

**THE FEDERAL REVENUE EFFECTS OF TAX-EXEMPT  
AND DIRECT-PAY TAX CREDIT BOND PROVISIONS**

Prepared by the Staff  
of the  
JOINT COMMITTEE ON TAXATION



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## INTRODUCTION

This document<sup>1</sup> describes the economic modeling that the Joint Committee on Taxation staff (“Joint Committee staff”) undertakes to assess the Federal revenue effects of tax-exempt and direct-pay tax credit bond provisions.<sup>2</sup>

Build America Bonds (“BABs”) were created by the American Recovery and Reinvestment Act of 2009 (“ARRA”) as a new form of State and local governmental bond. The interest income on a BAB is taxable to the bondholder and the issuer receives a refundable credit (a Federal government payment) equal to 35 percent of the interest payments on the bond.<sup>3</sup> The provision applied to bonds issued after April 1, 2009, and on or before December 31, 2010. During this period over \$182 billion of BABs were issued, including \$117 billion in 2010. In 2010, BABs accounted for approximately 28 percent of the total volume of long-term State and local governmental bond issuance. For the purposes of this document, “direct-pay bond” broadly refers to any bond where a portion of the interest costs are reimbursed by the Federal government directly to the bond issuer. There have been numerous proposals to extend BABs or create alternative direct-pay instruments, including a provision in the President’s Fiscal Year 2012 Budget that would modify and extend BABs permanently at a lower credit rate of 28 percent and expand the eligible uses of BAB proceeds.

Because some direct-pay bonds replace traditional tax-exempt bonds and this substitution is a component of the revenue estimate, the first section of this pamphlet discusses the methodology that the Joint Committee staff uses to estimate the revenue effects of changes in issuance of tax-exempt bonds. The second section presents the three broad categories of direct-pay bond provisions and discuss in general terms the revenue estimating methodologies that apply to each category. The BABs experiment has provided a wealth of information on the market for direct-pay bonds. Section three describes information collected about the two-year period during which BABs could be issued and how this information has been incorporated into the Joint Committee staff model of estimating direct-pay bonds provisions. Section four provides a detailed description of the Joint Committee staff estimate of the permanent extension of BABs contained in the President’s FY 2012 Budget.

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<sup>1</sup> This document may be cited as follows: Joint Committee on Taxation, *The Federal Revenue Effects of Tax-Exempt and Direct-Pay Tax Credit Bond Provisions* (JCX-60-12), July 16, 2012. This document can also be found on our website at [www.jct.gov](http://www.jct.gov).

<sup>2</sup> The staff of the Joint Committee on Taxation welcomes comments from interested readers who have studied the income tax aspects of the markets for taxable and tax-exempt securities.

<sup>3</sup> The BABs provision also gave State and local governments the option of issuing bonds with taxable interest so that the holder of the bond receives, for each dollar of investment, an interest payment equal to 65 percent of the bond’s coupon interest rate and a tax credit equal to 35 percent of the bond’s coupon interest rate. Very few of these types of bonds were issued. Recovery zone economic development bonds provided for a refundable issuer credit of 45 percent (sec. 1400U-2). Unlike BABs, the Code limited the volume of recovery zone economic development bonds that could be issued. Certain other volume-limited tax credit bonds may be issued as direct-pay bonds at the option of the issuer. They include: new clean renewable energy bonds, qualified energy conservation bonds, qualified school construction bonds and certain qualified zone academy bonds (sec. 6431(f)).

## I. ESTIMATING TAX-EXEMPT BOND PROPOSALS

This section briefly describes the general components of a revenue estimate of the change in Federal tax revenue that occurs due to changes in the Federal tax laws governing tax-exempt bond issuance. The analysis begins with a brief discussion of who benefits from the income exclusion of interest on tax-exempt bonds and how this relates to the Federal cost of providing the implicit subsidy to qualified State and local borrowing. A description is set forth of the model used to estimate the revenue effect of changes in tax-exempt bond issuance and the simplifying assumptions that are made to make the analysis more tractable. The next section discusses an alternative model and the difficulties involved in implementing this model. The final section describes the components of a tax-exempt bond revenue estimate using the Joint Committee staff methodology and gives an example of a tax-exempt bond proposal and how to estimate the revenue effect of the proposal.

### A. The Tax-Exempt Bond Market

Under present law, gross income does not include interest on State and local bonds. State and local bonds are classified generally as either governmental bonds or private activity bonds. Governmental bonds are bonds whose proceeds are primarily used to finance governmental functions or which are repaid with governmental funds. Private activity bonds are bonds in which the State or local government serves as a conduit providing financing to non-governmental persons (*e.g.*, private businesses or individuals). The exclusion from income for State and local bonds does not apply to private activity bonds, unless the bonds are issued for certain permitted purposes (“qualified private activity bonds”) and other requirements are met. During the period 2001-2010, the average annual volume of new tax-exempt bonds issued by State and local governments was \$340 billion and the average annual volume of tax-exempt notes (bonds with maturities of less than one year) issued by State and local governments was \$60 billion. As of the fourth quarter of 2011, State and local governments had total tax-exempt security liabilities of nearly \$3.0 trillion.<sup>4</sup>

One of the primary determinants of a bond investor’s willingness to purchase tax-exempt bonds is the investor’s marginal tax rate on interest income. Generally, all other things being equal (such as credit worthiness), a bond investor is indifferent between a tax-exempt bond and a taxable bond with an equivalent after-tax yield.<sup>5</sup> Using this relationship, for a given tax-exempt bond interest rate and taxable bond interest rate the marginal investor in tax-exempt bonds can be determined. The marginal investor is the investor facing a marginal tax on interest income such that the investor is indifferent between holding a tax-exempt bond and a taxable bond. Investors with marginal tax rates higher than the marginal investor earn a higher after-tax return from holding tax-exempt bonds, as opposed to comparable taxable bonds; and investors with marginal

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<sup>4</sup> Board of Governors of the Federal Reserve System, *Flow of Funds Accounts of the United States*, Flows and Outstandings Fourth Quarter 2011, Table L.105, p. 69. Available at: <http://www.federalreserve.gov/releases/z1/current/z1.pdf>.

<sup>5</sup> This may be represented algebraically as  $R_e = (1 - MTR_m)R_t$ , where  $R_e$  is the tax-exempt yield,  $MTR_m$  is the marginal tax rate of the marginal investor in tax-exempt bonds, and  $R_t$  is the taxable bond yield.

tax rates lower than the marginal investor earn a higher after-tax return from holding taxable bonds as opposed to comparable tax-exempt bonds. For example, if a taxable bond earns 6 percent interest and a comparable tax-exempt bond earns 4.5 percent interest then a taxpayer facing a marginal tax rate of 25 percent would earn an identical after-tax interest rate on both bonds. Taxpayers with marginal tax rates above 25 percent would earn a higher after-tax return from holding tax-exempt bonds, and taxpayers with marginal tax rates below 25 percent would earn a higher after-tax return from holding taxable bonds.

Table 1 below reports annual average interest rates on long-term corporate bonds and long-term tax-exempt bonds between the years 1986 and 2009. It also provides the implied marginal tax rate at which a bond investor would be indifferent between holding the average corporate bond and the average tax-exempt bond.

**Table 1.—Comparison of Taxable Interest Rates and  
Tax-Exempt Interest Rates 1986-2009**

<b>Year</b>	<b>Corporate Bond Interest Rate<sup>1</sup></b>	<b>Tax-Exempt Bonds Interest Rate<sup>2</sup></b>	<b>Implied Tax Rate of Marginal Investor</b>
1986	9.02	7.33	18.7
1987	9.38	7.66	18.3
1988	9.71	7.68	20.9
1989	9.26	7.23	21.9
1990	9.32	7.27	22.0
1991	8.77	6.92	21.1
1992	8.14	6.44	20.9
1993	7.22	5.59	22.6
1994	7.96	6.19	22.2
1995	7.59	5.95	21.6
1996	7.37	5.76	21.8
1997	7.26	5.52	24.0
1998	6.53	5.09	22.1
1999	7.04	5.44	22.7
2000	7.62	5.71	25.1
2001	7.08	5.15	27.3
2002	6.49	5.04	22.3
2003	5.67	4.74	16.4
2004	5.63	4.68	16.9
2005	5.24	4.40	16.0
2006	5.59	4.40	21.3
2007	5.56	4.40	20.9
2008	5.63	4.86	13.7
2009	5.31	4.61	13.2

Notes:

<sup>1</sup> Annual average bond yield for Moody's Long Term Aaa Corporate Bond Index.

<sup>2</sup> Bond Buyer 20-year Municipal Bond Index, an index consisting of 20 general obligation bonds that mature in 20 years. The average rating of the bonds is roughly equivalent to Moody's Aa1 rating. Source: *Bond Buyer Thompson Reuters 2012 Yearbook*.

Source: *Economic Report of the President, 2010*.

The top marginal tax rate of the individual income tax exceeded the implied tax rate of the marginal investor in each year between 1986 and 2009. This result implies that there is a distribution of investors of differing marginal tax rates that benefit by investing in tax-exempt bonds. To calculate a revenue estimate it is necessary to understand how the proposal affects the investment decisions of different investors within the distribution of all potential investors. For

example, some proposals will only affect the marginal investor in tax-exempt bonds while other proposals will affect the entire distribution of tax-exempt bond investors. Table 2 below shows the distribution of individual and corporate tax-exempt bond interest income by effective Federal marginal tax rate for tax year 2007. While the table shows that individual and corporate investors with effective marginal tax rates of 30 percent and higher earn 59 percent of all reported tax-exempt interest, a substantial amount of tax-exempt interest is reported by investors facing relatively low marginal tax rates. For example, 6.8 percent of tax-exempt interest is earned by investors with effective marginal tax rates of less than 10 percent.

**Table 2.—Distribution of Tax-Exempt Bond Interest  
by Effective Marginal Tax Rate, 2007**

<b>Effective Marginal Tax Rate</b>	<b>Individuals</b>		<b>Corporations</b>	
	Returns with Tax-Exempt Interest (thousands)	Tax Exempt Interest Amount (millions of dollars)	Firms with Tax- Exempt Interest	Tax-Exempt Interest Amount (millions of dollars)
<b>0 - 10</b>	680	5,777	10,220	13,396
<b>10 - 15</b>	220	1,519	331	(1)
<b>15 - 20</b>	1,008	8,901	5,392	51
<b>20 - 25</b>	150	1,033	19	(1)
<b>25 - 30</b>	2,796	28,395	1,340	19
<b>30+</b>	1,486	33,166	9,958	21,409
<b>Total</b>	6,340	78,791	27,260	34,875

Notes:

<sup>1</sup> Less than \$1 million.

Source: Joint Committee staff calculations, 2007 Individual Tax Returns and 2007 Corporate Returns.

## B. The Efficiency of Tax-Exempt Bond Financing

The income exclusion of interest on tax-exempt bonds provides a Federal subsidy to borrowers but, in practice, some of the subsidy accrues to the bond investors (the lenders). Because tax-exempt bond interest income is excluded from gross income, the bond investor is willing to accept a lower interest rate on tax-exempt bonds than he might otherwise accept on an identical taxable investment. Thus, the borrower receives a Federal subsidy on borrowed funds equal to the difference between the tax-exempt interest rate paid and the taxable rate that otherwise would be paid. In this way, the income exclusion lowers the cost of capital for State and local governments. For example, if a State and local government could borrow either at a taxable rate of 6 percent or at a tax-exempt rate of 4.5 percent, then issuing tax-exempt debt lowers the State and local borrower's annual borrowing cost by \$15,000 for every \$1 million borrowed relative to the cost of issuing the same amount of taxable debt.

The bond investor also receives a Federal subsidy equal to the difference between the tax-exempt interest rate and the after-tax yield on a comparable taxable investment (for the purposes of the current discussion we assume this investment to be a taxable corporate bond). The after-tax yield on a taxable bond decreases as an investor's marginal income tax rate increases. Therefore, for investors that hold a particular tax-exempt bond, the subsidy, as measured by the difference between the yield on the tax-exempt bond and the after-tax yield on a comparable taxable bond, increases as an investor's marginal tax rate increases. Using the example above, if an investor with a marginal tax rate of 35 percent purchases a \$1 million tax-exempt bond at a 4.5 percent interest rate this investor receives \$45,000 in tax-exempt interest. If this same investor purchased a comparable taxable bond at a 6 percent interest rate the investor would receive \$39,000 in after-tax interest. The difference between the incomes earned on these alternative investments is equal to the value of the Federal subsidy that benefits the investor, which in this case is equal to \$6,000. By providing income exclusion for the interest on this bond the Federal government forgoes collecting \$21,000 in income tax while, as discussed in the preceding paragraph, the State and local governmental issuer receives \$15,000 in interest cost savings. The 35-percent marginal tax rate investor receives \$6,000 in benefit. An investor with a 28-percent marginal tax rate holding the same tax-exempt bond would receive \$45,000 in tax-exempt interest instead of \$43,200 in after-tax interest from holding a comparable taxable bond. In this case, the value of the Federal subsidy that benefits the investor falls to \$1,800 and the Federal government forgoes \$16,800 in income tax in order to provide \$15,000 in interest cost savings to the State and local governmental issuer.<sup>6</sup> The tax-exempt bond subsidy is generally considered to be inefficient because, in most cases, the cost in terms of forgone tax revenues exceeds the value of the subsidy to State and local governmental issuers.<sup>7</sup>

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<sup>6</sup> The value of the Federal subsidy that benefits an investor with a 35-percent marginal tax rate is represented algebraically as  $\$1,000,000 \cdot .045 - \$1,000,000 \cdot .06 \cdot (1 - .35) = \$6,000$  and the value of the Federal subsidy that benefits an investor with a 28-percent marginal tax rate is represented algebraically as  $\$1,000,000 \cdot .045 - \$1,000,000 \cdot .06 \cdot (1 - .28) = \$1,800$ .

