The Build America Bonds Program: Savings Opportunities and Efficiency Improvements from Subsidizing Taxable Municipal Debt

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ABSTRACT

As a result of the 2008-2010 financial crisis, municipal borrowers (state and local governments, school districts, transit agencies, water utilities, etc.) faced increased borrowing costs and a risk-averse investor base that made it difficult to finance continued public spending, let alone fiscal stimulus. The Build America Bonds program was touted as a means to ease the credit crunch faced by municipal issuers through Federal interest subsidies on taxable municipal debt, providing an additional borrowing instrument alongside traditional tax-exempt municipal bonds. By allowing municipal borrowers subsidized access to taxable debt markets, the program was designed to lower borrowing costs, and draw new groups of investors (such as pension funds and 401(k) accounts) to municipal bonds that would not be attracted by the tax exemption structures of traditional municipal debt. This paper finds that the program met its objectives of lowering borrowing costs, as seen by an average yield savings of 69 basis points versus issuing in the tax exempt market, and attracting non-traditional investors, as indicated by low marginal tax rates for BAB investors. This paper argues that the Build America Bonds program was a success, and worthy of extension as a long-term alternative to tax exemption, although the subsidy proposed in President Obama’s 2013 Budget is overgenerous.

Keywords: American Recovery and Reinvestment Act, Build America Bonds, BABs, Municipal Finance, Public Finance, Direct Subsidy, Stimulus Plan

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I. Introduction

The Build America Bonds program was a component of the 2009 American Recovery and Reinvestment Act that offered state and local governments access to taxable debt markets by providing a large Federal subsidy on their interest payments. Alongside the traditional avenue of issuing tax-exempt debt, municipal governments were able to issue debt in the more expensive taxable market, because they could receive a Federal subsidy to compensate them for their higher interest costs. Switching to the taxable market helped municipal issuers borrow from non-traditional investors in a time of severe credit restriction, allowing state and local governments to continue borrowing and spending during the recession. Section I of this paper provides an overview of the program and the market conditions that made it necessary. Section II is a review of the existing literature on the program. Section III addresses whether the program achieved its goals of providing savings to municipal issuers and attracting a non-traditional investor base to municipal bonds, and at what cost. Section IV contains conclusions and policy implications of my results.

Traditional Municipal Finance

State and local government debt is an extremely large class of assets in the United States. As of 2011, the U.S. Treasury estimates $2.8 trillion in municipal bonds outstanding (Treasury, 2011, p. 3). Municipal bonds are usually exempt from income taxes. This means that an investor in California, for example, would not be required to pay Federal or state income taxes on a California municipal bond (although he might pay California income tax on an out-of-state municipal bond). Tax exemption allows state
governments, and other municipal issuers, to borrow at lower interest rates because bondholders are not required to pay taxes on their earnings.

Municipal bonds are typically structured to balance lower interest rates with tax advantages to lower borrowing costs for issuers, while providing high after-tax returns for investors. Figure 1 shows an indicative comparison of a tax-exempt and taxable $10,000 bond issued by a municipal issuer. For an individual taxed at a Federal income tax rate of 35%, the taxable bond with higher coupon, and the tax-exempt bond with lower coupon result in the same monthly earnings net of taxes, although in reality issuers would probably target a lower tax bracket to include a larger investor base.

<table>
<thead>
<tr>
<th></th>
<th>Taxable</th>
<th>Tax-Exempt</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coupon:</strong></td>
<td>5%</td>
<td>3.25%</td>
</tr>
<tr>
<td><strong>Income:</strong></td>
<td>$500</td>
<td>$325</td>
</tr>
<tr>
<td><strong>Taxes:</strong></td>
<td>$175.00</td>
<td>$0</td>
</tr>
<tr>
<td><strong>Earnings:</strong></td>
<td>$325.00</td>
<td>$325.00</td>
</tr>
</tbody>
</table>

Figure 1: Comparison of Taxable and Tax Exempt Bonds at 35% Federal Tax Rate

For individuals with high Federal income tax burdens, tax-exempt municipal securities can be a lucrative investment option despite lower interest rates relative to taxable bonds. In addition, many states, large cities, and fiscally sound public utilities can be seen as lower risk investments than comparably rated corporate securities. According to Invesco, “between 1990 and 2008, the 10-year cumulative default rate for all investment-grade munis was 0.06%, compared to 2.25% for all investment-grade corporate bonds,” and recovery rates on defaulted munis are significantly higher than for corporate defaults (2009, p. 4). Standard and Poor’s finds similar results for 2011, despite recent predictions of muni market turmoil, classifying 0.48% of the $1.3 trillion in muni bonds they follow as being in default (2011, p. 1).
Municipal bonds have interest rates determined largely by the perceived risk of the underlying issuer and the individual bond. Bonds from the same issuer can have different levels of risk, mostly reflecting two major factors: seniority of debt and the use of collateral. Securities offered as a more junior lien of debt have a higher risk to repayment in the event of a default, and thus a higher interest rate must be offered to compensate investors. Securitization of debt can help defuse some of this risk for investors, and thereby lower costs.

Most municipal issuers have steady flows of revenue associated with projects built using the money raised by specific bonds. A bond used to build a bridge, for example, could promise the revenue from bridge tolls against the debt service of the bond. This type of bond, secured using revenue from a project the bond pays for, is known as a revenue bond. This is one of the two most common types of tax-exempt bonds, along with general obligation (GO) bonds, which guarantee the full faith and credit of the issuer rather than specific revenue streams or assets in the event of a default. In Section III, I find that bond characteristics including credit rating and classification as a revenue bond impact the savings potential of the Build America Bonds program.

Financial Crisis and 2008 Municipal Bond Landscape

The financial crisis of 2008 caused major problems for state and local governments. Governments typically have two means of financing their activities: debt and taxes. With the economy contracting, taking on long-term debt to pay for short-term spending is a mainstay of Keynesian fiscal policy, and for state and local governments this meant issuing municipal bonds. However, the municipal bond market at the time was
subject to major liquidity constraints. Additionally, the municipal bond market faced problems caused by previous reliance on devices like bond insurance and variable rate bonds to keep borrowing costs artificially low. As a result, borrowing costs rose over 100% for state and local governments by fourth quarter 2008 (Treasury, 2011).

In the years leading up to the crisis, monoline bond insurance offered issuers a way to raise their credit ratings by purchasing insurance on debt service in the event of a default. The insurers’ business model “essentially consists of lending their own credit rating to debt issuers for a fee” (Schich, 2008, p. 84). This tool was invented in the 1970s for muni bonds, but expanded rapidly in the late 1990s and early 2000s. By 2003, almost half of all muni issuance in the US was “wrapped” in bond insurance (Schich, 2008). In 2008, however, as it became clear that bond insurers had nowhere near the level of capital needed in the event of widespread correlated defaults, ratings agencies began examining insured bonds with more scrutiny. Bond guarantees became all but worthless, and credit ratings on existing insured bonds dropped. More importantly for issuers however, buying inexpensive insurance for a lower quality credit to lower borrowing costs was no longer an option.

