TAX-EXEMPT BONDS REALLY DO SUBSIDIZE MUNICIPAL CAPITAL!

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Abstract

The traditional view of municipal finance holds that the federal tax-exemption of interest payments by state and local (municipal) governments provides a capital cost subsidy to municipal investment equal to the difference between the interest rates on taxable and tax-exempt bonds. Recently a new view has emerged which argues that tax-exemption plays a minor role, if any, in shaping municipal investment decisions. According to this new view, communities will use tax finance at the margin except in the unusual case where only debt finance is used. Thus, tax-exemption is an intramarginal (lump sum) transfer providing no incentive for municipal investment.

This paper concludes that the new view's policy prescriptions rest on implausible assumptions about voters' financial opportunities and costs. In particular, the new view assumes that the decisive voter has unlimited financial assets upon which he can draw to finance tax payments. The new view is shown to contain several anomalous results, including unexploited arbitrage profits and the implication that tax-exemption increases the municipal cost of capital. A broadened analysis incorporating leverage-related interest rates and constraints on financial assets and debt restores tax-exemption as a municipal capital-cost subsidy under a wide range of conditions.

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There is a long tradition in municipal finance holding that tax-exemption of municipal interest creates a capital-cost subsidy for investment by state and local governments (see, for example, Fortune 1992). According to this traditional view, tax-exemption reduces the interest rate on municipal bonds by a fraction equal to the tax rate of the marginal investor in municipal bonds. If that tax rate is s, the municipal bond yield will be $r_m = (1 - s)r$, where r is the yield on taxable bonds with equivalent risk. Because municipal investment is financed by municipal debt, at least at the margin, the marginal municipal capital cost subsidy is $r - r_m = sr$. The parameter s is called the implicit subsidy rate on tax-exempt bonds.

Recently a "new view" has been proposed in which tax-exemption is irrelevant to the municipal cost of capital and to the volume of municipal investment. This was first proposed by Southwick (1979), who concluded, using a model of municipal decisions made by a rational property owner who maximizes the value of his property, that tax-exemption was a lump-sum subsidy which does not affect the marginal cost of municipal capital. Gordon and Metcalf (1991), in a special issue of the National Tax Journal devoted to public policy issues surrounding tax-exemption, used a decisive voter model to show that municipal investment is independent of the existence of tax-exempt bonds; the title of their paper ("Do Tax-Exempt Bonds Really Subsidize Municipal Capital?") inspired the title of this study. Choate and Thompson (1996), assuming that municipal decisions are made by an independent municipal finance officer, proposed a municipal finance analogue of the well-known Modigliani-Miller proposition that capital structure is irrelevant to the corporate cost of capital. While each of these papers has unique characteristics, they all reach the conclusion that we characterize as the new view.

Our discussion will follow the approach presented by Gordon and Metcalf. Tax exemption, Gordon and Metcalf argue, does not affect the marginal cost of capital for

municipalities unless all municipal capital is debt financed. Therefore, except in unusual cases, tax-exempt bonds do not confer a subsidy to municipal investment at the margin. Rather, they concluded, the marginal cost of municipal capital is the after-tax interest rate on taxable bonds, (1-t)r, where t is the decisive voter's income tax rate. There is a tax subsidy to municipal investment, but it is equal to tr, and it is independent of the tax-exempt status of municipal bonds. While the New View recognizes a tax subsidy for municipal investment, it comes through tax finance rather than through debt finance.[1]

The present paper assesses the new view and broadens the analysis of the municipal cost of capital. We develop a choice-theoretic model resting on the same decisive voter foundations employed by Gordon and Metcalf. Our model incorporates a broader range of assets, including real assets, and considers the implications of less-than-infinitely elastic supply functions for both private and public debt. It also incorporates financial constraints excluded from the Gordon-Metcalf model.

The paper shows that the Gordon-Metcalf conclusions rest upon implausible assumptions about the financial options available to the decisive voter, about the relationship between interest rates paid and amounts borrowed, and about the financial position of the decisive voter. We argue that a crucial assumption of the Gordon-Metcalf new view is that tax finance is paid for by drawing down financial assets rather than by borrowing; in the language of this paper, the nonnegativity constraint on financial assets is not binding. In this case we show that an "eclectic view" emerges, in which communities fall neatly into two groups. Municipalities with low tax rates, that is, for which $r_m < (1-t)r$ for the decisive voter, will conform to the new view, using tax finance at the margin and having a marginal cost of municipal capital of (1-t)r. High-income communities will conform to the traditional view, the municipal bond rate being the marginal cost of capital.

Our analysis reveals some anomalous results when the financial assets constraint is not

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[1] Hulten and Schwab(1990) and Fortune (1995) independently concluded that the genesis of the subsidy through tax finance arose from the exclusion of the services of municipal capital from taxable income while interest costs are deductible. Thus, municipal capital is treated like owner-occupied housing--its services are excluded from taxable income while its financial costs are deductible.

binding. First, the marginal cost of municipal capital for high-tax rate voters is the municipal bond yield even though tax finance is used at the margin. This means that there is a disconnect between the cost of capital and the form of finance used at the margin. Second, the introduction of tax-exemption actually raises the marginal cost of municipal capital in high-income communities: that is, tax-exemption represents a tax on municipal investment, not a subsidy. Finally, in the new view the high-tax-rate voter leaves unexploited arbitrage profits which can be captured by borrowing at (deductible) taxable yields and investing in tax-exempt bonds.[2]

More plausible results emerge when the financial asset constraint is binding and voters view debt, either private or public, as the source of funds for municipal capital. An optimal capital structure emerges which equates the marginal costs of debt finance and tax finance. Changes in the implicit subsidy rate on tax-exempt bonds will induce substitution between tax finance and debt finance, a change in the municipal cost of capital, and a change in the quantity of municipal capital. Thus, the municipal bond market will be a source of subsidy for municipal capital. If, in addition, private debt limits are binding, municipal bonds will be the sole source of finance at the margin, and conditions in the tax-exempt bond market will have an even greater effect on the municipal cost of capital. Finally, elimination of tax-exemption will raise the municipal cost of capital for all communities.

In the next section we develop a choice-theoretic model upon which our analysis rests. The second section uses that model to compare the traditional and new views. In the third section we construct some broader views, specifically, an eclectic position, with all borrowing costs related to leverage, and a neo-traditional view in which there are binding constraints on the decisive voter's financial choices. The fourth section addresses some evidence bearing on the use of municipal debt and its connection to capital spending. The paper ends with a brief summary.

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[2] The 1986 Tax Reform Act denied deductibility for interest paid to carry municipal bonds. However, interest on home equity loans up to a loan value of $100,000 are deductible for all purposes.

1. A Model of Capital Spending and Its Financing

The model describes a decisive voter whose optimal allocation guides his municipality's financial choices. The model incorporates limits on an individual's ability to issue both private (taxable) debt and public (tax-exempt) debt. Limits on private debt arise primarily from collateral requirements. A form of quasi debt limit also exists in the tax code's eligibility requirements for deductibility of interest: Even if lenders will lend more, loss of deductibility will typically eliminate the financial incentives for private borrowing. Limits on public debt arise from statutory or constitutional debt limits or, more probably, from restrictions against long-term borrowing for operating purposes. Indeed, states typically prevent municipalities from borrowing more than the amount invested in public capital. The model also considers the financial costs of equity finance for private capital and tax finance for public capital. Equity finance of private capital, and tax finance of public capital, require bearing either the out-of-pocket costs of private or public debt, or the opportunity cost of forgone after-tax income from financial assets.

