AGI above each minimum AGI level.

The aggregate AGI of resident investors above the minimum taxable income level is approximated under 1984 law and the proposed law. The change in aggregate income due to the proposals is adjusted for the assumption that 70 percent of the residents deducted state income tax from federal taxable income and that they invested an average of one percent of their gross income in municipal bonds each year. This income reduction is divided by bond issuance in each state to approximate the percent change in demand for in-state bonds. Using an interest elasticity of 1.27, the percent change in net interest cost is calculated. The value in basis points is based on the 1984 average net interest cost for each state estimated by the Public Securities Association. The elasticity estimate is taken from Patric Hendershott and Timothy Koch, "An Empirical Analysis of the Market for Tax-exempt Securities", Monograph Series in Finance and Economics, New York University, Monograph 1977-4. For a discussion of using cubic spline interpolations of income distributions, see Christine Cumming and Roger Kubarych, "The Economic Effects of the Tax Deductibility of Interest", *Nominal and Real Interest Rates: Determinants and Influences*, Bank for International Settlements (1985).