The second tool that had helped keep borrowing costs low in the years leading up to the crisis was variable rate bonds. These bonds included auction rate securities, for which coupon rates are reset by auctions, and variable rate demand obligations, which use remarketing agents instead of auctions. At regular intervals, all of the bonds are bought back at par (face value), and then resold at the lowest market-clearing interest rate. In early 2008, auctions began to fail; investors stopped buying auction rate municipal debt, and the markets could not clear, leaving current holders with below
market-yield bonds. Similarly, remarketing agents had trouble reselling variable rate demand obligations, leaving them with huge blocks of illiquid bonds. McConnell and Saretto (2010) suggest that the hypothesis held in the news at the time, of risk-averse investors behaving irrationally and refusing to buy at any price, is improbable. They argue instead that maximum auction rates, a ceiling on how high coupon rates could be reset, prevented rates from rising high enough to reach market-required yields. In any case, this avenue to the markets was closed to new issuance, so borrowing costs could not be lowered using variable rate techniques. Additionally, many issuers were saddled with a complex burden of swaps they had taken on to convert their variable rate obligations into fixed rate debt, at a rate often below what they would pay for traditional fixed coupon debt in the pre-crisis market. Due to changing interest rate dynamics, swap-fixed variable rate debt became a source of losses for municipal issuers during the crisis, adding additional costs to existing debt.

The cost of servicing existing debt was rising, borrowing costs were increasing, and the innovations of the preceding decade for improving market access had failed spectacularly. By the fourth quarter of 2008, despite the need for increased government borrowing and spending for Keynesian stimulus, “monthly [bond] issuance had fallen to 68 percent of pre-crisis levels” (Treasury, 2011, p. 3). In February 2009, Congress passed the American Recovery and Reinvestment Act, which reshaped the municipal finance landscape for the next two years.
Structure and Justifications for the Build America Bonds Program

The Build America Bonds program sought to ease municipal borrowing costs by allowing states and local governments access to the broader investor base in the taxable bond markets, and thereby lowering borrowing costs. To compensate for the higher yields required in the taxable market, the program provided Federal subsidies, in the form of direct payment to issuers, and transferrable tax credits. As an indicative example, consider the December 1, 2010 General Obligation issuance from the State of California, which included both Direct Pay Build America Bond (BAB) and Tax Exempt Bond components.

<table>
<thead>
<tr>
<th>BAB (Taxable) Yield</th>
<th>Tax Exempt Yield</th>
<th>BAB Yield after Subsidy</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.68%</td>
<td>5.28%</td>
<td>4.99%</td>
</tr>
</tbody>
</table>

Figure 2: Yield on 12/1/2010 CA GO Bonds, 30-year maturity

While the yield California was forced to offer in the taxable markets was higher than what they issued on the same day in the tax-exempt market, once California is reimbursed by the Federal government for subsidy payments, the BAB yield net of subsidy is lower.

Issuing in the taxable market increased borrowing costs by less than the value of the subsidy because of the higher demand in the taxable market. While investors facing high income tax rates may find tax-exempt municipal securities a good investment, there are many classes of investors for whom tax-exempt bonds are less than optimal investments. Lower income investors, who face a lower Federal income tax, might see less of an advantage to owning tax-exempt bonds (thus the tax exemption that traditional municipal finance is based upon in the U.S. is inherently regressive).
More importantly during the credit crunch, massive institutional investors like pension funds, life insurance funds, and sovereign wealth funds, as well as other tax-advantaged investors like 401(k) accounts, do not benefit from additional tax exemption. Since these types of investors already pay little or no income tax, they have no incentive to buy municipal securities with low interest rates in exchange for tax breaks. Even high tax rate individuals have little incentive to purchase tax exempt bonds for their 401(k) or IRA accounts because of the tax advantages given to these accounts. As a result, traditional municipal bonds are largely held by individuals and mutual funds, rather than institutional investors or tax-advantaged accounts. Today, 70% of the $2.8 trillion in outstanding tax-exempt bonds are held by retail (individual and mutual fund) investors (Treasury, 2011). One of the major goals of the Build America Bonds program was to lower borrowing costs by attracting non-traditional investors to increase the demand for municipal securities. In Section III, I assess the effectiveness of the program in attracting non-traditional investors to municipal bonds.

The Build America Bond program was structured to include two distinct types of taxable municipal security. The first type, Direct Pay, was by far the most common and accounted for 97% of the total issuance volume of BABs. Direct Pay BABs allowed issuers to collect a subsidy worth 35% of interest expense from the Federal government; this allowed issuers to offer higher interest rates, under the expectation that they would only bear 65% of the interest cost. Recovery Zone Economic Development Bonds were a subclass of Direct Pay BABs, allowing regions significantly impacted by the recession to qualify for a 45% interest subsidy (Internal Revenue Service, 2009). The second type, known as Tax Credit BABs, offered a Federal Tax Credit (worth 35% of interest
payments) to bond holders. Tax credits are distinct from tax-exempt bonds because bondholders can apply the value of the credit against their total Federal income tax obligation, rather than simply exempting their returns on a single bond from taxes. Perhaps due to ambiguity around tax credits, or perhaps because for many classes of investors a high interest payment is more valuable than a lower interest payment with a guaranteed tax credit, Direct Pay bonds made up the overwhelming majority of Build America Bonds.

While there has yet to be a default on a Build America Bond, the Federal government is not responsible in the event of a default, so the credit rating on Build America Bonds is established in the same way as for traditional muni debt. Securitization, seniority, and underlying issuer credit rating are all taken into account when rating the bonds. Build America Bonds had similar credit ratings to tax exempt bonds, with most rated AAA or AA by Standard and Poor’s.¹ By the end of the program, I find 74.2% of the BAB issuance volume was rated at least AA- by Standard and Poor’s, or equivalent by Moody’s or Fitch.

**Summary of the Program**

In April 2009, the first Build America Bonds were issued by the University of Virginia, and by December 31, 2010 state and local borrowers had issued over $181 billion dollars of Build America Bonds. The highest concentration of BAB issuance occurred near the end of the program, as issuers sought to take advantage of an expiring

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subsidy. Near the beginning of the program, however, BAB issuance was much lower, both in absolute terms, and as a fraction of total muni issuance (Figure 3).