The voter inherits from past decisions an income of Y_1 in period 1 and Y_2 in period 2, a stock of financial assets (A_0), and a stock of housing equity (H). He chooses the utility-maximizing amounts of three goods: consumption in period 1 (C_1), consumption in period 2 (C_2), and municipal government services (S). The voter's well-behaved utility function is described by $U(C_1,C_2, S)$.

The voter can produce income in the second period in several ways. First, he can accumulate private capital goods (K_p) in the first period, and, combining it with labor employed in the second period (L_p), produce future income (F) according to the technology $F(K_p, L_p)$, which is subject to diminishing returns with marginal products F_k and F_L. A partnership form of business is assumed, so that business income is taxable at the personal income tax rate (t). Interest, but not principal, is a deductible expense. Business capital fully depreciates in the second period, generating tax savings of tK_p.

The voter must hold a non-negative amount of financial assets ($A \geq 0$). These can be invested in tax-exempt bonds at the risk-adjusted interest rate r_m, or in taxable bonds at the risk-

adjusted interest rate r. The choice depends upon a comparison of the after-tax yields on municipal and private debt, hence on the voter's personal income tax rate. The voter will elect to hold his assets in municipal bonds, that is, if $r_m > (1-t)r$; otherwise he will invest in private debt. The return on financial assets is $\max[r_m, (1-t)r]$.

Private capital accumulation can be financed by issuing private debt (D) at the pretax interest rate r*. We postulate that the interest rate paid is the risk-adjusted rate on loans to the private sector, r, multiplied by a factor reflecting the premium required for leverage. Specifically, $r^* = g(D)r$ with $g(0) = 1$, $g'(D) > 0$ and a debt supply elasticity of ϵ_d. The leverage premium g(D) reflects the costs to the lender of monitoring borrower activity and of potential bankruptcy costs. The interest rate paid on private debt approaches the rate on private loans at small amounts of debt, and it rises as more private debt is issued. Thus, it always costs more to borrow than to lend.

The amount of private debt is limited by the debt capacity restriction $D \leq q(K_p + H)$, with q $(0 < q < 1)$ being the maximum debt-equity ratio and $(K_p + H)$ being the assets available as collateral. H can be interpreted as the amount of home equity, or of any other nonfinancial assets eligible as collateral. Note that financial assets are not included in collateral: If they are held as taxable bonds, there is no incentive to borrow to accumulate taxable bonds; if they are held as tax-exempt bonds, post-1986 restrictions in the tax code eliminate the deductibility of interest paid for debt issued to carry municipal bonds, thereby eliminating any incentive to engage in tax arbitrage. The model also requires that private debt must be nonnegative $(D \geq 0)$ because agents cannot lend at the same rate at which they can borrow.

Municipal capital is formed in period 1 but provides services in period 2. These services are related to the municipal capital stock and to labor employed. The technology $S(K_m, L_m)$, exhibits diminishing returns with marginal products S_K and S_L. The voter finances municipal capital either by paying current taxes (tax finance) or by issuing municipal bonds (debt finance). Issuing municipal bonds in the amount M requires paying a tax-exempt bond rate of r_m^*, which is an increasing function of the amount of municipal debt. The rate paid on municipal bonds is the

rate at which he can lend in the municipal bond market multiplied by a factor reflecting the costs of borrowing, that is, $r_m^* = r_m f(M)$ where $f(0) = 1$ and $f'(M) > 0$, and $f(M)$ increases at a constant elasticity ϵ_m. Thus, the interest paid on municipal bonds exceeds the interest rate received on any municipal bonds held as financial assets.

The tax deductibility of municipal taxes is reflected in the parameter δ, where $\delta = 1$ if the taxpayer takes a standard deduction and $\delta = (1-t)$ if he itemizes. Note that if taxes are deductible, tax finance gets a double deduction, first in the form of forgoing the income taxes on income from financial assets, second in the deductibility of taxes paid. The parameter δ is peripheral to the point of this paper but is introduced for two reasons. First, discussions of tax finance versus debt finance often meet with questions about the effect of itemized deductions of state-local taxes; explicitly recognizing itemized deductions should assure readers that this is considered. Second, the possibility of itemizing deductions does play a role in determining the optimal amount of municipal investment, and therefore is economically relevant even though it is not central to this paper.[3]

The volume of municipal debt is limited in several ways. First, a non-negative value for outstanding municipal debt is required ($M \geq 0$) because municipalities have no incentive to invest in municipal bonds. Second, most states require that municipalities issue long-term debt only to finance capital outlays, hence $M \leq K_m$. Finally, it is assumed that municipalities hold no long-term private debt as assets because arbitrage restrictions eliminate the incentive for municipalities to issue tax-exempt bonds to hold taxable debt. Furthermore, even though it might be financially advantageous for taxpayers, municipalities do not levy taxes to build up endowments to be invested in taxable bonds.[4]

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[3] Itemizers find the tax-price of municipal services smaller than do non-itemizers, because the federal government pays part of the municipal tax bill. This encourages higher production of municipal services, but it does not alter the capital intensity or capital structure decisions because all payments by municipalities (labor, debt service, etc.) are equally affected.

[4] The effectiveness of arbitrage rules is controversial. Metcalf (1991) cites two types of arbitrage: saving arbitrage, in which taxes are raised and the proceeds are invested in taxable bonds, and debt arbitrage, involving the issuing of municipal bonds with the proceeds invested in taxable bonds. He finds no support

The voter's utility maximization problem is:

(1) a) **MAX** $U(C_1, C_2, S)$ **subject to**

b) $C_1 = Y_1 - (K_p - D) - \delta(K_m - M) - (A - A_0)$

c) $C_2 = Y_2 + (1-t)[F - wL_p] + tK_p - \delta(1+ r_m^*)M$
$- \delta wL_m - (1 + \delta r^*)D + [1 + \max(r_m, (1-t)r)]A$

d) $S = S(K_m, L_m)$ $F = F(K_b, L_b)$

e) $r_m^* = f(M)r_m$ $r^* = g(D)r$

f) $K_m \geq M$ $q(K_p + H) \geq D$ $(0 < q < 1)$

g) $K_m \geq 0$ $M \geq 0$ $K_p \geq 0$ $D \geq 0$ $A \geq 0$ $L_m \geq 0$ $L_b \geq 0$

Equation (1b) says that first-period consumption equals inherited income less equity invested in private capital less the after-tax tax levy for municipal capital spending less the increase in financial assets. Equation (1c) says that period-2 consumption is that period's inherited income plus the after-tax operating income from private capital plus the tax shield from depreciation less the after-tax debt service on municipal borrowing less the after-tax tax levy for the municipal wage bill less the after-tax debt service on private debt plus the after-tax income from financial assets.

There are five financial constraints [$K_m \geq M$, $M \geq 0$, $q(K_b + H) \geq D$, $D \geq 0$, and $A \geq 0$]. Shadow prices μ and β apply to the non-negativity of municipal and business debt, respectively; each is positive if no debt is issued, zero otherwise. Shadow price κ is positive when private debt capacity is fully used, zero otherwise. Shadow price λ is positive if municipal capital is financed solely by debt, zero otherwise. Finally, α is the shadow price for financial assets, positive if none are held and zero otherwise.