<sup>7</sup> For a discussion of this issue see Rosen, H.S., *Public Finance*, 4<sup>th</sup> edition, Irwin, New York, 1995, pp. 365-366.

### C. The Basic Portfolio Model

To estimate the revenue cost of changes in the tax law governing issuance of tax-exempt bonds it is necessary to establish a baseline of Federal tax receipts. Then an estimate of the new level of Federal tax receipts after the imposition of the change in the law is calculated. A revenue estimate of the provision is the difference between these two levels of Federal tax receipts.

The beginning reference point for a revenue estimate prepared by the Joint Committee staff is the Congressional Budget Office (“CBO”) 10-year projection of Federal receipts referred to as the revenue baseline. The size of the revenue baseline is determined by CBO forecasts of macroeconomic variables such as the annual growth of nominal gross national product (“GNP”), inflation rates, employment levels and investment levels. For the purpose of a conventional revenue estimate, the Joint Committee staff generally assumes that changes in tax law do not cause changes in economic aggregates such as GNP (as forecast in the baseline by CBO). Thus, for the purposes of calculating a revenue estimate, changes in the amount of tax-exempt bonds issued are assumed not to generate induced revenue effects due to changes in the aggregate level of output in the economy. In keeping with the fixed GNP assumption, the levels of total savings, investment, and loanable funds in the economy are also assumed to be invariant with respect to changes in tax law for the purpose of estimating tax-exempt bond provisions. However, the components of these variables may change among sectors, or industries, as a result of a change in tax law. One implication of these assumptions is that a change in the total amount of funds borrowed by the State and local sector (as measured relative to baseline borrowing) due to a change in tax law relating to tax-exempt bonds must be accompanied by an offsetting change in funds borrowed by the private sector.

In addition, generally tax-exempt bond revenue estimates are made under the assumption that interest rates, including taxable market interest rates or tax-exempt market interest rates, do not change as a result of changes in tax-exempt bond issuance.<sup>8</sup> In general, the Joint Committee staff model of the market for tax-exempt bonds assumes lenders have perfectly elastic demand for tax-exempt debt. This means that as more tax-exempt bonds are offered all that is needed to bring the market back into equilibrium is an infinitesimal increase in return.<sup>9</sup> For Joint Committee staff modeling, the most important implication of this assumption is that the relative interest rates of tax-exempt and taxable bonds do not change as bond issuance changes. Changes in the issuance of qualified State and local bonds that occur as a result of most proposals are small relative to the size of the entire capital market so in most cases, for purposes of making

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<sup>8</sup> There are exceptions to the constant interest rate assumption, for example, the costs of State and local borrowing was assumed to fall as a result of the Build America Bond program. This will be discussed in more detail later in the document.

<sup>9</sup> An alternative way to view the assumption of perfectly elastic demand for tax-exempt bonds is that the change in supply due to a proposal is not large enough to satiate the demand for tax-exempt bonds of the marginal investors, and, as such, the tax-exempt interest rate does not change. In other words, demand is perfectly elastic for modest changes in the supply of tax-exempt bonds. If the change in the supply of tax-exempt bonds were large enough that the tax rate of the marginal investors in tax-exempt bonds changes then a change in the tax-exempt bond interest rate would occur.

revenue estimates, it is reasonable to assume that there are not significant changes in relative interest rates.<sup>10</sup>

### **The taxable bond substitution model**

To predict changes in investor behavior that occur due to a change in the laws governing tax-exempt bonds it is necessary to model investor portfolio choice. Joint Committee staff models this choice using a two-asset, investment portfolio model where investors choose the amount of tax-exempt bonds and corporate taxable bonds to hold in their portfolios. In this model investors choose the portfolio composition that maximizes the after-tax return from their investment portfolio subject to considerations of risk, liquidity, diversification and other factors. The lowest-tax-bracket investors holding tax-exempt bonds are called the marginal investors. These investors are indifferent between holding comparable tax-exempt bonds and taxable bonds since their after-tax return from holding taxable debt is equal to the return from holding tax-exempt debt. In this case, the market tax-exempt bond yield is determined by the marginal income tax rate of the marginal investors of tax-exempt bonds. For example, if the taxable bond interest rate is 6 percent and the marginal investor of tax-exempt bonds has a marginal income tax rate of 25 percent, the market tax-exempt bond interest rate is 4.5 percent. In this model, the main component of a revenue estimate is the forgone Federal tax revenue from taxable bonds as investors adjust their portfolio holdings of tax-exempt bonds and taxable bonds in response to changes in the laws governing tax-exempt bond issuance. For purposes of discussion, the Joint Committee staff refers to this as the taxable bond substitution effect.

One implication of the taxable bond substitution model is that, for a given interest rate and supply of bonds, investors with the highest marginal tax rate will purchase as much of the available supply of tax-exempt bonds as they would like. If these investors are willing to purchase the entire supply of bonds then they become the marginal investor and their marginal tax rate determines the tax-exempt bond rate. For example, if one assumes a taxable yield of 6 percent and the highest marginal tax rate in the economy is 35 percent then this implies a tax-exempt bond yield of 3.9 percent.<sup>11</sup> If the amount of bonds the highest marginal tax rate investors are willing to purchase is less than the amount that issuers would like to sell, then issuers must increase the interest rate they are willing to pay in order to attract additional investors. These new investors now become the marginal investor and, as such, determine the tax-exempt interest rate. For example, if the next lowest tax-bracket is 31 percent then issuers would have to offer a tax-exempt bond interest rate of at least 4.14 percent to attract these potential investors. If the total amount of bonds that investors in these two tax-brackets are willing to purchase at this rate is sufficient to meet the amount of bonds issuers want to sell then the tax-exempt bond market interest rate will be 4.14 percent; otherwise, issuers will have to offer an even higher interest rate to attract investors in lower tax brackets. As a result, there can be a distribution of marginal tax rates of investors in tax-exempt bonds. For provisions that

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<sup>10</sup> To see the potential effects of relaxing this assumption see Harvey Galper and Eric Toder, "Modeling Revenue and Allocation Effects of the Use of Tax-Exempt Bonds for Private Purposes," in George G. Kaufman, ed., *Efficiency in the Municipal Bond Market: The Use of Tax-Exempt Bonds for Private Purposes*, JAI Press, 1981.

<sup>11</sup>  $(1-.35) * .06 = .039$ .

affect all investors in tax-exempt bonds (or a class of tax-exempt bonds) the relevant tax rate to use to calculate the change in revenue would be the weighted average marginal tax rate of the entire distribution of investors (where each investor's marginal tax rate is weighted by their share of total tax-exempt bond purchases). Other provisions only affect the marginal holders of tax-exempt bonds; in this case, the relevant tax rate is the marginal tax rate of the class of investors that are the marginal investors in tax-exempt bonds.

## D. Adequacy of the Basic Portfolio Model

Some analysts have suggested that a model that exclusively assumes taxable bond substitution overstates the revenue cost of changes in tax-exempt bond issuance.<sup>12</sup> They observe that if investors consider more lightly taxed assets such as corporate stock, as well as taxable bonds, as substitutes for tax-exempt debt, then the taxable bond substitution assumption results in overstatements of the revenue changes that occur due to changes in the volume of tax-exempt bonds issued relative to the baseline forecast. For example, suppose the Joint Committee staff estimates that a proposal results in an increase in total issuance of tax-exempt bonds of \$1 billion relative to the baseline forecast of tax-exempt bonds issuance. Under these circumstances, the Joint Committee staff model of investor behavior would assume that investors would purchase \$1 billion of tax-exempt bonds instead of the \$1 billion of taxable bond purchases they were assumed to make in the baseline projection of tax receipts. Alternatively, investors could be modeled as decreasing their investment in both equities and taxable bonds by \$1 billion in total in response to the proposal. Tax on capital gains is paid at the time of realization. Capital gains and dividend payments are taxed at lower rates than interest income, which is generally taxed on an accrual basis. Therefore, for investors, the Federal tax revenue loss from this forgone investment in equities and taxable bonds will be less than if the change in investment is assumed to come entirely from a reduction in taxable bond investment.

The Joint Committee staff estimates the revenue effects of more than one hundred tax-exempt bond revenue proposals annually. These proposals range from proposals that have very small effects on tax-exempt bond issuance to proposals that replace, or eliminate entirely, the income tax exclusion on tax-exempt bond interest. Flexibility in modeling assumptions is imperative if revenue estimates are to reflect expected or likely behavioral responses to changes in the laws governing tax-exempt bond issuance accurately. Unfortunately, it is difficult to express adequately these nuances in print, particularly in a concise fashion required in most methodological publications. This has led to misunderstandings regarding how the Joint Committee staff models tax-exempt bond proposals, and, in particular, has led to a perception that the Joint Committee staff naively applies the taxable bond substitution model. Part of the purpose of this document is to clarify the nuances of how the Joint Committee staff estimates tax-exempt bond proposals and show that, in many cases, the taxable bond substitution model closely approximates a model that explicitly assumes alternative portfolio decisions.

Tax-exempt bond proposals generally fall into three broad categories: 1) proposals that incrementally allow (or restrict) additional issuance of tax-exempt bonds, and, as such, affect the marginal investors in tax-exempt bonds, 2) proposals that affect investor demand for tax-exempt bonds, and 3) proposals that eliminate or comprehensively replace tax-exempt bonds. The discussion below briefly contrasts the implications of using the taxable bond substitution model versus a model that assumes investors make alternative portfolio allocation decisions for each of these general types of proposal.

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<sup>12</sup> James Poterba and Arturo Ramirez Verdugo, "Portfolio Substitution and the Revenue Cost of Exempting State and Local Government Interest Payments from Federal Income Tax," *National Tax Journal*, vol. 64, June 2011, pp. 591-613.

## **Incremental changes in tax-exempt bond issuance**

In the first category of proposals, where a proposal allows additional issuance of tax-exempt bonds, new investment in the private sector is assumed to decrease relative to the assumed baseline level of private sector investment as investors purchase additional tax-exempt bonds. As a result, any revenue effects associated with changes in corporate dividend payments, interest payments and retained earnings that occur as a result of this decrease in private sector investment relative to the baseline level of private sector investment, needs to be accounted for in making a revenue estimate.<sup>13</sup> Because corporations are required to pay tax on dividend payments and retained earnings, a change in these amounts has a revenue effect.

A model that allows investors to substitute equity, as well as debt, for tax-exempt bonds must not only account for the change in revenue as investors switch from taxable assets to tax-exempt assets, but also account for the change in revenue at the corporate level as retained earnings and dividend payments change. In the taxable bond substitution model, on the other hand, a change in corporate interest payments will have no Federal tax revenue effect in itself, since interest payments are deductible at the corporate level.<sup>14</sup> For these reasons, a model that allows changes in equity financed investment must account for the Federal tax revenue effect of this change on both investors and corporations while a model that only allows changes in debt financed investment need only account for the revenue effect of this change on investors. Without calculating the change in corporate Federal tax revenue that occurs in a richer model that allows debt and equity investment, it is impossible to determine whether the taxable bond substitution model systematically over-estimates or underestimates the change in Federal tax revenue due to this type of proposal. The Joint Committee staff considers the task of determining the effect on corporate Federal tax revenues to be exceedingly difficult and considers the taxable bond substitution model to be a practical approximation of a richer model.

## **Changes in investor demand**

In the second category of proposals, a proposal affects investors that hold tax-exempt bonds in the baseline without changing the total amount of tax-exempt bonds issued or the interest rate paid on these bonds.<sup>15</sup> For example, a proposal might cause infra-marginal investors in tax-exempt bonds to increase their purchases of tax-exempt bonds. In this case, the marginal holders of tax-exempt bonds are modeled as decreasing their tax-exempt bond holdings by the

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<sup>13</sup> In a model that allows for equity and debt financing, a change in new equity investment relative to the baseline level requires a change in new equity issues or a repurchase by corporations of existing corporate stock.