![Figure 3: BAB issuance (columns) and issuance as a percentage of muni total (line)](image)

California, New York, Texas, and Illinois were the four largest states of issuance. The bonds were issued for a variety of purposes, the most common of which were public improvements, and investments in schools and highways (see Appendix, Figure 1). Municipal issuers typically issue new bonds for two purposes: capital improvements and refinancing existing debt. Build America Bonds could not be used to refinance in most circumstances, nor could they be used for payroll purposes, thus funds raised by BAB issuance were almost exclusively used for infrastructure investment (Internal Revenue Service, 2009).

Because the program aimed largely at fixed income investors like retirement accounts and pension funds, who tend to have long-term obligations, issuers focused on

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longer maturities. Midway through the program, Treasury observed: “BABs have attracted many investors that demand long dated securities that match their long dated liabilities” (2010, p. 6). During the first year of issuance, “while 54% of BABs [had] longer maturities than 10 years, only 36% of regular municipal bonds [had] similar maturities,” indicating that the trend toward longer issuance was not a wider muni trend during the period (Ang, Bhansali, and Xing, 2010, p. 6).

Looking at the entire life of the program 20-year, 25-year, and 30-year maturity bonds were by far the most popular (Figure 4). Issuance was somewhat common past the 30-year mark, a rarity in traditional tax-exempt markets. This paper will evaluate the changing investor base at different maturities, as well as the degree of savings afforded by the program at different maturities, in Section III.

Figure 4: BAB Issuance by Years to Maturity
**Subsidy and Tax Exemption: Incidence and Efficiency**

Direct Pay Build America Bonds include an overt Federal subsidy to municipal issuers: the Federal government pays issuers directly for 35% of their interest costs. Traditional tax-exempt bonds, however, are implicitly subsidized. Tax exemption requires the Federal government forgo revenue to support a program, which is economically equivalent to the government taxing and then spending in support. In their analysis of the Build America Bonds program, Liu and Denison refer to tax exemptions as indirect subsidies, and note that the direct subsidies of the Build America Bonds have an important advantage over the indirect subsidy of tax exemption: “the advantage of a direct subsidy is that the income can be targeted at the specific individuals needing the subsidy, potentially reducing the overall costs to government” (2011, p. 2).

Tax exemption benefits the municipal issuer, as does a Federal subsidy, but the Federal government has little control over the incidence of who benefits from money it does not collect. While some of this benefit goes to the issuer, bondholders are effectively subsidized as well, to varying degrees depending on price elasticity, tax brackets, and interest rates. While the Build America Bonds program requires the Federal government to pay a 35% subsidy directly, the tax exemption system has no clear amount of *direct* subsidization, and thus the level to which it provides Federal subsidization of both issuers and bondholders is unclear.

In addition to questions of cost-savings, Build America Bonds also raise questions about the efficiency of the current system of tax exemption for municipal finance. Despite the fact that subsidies and taxes are equivalent for the purposes of the Federal budget, critics of the program, like Iowa Senator Charles Grassley, claim the Build
America Bonds program “increases the size of the federal government, because it takes what used to be a tax-cutting program, namely municipal bonds, and convert[s] that into Build America Bonds.” Mr. Grassley is not alone in failing to grasp the concept of tax-subsidy equivalence, and the program is thus frequently painted as an expansion of government rather than a tool to replace an existing policy instrument at a potentially lower cost.

Although the program ended after 2010, if it indeed provided savings to municipal issuers, and a more efficient means of subsidizing issuers without unnecessary subsidization of bondholders, then a convincing policy argument can be made for a permanent institution of the program as a replacement for indirect subsidy through tax exemption. As Liu and Denison remark, the BAB program represented an experiment to test “whether the indirect tax-exemption on municipal bond interest is meeting desired policy objectives in the most cost efficient way” (2011, p. 5). This paper will assess whether the program did indeed provide savings, the nature of those savings, and examine the tax brackets of BAB investors to address the effectiveness of the Build America Bonds program in providing savings and targeting new investors.

II. Literature Review

This section provides a review of the existing literature on the Build America Bonds program, focusing on the core topics I analyse in Section III. First I look at papers that assess the savings provided by the program versus tax exemption. Next I look at research that begins to tackle tax questions implied by the program. I then present two

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3 As quoted in American Progress, November 2010.
approaches that address the generosity of the Federal subsidy, before concluding with a discussion of whether the program stimulated increased infrastructure investment.

**Cost Savings**

The first major analysis of the Build America Bonds program was performed by the US Treasury (2010), and looked at the first $90 billion of Build America Bonds issued, from April 2009 through March 2010. The Treasury analysis performs the first savings comparison of BABs to tax-exempt bonds, treating yield as a measure of borrowing costs as is standard in the literature. They look at issuers who issued both tax-exempt and Build America Bonds on the same day, to control for issuer specific effects and differences in the market over time. Controlling for time effects is important because both the volume of total municipal debt issuance and the fraction of municipal debt issued as Build America Bonds fluctuated during the life of the program, so cross-temporal comparisons could lead to questionable conclusions (see Section I, Figure 3). Looking at these pairs of issuance, Treasury runs a fixed-effects regression to estimate savings by maturity, and then extrapolates from their results for savings by maturity in the sample of paired bonds to estimate the total savings of the program.

At the time of the release of this first report, the Treasury was using a sample of 92 pairs of BABs and tax-exempt issues from April to September 2009, totalling 1,815 separate BABs due to the wide range of maturities at each issuance. They find an average savings of 31 basis points for a 10-year bond, and 112 basis points on a 30-year bond. When they extended their analysis (2011) to include 528 pairs of BABs and tax-exempt
bonds issued on the same day (all paired issuance throughout the program), they found slightly lower savings, averaging 84 basis points on 30-year bonds.

The Treasury reports focus on two trends in their conclusions. First, when treating yield as a measure of borrowing cost, Build America Bonds provided savings versus traditional tax-exempt munis across the yield curve. Second, these savings were greater at longer maturities. The Treasury reports used this observation to support the hypothesis that Build America Bonds attracted a non-traditional set of municipal bond investors like retirement accounts, with long term obligations and thus greater demand at longer maturities. This increased demand decreased borrowing costs dramatically at longer maturities. Beyond savings by maturity analysis, however, the Treasury reports do not address who the ultimate holders of Build America Bonds actually are.

Outside of government circles, private sector and academic economists have also examined the Build America Bonds program. Ang, Bhansali, and Xing (2010) look at the set of Build America Bonds issued during 2009 and draw qualitative conclusions on savings similar to those of the Treasury reports. They find that issuing BABs rather than traditional tax-exempt debt lowered the average cost of financing (measured by yield) for issuers by 54 basis points. They also observe that BABs have longer maturities than traditional municipal bonds, and greater savings at longer maturities.