Defining the marginal value of municipal services in terms of period-2 goods, $(U_S / U_2)S_K$, as S_K^*, and the after-tax return on private capital, $(1-t)F_K + t$, as F_K^*, the shadow prices at the optimal allocation are

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for saving arbitrage, but concludes that debt arbitrage is widely used in spite of the Treasury's arbitrage rules, first issued in 1969.

(2) (a) $\alpha^* = q\kappa^* + [F_K^* - [1+ \max(r_m, (1-t)r)]\}$ $(\alpha \geq 0)$

(b) $(1-q)\kappa^* - \beta^* = F_K^* - [1+ \delta(1+\epsilon_d)r^*)]$ $(\kappa^* \geq 0, \beta^* \geq 0, \kappa^*\beta^* = 0)$

(c) $\lambda^* = \delta q\kappa^* + \delta(F_K^* - S_K^*)$ $(\lambda^* \geq 0)$

(d) $\mu^* = -\{S_K^* - \delta[1+(1+\epsilon_m)r_m^*]\}$ $(\mu^* \geq 0, \lambda^*\mu^* = 0)$

where each shadow price marked with an asterisk is the original shadow price divided by U_2.

Equation (2a) describes the financial asset constraint: Financial assets will be drawn down to zero ($\alpha^* > 0$) if private debt is at its limit ($\kappa^* > 0$) or if the marginal return on private capital exceeds the return on financial assets, reflecting an incentive at the margin to draw financial assets down further to finance private investment. Equation (2b) addresses the zero lower bound on private debt: No private debt will be issued ($\beta^* > 0$) if the return on private capital is below the cost of private debt; obviously, it doesn't pay to borrow if the return is below the borrowing cost. Equation (2c) states the condition for maximum use of municipal debt: All municipal capital will be debt financed ($\lambda^* > 0$) if the debt limit on private debt has been reached or if the return on private capital exceeds the cost of municipal debt. In the latter case the voter will want to fully exploit his municipal debt capacity in order to divert resources to private capital. Finally, equation (2d) says that no municipal debt will be issued ($\mu^* > 0$) when the return on municipal capital is less than the cost of municipal debt.

2. The New and the Traditional Views of Municipal Finance

The model just described can be used to analyze both the traditional and new views, laying bare their underlying assumptions. Both views assume that the optimizing voter holds financial assets ($\alpha^* = 0$) and that any debt limits are not binding ($\kappa^* = 0$). The shadow price system reduces to

(3) (a) $F_K^* = [1+ \max(r_m, (1-t)r)]\}$

(b) $\beta^* = -\{F_K^* - [1+ (1-t)(1+\epsilon_d)r^*)]\}$ $(\beta^* \geq 0)$

(c) $\lambda^* = \delta(F_K^* - S_K^*)$ $(\lambda^* \geq 0)$

(d) $\mu^* = -\{S_K^* - \delta[1+(1+\epsilon_m)r_m^*]\}$ $(\mu^* \geq 0, \lambda^*\mu^* = 0)$

The traditional and new views differ only in their assumptions about leverage and interest rates paid. The new view assumes that private debt can be issued at a constant interest rate (ϵ_d = 0, r* = r), but municipal debt is issued at leverage-related rates ($\epsilon_m > 0$, $r_m^* > r_m$). The traditional view reverses this: private debt is issued at increasing rates ($\epsilon_d > 0$, r* > r) but municipal debt is issued at constant rates ($\epsilon_m = 0$ and $r_m^* = r_m$).

The New View

Table 1 reports the results of considering the new view and the traditional views from the vantage points of low-tax-rate and high-tax-rate voters. Inspection of (3) shows that the low-tax rate new view voter acquires private capital up to the point where its marginal after-tax return is equal to the after-tax interest rate on taxable debt. This is because he will invest his financial assets in taxable bonds, and he has no incentive to acquire private capital if it returns less than his opportunity cost. Because the shadow price β* is identically zero, he is indifferent between borrowing and drawing down financial assets; the hurdle rate for private capital can be interpreted as either the after-tax cost of private debt or the after-tax return on financial assets. Because municipal debt is less expensive than tax finance, at least for low levels of debt, the voter will issue some municipal bonds, hence μ* = 0. This means that the return on municipal capital will equal the marginal cost of municipal debt, $\delta[1+(1+\epsilon_m)r_m^*]$. However, unless ϵ_m is sufficiently low, he will not finance all municipal capital with debt. Hence λ* = 0, and the marginal returns on private and municipal capital will be equal.

The high-tax-rate new view voter will invest in private capital up to the point where its marginal after-tax return is equal to the municipal bond rate. This is because r_m is the return on financial assets, and the voter will not buy capital assets if he can earn more on financial assets. Private debt will be issued (β* = 0) because it is the lowest-cost source of funds. Indeed, because private debt is available in an unlimited amount at a constant interest rate, all municipal investment will be financed by taxes and no municipal debt will be issued (μ* > 0 and λ* =0).

The new view of a high-tax-rate voter's decision leaves a significant loose end. The marginal

return will be equal to the municipal bond yield because it does not pay to invest in private capital if its return is less than the return on financial assets. But he can borrow in the taxable bond market at the after-tax cost of (1-t)r, which is less than r_m. Thus, our optimizing voter can get unlimited arbitrage profits by borrowing in the taxable bond market and investing the proceeds in the tax-exempt market. Completing the model requires introducing a mechanism to prevent unexploited arbitrage opportunities. One such mechanism is the introduction of private debt limits, but these will reintroduce the possibility that municipal bond yields are the marginal cost of municipal capital.[5]

Figure 1 shows the new view of municipal investment and finance. In each panel the schedule K_mK_m shows the marginal benefits of municipal capital. The high-tax-rate investor (left panel) will choose tax finance over debt finance because he can obtain funds at (1-t)r, which is less than the interest rate on investment in municipal bonds and, therefore, is less than the interest rate paid on municipal debt finance. In this way he is effectively arbitraging the two markets by borrowing at (1-t)r in order to maintain his holdings of municipal bonds earning r_m; note that he leaves unexploited arbitrage profits. The marginal cost of municipal capital is (1-t)r and independent of the municipal bond market.

The low-tax-rate voter shown in the right panel would prefer municipal debt finance for low levels of capital. But, because the cost of debt finance increases with its volume, debt finance stops at OM of municipal debt. At that point the marginal cost of municipal debt is equal to the marginal cost of private debt. The remaining MK_m* of municipal capital is financed by drawing down investments in private debt or by issuing private debt. The marginal cost of capital is (1-t)r. Note that if ϵ_m is sufficiently low the low-tax-rate voter will rely solely on debt finance, never finding it profitable to borrow in the taxable bond market or to draw down financial assets. This is the one case in which the new view recognizes that tax-exemption provides a capital cost subsidy.

The new view has several clear policy implications. First, the marginal cost of municipal

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[5] The Tax Reform Act of 1986 attempted to end this arbitrage opportunity by eliminating the deductibility of private interest paid for carrying tax-exempt securities. However, this arbitrage incentive remains because of the difficulty in determining the use of the proceeds of borrowing, and because the $100,000 home equity allowance provides an escape route for most voters.

capital is set by the after-tax return on taxable debt, not by the yield on tax-exempt bonds. Second, the implicit subsidy rate on municipal bonds arising from tax-exemption is irrelevant to the volume of municipal investment: no municipal capital cost subsidy is transmitted through the municipal bond market because the only tax rate that affects investment is the tax rate of the decisive voter. Third, the proper test for the traditional view is that all municipal capital is debt financed: any use of tax finance is support for the new view because the municipal bond rate will be the marginal cost of capital only when all municipal capital is debt financed.