<sup>14</sup> The model that assumes investors choose between tax-exempt and taxable bonds implicitly assumes the capital needs of corporations are entirely debt financed. Under this circumstance, all profits of the firm are paid out to investors in the form of interest payments. Because corporations can deduct interest payments, any revenue effects due to changes in the amount of profit paid out in the form of interest payments is counted in the measure of the change in investor Federal tax liability resulting from a change in interest income.

<sup>15</sup> It is possible that a provision could cause a large enough change in the demand for tax-exempt bonds that the marginal holder of tax-exempt bonds changes. Under these circumstances, the amount of tax-exempt bonds issued may change and this effect will be calculated in the revenue estimate.

exact amount that infra-marginal investors increased their tax-exempt bond holdings. In other words, there is no change in the overall ratio of private sector to public sector investment. Because there is no change in private sector investment, there is no change in corporate taxes, and the revenue estimate need only account for changes in investor tax liability. In this scenario, the Joint Committee staff assumes that the infra-marginal investors increase their purchases of tax-exempt bonds and decrease their holding of taxable bonds. The Joint Committee staff considers it reasonable to assume that these investors make adjustments in their holdings within a class of investments with similar attributes; that is, they replace a debt instrument investment with another debt instrument investment. In addition, to the extent that these investors purchase additional tax-exempt bonds because of their tax attributes it is reasonable to assume that they replace investments subject to relatively higher taxes, such as debt investments, as opposed to replacing equity investments which are subject to relatively lower taxes. To maintain financial transaction balance, the marginal tax-exempt bond holders that divest of tax-exempt bonds under the proposal are assumed to replace tax-exempt bonds with taxable bonds.<sup>16</sup> If, instead, these investors replace tax-exempt bonds with other tax-favored assets such as corporate stock, the revenue cost of the proposal increases because there is less Federal tax revenue collected from those investors shifting into holding taxable securities to offset the Federal tax revenue lost from the infra-marginal investors that increased their holdings of tax-exempt bonds under the proposal.

### **Proposals to eliminate the income exclusion of tax-exempt bond interest**

The final category of tax-exempt bond proposals entirely eliminates the income tax exclusion for tax-exempt bond interest. Under these proposals, all investors in tax-exempt bonds are assumed to entirely replace their baseline holdings of Federally tax-exempt bonds with alternative investments.<sup>17</sup> The question is what alternative investments do they choose? To the extent that a particular tax-exempt bond investor cares more about the income profile of the investment than the tax-treatment of that income, it is reasonable to assume that some of the baseline investors falling into this category continue to purchase taxable State and local bonds. In addition, approximately two-thirds of States exclude interest income from State taxes for bonds issued either by the State or localities located within the State, so a portion of the interest income relating to taxable State and local bonds would continue to be tax-exempt at the State level.<sup>18</sup> For these reasons, the Joint Committee staff assumes that a portion of the taxable State

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<sup>16</sup> It is not necessarily the case that these taxpayers literally trade investments with the higher marginal tax rate investors that purchased additional tax-exempt bonds under the proposal. The marginal holders of tax-exempt bonds may purchase equity to replace their tax-exempt bond investments, but, if this were the case, some other investor in the economy must replace an equity investment with a taxable debt investment. This type of analysis requires a complete modeling of the complex portfolio adjustments that would occur as a result of such a proposal. This is not practicable at this time.

<sup>17</sup> This discussion is focused on how the Joint Committee staff models this portfolio adjustment. Depending on the proposal, it is likely that the level of State and local borrowing will change as the interest rate these State and local governments pay to borrow changes. This effect is discussed in the context of direct-pay bonds later in this document.

<sup>18</sup> The Joint Committee staff generally assumes that State laws are invariant to changes in Federal law. If a State exempts interest on certain bonds from State taxes, a change in the treatment of these bonds at the Federal

and local bonds that are issued under the proposal are purchased by investors that hold tax-exempt bonds in the baseline.

It is likely, however, that a large portion of the taxable State and local bonds would be purchased by investors facing zero or very low marginal income tax rates (*e.g.*, pension funds, university endowments, tax-exempt entities and foreign investors). These taxpayers are assumed to substitute taxable State and local bonds for other taxable bonds with a similar risk and interest income profile. In other words, these investors are assumed to maintain the debt-to-equity ratio in their investment portfolios. For example, a pension fund manager purchasing a 30-year taxable State bond with a six-percent coupon would sell a 30-year corporate bond with a six-percent coupon as opposed to selling an equivalent amount of stock. The investors that held tax-exempt bonds in the baseline and reduce their holdings of State and local debt due to the provision are assumed to increase their holdings of both taxable private sector debt and corporate stock. Since low- marginal tax rate investors such as pension funds are assumed to replace taxable private-sector debt in their portfolios with taxable State and local bonds under the proposal, the taxable private-sector debt these investors no longer hold will be held by other investors. A portion of this amount of taxable private sector debt shifts to the portfolios of the investors that replace tax-exempt bond investment with taxable private sector debt investment. The remainder of the taxable private sector debt that low-marginal tax rate investors replace under the proposal will be held by the third class of investors in the economy – investors that had no baseline holdings of tax-exempt bonds. To balance the financial transactions in the model, these investors are assumed to finance their purchases by forgoing equity investment. This forgone equity investment is equal to the new amount of equity investment made by the investors that substitute equity investment for tax-exempt bond investment under the proposal.

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level is irrelevant. On the other hand, if a State uses Federal adjusted gross income as a measure of income for purposes of calculating State taxes (or specifically ties tax-exemption at the State level to tax-exemption at the Federal level) and provides no other specific exceptions for State and local bonds, then these bonds would be considered taxable at both the Federal and State levels.

**Table 3.—Hypothetical Economy with Portfolio Shifting  
(billions of dollars)**

	<b>State and Local Bonds</b>	<b>Corporate Bonds</b>	<b>Corporate Stock</b>	<b>Total</b>
<b><u>Baseline:</u></b>				
Investor Class A	\$200	\$50	\$50	\$300
Investor Class B	\$0	\$300	\$800	\$1,100
Investor Class C	\$0	\$100	\$400	\$500
Total	\$200	\$450	\$1,250	\$1,900
<b><u>Proposal:</u></b>				
Investor Class A	\$50	\$50	\$200	\$300
Investor Class B	\$150	\$150	\$800	\$1,100
Investor Class C	\$0	\$250	\$250	\$500
Total	\$200	\$450	\$1,250	\$1,900

For example, suppose the Federal income exclusion for interest earned on tax-exempt bonds is eliminated and State and local governments sell \$200 billion of taxable bonds instead of the \$200 billion of tax-exempt bonds they planned to issue in the first year after the passage of the new law. In Table 3, above, there are three investor classes: Class A, taxable investors that had planned to hold tax-exempt bonds in their portfolios in the baseline; Class B, zero tax investors that plan to hold no tax-exempt bonds in their portfolios in the baseline; and Class C, taxable investors that plan to hold no tax-exempt bonds in their portfolios in the baseline. Table 3 above shows a hypothetical economy where Class A investors plan on holding \$200 billion of tax-exempt bonds in the baseline. Under the proposal, these investors are assumed to continue to hold \$50 billion of the newly taxable State and local bonds; while zero-tax-rate Class B investors purchase the remaining \$150 billion of newly taxable State and local bonds. Class A investors that were planning on purchasing \$200 billion of tax-exempt bonds in the baseline now have \$150 billion remaining to invest, which they use to purchase an additional \$150 billion of corporate stock. This net gain of corporate equity assets by Class A investors is exactly offset by a reduction in corporate stock holdings by Class C investors. The financial transactions in the economy are completed by assuming that Class C investors purchase the remaining \$150 billion of corporate bonds that the zero-tax-rate Class B investors no longer hold in their portfolios.

For revenue estimating purposes the portfolio changes of the zero tax investors (Class B) have no Federal tax revenue effect. Even if these investors had low tax rates there is still no revenue effect, because it is assumed that these investors substitute investments with identical returns. Both classes of taxable investors (Class A and Class C) increase their total holdings of taxable State and local and corporate bonds (from \$150 billion to \$350 billion). This increase in holdings of taxable debt increases Federal tax receipts. Class A and Class C investors also exchange holdings of corporate stock. The magnitude of the revenue effect of the aggregate exchange of stock holdings between the two classes of taxable investors depends on the relative

average marginal tax rates of the two groups. To assign the relative difference in tax rates between these two groups would require a complete model of portfolio adjustment in a complex economy. A model that is this extensive is infeasible at this time. For the purposes of revenue estimating the Joint Committee staff assumes that the two groups are identical. Under these assumptions, the results of the model are identical to a model that assumes tax-exempt bond holders replace all of their holdings with taxable bonds.

### **The corporate equity substitution modeling approach**

The most critical assumption in the previous model is that taxable investors are assumed to make the residual portfolio adjustments necessary to balance the financial transactions in the economy. Recent research has examined the revenue consequences of various portfolio adjustments that investors in tax-exempt bonds may undertake if the tax exemption on these bonds were eliminated.<sup>19</sup> In this research the focus is on better understanding the likely portfolio adjustments tax-exempt bond holders may undertake, and, as a result, the assumption is made that zero-tax-rate investors are assumed to make the residual portfolio adjustments necessary to balance the financial transactions in the economy. This implies that the portfolio adjustments made by the investors in taxable State and local bonds are entirely determined by the assumed portfolio adjustments made by investors that held tax-exempt bonds in the baseline. In the previous example (Table 3), investors in tax-exempt bonds are assumed to replace a portion of their tax-exempt bond holdings by purchasing an additional \$150 billion of corporate stock. In a model where zero-tax-rate investors balance the financial transactions, these entities must divest \$150 billion of corporate stock in order to invest in taxable State and local bonds. Under these assumptions, a revenue estimate only requires an analysis of the tax implications of the \$150 billion of corporate stock that baseline holders of tax-exempt bonds purchase under the proposal, since they acquire these assets from zero-tax-rate investors. In this modeling approach a revenue estimate only requires an analysis of the change in taxes associated with the portfolio adjustments made by investors that held tax-exempt bonds in the baseline since the financial transactions in the economy are always completed by zero-tax-rate investors. That is, under this modeling approach, if the holder of tax-exempt bonds purchases corporate equity as a consequence of a proposal to eliminate tax-exempt bonds, then the corporate equity is purchased from a tax-exempt entity. The tax-exempt entity sells the corporate equity and purchases taxable State and local debt. If zero-tax-rate investors are likely to replace taxable debt instruments with taxable State and local bonds then the corporate equity substitution modeling approach underestimates the increase in Federal tax revenue due to a proposal that made tax-exempt bonds taxable compared to the taxable bond substitution modeling approach. This is because the average marginal tax rate on the returns to corporate equity received by a taxpayer is lower than the average marginal tax rate on the returns to taxable debt.

For purposes of calculating the revenue estimate, the Joint Committee staff begins with the initial purchase of taxable State and local bonds by zero-tax-rate investors. Investment

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<sup>19</sup> James Poterba and Arturo Ramirez Verdugo, "Portfolio Substitution and the Revenue Cost of Exempting State and Local Government Interest Payments from Federal Income Tax," *National Tax Journal*, vol. 64, June 2011, pp. 591-613.

decisions by zero-tax-rate investors are less complex since the tax attributes of an investment are irrelevant. For these investors, taxable State and local bonds are a very close substitute for taxable debt instruments; therefore, the Joint Committee staff models these investors as adjusting their portfolios within a class of closely related investments. If zero-tax-rate investors are indeed likely to maintain the debt to equity ratio in their portfolios in response to a proposal that creates a taxable State and local bond instrument, then the Joint Committee staff feels that the taxable bond substitution model is the most appropriate model to use to estimate the increase in Federal tax revenues that may occur due to the proposal.<sup>20</sup>

## **Summary**

While investigations into the revenue consequences of more realistic investor portfolio reallocations are important, determining whether the taxable bonds substitution assumption either underestimates or overestimates the estimated revenue cost relative to these alternative assumptions is exceedingly difficult. This requires a complete model of how changes in investment between the private sector and public sector occur and how they affect the level of corporate dividends, profits, and interest payments in the economy. One interpretation of the taxable bond substitution model is that it is based on a simple characterization of the economy that makes tractable the tracking of changes in taxable income for the practical purpose of calculating revenue estimates of tax-exempt bond proposals. At this time, the Joint Committee staff considers the taxable bond substitution model to be the most practical for revenue estimating purposes.

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<sup>20</sup> In the Joint Committee staff taxable bond substitution model, a tax-exempt entity purchases some of the taxable State and local bonds and sells an equal amount of taxable corporate or Federal government bonds. The taxable corporate or Federal government bonds no longer held by the tax-exempt entity must be purchased by taxable entities. Even if the original holder of tax-exempt bonds chooses to hold some more lightly taxed corporate equities in lieu of taxable bonds as a result of the proposal, some other taxable person must hold less corporate equity and more taxable bonds.