Ang, Bhansali, and Xing (2010) reach similar conclusions using a more comprehensive methodology that accounts for more of the available data than the Treasury reports. Looking at the 2009 Build America Bonds, they remove the bonds with option features, resulting in a set of “straight bonds,” representing 39% of BAB issuance during 2009. They use this set of bonds to estimate hypothetical yields from BAB
cashflows discounted using muni, corporate, and Treasury discount rates, and then compare these hypothetical yields to actual yields to estimate savings versus traditional debt. They use a cash flow model to generate price, and then compute yield from that price. These hypothetical yields represent borrowing costs had bonds been issued in the markets whose rates are used to discount, instead of as BABs.

While the authors comparisons using Treasury rates and financial institution swaps are interesting, they require unrealistic assumptions about the risk profile of municipal issuers as compared to the US Treasury and taxable corporate debt. However, the comparison between BAB yields and hypothetical muni yields, had the issuers chosen to issue tax-exempt munis for the same BAB cashflows, is germane to the question of whether BABs provide savings over traditional muni bonds. Furthermore, this approach does not limit the data set to only those issuers who issue both types of bonds on the same day as in the Treasury analysis.

Both the Treasury reports, and the paper by Ang, Bhansali, and Xing acknowledge problems with high underwriting fees in the early stages of the program. Ang, Bhansali, and Xing ignore underwriting costs when reporting their savings, assuming underwriting costs will eventually even out with those in the tax-exempt market. Treasury (2011) focuses on the underwriting fees question in more detail. They find that while underwriting fees climbed to over $8/bond (on $1000 face value) for Build America Bonds near the beginning of the program, by late 2010 they had fallen much closer to the roughly $6/bond mark that underwriters charged for traditional munis. The Treasury report postulates that early spikes in underwriting fees could indicate perceptions of higher risk due to the introduction of a new and untested type of security.
As BAB volume increased over the life of the program, uncertainty decreased, and underwriting fees fell accordingly. Regardless, “the one-time differential in BABs underwriting fees, which was 7 basis points on average over the life of the program, should be compared with yield savings that could be on the order of 80-90 basis points per year for issuers of BABs relative to longer term tax exempt debt” (Treasury, 2011, p. 10). The underwriter’s fees were an interesting aspect of the BAB program, but do not significantly undermine the potential for savings afforded issuers by opening this new market.

Partly because of the consensus in the literature that underwriting costs were a problem for the BAB program, Liu and Denison (2011) examine the question of whether Build America Bonds provide cost savings by looking at True Interest Cost (TIC). True Interest Cost (TIC) is defined by the Municipal Securities Rulemaking Board to be “the rate, compounded semi-annually, necessary to discount the amounts payable on the respective principal and interest payment dates to the purchase price received for the new issue of bonds.”

Liu and Denison examine TIC for BABs, non-BAB taxable, and tax-exempt munis over the period from April 2009 through March 2010 in California (the largest tax exempt and BAB market), including only Direct Pay BABs. They regress TIC on market interest rate (Bond Buyer Index 20), Federal tax treatment, bond and issuer characteristics (e.g. callability, refunding status, rating), and bond type (e.g. general obligation, revenue, sales tax). They find that on average, tax exempt TIC is 5.183%, while BAB TIC is 7.149% before subsidy. When taking into account the 35% subsidy, this implies average

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4 http://www.msrb.org/msrb1/glossary/view_def.asp?param=TRUEINTERESTCOST
savings of 72 basis points from issuing BABs rather than tax-exempt bonds, which is a similar finding to that of Ang, Bhansali, and Xing, although limited to California debt.

**Taxes and Bondholders**

Liu and Denison (2011) extend their analysis by considering the marginal tax rates implied by the Build America Bond program. They define the after-tax return rate of a Build America Bond as:

\[ r = r_{BAB} (1 - \tau) \]

where \( r_{BAB} \) is the interest rate on a BAB, and \( \tau \) is the Federal income tax rate of the marginal investor. Rearranging to solve for \( \tau \) in terms of \( r \) and \( r_{BAB} \) allows them to solve for the marginal tax rate that would make an investor indifferent between buying a Build America Bond and a tax-exempt bond with a return of \( r \). Implied marginal tax rate is explained elsewhere in the literature, notably in Joulfaian and Matheson (2009), but Liu and Denison make the only attempt to estimate numeric values for marginal tax rates under the Build America Bonds program.

Using average BAB TIC rates and average tax-exempt TIC rates, Liu and Denison find an average implied tax rate for the marginal BAB investor of 25%. This means that an investor taxed below a 25% rate would strictly prefer an average BAB to an average tax-exempt bond because the higher coupon payments are worth more to him than tax exemption. The higher the implied marginal tax rate, the greater the demand for BABs will be relative to the demand for tax-exempt munis. They perform this analysis to evaluate the generosity of the Federal subsidy, however it also allows us to better understand the investor base that issuers are aiming for when they structure their BAB
issuances, as I address further in Section III. Unfortunately, Liu and Denison only cover a single state for half the life of the program. No authors address the composition of the BAB investor base systematically, because the opacity of the secondary market makes direct analysis extremely difficult.

Many institutional investors in tax-exempt bonds seem unlikely to have been interested in BABs as well, further evidence that the BAB investor base was different from that for traditional municipal debt. When I spoke with fund managers at American Century Investments, it became clear that municipal bond funds, large holders of traditional tax-exempt debt, were often uninterested or unable to purchase BABs because of the structure of their funds. Municipal bond fund investors expect little or no tax burden as a result of their investment, so fund managers were wary of purchasing taxable bonds as part of the fund, despite the higher after-tax returns possible from purchasing BABs. American Century bond funds that already held taxable bonds did buy BABs, but investors in these diversified bond funds are distinct from investors in muni-only funds.\(^5\)

**Subsidies, Incidence, and Efficiency**

Liu and Denison (2011) treat the marginal tax rate of the investor who is indifferent to switching over to tax-exempt debt as the implied rate of tax revenue forgone by allowing tax exemption, and thus the rate of the indirect subsidy paid on tax-exempt bonds. By lowering the direct subsidy to the level of the indirect subsidy, Liu and Denison suggest that the Federal government can make issuers indifferent between the

\(^5\) Meeting at American Century Investments with Dave MacEwan, David Moore, Joe Gotelli, and others. November 21, 2011.
two types of bonds, and thus any Direct Pay subsidy greater than 25% would have been sufficient to draw issuers to the BAB program.