The Traditional View

In the traditional view the voter can borrow or lend in the municipal debt market at the constant rate r_m, but can borrow in the private debt market only at an increasing cost. The low-tax-rate voter will invest in taxable debt, which sets the hurdle rate for private capital. For him, municipal debt finance will be less expensive than tax finance at all levels of municipal debt so the marginal return on public capital will be the interest rate on municipal debt. Thus, private capital will be more profitable than public capital at the margin. This means that all municipal capital is debt financed ($\lambda^* = 0$), that some private debt is issued ($\beta^* = 0$), and that the municipal bond rate determines the marginal cost of municipal capital for the low-tax-rate voter.

For the high-tax-rate voter the lowest cost source of funds is private debt, at least for low levels of private debt . Some private debt will be used ($\beta^*=0$), and private debt will be issued up to the point where its marginal cost is equal to the constant municipal bond rate. All capital, public and private, above this amount will be financed by drawing down holdings of tax-exempt securities. If the desired amount of private capital exceeds the optimal use of private debt, the additional private capital and all municipal debt will be financed by issuing municipal debt, hence $\lambda^* > 0$. However, if the optimal amount of private capital is less than the optimal use of private debt, the first units of municipal capital will be tax financed via private debt, and the remaining units of municipal capital will be debt financed ($\lambda^* = 0$). In either case, $S_K^* = (1-t)(1+r_m)$ and the municipal bond yield determines the marginal cost of capital for the high-tax-rate voter.

Thus, the traditional view implies that both low-tax-rate and high-tax-rate investors will use debt finance to pay for much, if not all, desired municipal capital. Figure 2 shows the traditional view. The high-tax rate voter in the left panel Is assumed not to have exhausted his profitable private borrowing opportunities in the financing of private capital, so he chooses tax finance for small levels of municipal capital. The tax-financed amount of municipal capital is OM, and the remaining MK_m^* of municipal capital is debt financed. The low-tax-rate voter (right panel) uses debt finance for all municipal capital. The municipal bond rate determines the marginal cost of capital and tax-exemption is a source of capital cost subsidy.

3. Broader Views of Municipal Finance

An Eclectic View: Leverage-Related Borrowing Costs in Both Debt Markets

Both the new and traditional views assume that one source of funds is acquired at increasing costs while all others are available with an infinitely elastic supply. This is implausible because all lenders are concerned with leverage-related costs. This section considers the results of leverage-related costs in both markets.

The least-cost form of debt will be issued up to the point where its marginal cost equals the yield on financial assets. Investment after this point is financed by drawing down financial assets. Whether private or municipal debt is least-cost depends on the voter's tax rate. A high-tax-rate voter will find that private debt is least-cost for low levels of borrowing. He will issue private bonds ($\beta^* = 0$) up to the point where the marginal cost of private debt equals the yield on municipal bonds, that is, until $(1+\epsilon_d)r^* = r_m$. He will not use municipal debt because additional capital spending is financed at the opportunity cost r_m, the yield on financial assets, which is less than r_m^*. Hence, $\mu^* > 0$ and $\lambda^* = 0$. Thus, the marginal cost of both private and public capital is r_m for the high-tax-rate voter even though he chooses tax finance for all municipal investment. This maintains the essence of the traditional view--the tax-exempt bond market determines the marginal cost of municipal capital and tax-exemption subsidizes municipal investment--but, somewhat paradoxically, the yield on municipal bonds is the cost of municipal capital even though no municipal debt is used!

The low-tax-rate voter will find that municipal debt is the least-cost source of funds. He will issue municipal bonds until either the amount issued has reached its limit of the amount of municipal capital (at which point $\lambda^* > 0$) or the marginal cost of municipal bonds has risen to equal the after-tax yield on financial assets (in this case $\lambda^* = 0$). No private debt will be used ($\beta^* > 0$) because its cost exceeds the return on financial assets. The low-tax-rate voter will choose a mixture of tax and debt finance, with perhaps all municipal capital being debt financed. Even though debt finance might be heavily used, the marginal cost of municipal capital will be (1-t)r, the yield on financial assets.

Figure 3 shows this eclectic view. In both panels the amounts of private and public capital are horizontally aggregated to derive the demand-for-capital function, KK. The schedules K_pK_p and K_mK_m represent the demand for private capital and municipal capital, respectively. The high-tax-rate voter will choose OK* of total capital, of which OK_p* is private and K_p*K* is public. This will be financed by OD of private debt, and by DK* of taxes, paid for by drawing down financial assets.

The low-tax-rate voter will, *ceteris paribus*, choose a smaller amount of capital because he earns a higher return on financial assets. His desired capital, OK**, consists of OK_m** in public capital and K_m**K** in private capital. He will issue OM in municipal debt and pay for the remaining MK** by drawing down financial assets at the opportunity cost (1-t)r. Thus, $\lambda^* = 0$, i.e., the municipal debt constraint is not binding, and he will use mixed finance (both debt and taxes) for his municipal investment. The marginal cost of capital will be set by the return on private bonds and by the voter's income tax rate.

The eclectic view provides a sharp distinction between the decisions of high-tax-rate and low-tax-rate voters. The high-tax-rate voter will conform to the traditional view, with r_m being the marginal cost of capital, while the low-tax-rate voter will conform to the new view, having a cost of capital of (1-t)r. Both will rely heavily on tax finance.

Table 2 summarizes the conclusions for the three models resting on availability of financial assets as a source of municipal tax finance.

A Neo-Traditional View: The Effect of Limited Financial Assets and Private Debt Limits

As noted above, the traditional and new views assume that financial assets are available in sufficient quantity to pay any taxes levied to finance municipal capital. Few voters are in such a fortunate position, and those few will be high-income voters. Thus, it is worth spending a moment on the decisive voter's calculus when financial assets are insufficient to finance his desired private capital, forcing him to resort to debt finance. We also consider the case where a private debt limit is binding. We call this the neo-traditional view

The optimal capital structure when there are no financial assets to draw on ($\alpha^*>0$) is shown in Figure 4, which assumes a low-tax-rate voter and is drawn for a pre-specified level of total capital (OK*), with municipal debt finance represented by an eastward direction and private debt finance shown in the westerly direction. The line sloping upward to the northeast, with intercept r_m and passing through point **a**, describes the marginal cost of municipal debt: As M increases, this marginal cost rises. The line which slopes up to the northwest, having intercept (1-t)r and passing through point **b**, is the marginal cost of private debt. If there is a private debt limit of $D_{max.}$, this schedule becomes vertical at that amount of private debt (the line segment **bc**); in this case $\kappa^* > 0$.

Consider the situation with no private debt limit. Both private and municipal debt will be used in a mix which equates the marginal costs. The amount of municipal debt will be OM* and M*K* will be the amount of private debt. The marginal cost of capital is k*. Both municipal and private debt are used at the margin, so tax-exemption affects the cost of capital. For example, an increase in the implicit subsidy rate (s) creates a reduction in r_m, r held constant. This will shift the northeast-sloping schedule downward, inducing a substitution of municipal debt for private debt and a lower marginal cost of municipal capital. The optimal quantities of both municipal and private capital will increase, that is, the higher implicit subsidy rate will encourage more investment in both municipal and private capital.[6]

[6] The Choate-Thompson version of the new view assumes that all agents pay the same tax rate with no leverage-related lending costs. The cost of capital would be (1-t)r for both debt and tax finance. In Figure 4 the cost of capital schedule would be infinitely elastic at $r_m = (1-t)r$.