## E. An Example of a Tax-Exempt Bond Revenue Estimate

### Changes in the supply of tax-exempt debt

The following discussion sets forth an example of how Joint Committee staff uses this general framework to estimate the revenue effects associated with changes in Federal tax law that affect the supply of tax-exempt bonds. Federal law affects the supply of tax-exempt bonds either by restricting or limiting issuance of certain tax-exempt bonds or by changing the cost of borrowing for issuers. For example, interest on bonds issued by governmental units to finance activities carried out and paid for by private persons (“private activity bonds”) is taxable unless the Internal Revenue Code specifically provides that a private activity bond for that type of activity is a tax-exempt qualified bond and certain other requirements are met. The volume of tax-exempt private activity bonds that can be issued is generally limited by a State volume cap. These limits on both the activities that can be financed on a tax-exempt basis and the volume of tax-exempt private activity bonds that may be issued by State and local governments affect the supply of tax-exempt bonds.

Under the assumptions described above, when additional supply of tax-exempt bonds is made available due to a change in law, the marginal investors in tax-exempt bonds, in the aggregate, reduce their holdings of taxable bonds by a dollar amount equal to the value of the newly available supply of tax-exempt bonds.<sup>21</sup> The first component of a revenue estimate of a change in the supply of tax-exempt bonds measures the revenue consequences of the forgone Federal income tax associated with the substitution of tax-exempt debt for taxable debt in the portfolios of the marginal investors in tax-exempt bonds. The second component of the revenue estimate measures the change in Federal tax revenue due to the change in borrowing cost associated with the change in issuance of State and local debt. In other words, interest payments change due to the switch from taxable debt to tax-exempt debt. In general, the Joint Committee staff assumes the benefit from tax-exempt financing redounds to the issuer of the bond in the form of lower interest rates. However, often interest payments are a deductible expense of the borrower. As interest payments fall there may be an associated fall in Federal tax deductions, which increase Federal tax revenues.<sup>22</sup>

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<sup>21</sup> This may not always be the case. For example, if a new category of private activity bond that is subject to the volume cap is created and the baseline assumed full issuance of all new private activity bond authority, then increased issuance of one type of private activity bond requires, an equivalent decrease in issuance of other categories of private activity bond. In this case there is no change in tax revenues.

<sup>22</sup> This assumes that interest payments associated with the specific activity are deductible from income for purposes of determining Federal income tax liability and that the taxpayers that experience the change in interest payments are itemizers. For tax-exempt bonds issued by State and local governments for public capital investment (e.g. general obligation bonds) this effect is generally zero. The Joint Committee staff assumes that State and local taxes are invariant to changes Federal tax laws. For these types of bonds, as interest payments change State and local entities are modeled as adjusting their borrowing levels relative to the assumed baseline level of borrowing. This implicitly assumes no change in the underlying resources dedicated to debt service (e.g. State and local taxes). Some authors have modeled State and local entities as adjusting State and local taxes as municipal bond interest rates change. Roger H. Gordon and Gilbert E. Metcalf, “Do Tax-Exempt Bonds Really Subsidize Municipal Borrowing,” *National Tax Journal*, vol. 44, no. 1, December 1991, pp. 71-79.

For example, tax-exempt mortgage revenue bond (“MRB”) proceeds can be used to provide subsidized mortgages to certain homebuyers. The lower mortgage interest payments made by homeowners results in a revenue gain due to a reduction in mortgage interest expense deductions by the affected homeowners. The annual revenue loss from an increase in the supply of MRBs has two components:

1. Lost Federal receipts as investors substitute tax-exempt bonds for taxable bonds in their portfolios, and,
2. Increased tax receipts due to lower mortgage interest deductions as mortgagees substitute lower interest cost MRB mortgages for higher interest cost conventional mortgages.

Algebraically these two factors can be written as follows:

$$(B_e * R_t * MTR_m) - (\alpha B_e * (R_t - R_e) * MTR_b). \quad (1)$$

$B_e$  represents the dollar value of the increase in tax-exempt bonds sold due to the proposal.

$R_t$  is the interest rate on taxable mortgage bonds.

$MTR_m$  is the marginal tax rate on interest income of the marginal holders of tax-exempt mortgage bonds.

$\alpha$  is the proportion of bond proceeds borrowed by homeowners that benefit from lower mortgage rates and itemize deductions on their Federal tax return.

$R_e$  is the tax-exempt mortgage bond interest rate.

$MTR_b$  is the average marginal income tax rate of the homeowners receiving subsidized mortgages.

The first component of this expression is the revenue loss due to the substitution of tax-exempt mortgage revenue bonds for taxable bonds in the portfolios of the marginal investors in tax-exempt bonds. The second component is the revenue gain due to the reduction in mortgage interest deductions from the homeowners that pay lower interest rates due to the provision. For example, if an additional \$1 million of tax-exempt mortgage revenue bonds are issued and the taxable yield is 6 percent and the tax-exempt yield is 4.5 percent then the government forgoes \$15,000 in income taxes on the displaced taxable debt. However, if 50 percent of the proceeds are borrowed by itemizers and the average marginal tax rate of these homeowners is 25 percent then the government collects additional revenues of \$3,750 due to a reduction in mortgage interest expense deductions. This implies an annual loss in Federal income taxes of \$13,125.<sup>23</sup>

So far, the discussion has addressed the effect of proposals that change the supply of tax-exempt bonds. The demand for tax-exempt bonds depends on, among other things, the after-tax

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<sup>23</sup>  $\$1,000,000 * (.06 * .25) - \$1,000,000 * .50 * (.06 - .045) * .25 = \$13,125.$

interest rate and riskiness of tax-exempt bonds relative to alternative investments. In addition, tax law may prohibit or limit the amount of tax-exempt bonds that certain categories of investor may hold. Changes in law that affect either the after-tax interest rate or the holding rules cause changes in the demand for tax-exempt bonds. For example, certain types of tax-exempt private activity bonds are subject to alternative minimum tax (“AMT”), which can decrease the return to investment in these bonds for investors subject to the AMT. Current law also affects the after-tax rate of return on tax-exempt bonds held by commercial banks, which generally may not deduct the carrying cost (the interest expense incurred to purchase or carry an inventory of securities) of tax-exempt bonds. In most cases, the effects of these provisions are assumed to be too small to cause a change in the overall price, and hence the yields, of all tax-exempt bonds. In other words, the marginal investors in the baseline still hold tax-exempt bonds under the provision, although the amount of bonds that they hold may change.

### **Changes in the demand for tax-exempt debt by different investors**

Revenue estimates for these types of proposals are typically not driven by changes in the total amount of tax-exempt debt issued. However, there are changes in the amount of tax-exempt bonds that different investors hold. Proposals that change the demand for tax-exempt bonds most often involve a change in the distribution of tax-exempt bond holdings among tax-exempt bond investors facing different marginal tax rates. For example, a provision that makes tax-exempt bonds relatively more attractive to the highest marginal tax rate investors might involve a transfer of tax-exempt bonds from the marginal investors in tax-exempt bonds to the highest-marginal-tax-rate investors in tax-exempt bonds. In this case, the revenue estimate equals the amount of bonds that change hands times the taxable interest rate times the difference in the marginal tax rate of the investor that purchases additional bonds under the proposal less the marginal tax rate of the marginal investor in tax-exempt bonds.<sup>24</sup>

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<sup>24</sup> This can be represented as  $B_e * R_t * (MTR_h - MTR_m)$  where  $B_e$  is the amount of bonds that change hands,  $MTR_h$  is the average marginal tax rate of the high marginal tax rate investors that acquire additional tax-exempt bonds and  $MTR_m$  is the average marginal tax rate of the marginal investors in tax-exempt bonds that divest tax-exempt bonds under the proposal.  $R_t$  is the interest rate on comparable grade taxable debt.

## II. ESTIMATING DIRECT-PAY BOND PROPOSALS

### A. In General

To estimate a direct-pay bond proposal, it is necessary to determine the extent to which direct-pay bonds replace tax-exempt bonds as debt instruments for tax-exempt borrowers. For a direct-pay bond the issuer pays a taxable interest rate to the holder of the bond and receives a payment, in the form of a refundable credit, back from the Federal government for a portion of the interest payment. The investor in a direct-pay bond receives a taxable interest rate equal to the rate on a comparable taxable bond. From an investor's point of view a direct-pay bond is identical to a taxable bond; the only difference being that direct-pay bonds are issued by State and local governments and taxable bonds are generally issued by private sector entities and the Federal government (although there are instances where State and local governments issue taxable bonds). The Federal government repayment of a portion of the borrower's interest cost creates a wedge between the interest rate investors receive and the after-credit interest rate State and local governments pay to borrow. For example, if one assumes a credit rate of 35 percent and a taxable interest rate of 6 percent then the after-credit interest rate the issuer pays is 3.9 percent, while a bondholder in the 28-percent tax bracket receives an after-tax interest rate of 4.32 percent.<sup>25</sup>

Direct-pay bond proposals can be designed to replace all tax-exempt bonds. In this case, State and local governments that issue tax-exempt bonds in the baseline are assumed to issue only direct-pay bonds under the proposal. Alternatively, direct-pay bonds can be designed to augment the traditional tax-exempt bond instruments that State and local governments typically issue. In this case, investors and borrowers (State and local governments) have a choice of whether to invest and borrow in either tax-exempt bonds or direct-pay bonds. Depending on the credit rate and marginal tax rates, one instrument may dominate the other and the market may consist of either only tax-exempt bonds or only direct-pay bonds.<sup>26</sup> Otherwise, both types of bonds may be issued. Alternatively, it is possible that a proposal could allow direct-pay bonds to be issued for purposes that would be prohibited from tax-exempt bond financing under present law. In this case, direct-pay bonds may replace taxable borrowing and it is possible that there may be no change in the issuance of tax-exempt debt. The revenue estimate for a direct-pay bond proposal will differ depending on which of the above structures the proposal follows.

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<sup>25</sup> The calculation of the after-credit interest rate borrowers pay is  $.06*(1-.35) = .039$  and the after-tax interest rate a bondholder in the 28-percent tax bracket would receive is  $.06*(1-.28) = .0432$ . In this simple case, the Federal government would make annual payments to the issuer in an amount equal to 2.1 percent times the face amount of bonds issued ( $.06*.35 = .021$ ).

<sup>26</sup> For example, if the direct-pay credit rate is 80 percent and the taxable bond interest rate is 6 percent then State and local governments pay an after-credit interest rate of 1.2 percent ( $.06*(1-.8) = .012$ ). In this case, borrowers only issue tax-exempt bonds if there are investors willing to purchase tax-exempt bonds paying an interest rate less than or equal to 1.2 percent. This implies that potential investors in tax-exempt bonds face marginal tax rates equal to 80 percent or above, otherwise they would be unwilling to hold a bond with an interest rate of 1.2 percent. In this example, given current law marginal tax rates, only direct-pay bonds would be issued.

If the credit rate on direct-pay bonds is set so that the after-credit interest rate is lower (higher) than the tax-exempt bond rate available under present law, then the cost of State and local government borrowing is expected to fall (rise). Under these circumstances, maintaining the tax-exempt bond revenue estimating convention that State and local borrowing costs are invariant to changes in the tax laws is clearly unrealistic.<sup>27</sup> Therefore, for purposes of estimating direct-pay bond proposals it is necessary to drop the assumption of perfectly elastic demand for State and local government debt.

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<sup>27</sup> Several studies have found that the Build America Bonds provision lowered the interest rate paid by State and local governments. For example, a 2010 Treasury Report (“Treasury Analysis of Build America Bonds and Issuer Net Borrowing Costs” available at <http://www.treasury.gov/initiatives/recovery/Documents/BABs-Report-4-2-2010-FINAL.pdf> ) found that Build America Bonds lowered interest rates by 112 basis points on a 30-year bond.

## B. Single Instrument Case

The most straight-forward case from a revenue estimating perspective is a proposal where direct-pay bonds replace tax-exempt bonds (or a defined category of tax-exempt bonds) entirely. Since State and local governments can no longer issue tax-exempt bonds, the credit rate can be set so that the after-credit interest rate on direct-pay bonds decreases, remains the same, or increases relative to the baseline tax-exempt bond interest rate.

The first component of the revenue estimate is the value of the credit payments the Federal government pays to direct-pay bond issuers. Issuers receive payments from the Federal government equal to the volume of bonds issued times the interest rate paid on the bonds multiplied by the direct-pay bond credit rate.