Liu and Denison conclude from this analysis that not only does the program provide savings in its current form, but also that the Direct Pay subsidy is too high at a very generous 35%, when a 25% subsidy would be equivalent to make issuers neutral between issuing BABs and tax-exempt debt. Similarly, Luby (2010) looks at two matched pairs of Ohio BABs and concludes that a direct subsidy rate of 24% is equivalent to the indirect subsidy of municipal bond tax-exemption in this limited case for Ohio. Treasury (2010) suggests that a 28% subsidy rate would make the program revenue-neutral when compared with tax-exemption.

Despite the generosity of the Federal subsidy, the total subsidy amount is effectively lowered because many BAB holders will return some fraction of subsidy dollars in their income tax payments. Luby (2010) explains that the net cost of the Federal subsidy is equal to the sum of subsidy payments less BAB income tax revenue. Many of the investors drawn to BABs do not pay income taxes, and the tax brackets of BAB holders vary, so it is hard to estimate the magnitude of this effect. Congressional Budget Office (2010) estimates Federal income tax receipts from BAB income to equal more than two-thirds of subsidy costs from 2009-2019.

**Increased Investment**

In assessing the effectiveness of the Build America Bonds program, it is important to consider whether the program, if it did indeed lower borrowing costs as suggested, resulted in increased infrastructure investment. The life of the program was
too short and subject to too many exogenous shocks to compare the level of issuance during the program with the issuance before and after in any significant way. However, Joulfaian and Matheson examine the price elasticity of tax-exempt debt to understand “the critical question of whether state and local jurisdictions respond to the cost of capital, and whether lowering that cost stimulates additional borrowing and spending” (2009, p. 2). To test a relationship often suggested in the literature, they examine panel data on aggregate state-level muni issuance from 1987-2006 and find a strong relationship between borrowing costs and the level of municipal issuance. Specifically, they find that a 1-percentage point drop in interest rates is associated with an $8.7 billion increase in bond issuance, controlling for state and year fixed effects. While this relationship is not necessarily identical for the introduction of BABs, Joulfaian and Matheson affirm the understanding in the literature that lower borrowing costs spur additional issuance from municipal entities, and since Build America Bonds could not be used to refinance existing debt, all additional borrowing enabled by lower borrowing costs can be considered to be intended for capital investment.

**III. Data, Methodologies, and Results**

This section addresses whether the goals for the Build America Bonds program, namely providing issuer savings and attracting a non-traditional investor base, were achieved, and at what cost. Specifically, I examine the following three questions:
1. Who was the marginal buyer of Build America Bonds at each maturity, and to what extent did the program target investors whose low Federal income tax rates would make them unlikely to invest in tax-exempt municipal debt?

2. Did municipal issuers face lower borrowing costs by issuing Build America Bonds rather than traditional tax exempt municipal bonds, and were the savings uniform across the yield curve?

3. How efficient was the Federal subsidy under the Build America Bonds program, and what would an optimal subsidy look like if a similar program were brought back in the future?

To answer these questions, I examine data from Bloomberg Financial Data for all 2,275 issues (22,816 individual maturities) of Build America Bonds issued over the life of the program (April 3, 2009 through December 31, 2010) including ratings and bond characteristics. Similar to Ang, Bhansali, and Xing (2010) and Liu and Denison (2011), I divide the set into callable and non-callable bonds to avoid problems with accurately valuing call options when estimating savings.\(^6\) I classify bonds as “high grade” if they received at least an AA- credit rating from Standard and Poor’s (or equivalent from Moody’s or Fitch). Following Liu and Denison (2011), I also match bonds with relevant interest rates at issuance from a tax-exempt muni index for comparison. Rather than the Bond Buyer 20 Index used by Liu and Denison, I use the MMA Historical New Issue Yield Curve of AAA rated tax exempt municipal bonds because it provides historical rates at every year on the yield curve from 1 to 30, allowing me to calculate precise

\(^6\) Call options on municipal bonds can raise the yield the market requires because a 30-year bond with a 10-year par call is worth less to a long-term investor than a non-callable 30-year bond with the same coupon.
results at each maturity, rather than rough estimations using a single index value at each date.

**Marginal Tax Rate Analysis**

Near the end of their analysis of California issuance under the Build America Bonds program, Liu and Denison (2011) offer a basic model of implied marginal tax rates to estimate how much lower the Federal subsidy for the program could have been and still offered savings for California issuers. They note that for the program’s direct subsidy to have the same impact as the indirect subsidy from tax exemption on interest income from municipal bonds, theoretically:

\[ r_{TaxExempt} = (1 - \tau) r_{BAB} \]  

(1)

where \( \tau \) represents the tax rate of an investor indifferent between buying a bond with the yields offered by a taxable BAB and a tax-exempt bond. They use this to evaluate the efficiency of the program subsidy, but calculating the tax rate of the marginal investor also offers insight into the composition of the investor base for Build America Bonds. This tax rate represents an upper bound on the tax rates of investors in Build America Bonds. Since one of the stated goals of the program was to target non-traditional investors with lower income tax burdens than traditional muni investors, an empirical understanding of the implied tax rates of marginal BAB investors can help explain what types of investors were interested in BABs, and thus indicate whether this goal was met.

Using the MMA Index historical interest rate on the date of issuance for the relevant years to maturity of each bond issued over the life of the BAB program, and
before tax yield for each BAB, I calculate the implied tax rate of the marginal BAB investor by rearranging Equation 1.

\[ \tau = 1 - \left( \frac{r_{\text{TaxExempt}}}{r_{\text{BAB}}} \right) \]  

(2)

Next, I create binary variables CALLABLE, to indicate whether individual maturities featured call options, and HIGRADE, to indicate whether the bonds received at least an AA- rating from S&P or equivalent from Moody’s or Fitch. Because traditional municipal bonds are typically exempt from state income tax in their state of issuance, states with income taxes offer additional benefit to in-state bond holders; I create a binary variable STATETAX to indicate whether the state of issuance levies personal income tax. Following Ang, Bhansali, and Xing’s previous analysis of the tax exempt market (2010), I create binary variable LIQUID, to denote bonds issued in New York and California, whose bonds “tend to be the most liquid… because these states have high income tax rates and have many residents with high marginal tax rates for whom in-state municipal bonds are attractive investments” (p. 17). REVSEC denotes whether the bonds are tied to specific sources of revenue, either issued as revenue bonds or as certificates of participation (see Section I: Traditional Municipal Finance). I model implied marginal tax rate as a function of these variables (Equation 3).

\[ \tau = f(\ln(YTM), \text{CALLABLE}, \text{HIGRADE}, \text{REVSEC}, \text{STATETAX}, \text{LIQUID}) \]  

(3)

For simplicity, I only consider Direct Pay BABs with years to maturity \( \geq 1 \). Ordinary Least Squares regression of implied marginal tax rate on log years to maturity indicates a negative relationship between implied marginal tax rate and years to maturity (Table 1).