Now suppose that a private debt limit is binding. More municipal debt will be used to replace the now disallowed private debt. The amount of municipal debt increases to OM** and the amount of private debt falls by the same amount, to M**K* = $D_{max.}$. The cost of capital will be k**, which is greater than k* because the debt limit prevents the optimal combination of debt and tax finance. Municipal debt is now the marginal source of funds. When private debt limits are binding the impact of a rise in the implicit subsidy rate on the cost of capital will be greater, and its impact on the intensity of municipal debt finance will be smaller.

Thus, the existence of limited financial assets will restore tax exemption to an influential role in the determination of municipal capital, even for the low-tax-rate voter for whom it was irrelevant in the eclectic view. Debt limits will further increase the effectiveness of tax-exemption as an incentive to municipal investment.

Tax-Exemption and the Subsidy to Municipal Capital

We have seen that when financial assets are held in sufficient quantity and when the decisive voter itemizes deductions, the eclectic view holds that the cost of municipal capital is (1-t)(1-s)r in high-tax-rate communities, and $(1-t)^2r$ in low-tax-rate communities. If tax-exemption were eliminated, all voters would hold their financial assets in taxable bonds and the marginal cost of capital would be $(1-t)^2r$ in all municipalities. Low-tax-rate communities would find that elimination of tax exemption has no effect on the municipal cost of capital, but high-tax-rate communities ($s < t$) would experience a reduction in the marginal cost of capital if tax-exemption were eliminated. The reason for this paradoxical result is that tax-exemption gives high-tax-rate investors an asset with a higher after-tax return, thereby setting a higher hurdle rate for municipal investment. Thus, when the return on financial assets sets the marginal cost of municipal capital, tax-exemption does not shift capital from the private to the public sector, as some studies have suggested (Gordon and Slemrod, 1983; Fortune, 1984). Rather, it diverts resources from the public sector to the private sector.

The more conventional result--that tax-exemption reduces the cost of capital--is restored in the neo-traditional view, when voters must finance capital investment by borrowing, either private

debt for tax finance or municipal debt for debt finance. This is shown for a low-tax-rate voter in Figure 5. The initial optimal capital structure, with tax-exempt bonds, has a capital cost of k* and municipal debt of M*. Because elimination of tax-exemption means that municipal bonds will be taxable, the marginal cost of the first unit of municipal debt increases from r_m to r. The increase in the marginal cost of municipal debt induces a substitution of tax finance (paid for by private debt) for municipal debt, and an increase in the cost of capital to k**.

In summary: When the financial asset constraint is not binding, the elimination of tax-exemption will reduce the cost of capital for high-tax-rate communities and raise the cost of capital for low-tax-rate communities. When the financial asset constraint is binding, tax-exemption reduces the marginal cost of municipal capital in all communities, encouraging municipal investment.

4. Some Evidence

The objective of this paper is to extend our understanding of the analysis of the municipal cost of capital, and to determine the conditions under which tax-exemption represents a subsidy to municipal investment. Tests of the various hypotheses are beyond the scope of this paper. However, we briefly discuss some evidence bearing on these issues.

Quantitative Evidence

Unfortunately, no studies exist which test the fundamental argument of this paper: that tax-exempt bonds do subsidize municipal capital. Most focus on the use of municipal debt rather than on the optimal quantity of municipal capital. This might be the result of the widespread adherence to the traditional view, which views debt as the marginal source of funds. We have seen that this inference is not valid.

One study close to the subject of this paper is by Douglas Holtz-Eakin (1991). He examined aggregate data for municipal investment and debt issued in the period 1950-1984, noting that the average ratio of gross newly issued state and local debt to capital spending was about 35-40 percent, though there were large year-to-year variations (the lowest share of about 15 percent was

in 1981, the highest, about 65 percent, was in 1983). The extensive use of tax finance might be taken as *prima facie* evidence in favor of the new view, for in that view all communities rely heavily on tax finance. However, we have shown that the cost of capital is not readily connected to the method of finance. When the financial asset constraint is not binding, our eclectic view predicts that high-income communities will use tax finance but the municipal bond rate will still be the cost of capital. When the financial asset constraint is binding and voters must resort to borrowing to pay for tax finance, both debt finance and tax finance will be used and the implicit subsidy rate on municipal bonds will affect the cost of capital.

More importantly, Holtz-Eakin also developed and estimated aggregate models of state-local capital spending and of the share of that capital spending which is debt financed. Included among his explanatory variables for investment is a measure of the weighted average real cost of capital. This is a composite variable which includes the effects of the difference between the implicit subsidy on municipal bonds and the personal income tax rate, a crucial variable in our analysis.[7] In Holtz-Eakin's model, this variable, measured as (t-s)r, affects the share of capital spending financed by state-local debt. This share then determines the weight of debt finance in the average cost of capital, which is a variable explaining aggregate per-capita state-local capital expenditures. Thus, the variable (t-s)r affects investment through two channels: its effect on the debt share, and its direct effect on the weighted average cost of capital.

Holtz-Eakin finds that an increase in the variable (t-s)r has a statistically significant effect on the debt finance share: cheaper municipal debt is substituted for more expensive tax finance. That improvements in the municipal bond market, which show up as an increase in s, lead to a substitution of debt finance for tax finance is a conclusion consistent with all models in this paper. He also found that the weighted average cost of state-local capital has a negative impact on capital spending, suggesting that the tax-exempt bond market does have the expected effect on capital

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[7] The weighted average real cost of capital can be calculated as $(1-\theta)(1-t)r + \theta(t-s)r - \pi$, where π is the anticipated inflation rate and θ is the debt finance share. The first term is the nominal cost of tax finance, assumed to be paid for by drawing holdings of private bonds, and the last is the inflation premium. Only the second term reflects the rate differential central to our analysis

spending. This result is consistent with the eclectic and neo-traditional views, and not with the new view. However, the foundations of this conclusion are fragile because the effect of the weighted average cost of capital is not statistically significant, and because it is inferred from the influence of a composite variable, not from a direct examination of the effect of implicit subsidy rate on municipal bonds. Thus, while Holtz-Eakin's paper does not support the new view, it also does not reject it.

Furthermore, aggregate time-series data are not appropriate tests of the views in this paper. The hypotheses in this paper are better tested by data on a cross-section of communities because the tax rate of the decisive voter is an important variable, and aggregated time series data mask major cross-sectional variations in this variable. Aggregate data also mask important institutional factors. Some capital spending projects would be heavily tax financed because they are directly tied to tax revenues, not because a rational decision maker is voting for tax finance. For example, state spending on highways, roads, and bridges is largely financed by use taxes, like the gasoline tax, and we should expect the debt share to be low. Yet another example is local school construction, for which many states pay a significant share of the costs. These intergovernmental transfers are primarily financed by taxes, but at a level not subject to the control of the decisive voter in a specific community. In short, the new view and traditional views are most applicable in the context of financing the local share of the costs of capital spending.

A Case Study

Are municipal finance decisions made as if a rational optimizing decision maker is at the helm? While I have no definitive answer to this question, I do have strong doubts. These doubts are rooted in my experience as an elected and an appointed official involved in municipal financial issues. The following observations are drawn from one small community which should fit the high-tax-rate decisive voter model.