Because the proposal replaces tax-exempt bonds with direct-pay bonds, it is expected that investors change their investment portfolios. The second component of the revenue estimate accounts for the change in revenues that occurs as investors rearrange their portfolios. Some investors that hold tax-exempt bonds in the baseline are now assumed to invest in taxable direct-pay bonds. By holding taxable, direct-pay bonds in lieu of tax-exempt bonds, tax receipts from these investors increase. The remaining direct-pay bonds are likely to be purchased by investors facing zero or very low marginal income tax rates. These investors are assumed to replace a portion of their baseline holdings of taxable bonds with direct-pay bonds. The replaced taxable bonds are now assumed to be held by taxable investors (for a detailed description of these changes in portfolio holdings see the discussion of the third general category of tax-exempt bond proposals on page 7).<sup>28</sup> Overall, these portfolio adjustments increase Federal tax receipts.<sup>29</sup>

The third component of the revenue estimate is the potential tax effect of changes in Federal tax deductions that may occur due to the proposal. As discussed earlier in the context of mortgage revenue bonds, to the extent that State and local governments issue bonds on behalf of taxable private persons, the creation of direct-pay bonds may cause changes in deductible interest payments that accrue to the taxpayers that utilize the proceeds from the bonds issued on their behalf by State and local governments. There is no change in Federal tax deductions to the extent direct-pay bonds replace State and local government general obligation bonds and revenue bonds since State and local governments are assumed to keep taxes at baseline levels and adjust the level of capital investment or some other government spending component in response to changes in the interest rate they pay on borrowing. Whether these changes in deductible interest payments have a positive or negative effect on Federal tax receipts depends on whether the after-credit interest rate State and local governments pay under the proposal is higher or lower than the baseline tax-exempt bond interest rate.

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<sup>28</sup> This statement assumes that comparable corporate bonds and direct-pay bonds pay the same interest rate. This assumption is maintained for the analysis that follows.

<sup>29</sup> The zero or very low marginal tax rate investors in direct-pay bonds that hold taxable bonds in the baseline substitute one taxable bond for another (since direct-pay bonds are also taxable). Therefore, these taxpayers have no change in tax liability.

The revenue effect of a provision that replaces tax-exempt bonds with direct-pay bonds has the following components:

1. Increased Federal outlays from Federal payment of a portion of State and local interest payments on direct-pay bonds,
2. Increased Federal receipts as investors substitute taxable bonds for tax-exempt bonds, and,
3. A potential change in Federal tax receipts due to a change in Federal tax deductions.

For a proposal that replaces an amount of tax-exempt bonds  $B_e$  with an amount of direct-pay bonds  $B_d$ , the revenue effect described above can be expressed algebraically as:<sup>30</sup>

$$(B_d * R_d * C) - (B_e * R_t * MTR_e) - (\alpha B_d * (R_e - R_{ac}) * MTR_b). \quad (2)$$

Where  $R_d$  is the interest rate on direct-pay bonds.

$C$  is the credit rate on direct-pay bonds.

$R_t$  is the interest rate on taxable bonds.

$MTR_e$  is the average marginal income tax rate of all purchasers of tax-exempt bonds in the baseline.

$R_e$  is the baseline tax-exempt bond interest rate.

$\alpha$  is the proportion of bond proceeds borrowed by municipal governments that account for changes in itemized deductions.

$R_{ac}$  is the after-credit interest rate paid by issuers of direct-pay bonds.

$MTR_b$  is the average marginal income tax rate of all taxpayers that experience a change in itemized deductions due to the proposal.

If  $C$  is set equal to the marginal tax rate of the marginal holder of tax-exempt bonds ( $MTR_m$ ), and the interest rate on direct-pay bonds is equal to the interest rate on taxable bonds ( $R_d = R_t$ ) then there is no change in the interest rate paid by State and local borrowers ( $R_{ac} = R_e$ ). This implies that the third component of equation (2) is equal to zero. Since interest rates are unchanged, it is also the case that there is no change in total issuance ( $B_d = B_e$ ). Since the average marginal tax rate of all investors in tax-exempt bonds is greater than the marginal tax rate of the marginal investor in tax-exempt bonds, it must be the case that the credit rate is less than the average marginal tax rate of all investors in tax-exempt bonds ( $MTR_e$ ), and the revenue the Federal government collects due to taxable bond substitution exceeds the value of the credit

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<sup>30</sup> Since direct-pay bonds may lower or raise the after-credit interest rate, it is not necessarily the case that  $B_d$  will equal  $B_e$ . This depends on the credit rate and assumptions made regarding how sensitive State and local borrowing is to changes in the cost of borrowing. See David Joulfaian and Thornton Matheson, "The Supply Elasticity of Tax-Exempt Bonds," *Proceedings of the Annual Conference on Taxation*, 2009, pp. 136-142. Available at: <http://ntanet.org/publications/nta-proceedings/210.html>. In addition, the change in the amount of taxable bond borrowing, which is equal to the change in municipal borrowing, ( $B_d - B_e$ ), is generally assumed to be small relative to the overall size of taxable capital markets. For this reason it is assumed to have no measurable effect on taxable bond interest rates.

payments made by the Federal government. This implies that, in theory, the credit can be set so that there are no changes in the after-credit yield on State and local borrowing. This may be achieved at a reduced revenue cost to the Federal government relative to the baseline revenue cost to the Federal government of issuance of the same amount of tax-exempt bonds.

For example, if one assumes the taxable interest rate is 6 percent and the baseline tax-exempt interest rate is 4.5 percent then this implies the tax rate of the marginal investor in tax-exempt bonds is 25 percent. If the credit rate is set at 25 percent then the after-credit yield on a direct-pay bond is equal to the baseline interest rate on tax-exempt bonds. If the average marginal income tax rate of purchasers of tax-exempt bonds in the baseline equals 30 percent, then for every \$1 billion of tax-exempt bonds that is replaced by \$1 billion of direct-pay bonds there is an annual Federal tax revenue gain of \$3 million for the life of the bonds.<sup>31</sup> It should be noted that this type of direct-pay bond is revenue efficient in that the value of the benefit to borrowers in terms of interest savings is equal to the cost to the Federal government of providing the subsidy. In this example, the annual value of the reduction in interest cost that State and local borrowers enjoy and the annual cost to the Federal government are both equal to \$15 million.<sup>32</sup>

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<sup>31</sup>  $\$1 \text{ billion} * (.06 * .25) - \$1 \text{ billion} * (.06 * .30) = -\$3 \text{ million}$ . The credit outlay would be  $\$1 \text{ billion} * (.06 * .25)$  and the increased receipts from removing \$1 billion of tax-exempt from the market would be  $\$1 \text{ billion} * (.06 * .30)$ .

<sup>32</sup>  $\$1 \text{ billion times } (.06 - .045) = \$1 \text{ billion} * (.06 * .25)$ .

## C. Multi Instrument Case

### Tax-exempt and tax credit bonds available in the market

One of the recently enacted versions of a direct-pay bond is the Build America Bond ("BAB").<sup>33</sup> Rather than replacing tax-exempt bonds, BABs served as a supplemental instrument available to issuers. BABs were restricted to new-issue public purpose infrastructure bonds. For BABs to replace at least a portion of baseline tax-exempt bond issuances, the credit rate must be set so that the after-credit interest rate paid by the issuer on a direct-pay bond is less than the interest rate paid on a tax-exempt bond for the same issuance absent the provision. If this is not the case, issuers will simply continue to issue tax-exempt bonds exclusively.

Within a class of tax-exempt bonds with similar issuer characteristics relating to the cost of borrowing (such as maturity length or risk), it is likely that issuers tend to make similar decisions regarding whether to issue direct-pay or tax-exempt bonds under a proposal. During 2009 and 2010, for instance, eligible infrastructure bonds with maturities greater than 20 years were predominantly issued as BABs while bonds with shorter maturities were most often issued as tax-exempt bonds. This outcome was likely a result of the difference between the yield curve for taxable bonds and the yield curve for tax-exempt bonds. The yield spread (the difference between the interest rates of comparable bonds) between taxable bonds and tax-exempt bonds tends to decrease as bond maturity increases. For example, monthly return observations between comparable State and local bonds and taxable Treasury Notes and bonds can be used to compare average monthly returns on tax-exempt and taxable bonds. During the period from 1984 to 1991, the average monthly return on one-year State and local bonds was 0.49 percent and was 0.72 percent on taxable one-year Treasury notes. During the same period the average monthly return on 20-year State and local bonds was 1.12 percent and 1.28 percent on 20-year Treasury Bonds. The ratio of average tax-exempt interest rates to average taxable interest rates during this period increased from 68 percent for one-year bonds to 87.5 percent for 20-year bonds.<sup>34</sup> One implication of this phenomenon is that the relative advantage of issuing direct-pay bonds instead of tax-exempt bonds increases as bond maturity increases assuming a fixed credit rate regardless of maturity.<sup>35</sup>

For example, suppose a 10-year AAA rated tax-exempt bond pays an interest rate of 2.40 percent and a 30-year AAA rated tax-exempt bond pays an interest rate of 4.11 percent. Also suppose similarly rated taxable bonds pay interest rates of 3.77 percent and 4.88 percent for the

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<sup>33</sup> Pub. L. No. 111-5, sec. 1531(b) (sec. 54AA of the Code in conjunction with sec. 6431). The authority to issue BABs expired as of January 1, 2011. Certain other tax credit bonds, such as new clean renewable energy bonds ("CREBs"), qualified energy conservation bonds, and qualified school construction bonds also may be issued as direct-pay bonds. See sec. 6431(f)(3).

<sup>34</sup> John M.R. Chalmers, "Systematic Risk and the Muni Puzzle," *National Tax Journal*, vol. 49, no. 4, December 2006, pp. 833-848.

<sup>35</sup> This is discussed in more detail later in this document in the context of observations regarding the issuance of BABs during 2009 and 2010.

same respective maturities as the tax-exempt bonds.<sup>36</sup> If the government is offering a 28-percent credit direct-pay bond, a 10-year direct-pay bond has an after-credit interest rate of 2.71 percent while a 30-year direct-pay bond has an after-credit interest rate of 3.51 percent.<sup>37</sup> Issuers at shorter maturities continue to issue tax-exempt bonds since direct-pay bonds do not provide any interest savings. However, issuers at longer maturities are more likely to issue direct-pay bonds since they lower their interest costs by 60 basis points relative to the interest cost of issuing tax-exempt bonds.<sup>38</sup>

### **Behavioral assumptions**

If the relationship between the yield on tax-exempt bonds and the yield on taxable bonds does not change as maturity or risk changes then the market likely consists of either all tax-exempt bonds or all direct-pay bonds depending on the direct-pay bond credit rate.<sup>39</sup> Since this was not observed with a direct-pay bond credit rate of 35 percent during the period when BABs could be issued, the Joint Committee staff assumes that for credit rates less than 35 percent both tax-exempt bonds and direct-pay bonds are issued as long as the credit rate is high enough to induce some issuers to issue direct-pay bonds.

The Joint Committee staff assumes that issuers compare the borrowing cost of issuing a tax-exempt bond versus the cost of issuing a direct-pay bond. The issuer issues the instrument that has the lowest borrowing cost. The after-credit interest rate on direct-pay bonds imposes a ceiling on the highest interest rate that an issuer is willing to pay. If tax-exempt bonds that a State or local government issues in the baseline have a tax-exempt interest rate that is lower than the after-credit interest rate the State or local government would pay under a direct-pay proposal, then the Joint Committee staff assumes the State or local government continues to issue tax-exempt bonds. If, under the baseline, a State or local government issues tax-exempt bonds at a tax-exempt interest rate that is higher than the after-credit rate on a direct-pay bond, the State or local government will try to offer tax-exempt bonds at an interest rate that is less than or equal to the after-credit interest rate. The Joint Committee staff assumes these State or local governments continue to issue tax-exempt bonds if they can find investors that will buy the tax-exempt bonds at a slightly lower interest cost than the State or local government would pay on a

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<sup>36</sup> This example uses interest rates on similarly rated State and local bonds and corporate bonds at the respective maturities as reported in the May 14, 2011 *Bond Buyer*.

<sup>37</sup> The after-credit interest rate on a direct-pay bond is equal to the taxable bond interest rate times one minus the credit rate. In the example above, the after-credit interest rate on a 10-year direct-pay bond is equal to  $.0377 * (1-.28) = 0.0271$  and the after-credit interest rate on a 30-year bond is equal to  $.0488 * (1-.28) = 0.0351$ .

<sup>38</sup> One percentage point of interest equals 100 basis points. For example, a yield of 3.51 percent is 351 basis points.

<sup>39</sup> Using the previous example, suppose that the ratio of the tax-exempt interest rate and corporate interest rate is the same at 30-year maturities as it is at 10-year maturities (a linear yield curve). In this example, the tax-exempt interest rate is approximately 64 percent of the taxable interest rate for 10-year maturity bonds. Assuming that long-term corporate rates remain unchanged, implies that the tax-exempt bond on a 30-year bond is 3.11 percent ( $4.08 * .64 = 3.11$ ). In this case, interest rates on tax-exempt bonds are lower than the after-credit interest rate at both maturities and only tax-exempt bonds are issued.

comparable direct-pay bond, otherwise the State or local government will issue direct-pay bonds. In either case, the cost of borrowing either falls or remains unchanged for all borrowers.