---

Because Breusch-Pagan tests indicate heteroskedasticity, I report t-statistics calculated from robust standard errors as suggested in White (1980).

<table>
<thead>
<tr>
<th></th>
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<th>State and Bond Controls</th>
</tr>
</thead>
<tbody>
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<td>-0.135 (-85.47)**</td>
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<tr>
<td>HIGRADE</td>
<td>-0.120 (-61.76)**</td>
<td>-0.120 (-66.22)**</td>
<td></td>
</tr>
<tr>
<td>CALLABLE</td>
<td>0.082 (43.88)**</td>
<td>0.088 (46.08)**</td>
<td></td>
</tr>
<tr>
<td>REVSEC</td>
<td>0.039 (26.43)**</td>
<td>0.037 (25.31)**</td>
<td></td>
</tr>
<tr>
<td>LIQUID</td>
<td>0.057 (18.13)**</td>
<td>0.057 (18.13)**</td>
<td></td>
</tr>
<tr>
<td>STATETAX</td>
<td>-0.013 (-7.05)**</td>
<td>-0.013 (-7.05)**</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>0.468 (134.61)**</td>
<td>0.586 (165.22)**</td>
<td>0.605 (148.73)**</td>
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<td>$R^2$</td>
<td>0.27</td>
<td>0.46</td>
<td>0.46</td>
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<td>N</td>
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<td>19,035</td>
<td>19,035</td>
</tr>
</tbody>
</table>

* $p<0.05$; ** $p<0.01$

Table 1: Regressing Implied Marginal Tax Rate on YTM and Select Binary Variables

The negative sign and high magnitude for years to maturity suggest that the longer maturity bonds were being purchased by a different type of investor than the short maturity bonds. Purchasers on the long end of the curve had lower implied marginal tax rates, suggesting these were more likely institutional investors with low tax burdens, buying where the majority of BABs were issued.

The signs on the bond control variables can be understood by examining Equation 2 carefully. Any effect that decreases $r_{BAB}$ relative to $r_{taxexempt}$ increases the value of the subtracted fraction, and thus decreases $\tau$. The sign on HIGRADE is negative because...
higher rated credits can be sold at lower yields to reflect the risk premium. Conversely, long-term investors view callability as a negative trait because bonds will typically be called in lower interest rate environments, forcing the investor to move their money to a less profitable investment in the future. As a result, higher quality BABs should have lower yields and thus lower implied marginal tax rates, while callable BABs should have higher yields and higher implied marginal tax rates, so the signs are as expected.

Similarly, BABs flagged as backed by specific revenue streams are viewed as less secure investments than bonds backed by the full faith and credit of the issuer, as general obligation muni bonds typically are. Since revenue backed bonds are less desirable, they must offer higher yields, leading to higher implied marginal tax rates. The effects from offering callable or revenue-tied bonds are less dramatic, but the effect of being rated at least AA- decreases the implied marginal tax rate by approximately 12%, almost as much as increasing years to maturity by 2.72 years.

For the state control variables, the effects are somewhat more muted. Whether or not the bonds are issued in states that levy income tax on in-state bonds impacts the value of tax exemption. For a state with income tax, BABs become less valuable in comparison at all tax brackets, thus the implied marginal tax rate is lower reflecting the increase in the ratio of tax exempt to BAB rates expressed in Equation 2. Emphasizing the importance of institutional investors with long-term obligations who plan to buy and hold, liquidity has a positive sign. The long-term obligations of BAB purchasers make secondary sale of the bonds less important than for tax-exempt bonds, so institutional investors are less likely to accept lower coupons in exchange for a liquidity premium.
Because the regression indicated that callability and credit quality were significant explanatory variables for the implied marginal tax rate, analysing a dataset excluding callable bonds and any bonds that did not receive high grade ratings allows me to average implied marginal tax rate at each maturity across the yield curve for a subset of the bonds and graph the trend. 74.2% of total BAB issuance received high grade (AA- or better) ratings and 50.3% was not callable. Together, high grade non-callable Direct Pay BAB issuance represented 14.2% of total BAB issuance, and when implied marginal tax rate weighted by par amount is graphed against years to maturity, the trend is clear.

Increased volatility from 20 years out to 30 years indicates that excluding callable and lower credit bonds does not account for all noise, but R-squared=0.78 suggests 78% of variation in average implied marginal tax rates is explained by variation in years to maturity alone (see Table 2, and Appendix).
While the relationship is less significant when we relax the exclusion of callable bonds and lower credit ratings, the trend still appears for OLS regression of average implied marginal tax rate on ln(years to maturity) throughout the dataset, again using White standard errors due to heteroskedasticity.

<table>
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<tr>
<th></th>
<th>R-Squared</th>
<th>ln(ytm)</th>
<th>t-stat</th>
<th>p-value (α=0.01)</th>
</tr>
</thead>
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<tr>
<td>Non-callable, (AA- or better)</td>
<td>0.780</td>
<td>-0.115</td>
<td>-8.21</td>
<td>0.000</td>
</tr>
<tr>
<td>(AA- or better)</td>
<td>0.642</td>
<td>-0.095</td>
<td>-5.77</td>
<td>0.000</td>
</tr>
<tr>
<td>All</td>
<td>0.599</td>
<td>-0.101</td>
<td>-4.19</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Table 2: Average Implied Marginal Tax Rate for Direct Pay BABs vs. years to maturity

Relaxing the restrictions on the set of bonds considered appears to reduce the statistical significance of the relationship, but the relationship is significant for all Direct Pay BABs. In all cases, regression suggests a strong negative relationship between years to maturity and average implied marginal tax rate.

For the short maturities, the highest rated non-callable BABs have an implied marginal tax rate roughly equivalent to the maximum income tax burden. Tax rates descend from 20% to 10% from the 5-22 year maturity, and dip below 10% for the 23-30 year maturities. This suggests that issuers targeted their longer maturity obligations toward lower tax-bracket investors, consistent with the goal of attracting pension funds, mutual funds, and other non-traditional low-income-tax, long-term obligation investors.

BAB issuers were able to sell long dated bonds, at rates implying a low tax burden, but the implied marginal tax rate is an upper bound. Anyone with a tax rate below the implied marginal rate would be better off buying a BAB rather than tax exempt debt at the relevant index rate, but that does not mean that investors only bought on the margin. Pension funds, 401(k) investors, and other non-traditional muni investors might
face a 0% income tax rate, and would thus be even more likely to buy BABs with a low implied marginal tax rate.