Weston, Massachusetts, is a small, almost entirely residential, community with a population of about 10,000. It has the highest median home value and the highest median family income of the 351 cities and towns in Massachusetts. The educational level and the level of financial sophistication

are unusually high. The town is socioeconomically homogeneous. Questions of capital spending and of municipal debt finance are decided at semi-annual town meetings, a disappearing New England tradition in which all voters are invited to come and express their support for and against proposals made by the town's officials or by other residents. The proposals voted on at town meeting are developed by committees comprised of highly educated people who have as solid an understanding of finance as one could expect. Financial matters are the province of a three-member Board of Selectmen and a five-member School Committee, both elected, with the advice of an appointed Finance Committee. These committees develop the annual operating budget, the capital budget, and debt finance proposals placed before the town meeting. All committee positions are for three-year terms, with reelection or reappointment for more than a total of three terms a very rare event. Thus, voters have considerable influence on the membership of committees.

In short, Weston's capital spending and financial decisions are made in a setting consistent with rational decision making along the lines of a decisive voter model. This, combined with the town's affluence, suggests that it should behave like the high-tax-rate decisive voter having no binding financial constraints: capital projects should be primarily financed by taxes (though the municipal bond rate should still be the marginal cost of capital). But capital projects are almost entirely debt financed. While these projects receive a great deal of vetting, their financing is dealt with quickly and without concern for the analysis in this paper. Small capital projects (minor renovation and refurbishing of facilities, replacement of town vehicles and equipment) are included in the operating budget and are tax financed. All major capital projects, such as construction or reconstruction of schools and other town buildings, or expansion of the fleet of town vehicles, are financed by municipal bonds, subject to a 2/3 majority at town meeting. Advocates of tax finance for significant capital projects are few, and, though politely treated, are ignored.

Why should voters in a town with all the qualities for right conduct be so oblivious to the unnecessary financial burdens that the new view says they impose on themselves? One answer is that Weston voters are neo-traditionalists who face high leverage-related costs of private debt and believe that Weston can sell municipal bonds under conditions of highly elastic supply. Weston's low

tax rate and its Aaa rating suggest significant unused tax capacity and should contribute to both a low rate paid on municipal bonds and a high elasticity of municipal debt supply. The marginal cost of private debt could also be high and inelastic because home equity loan opportunities have been fully utilized, so interest on additional debt is not deductible.

However, other reasons can be advanced which suggest the limitations of the analysis underlying this and other formal models of municipal finance. We consider three such reasons: institutional or statutory factors, assumptions about capitalization of municipal debt into housing values, and unusually high returns on financial assets. Since 1981 the taxing authority of Massachusetts communities has been restricted by Proposition 2½, which limits the property tax levy to an increase of 2½ percent per year unless a majority of voters approve an "override." Two types of override exist: a general tax levy override, which permanently increases taxing authority by the approved amount, and a debt service override, which temporarily increases the taxing authority by the amount of the debt service required on a proposed bond issue. If a capital project is tax financed with majority approval of a general override to levy the required taxes, that additional taxing authority is available for all future years: it cannot be restricted to the levy required for a specific project. But if the project is financed by debt, voters can approve a debt service override, which allows the taxes required for debt service to be raised outside of the Proposition 2½ levy limit. As the debt is paid off, the additional taxing authority disappears. Thus, voters who believe that town budgets will automatically increase to the levy limit will prefer debt to tax finance as a means of maintaining financial control.

Another explanation is that voters widely discount the possibility that housing values fully reflect outstanding municipal debt. One hears this in several ways. Many voters believe that tax levies for major, nonrecurring projects are simply too big a financial burden to bear in one year. For example, a recent decision to proceed on a $15 million renovation of the single high school would have required a tax levy of over $4,500 per house, about 1 percent of the average assessed value and almost double the current mill rate. Many voters resist such a large increase even for a non-recurring purpose, preferring to smooth out the payments by municipal borrowing. Other voters

believe that debt finance is a way to charge future residents for the benefits from capital projects, and that this promotes intergenerational efficiency and equity. Still others, unmoved by considerations of efficiency or equity, view debt finance as a way to shift the financial costs of projects to future residents. All of these beliefs rest on the assumption that municipal debt is not fully capitalized into housing prices, for, if it were, the usual neo-Ricardian conclusions about tax versus debt finance would apply: only the amount spent matters, the financing is irrelevant.

A third explanation is that voters might have private investment opportunities which generate such high yields (risk-adjusted and after-tax) that municipal debt finance dominates tax finance. Our model incorporates capital held by a partnership form of business, subject to diminishing returns. Common stocks might be a dominant financial asset with constant returns. The equity premium puzzle suggests that the risk-adjusted return on common stocks has been inexplicably high over long periods. This could lead to sole reliance on debt finance, especially if the supply of credit to municipalities is highly elastic.

Whatever the reason for Weston's capital structure, it is clearly not consistent with the new view.

5. Summary and Conclusions

The point of departure for this paper is the recent introduction of a new view in municipal finance. Rejecting a traditional view arguing that the exemption of municipal interest payments from federal taxation transmits a tax subsidy to municipal capital, the new view has several clear policy implications. First, the marginal cost of municipal capital is set by the after-tax return on taxable debt, not by the yield on tax-exempt bonds. Second, the implicit subsidy rate on municipal bonds due to tax-exemption is irrelevant to the volume of municipal investment. No municipal capital cost subsidy is transmitted through the municipal bond market because the only tax rate that affects the marginal cost of capital is the tax rate of the decisive voter. Third, the proper test for the traditional view is that all municipal capital is debt financed. Any use of mixed finance is evidence for the new view.

None of these results hold up under the scrutiny of a broader model. This paper shows that

the new and traditional views both rest on the assumption that any municipal taxes levied to pay for capital expenditures are financed by drawing down financial assets. The only fundamental difference between these views is that the new view assumes that the interest rate paid on municipal bonds increases with municipal leverage, while the traditional view assumes that it does not. An eclectic view, recognizing that interest rates on both public and private debt increase with the respective borrowing volumes, implies a neat bifurcation: the new view applies to low-tax-rate communities while the traditional view applies to high-tax-rate communities. This eclectic view also suggests that the cost of municipal capital is not necessarily connected to the form of finance used at the margin: In the eclectic view, high-tax-rate voters will use tax finance at the margin but the municipal bond rate will still determine the cost of capital. Table 2 summarizes the results of three positions: the traditional view, the new view and an eclectic view.

The paper also examines the municipal cost of capital when voters face a binding financial asset constraint (financial assets cannot be negative). When financial assets are not available in sufficient volume to pay for the desired tax finance, a neo-traditional view emerges in which an optimal capital structure exists that equates the marginal costs of public and private debt. Both tax finance and debt finance will be used, and tax-exemption, transmitted through the implicit subsidy on municipal bonds, is restored to an influential role in determining capital spending. This role is strengthened when private debt limits are binding, preventing a voter from borrowing in the private debt market at the margin and forcing him to use municipal bonds as the sole marginal source of funds.

The paper concludes with a brief discussion of some available evidence. This evidence cited is inconclusive, but it is consistent with the efficacy of tax-exemption as a subsidy to municipal investment.