Let  $B_h^0$  represent the volume of tax-exempt bonds issued in the baseline with interest rates that are higher than the respective after-credit interest rate that would apply under a direct-pay bond proposal. Label this group the “high-interest rate issuers.” As high-interest rate issuers substitute direct-pay bonds for tax-exempt bonds, investors that hold these tax-exempt bonds in the baseline adjust their portfolios in response to the decrease in supply of tax-exempt bonds. Some investors that hold tax-exempt bonds in the baseline now hold taxable bonds and this effect increases tax revenues (for the purposes of the discussion below,  $B_s$  defines the volume of bonds held by investors that switch from tax-exempt investment to taxable investments). The investors that switch from holding tax-exempt to taxable bonds are assumed to have marginal tax rates that are less than the credit rate. On the other hand, investors with marginal tax rates greater than the credit rate continue to hold tax-exempt debt. Let  $B_h^e$  denote the tax-exempt bonds held by these investors under the proposal.

For example, if a State or local borrower can borrow at a taxable rate of 6 percent and the Federal government offers a direct-pay bond option with a 28-percent credit, then the highest tax-exempt interest rate this borrower would pay is 4.32 percent.<sup>40</sup> If absent the proposal the borrower is to pay a tax-exempt bond interest rate of 4.5 percent, the borrower will no longer issue tax-exempt bonds unless the yield falls to at least 4.32 percent. At this yield a taxpayer with a marginal tax rate of less than the credit rate of 28 percent earns a higher after-tax interest rate from holding taxable bonds. For example, an investor with a 27-percent marginal tax rate earns an after-tax interest rate of 4.38 percent on a taxable bond. On the other hand, investors with marginal tax rates greater than 28 percent prefer to hold tax-exempt debt (even at the lower interest rate of 4.32 percent). For example, an investor with a 29-percent marginal tax rate would receive an after-tax interest rate of 4.26 percent on a taxable bond, which is less than the 4.32 percent he or she earns on a tax-exempt bond. Investors with marginal tax rates greater than the credit rate continue to hold tax-exempt bonds, so there is no change in their tax liability. This group of investors is still willing to hold tax-exempt bonds but, as alternative bonds to direct-pay bonds, tax-exempt bonds pay a lower interest rate equal to the after-credit interest rate on direct-pay bonds.

In the market, some State and local governments pay higher interest rates to attract investors than do other State and local governments. This generally is ascribed to perceived differences in the riskiness of the State or local issuer or to differences in the liquidity of the bonds. The total amount of bonds issued by high-interest rate issuers under the proposal ( $B_h^1$ ), is now equal to the amount of direct-pay bonds they issue plus the reduced amount of tax-exempt bonds they issue ( $B_d + B_h^e$ ). If high-interest rate issuers are sensitive to changes in borrowing costs, then the total amount of bonds they issue under the proposal ( $B_h^1$ ) exceeds the amount of bonds they issued in the baseline ( $B_h^0$ ). In other words, the proposal stimulates additional issuance of State and local bonds.

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<sup>40</sup>  $0.0432 = 0.06*(1-0.28)$ .

The amount of direct-pay bonds issued is equal to the amount of baseline tax-exempt bonds switched to being issued as direct-pay bonds under the proposal plus any net increase in total State and local bond issuance that occurs due to the proposal. This may be written as  $B_d = B_d^S + B_d^I$  (where  $B_d^I$  is the amount of direct-pay bonds associated with the net increase in State and local issuance). Because overall investment in the economy is assumed to be fixed, any net increase in State and local sector borrowing is accompanied by an equal net decrease in private sector investment.

### **Revenue effects**

The revenue effect of a provision that replaces tax-exempt bonds with direct-pay bonds has the following components:

1. An increase in Federal outlays from Federal payment of a portion of State and local interest payments on direct-pay bonds,
2. An increase in Federal receipts as investors substitute taxable bonds for tax-exempt bonds, and,
3. A potential change in Federal tax receipts due to a change in Federal itemized deductions if tax-exempt bond interest rates fall.
4. A potential change in Federal tax receipts due to a change in Federal itemized deductions because of a change in interest payments associated with the increase in investment in the State and local sector.

The first component of the revenue estimate is the value of the credit payments the Federal government pays to direct-pay bond issuers. Issuers receive payments from the Federal government equal to the volume of bonds issued times the interest rate paid on the bonds multiplied by the direct-pay bond credit rate. The Joint Committee staff reports this outlay as equivalent to a decline in Federal tax receipts.

The second component of the revenue estimate accounts for the change in revenues that occurs as investors adjust their portfolios. Some investors that hold tax-exempt bonds in the baseline are now assumed to invest in taxable direct-pay bonds. The remaining direct-pay bonds are likely to be purchased by investors facing zero or very low marginal income tax rates. These investors are assumed to replace a portion of their baseline holdings of taxable bonds with direct-pay bonds. The replaced taxable bonds are now assumed to be held by taxable investors. On net, these portfolio adjustments increase Federal tax receipts.

The third and fourth components of the revenue estimate measure the potential tax effect of changes in Federal tax deductions that may occur due to the proposal. The third component measures any changes in deductible interest payments if tax-exempt interest rates decrease due to the proposal. This effect is either zero or increases Federal tax receipts. The fourth component measures any changes in deductible interest payments associated with any net increase in total borrowing by State and local governments. This effect is also either zero or increases Federal tax receipts.

Summarizing algebraically, a proposal that replaces an amount of tax-exempt bonds  $B_s$  with an amount of direct-pay bonds  $B_d$ , the revenue effect described above can be expressed as:

$$(B_d * R_d * C) - (B_s * R_t * MTR_s) - \alpha(B_h^e + B_d^s) * (R_h^e - R_{ac}) * MTR_b - \gamma B_d^i * (R_d - R_{ac}) * MTR_b. \quad (3)$$

The first expression in equation (3),  $(B_d * R_d * C)$ , is the value of credit payments made by the Federal government to the issuers of direct-pay bonds. The second expression,  $(B_s * R_t * MTR_s)$ , is the value of the taxable bond substitution offset, where  $MTR_s$  is the average marginal tax rate on interest income of the investors that switch (where  $MTR_s < C$ ). The third expression,  $(\alpha(B_h^e + B_d^s) * (R_h^e - R_{ac}) * MTR_b)$  measures the value of the change in income tax liability due to a change in interest expense deduction of the beneficiaries of the lower interest rates associated with the bonds, both direct-pay and tax-exempt, that replace the amount of high-interest rate tax-exempt bonds issued in the baseline (where  $R_h^e$  is the baseline tax-exempt interest rate on these bonds and  $R_{ac}$  is the after-credit return on alternative direct-pay bonds). The fourth expression,  $(\gamma B_d^i * (R_d - R_{ac}) * MTR_b)$  measures the value of the change in income tax liability due to a change in interest expense deduction of the beneficiaries of the lower interest rates associated with any net increase in total issuance that may occur due to the proposal.<sup>41</sup>

### **Efficiency of the credit subsidy**

This type of direct-pay bond increases the efficiency of the subsidy provided to State and local governments. For the volume of direct-pay bonds issued, the value of the benefit in terms of reduced issuer interest rates equals the cost of the credit. There is also some efficiency gain associated with the volume of tax-exempt bonds that have a decrease in yield due to the proposal, although it should be noted that the tax-exempt bond holders that accrue the greatest amount of the Federal subsidy (the highest marginal tax rate holders) continue to hold tax-exempt bonds. In addition, since tax-exempt bonds are still available, State and local government borrowers can never receive a lower subsidy than they do without the proposal. This is in contrast to the single instrument case where the credit rate could be set at a level that decreases the subsidy level. It should be noted, however, that these efficiency gains cannot be achieved without increasing the level of subsidy directed to State and local government borrowers.

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<sup>41</sup> For direct-pay bonds that are used for State and local governmental purposes the third and fourth expressions are assumed to be zero because a decrease in interest cost is assumed to result in additional governmental borrowing. This is not the case if it is assumed that State and local governments use these savings to lower taxes that are deductible from Federal income taxes.

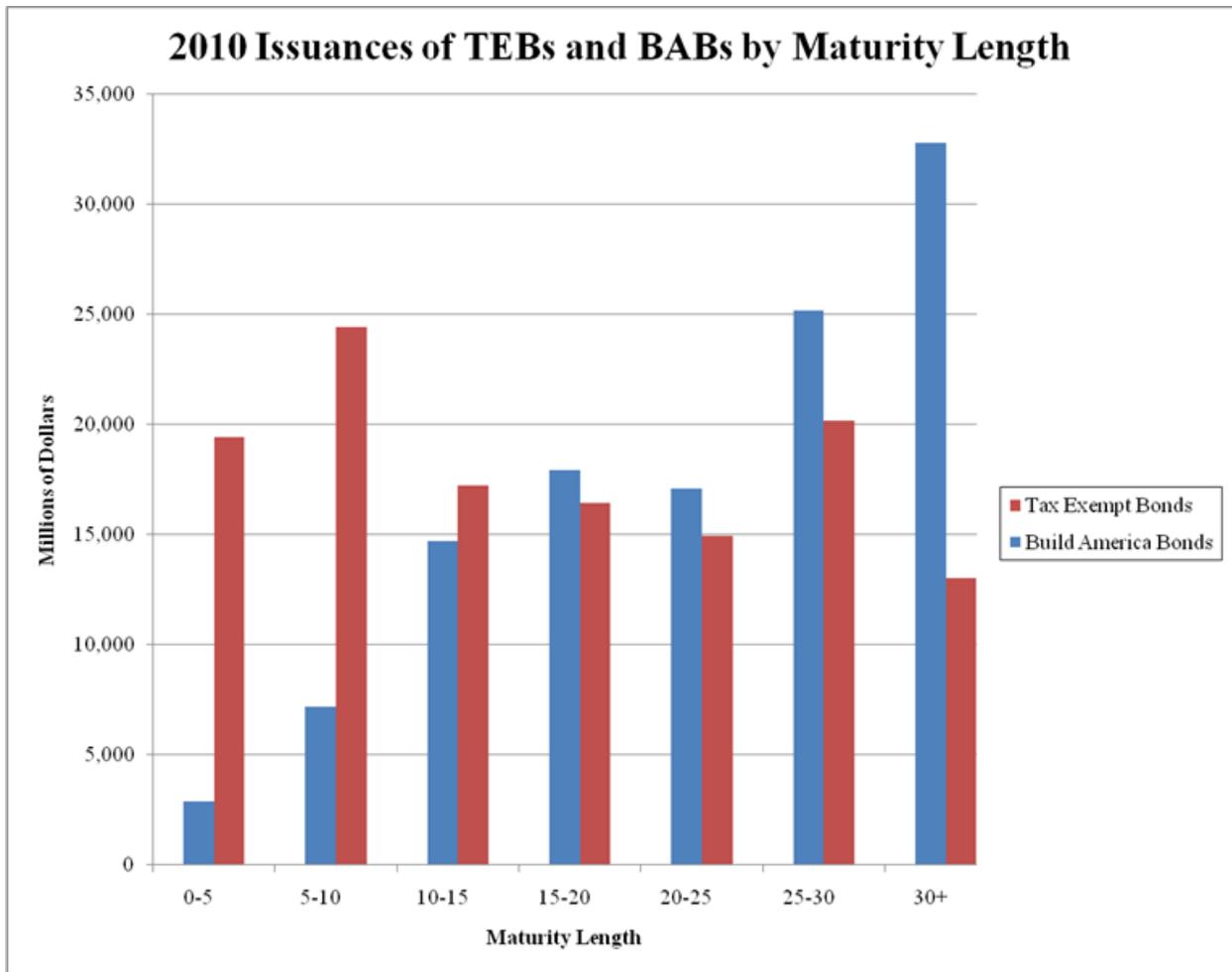
#### **D. New Use Direct-Pay Case**

Under new-use proposals, direct-pay bonds are allowed for uses that are currently prohibited from being financed with tax-exempt bonds. As in the cases discussed above, there is no change in the tax position of the investors in the direct-pay bonds, and the Federal government experiences an increase in outlays associated with the credit payments that issuers of the bonds receive from the Federal government. The distinguishing feature of this type of proposal is that there can be instances where there is no revenue offset associated with a reduction in issuance of tax-exempt bonds. If the costs of bond issuance fall on entities other than State and local governments, then it is unlikely that increases in issuance of these direct-pay bonds are accompanied by decreases in issuance of tax-exempt bonds. For example, if direct-pay bonds may be issued for investment in large scale manufacturing plants (as distinct from small-issue industrial development bonds permitted under present law) there is likely almost no change in the issuance of tax-exempt bonds. As a result, the revenue estimate is equal to the value of the outlay payments made by the Federal government. For a given credit level, this type of proposal has the greatest revenue cost per dollar of direct-pay bond issuance of the three general types of proposals. On the other hand, if the new category of bond is a close substitute for an activity that State and local governments currently finance with tax-exempt bonds, then there is likely to be an associated decrease in issuance of tax-exempt bonds that offsets some of the revenue cost associated with credit payments made to State and local borrowers.