![Figure 2: Marginal Tax Rate (all Direct Pay BABs) vs. YTM](image)

Looking at the entire life of the program, I find an average implied marginal tax rate of 16.7%, lower than the 25% that Liu and Denison (2011) find for California issuance. Their analysis only looked at 2009 issuance, so perhaps the difference comes from slow adoption among non-traditional investors, or issuer attributes distinct to California. Since California has a state income tax and is also one of the states known for liquidity, regression results in Table 1 suggest a 5.7-1.3=4.4% higher average implied marginal tax rate for California, which explains most of the difference. Poterba and Verdugo (2008) find that the average implied marginal tax rate of tax-exempt bondholders is 26.8%. Since the implied marginal tax rate of the BAB investor is an upper bound on the tax bracket for investing in BABs, I find that the marginal tax-exempt investor would not be interested in buying BABs, lending further credence to the suggestion that the program
attracted non-traditional muni investors. Thus, even though the opacity of the secondary market for municipal bonds makes a comprehensive assessment of bondholders impossible, implied marginal tax rates indicate that the program’s goal of attracting non-traditional lower-tax-burdened investors was met.

Savings By Maturity Analysis

Understanding the savings opportunities created by the Build America Bonds program requires an understanding of the relationship between tax-exempt yields and BAB yields before and after subsidization. Averaging these yields across each day when BABs were issued, BAB yields are clearly higher than tax-exempt yields, as expected (Figure 3). The gap between the BAB yield and the BAB yield net of subsidy widens along the yield curve, reflecting the higher coupons and thus higher subsidy amounts at longer maturities.

Figure 3: Average Yield Comparison on Dates of BAB Issuance
Remarkably, BAB yield net of subsidy still appears higher than tax-exempt yield until the 4-year maturity, which corresponds to negative savings for Build America Bonds at the short end of the curve. Unfortunately, this method of averaging across a two-year period of time is extremely imprecise because rates varied dramatically over the life of the program. Comparing average rates over a two-year period only gives a vague picture of how the savings were realized, and loses any sense of their magnitude.

To analyse the savings provided by the program more precisely, I estimate the present value of BAB cash flows discounted using tax-exempt muni interest rates following the work of Ang, Bhansali, and Xing (2010). These estimates represent the hypothetical scenario of what borrowing costs would have been for issuers had they issued in the tax-exempt market at historical interest rates on the date of issuance instead of issuing BABs. Ang, Bhansali, and Xing perform their analysis using only the 2009 issuance, $63.4 billion of the program’s total $182 billion, so I extend their analysis for estimating borrowing costs over the entire life of the program.

To avoid the effects of call option valuation on borrowing costs Ang, Bhansali, and Xing exclude callable bonds, narrowing their 6,177 individual bonds down to the 39% without embedded options. Because this method of estimation requires knowing the number of years that each bond will actually be held, I also exclude callable bonds. This narrows the 22,816 individual bonds in my dataset down to 12,078 non-callable bonds, representing $94.3 billion in par (50.3% of total par).

Next, I match each individual bond with the relevant index rate from the MMA Historical Index based on issue date and years to maturity. For their muni discount rates, Ang, Bhansali, and Xing use zero-coupon rates from interdealer trades of tax-exempt
bonds. Rather than building zero-coupon curves, I use MMA Historical Index rates for simplicity, as the secondary trading market for many municipal bonds is dominated by a few large players and thus quite opaque.

Using these rates, I estimate the present value of BAB cashflows had they been issued in the tax exempt market on their settlement date according to Equation 4, discounted using the settlement date’s historical MMA Index rates.

\[ PV_i = \sum_{i=1}^{2N} \frac{CASHFLOW_i}{(1 + r_t / 2)^i} \]  

I then compare these hypothetical present value cashflows with the actual BAB present value cashflows net of subsidy, either 35% for Direct Pay or 45% for Economic Recovery Zone bonds. There are endogeneity problems with this approach; since BABs represented 23.1% of total municipal issuance during the time period, adding so much additional issuance into the tax-exempt market would almost certainly have moved rates. Still, for estimation purposes, comparing the after-subsidy BAB cashflows with hypothetical tax-exempt cashflows allows me to approximately calculate present value and yield savings for each bond in the dataset.

Because Ang, Bhansali, and Xing (2010) and Treasury (2010, 2011) both found that savings were greater at longer maturities, I treat years to maturity as an explanatory variable for present value savings as a percentage of par amount, along with a binary variable HIGRADE for credit quality (at least AA- rating from S&P or equivalent). I also include binary variables STATETAX, for whether the state of issuance levies an income tax, and LIQUID, for whether muni bonds from the state of issuance are known for

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8 See Section I, Figure 3
liquidity (California and New York). REVSEC denotes whether the bonds were issued as revenue bonds or certificates of participation, rather than general obligations, and therefore have dedicated revenue streams for debt service payment. I model present value savings as a fraction of present value tax-exempt cashflows using Equation 5.

\[
P_{\text{V SAV}} / P_{\text{V tax-exempt}} = f(ln(YTM), \text{HIGRADE}, \text{STATETAX}, \text{LIQUID}, \text{REVSEC})
\]  

I run an OLS regression including only Direct Pay BABs, ignoring those with years to maturity less than 1. Again, I use White standard errors to account for heteroskedasticity. Regression results indicate a strong positive relationship between years to maturity and the present value savings at issuance from issuing BABs (Table 2).

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<th>State and Bond Controls</th>
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<tr>
<td></td>
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<td>(45.75)**</td>
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<td>-0.005</td>
<td>-0.005</td>
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<tr>
<td></td>
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<td>(-5.12)**</td>
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<td></td>
<td>(8.18)**</td>
<td>(5.77)**</td>
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<td>LIQUID</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>(9.70)**</td>
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<tr>
<td>(N)</td>
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<td>10,384</td>
<td>10,384</td>
</tr>
</tbody>
</table>

* \(p<0.05; \) ** \(p<0.01\)

Table 2: Regressing Present Value Savings as Percentage of Par on YTM and Binary Variables

Presumably, the increased demand from institutional investors with long-term obligations is a major source of savings for issuers, forcing taxable rates down relative to tax-exempt
on the long end of the curve. Since savings is computed by subtracting the present value of BAB cashflows from the hypothetical present value of tax-exempt cashflows, one can understand the signs in the regression results by examining how changes to the BAB interest rate used to discount the cashflows impact the present value of BAB cashflows relative to tax-exempt. Since any increase to the BAB interest rate increases the denominator of the subtracted fraction (see Equation 4), changes that increase BAB interest rates will increase present value savings. Effectively, this means that any variable that shifts the BAB interest rate should shift savings in the same direction.