Table 1
Optimality Conditions for the New and Traditional Views

New View

Low Tax Rate	High Tax Rate
$F_K^* = 1+ (1-t)r$	$F_K^* = 1+ r_m$
$\beta^* = - \{F_K^* - [1+ (1-t)r)]\}$	$\beta^* = - \{F_K^* - [1 + (1 - t)r)]\}$
$\lambda^* = (1-t)(F_K^* - S_K^*)$	$\lambda^* = (1-t)(F_K^* - S_K^*)$
$\mu^* = - \{S_K^* - (1-t)[1+(1+\epsilon_m)r_m^*]\}$	$\mu^* = - \{S_K^* - (1-t)[1+(1+\epsilon_m)r_m^*]\}$

Traditional View

Low Tax Rate	High Tax Rate
$F_K^* = 1+ (1-t)r$	$F_K^* = 1+ r_m$
$\beta^* = - \{F_K^* - [1+ (1-t)(1+\epsilon_d)r^*]\}$	$\beta^* = - \{F_K^* - [1+ (1-t)(1+\epsilon_d)r^*]\}$
$\lambda^* = (1-t)(F_K^* - S_K^*)$	$\lambda^* = (1-t)(F_K^* - S_K^*)$
$\mu^* = - [S_K^* - (1-t)(1+r_m)]$	$\mu^* = - [S_K^* - (1-t)(1+r_m)]$

This table assumes the voter itemizes ($\delta = 1 - t$).

Table 2
Comparison of Traditional, New and Eclectic Views

Voter	*Municipal Capital Structure*			*Marginal Cost of Capital*		
Tax Rate	**New View**	**Traditional**	**Eclectic View**	**New View**	**Traditional**	**Eclectic View**
low	Mixed (T)	Debt Only	Mixed (T)	(1-t)r	r_m	(1-t)r
high	Tax Only	Debt Only	Tax Only	(1-t)r	r_m	r_m

The letters in parentheses represent the marginal source of funds when bot debt and tax finance are used: T for tax finance.

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Notes

The voter's utility maximization problem is:

(1) a) **MAX** $U(C_1,C_2, S)$ **subject to**

b) $C_1 = Y_1 - K_b - \delta(K_m - M) - (A - A_0) + D$

c) $C_2 = Y_2 + (1-t)[F - wL_b] + tK_b - \delta(1+ r_m^*)M - \delta wL_m \qquad r_m^* = f(M)r_m$

$+ [1 + \max(r_m, (1-t)r)]A - (1 + \delta r^*)D \qquad r^* = g(D)r$

d) $S = S(K_m, L_m) \qquad F = F(K_b, L_b)$

e) $K_m \geq M \qquad q(K_b + H) \geq D \qquad (0 < q < 1)$

f) $K_m \geq 0 \quad M \geq 0 \quad K_b \geq 0 \quad D \geq 0 \quad A \geq 0 \quad L_m \geq 0 \quad L_b \geq 0$

The first order conditions are:

(2) (a) $\mathbf{K_b}$**:** $U_2[(1-t)F_K + t] - U_1 + q\kappa \leq 0$ *and* $K_b\{U_2[(1-t)F_K + t] - U_1 + q\kappa\} = 0$

(b) $\mathbf{K_m}$**:** $U_S S_K - \delta U_1 + \lambda \leq 0$ *and* $K_m\{U_S S_K - \delta U_1 + \lambda\} = 0$

(c) **M:** $-U_2\delta[1 +(1+ \epsilon_m) r_m^*] + \delta U_1 - \lambda + \mu = 0$

(d) **D:** $-U_2[1 + \delta(1+ \epsilon_d)r^*] + U_1 - \kappa + \beta = 0$

(e) **A:** $U_2 [1+ \max(r_m, (1-t)r)] - U_1 + \alpha = 0$

(f) $\mathbf{L_b}$**:** $U_2(1-\delta)(F_L - w) \leq 0$ *and* $L_b[U_2(1-\delta)(F_L - w)] = 0$

(g) $\mathbf{L_m}$**:** $-U_2\delta w + U_S S_K \leq 0$ *and* $L_m(-U_2\delta w + U_S S_K) = 0$

(h) **κ:** $q(K_b + H) - D \geq 0$ *and* $\kappa[q(K +H) - D] = 0$

λ: $K_m - M \geq 0$ *and* $\lambda(K_m - M) = 0$

α: $A \geq 0 \quad \alpha A = 0$ **μ**: $M \geq 0 \quad \mu M = 0$ **β :** $D \geq 0 \quad \beta D = 0$

$\alpha, \beta, \kappa, \lambda, \mu \geq 0$

We assume that some capital will be employed in both sectors, allowing equations (2a) and (2b) to be treated as equalities. This is a benign assumption because questions of finance are irrelevant if no capital is employed. Defining the marginal value of municipal services in terms of period-2 goods as v ($v = U_S / U_2$), an analysis of shadow prices reveals that

(3) (a) $\alpha^* = q\kappa^* + [F_K^* - [1+ \max(r_m, (1-t)r)]\} \qquad (\alpha \geq 0)$

(b) $(1-q)\kappa^* - \beta^* = F_K^* - [1+ \delta(1+\epsilon_d)r^*)] \qquad (\kappa^* \geq 0, \beta^* \geq 0, \kappa^*\beta^* = 0)$

(c) $\lambda^* = \delta q\kappa^* + \delta(F_K^* - S_K^*) \qquad (\lambda^* \geq 0)$

(d) $\mu^* = -\{S_K^* - \delta[1+(1+\epsilon_m)r_m^*]\} \qquad (\mu^* \geq 0, \lambda^*\mu^* = 0)$

in which $F_K^* = (1-t)F_K + t$ and $S_K^* = vS_K$ are the after-tax marginal returns on private and municipal capital, and each shadow price marked with an asterisk is the original shadow price divided by U_2.

Equation (3a) describes the financial asset constraint: Financial assets will be drawn down to zero ($\alpha^* > 0$) if private debt is at its limit or if the marginal return on private capital exceeds the return on financial assets. Equation (3b) addresses the zero lower bound on private debt: No private

debt will be issued ($\beta^* > 0$) if the return on private capital is below the cost of private debt. Equation (3c) states the condition for maximum use municipal debt: All municipal capital will be debt financed ($\lambda^* > 0$) if the debt limit on private debt has been reached or if the return on private capital exceeds the cost of municipal debt. Finally, equation (3d) says that no municipal debt will be issued ($\mu^* > 0$) when the reurn on municipal capital is less than the cost of municipal debt.