### III. BUILD AMERICA BONDS

This section discusses the impact that BABs had on municipal capital markets between April 1, 2009 and December 31, 2010. During this period, over \$182 billion of BABs were issued. In 2010, the first full year of the program, \$117 billion, of BABs were issued with an average issuance-weighted maturity of 24 years. In contrast, during 2010, \$125 billion of new issue public purpose tax-exempt bonds were issued and these bonds had an average issuance weighted maturity of 9.8 years. Figure 1 below shows the volume of issuance at different maturity lengths for tax-exempt bonds and BABs issued during 2010.<sup>42</sup> The histogram shows a market preference for issuing tax-exempt bonds at shorter maturities and BABs at longer maturities.

Figure 1



Source: Based on Joint Committee staff calculations using Thomson and Reuters data on BAB issuance during this period.

<sup>42</sup> For the purposes of this section, tax-exempt bonds include new issue long-term public purpose tax-exempt bonds, but do not include refunding bonds, bonds with maturities under one year, and private-activity bonds.

Historically, tax-exempt bonds have had a steeper yield curve at longer maturities than Treasury bonds or corporate bonds. However, prior to 2008, State and local governments could avoid longer maturity tax-exempt bonds by using various synthetic instruments (*e.g.*, Tender Option Bond (“TOBs”) programs or variable rate bonds); these financing mechanisms allowed State and local governments to issue what in essence was short-term debt to finance long-term capital projects and avoid the higher interest costs imposed by the long end of the tax-exempt bond yield curve.<sup>43</sup> In addition, the tax-exempt bond market had access to an established insurance market that helped to entice investors into the long end of the market for those State and local governments that did choose to issue long term tax-exempt bonds. The financial market crises during 2008 and early 2009 coincided with the disappearance of variable-rate demand offerings because of a lack of liquidity providers and the closing of the auction-rate market.<sup>44</sup> In addition, the collapse of the bond insurance market made investments in the long end of the market riskier. The combination of these events produced a significant steepening of the tax-exempt bond yield curve in 2009, particularly at longer maturities.

This was the tax-exempt bond market environment when the American Recovery and Reinvestment Act was passed on February 13, 2009. Because issuers of BABs pay a taxable interest rate on their bonds, but receive a 35-percent credit on the interest payment, the new instrument resulted in an increase in the supply of bonds that State and local governments were willing to offer in the taxable bond market. Pension funds, insurance companies, university endowments, and foreign investors were willing to purchase offerings of these bonds because they pay taxable interest rates comparable to rates on corporate bonds and these investors are subject to either very low or zero Federal income tax rates. BABs are attractive to traditional investors in corporate bonds and Treasuries because BABs offer the opportunity to earn yields similar to corporate yields while diversifying their portfolio holdings. While there is some evidence that BABs traded at a premium relative to similarly rated corporate bonds, it appears that the spread between BABs and corporate bonds significantly decreased as investors became more familiar with the new instrument. The introduction of BABs gave traditional State and local borrowers access to the corporate yield curve and gave traditional corporate bond investors new instruments for diversification. Given the shape of the tax-exempt bond yield curve relative to the corporate bond yield curve, the savings from issuing BABs instead of tax-exempt bonds increases as the maturity of the bond lengthens.

The fact that issuers chose to issue a significant volume of BABs instead of tax-exempt bonds prior to the expiration of the program provides evidence that these tax credit bonds lowered the cost of State and local government borrowing. Studies have identified savings

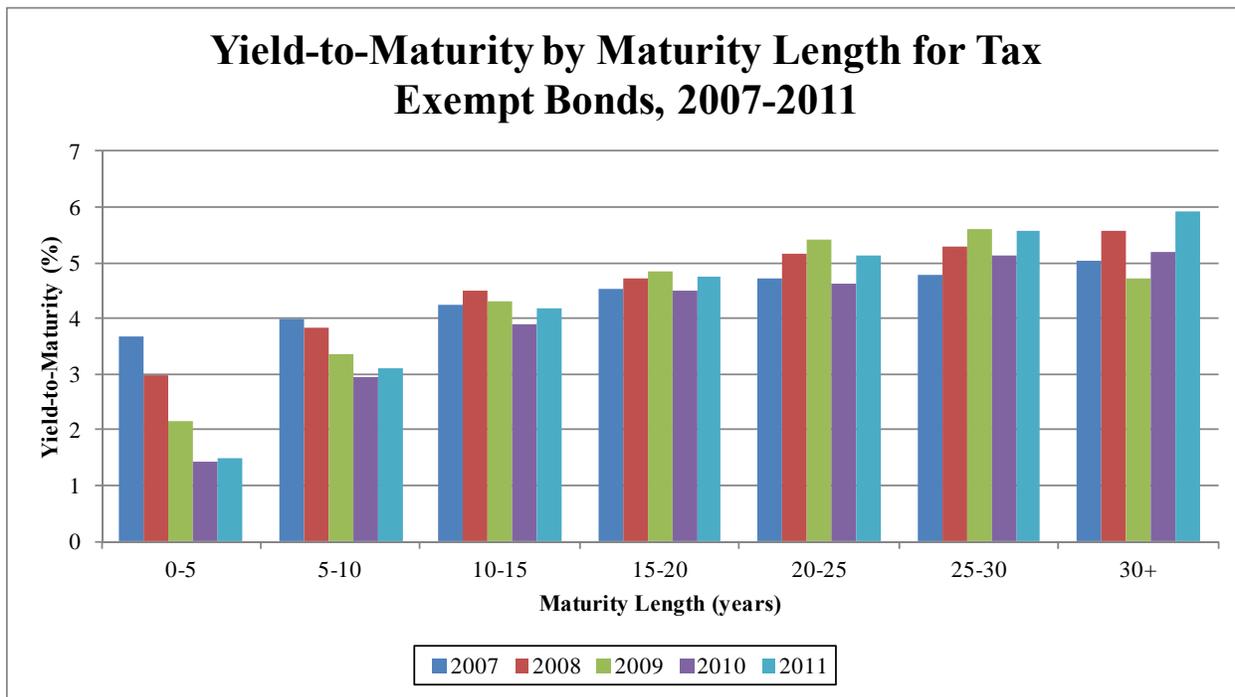
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<sup>43</sup> TOBs are synthetically created short-term tax-exempt instruments. A TOB sponsor will buy a portfolio of fixed rate, long-term State and local bonds and combine them with an interest rate swap to create short-term tax-exempt floating rate bonds. Variable rate bonds (*e.g.* variable-rate demand obligations and auction-rate securities) are issued as long-term bonds, but are priced and traded as short-term instruments because their variable rate is pegged to rates on short-term instruments.

<sup>44</sup> During 2009 and 2010 fixed-rate issuance increased substantially over pre-crises levels. Prior to 2009, the largest volume of fixed-rate issuance for any single year was \$306.5 billion in 2005, while in 2010 fixed rate issuance totaled \$391.8 billion.

ranging from 31 basis points up to 112 basis points from issuing BABs instead of tax-exempt bonds.<sup>45</sup> In all of these studies savings increase as maturity increases or lengthens. In addition, the decrease in the supply of tax-exempt bonds available to traditional buyers of State and local bonds caused downward pressure on tax-exempt yields, since tax-exempt bond investors had to accept lower interest rates in order to entice municipalities to issue tax-exempt bonds instead of BABs. Nonetheless, tax-exempt bonds still accounted for over 51 percent of new long-term public purpose State and local bond issuance in 2010, largely in maturities less than 10 years. This evidence indicates that when BABs and tax-exempt bonds are both available as alternative instruments, the State and local bond market tends to bifurcate into two markets with BABs tending to be issued at longer maturities and tax-exempt bonds at shorter maturities.<sup>46</sup>

Figure 2



Source: Based on Joint Committee staff calculations using Thomson Reuters data.

Figure 2 above shows the yield to maturity by maturity length for new issue long-term public purpose tax-exempt bonds between 2007 and 2011. The figures shows that for maturities less than 10 years, yields on tax-exempt bonds issued in 2008, 2009, 2010, and 2011 fell in

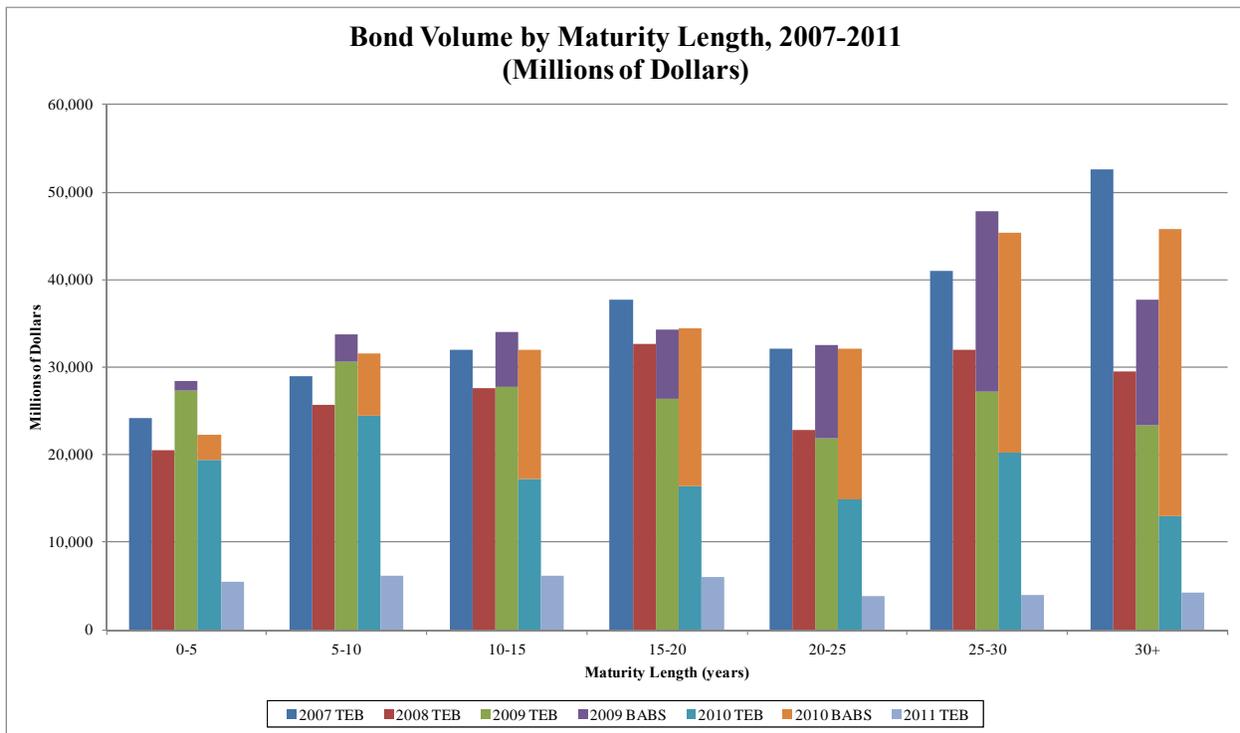
<sup>45</sup> Liu, Gao and Denison, Dwight V., “Indirect and Direct Subsidies for Cost of Government Capital: Comparing Tax-Exempt Bonds and Build America Bonds” (February 19, 2011). Available at SSRN: <http://ssrn.com/abstract=1764703>.

<sup>46</sup> This assumes that the BAB rate is not set below the implicit tax rate that clears the tax-exempt market in the baseline or above the highest marginal tax rate of taxpayers holding tax exempt bonds in the baseline. If this were the case, State and local governments either issue all tax-exempt bonds or all BABs.

comparison to yields on comparable tax-exempt bonds issued in 2007. In contrast, yields on tax-exempt bonds of longer maturities issued in 2008, 2009, 2010, and 2011 were similar or higher than yields on comparable tax-exempt bonds issued in 2007. That is, the yield curve for tax-exempt bonds steepened in 2008, 2009, 2010, and 2011. The steepening of the yield curve between 2007 and 2008 was likely due, at least in part, to the collapse of the variable-rate demand market and the disappearance of tax-exempt bond insurance providers. In the first five months of calendar year 2011 following the expiration of the BABs program interest rates at shorter maturities remained relatively unchanged while interest rates at longer issuances increased. This steepening of the yield curve between 2010 and 2011 is consistent with the view that BABs provided the greatest benefit to longer maturity issuances.

Given this evidence, it is not surprising that the BABs program had its greatest effect displacing longer maturity tax-exempt bonds. Figure 3 shows total new-issue long-term public purpose State and local government issuance by maturity length between 2007 and 2011. Total issuance during 2009 and 2010 includes both tax-exempt bonds and BABs. For maturity lengths less than 20 years, volume in 2010 relative to 2008 is relatively unchanged. However, for maturities 20 years and greater, there is a significant increase in issuance in 2010 relative to 2008. During 2010 total issuance at maturities less than 20 years was 12.8 percent higher than in 2008. For maturities 20 years and longer total issuance during 2010 was 46 percent higher than in 2008.