FIGURE 1
THE NEW VIEW

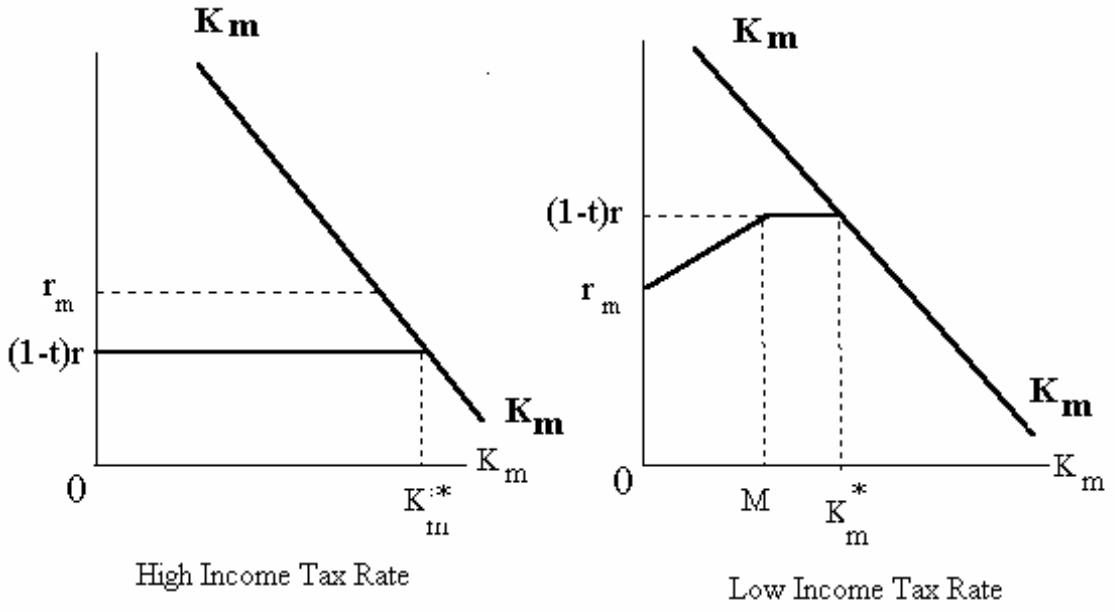


FIGURE 2
THE TRADITIONAL VIEW

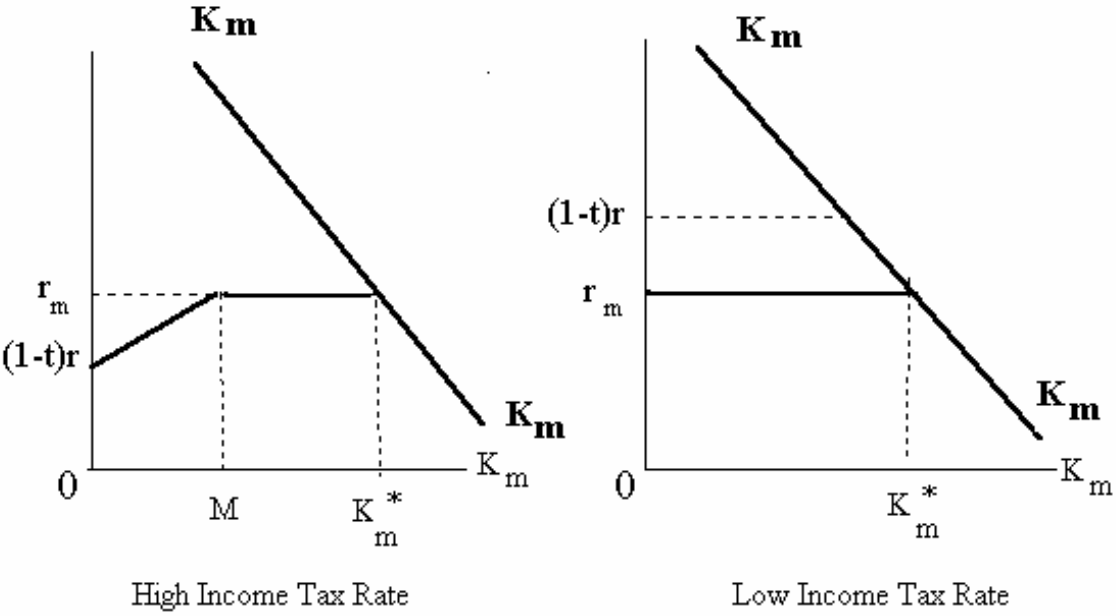
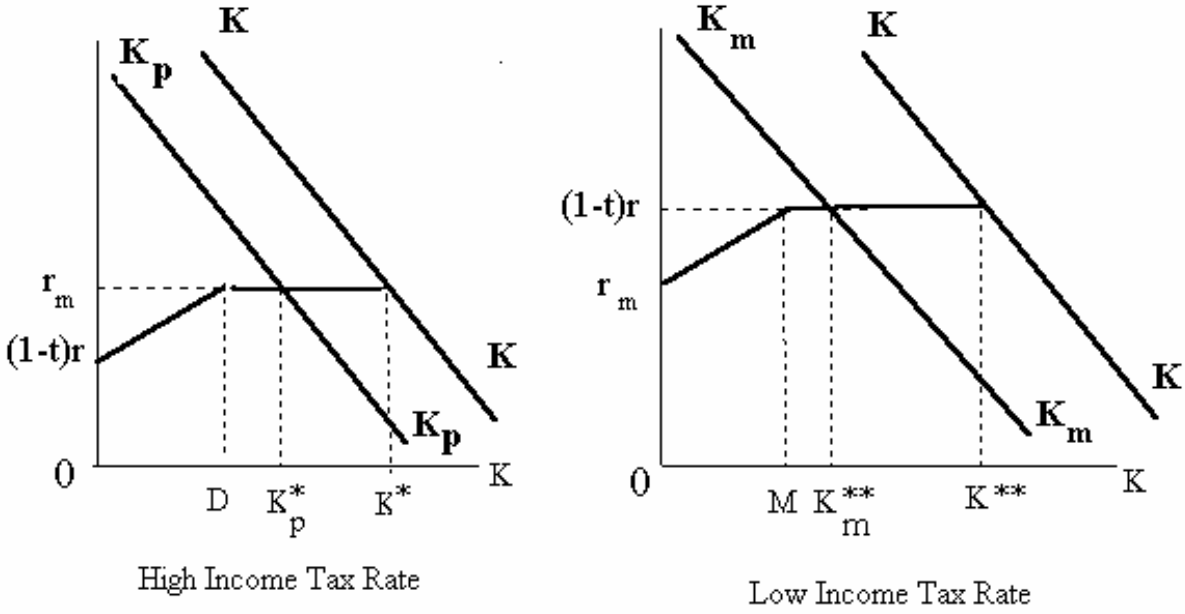


FIGURE 3
THE ECLECTIC VIEW
LEVERAGE-RELATED INTEREST RATES
IN BOTH DEBT MARKETS



$$K = K_p + K_m$$

FIGURE 4
THE EFFECT OF FINANCIAL ASSET
AND DEBT CONSTRAINTS

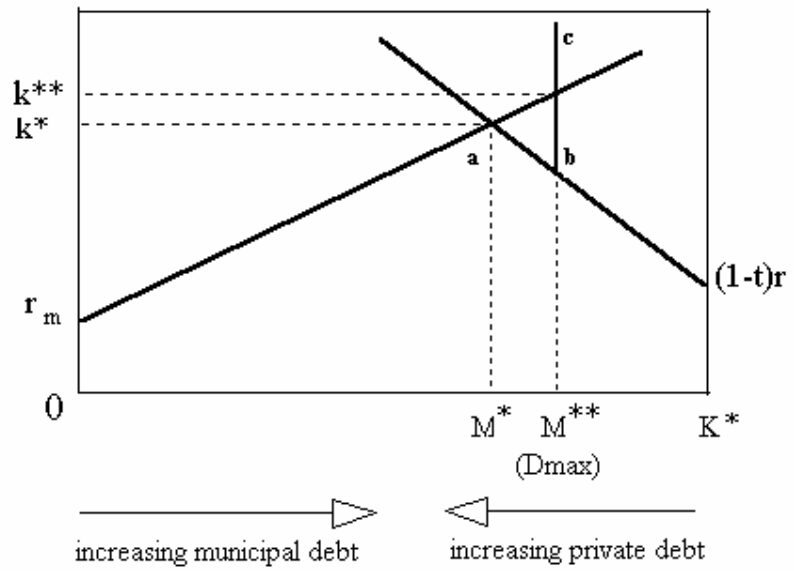


FIGURE 5
ELIMINATING TAX-EXEMPTION
WHEN THE FINANCIAL ASSET CONSTRAINT
IS BINDING