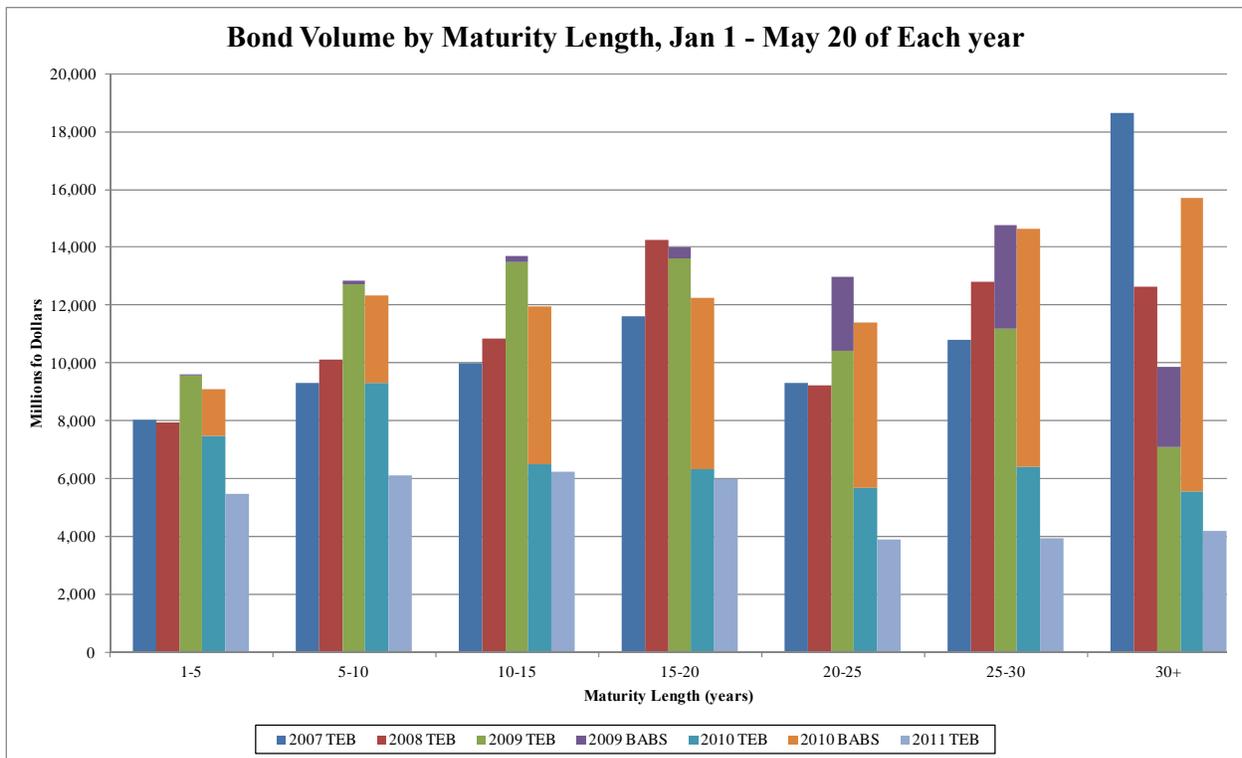
**Figure 3**



Source: Based on Joint Committee staff calculations using Thomson Reuters data.

Data suggest that the demand for long maturity municipal debt is still below levels prior to 2008. Figure 4 shows the issuance of new issue long-term public purpose municipal debt by maturity for the first five months of each year between 2007 and 2011. While total issuance in 2011 is down at each maturity length, the reduction is greatest at longer maturities. Total issuance of bonds with maturities of 30 years or more during the first five months of 2010, the last year of the BAB program, was 87 percent of total issuance at this maturity during the same period during 2007. However, issuance at the same maturity during the first five months of 2011 was only eight percent of total issuance during the same period in 2007. In 2011, total issuance at maturities longer than 20 years is less than total issuance at maturities less than 20 years. This suggests that the BAB program had significant effects at longer maturities and that, in the absence of a direct-pay program, issuance of longer maturity State and local government debt may be lower than historical averages at least for the near future.

**Figure 4**



Source: Based on Joint Committee staff calculations using Thomson Reuters data.

#### IV. ESTIMATING THE PRESIDENT'S FISCAL YEAR 2012 BUDGET PROPOSAL

In this section, we will provide a more detailed outline of the estimating methodology used to estimate the Build America Bond proposal in the Administration's Fiscal Year 2012 budget proposals.<sup>47</sup> The proposal permanently extends the Build America Bond program at a reduced credit rate of 28 percent and expands the eligible uses for BABs. The eligible uses for new BABs include: (1) original financing for governmental capital projects; (2) current refunding of prior public capital project financings; (3) short-term governmental working capital financings for governmental operating expenses, subject to a thirteen-month maturity limitation; and (4) financing for section 501(c)(3) non-profit entities. For expositional purposes, this section outlines the estimating procedure as it pertains to extension of original BABs (original financings for governmental capital projects) at the 28 percent credit rate. The expansion to additional uses generally applies the same estimating methodology.

In 2010, more than \$117 billion of BABs were issued at an issuance-weighted average coupon rate of 5.76 percent and an issuance weighted average after-credit yield of 3.74 percent. At the lower credit rate of 28 percent, the Joint Committee staff estimated that approximately \$46 billion of BABs would be issued for original financings for governmental capital projects in calendar year 2012. At the lower credit rate, the Joint Committee staff anticipated that issuance would be largely restricted to long-term debt of maturities of 20 years and greater. The Congressional Budget Office provides the Joint Committee staff with a forecast of Moody's Seasoned Corporate AAA Bond yields. Using this series and the historical relationship of this series to long-term BAB yields during 2009 and 2010, the Joint Committee staff estimated the average long-term BAB yield to be equal to the Moody's Seasoned Corporate AAA Bond yield plus 20 basis points. This adjustment accounts for differences in the risk and maturity profile of BABs relative to the component bonds of the Moody's Index. Using this method, the average issuance-weighted BAB coupon for 2012 was estimated to be 6.04 percent. The annual outlay is calculated by multiplying the estimated dollar volume of bonds issued by the average estimated coupon rate on those bonds, with the result multiplied by the credit rate. As a result, the Joint Committee staff estimated that the Federal government would have annual outlays that are associated with the 2012 vintage of BAB issuance for original financings for governmental capital projects of approximately \$778 million.<sup>48</sup>

In 2007, \$125.7 billion of new issuance long-term public purpose tax-exempt bonds were issued which had maturities of 20 years or greater. In the following year, as the demand for

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<sup>47</sup> For a description, discussion, and revenue estimate of the Administration's Fiscal Year 2012 budget proposal see Joint Committee on Taxation, *Description of Revenue Provisions Contained in the President's Fiscal Year 2012 Budget Proposals* (JCS-3-11), June 2011. For fiscal year 2013 the President has made a similar proposal to that for fiscal year 2012. For a description, discussion, and revenue estimate of the fiscal year 2013 proposal see Joint Committee on Taxation, *Description of Revenue Provisions Contained in the President's Fiscal Year 2013 Budget Proposals* (JCS-2-12), June 2012.

<sup>48</sup> Annual Outlay = \$46 billion\*0.0604\*0.28. The government would be obligated to pay this amount as long as the entire volume of bonds is outstanding. This amount will decrease over time as bonds are retired. However, for purposes of the revenue effect, bond retirement occurs largely outside the 10-year budget window.

long-term State and local governmental debt decreased, issuance of these bonds fell to \$84.4 billion. The Joint Committee staff estimated that approximately \$95 billion of new-issue public purpose tax-exempt bonds would be issued in the baseline during 2012 at interest rates that exceed the after-credit interest rate issuers would pay if they issued 28-percent BABs under the President's Budget proposal. These bonds would largely, but not exclusively, be bonds with maturities of 20 years and greater. Using the CBO forecast of interest rates for 2012 and accounting for changes in the market for State and local bonds, the Joint Committee staff estimated that the average issuance weighted tax-exempt bond interest rate for bonds with maturities of 20 years or more issued during 2012 would be 4.55 percent.

Under the President's FY 2012 Budget Proposal, the Joint Committee staff forecast that issuers of long-term bonds would pay average after-credit interest rates of 4.35 percent, which is a 4.4 percent reduction in borrowing costs relative to the average borrowing cost in the baseline of 4.55 percent for comparable tax-exempt bonds. The Joint Committee staff estimated that the decrease in borrowing cost due to the President's FY 2012 Budget Proposal would increase new issue public purpose State and local bond issuance by \$3.3 billion in 2012.<sup>49</sup> This implies that \$52.3 billion of bonds that would be issued as tax-exempt bonds in the baseline would continue to be issued as tax-exempt bonds under the proposal, but at lower interest rates. In addition, \$42.7 billion of bonds that would be issued as tax-exempt bonds in the baseline would be issued as BABs under the proposal and \$3.3 billion of baseline investment in private sector taxable instruments would be invested in BABs under the proposal.

As discussed previously, only investors with marginal income tax rates that exceed 28 percent are willing to continue to hold tax-exempt bonds and accept lower interest rates that would be competitive with after-credit direct-pay bond interest rates. These investors have no change in their taxable incomes because they continue to hold tax-exempt debt. The investors that held the \$42.7 billion of tax-exempt debt in the baseline that is now issued as direct-pay bonds are assumed to replace their tax-exempt holdings with taxable bonds. These investors are modeled as having marginal tax rates that range from 22 percent (the tax rate of the marginal holder of these tax-exempt bonds in the baseline) to 28 percent (the tax rate of the investor that is just indifferent between holding tax-exempt bonds at the lower interest rate needed to entice bond issuers to issue tax-exempt bonds instead of direct-pay bonds).<sup>50</sup> Based on tabulations from the Joint Committee staff individual tax model, the average marginal tax rate of these investors is estimated to be 26.5 percent. The Joint Committee staff assumed these investors would invest in taxable bonds that have similar maturity and risk attributes as the tax-exempt

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<sup>49</sup> Studies of the sensitivity of tax-exempt bond issuance to changes in interest rates have used data prior to enactment of the BAB program. In addition, the data used in these studies do not reflect the changes in market conditions that occurred due to the disappearance of synthetic instruments used to avoid the long end of the yield curve and the disruption of the tax-exempt bond insurance market. Data on issuance prior to and after enactment of the BAB program indicate that direct-pay bonds may significantly stimulate issuance at longer maturities. For example, total issuance of long-term State and local bonds set an annual record of \$431.0 billion in 2010 (the last year of the BAB program). This subject will continue to be researched as more post-BAB data become available.

<sup>50</sup> The average implicit tax rate of the marginal holder of long-term tax-exempt bonds during the period 1986 to 2007 is approximately 20 percent (see Table 1).

bonds that they held in the baseline. Baseline interest rate projections estimated that these bonds pay an average interest rate of 6.04 percent. The Joint Committee staff estimated this behavioral result of the proposal would raise annual Federal revenues by approximately \$683 million.<sup>51</sup>

The final component of the revenue effect measures the change in Federal revenues due to the change in deductible interest payments made by the ultimate beneficiaries of the bond proceeds. Because this analysis pertained to bonds used for governmental capital expenditures, this component equaled zero because the Joint Committee staff assumed interest savings were used to finance additional governmental capital expenditures.

The total revenue cost of the proposal equaled the outlay amount less the sum of the increase in revenues due to the decrease in issuance of tax-exempt bonds and increase in revenues due to lower interest cost payments. The Joint Committee staff estimated that the President's FY 2012 Budget direct pay bond proposal as it applied to original financings in 2012 of governmental capital projects would have a revenue cost of roughly \$95 million per year for the lifetime of the bonds.<sup>52</sup> Taking into account fiscal splits,<sup>53</sup> interest rate payment schedules and outlay schedules the revenue cost of the first year of the program would cost approximately \$790 million between 2012 and 2021. Because the proposal would have made direct-pay credit bonds permanent, the full revenue estimate would apply the same methodology to each year inside the budget window. For the estimate of the proposal prepared by the Joint Committee staff,<sup>54</sup> the relevant projected issuances, interest rates, and investor marginal tax rates were calculated for each year. In addition, the full revenue estimate accounted for the revenue effects associated with the additional uses allowed under the proposal that were not allowed under the original BAB program.

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<sup>51</sup> The revenue effect of this component of the proposal is calculated by multiplying the dollar volume of bonds times the interest rate on the bonds times the average marginal tax rate of the bond holders. That is, revenue = \$42.7 billion\*.0604\*0.265.

<sup>52</sup> \$778 million - \$683 million = \$95 million.

<sup>53</sup> Calendar year revenue estimates are transformed into fiscal year revenue estimates by accounting for tax receipts within a fiscal year by payment type (*e.g.*, estimated tax payments and withholding).

<sup>54</sup> As reported in Joint Committee on Taxation, *Description of Revenue Provisions Contained in the President's Fiscal Year 2012 Budget Proposal* (JCS-3-11), June 2011, page 629, the Joint Committee staff estimated the proposal to lose \$5.7 billion relative to baseline Federal receipts for the period spanning fiscal year 2011 through fiscal year 2021.