Since higher rated bonds typically have lower interest rates, the sign on HIGRADE is negative as expected. Similarly, since bonds tied to specific revenue streams are less secure than general obligation bonds, they tend to have higher rates, and savings are increased as a result, although the magnitude of these changes is small. As noted in my discussion of implied marginal tax rates, the long-term investors the BAB program targets have less incentive to pay a premium for liquidity. BAB rates must therefore be higher relative to tax-exempt for liquid bonds, hence the positive sign on LIQUID. At first the negative sign on STATETAX seems surprising; since the presence of a state income tax in the state of issuance raises the value of tax exemption, one might expect a higher BAB yield would be necessary, leading to lower present value of BAB cashflows, and thus increased savings. However there is a high correlation between states with income taxes and high levels of municipal issuance (California, New York, Illinois, etc). States that issue more municipal bonds tend to issue in greater volume, and investors and ratings agencies have more experience with these issuers, reducing BAB rates relative to the tax-exempt index, and causing a negative sign on STATETAX. Since the
concept of savings does not really make sense with years to maturity = 0, the constant term should be 0 to reflect the impossibility of savings for the base profile bond. As I add in more controls and my model gets more accurate, the constant term appears to get closer to 0.

To demonstrate the relationship between years to maturity and present value savings, I graph average present value savings as a fraction of estimated tax-exempt issuance value at each maturity along the yield curve (Figure 4).

![Figure 4: Average PV Savings for High Grade (AA- and above) Direct Pay Non-Callable BABs](image)

I find greater savings at the longer maturities, with large savings closer to the 30 year mark, and negative savings at the short (1-4 year) maturities. This negative savings region corresponds with the region of subsidized average BAB rates lower than average tax-exempt rates in Figure 3. In general, my analysis agrees with that of Ang, Bhansali, and Xing (2010), and the Treasury (2011) in finding that the program provided significant savings to issuers, and that savings were greater at longer maturities reflecting
the longer-term obligations of BAB investors relative to traditional tax-exempt investors. Summing the present value savings across the entire program results in $43.3 billion in present value savings, greater than the $20 billion estimate that Treasury finds from extrapolating their analysis of a restricted sample of paired BAB and Tax Exempt issuance issued by the same issuer on the same day. Average present value savings over the life of the program is roughly 13.5% for non-callable high grade Direct Pay BABs, and 14.6% when I include callable BABs as well.

Since the literature traditionally expresses savings as the difference between after-tax BAB yield and tax-exempt yield, I perform similar analysis to calculate savings expressed as the difference between after-subsidy BAB yield and hypothetical tax-exempt yield estimated from the present value of cash flows found in Equation 4. As before, I analyse Direct Pay bonds, excluding callable bonds and bonds rated below AA-. Under these restrictions, I find average yield savings of 69 basis points over the life of the program, which is slightly lower than the savings of 72 basis points found by Liu and Denison for California (2010), and higher than the 54 basis points found by Ang, Bhansali and Xing (2010). Treasury (2011) found average savings of 84 basis points for 30-year bonds, which is lower than the 98 basis points I find, but consistent with the positive relationship between savings and years to maturity.

Finally, I graph average yield savings of non-callable high grade Direct Pay BABs against years to maturity (Figure 5). Fitting a logarithmic trend line through this graph suggests that 75% of the variation in yield savings can be explained by years to maturity alone (see Appendix). I ignore years to maturity greater than 30 because such
issuance is extremely uncommon in the taxable market, as well as issuance with years to maturity less than 1.

Figure 5: Average Yield Savings for High Grade (AA- and above) Callable Direct Pay BABs

Subsidy Incidence Analysis

Key to any assessment of an alternate policy instrument is the question of efficiency. Because I compare a direct subsidy to an existing program of indirect subsidy, I must address what percentage of additional government outlays (or revenue forgone) is actually providing the additional benefit to the subsidy target. Since the goal of the program was to help municipal issuers access a market that provided savings, rather than merely increase the subsidy on municipal borrowing, it is important to observe what fraction of savings can be explained by increased Federal subsidy outlays, and what fraction remains to be explained by increased private investment. Prominent critics of the Build America Bonds program, like Senator Charles Grassley (R-IA), have claimed that
the program is a “richer subsidy at a much higher cost to U.S. taxpayers.” By analysing
the incidence of the subsidy in the Build America Bonds program, I find that such claims
of higher cost are inaccurate.

I calculate the total present value at issuance of the Federal subsidy by
discounting subsidy payment cashflows using Treasury rates with similar years to
maturity on the date of issuance (indicative of Federal government borrowing costs). This
places the total cost of the subsidy at $71 billion. Using the implied marginal tax rate for
each bond, I calculate the value of revenue that would have been lost through tax
exemption had this bond’s holders been forced to buy a tax-exempt bond instead. I
discount using the same Treasury rates as before, and find a total of $32.1 billion in
indirect subsidy would have been required. The subsidy given by the Federal government
under the BAB program is indeed more generous than tax exemption by $38.9 billion.

The present value savings of the program versus issuing tax exempt were $43.3
billion for an additional subsidy of $38.9 billion, so 90% of the issuer savings reflected
increased generosity in Federal subsidies. The remaining 10% of issuer savings can be
attributed to increased private sector investment. Because of the increased demand for
municipal bonds in the taxable market, the benefits of the program to issuers outweighed
the increased subsidy costs. I found a 16.7% average implied marginal tax rate, which
would indicate that roughly 48% of the subsidy was necessary to make investors
indifferent between tax-exempt munis and Build America Bonds. The remaining 52% of
the 35% subsidy can be seen as a payment to bond holders. From these results, it is clear
that the Federal subsidy was too high, and while that contributed to increased issuer

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9 As quoted in *American Progress*, November 2010.
savings through higher payments to issuers, it also benefited the investors who flocked to Build America Bonds. Unfortunately for the stimulus program, subsidy dollars paid to bond investors are unlikely to become an immediate component of consumer spending given the long-term nature of the bonds. While I dismiss Treasury’s claims that the program is entirely a wealth transfer to issuers due to the over-generosity of the subsidy, it is also clear that the program provided more value in savings than it lost through additional costs, making the Build America Bonds program a net decrease on total government expenditures (Federal plus municipal).

Furthermore, when I examine the assertion made in Luby (2010) and Congressional Budget Office (2010) that the total subsidy should be considered net of increased Federal income tax receipts due to shifting investors from tax-exempt to taxable bonds, the net value of the Federal subsidy decreases dramatically, improving the efficiency of the program. Over the first 10 years (from 2009 through 2019) CBO estimated that Federal outlays on the Build America Bond program (subsidy payments) would equal $36 billion; using my methodology of present value discounting with relevant Treasury rates, I find Federal outlays for 2009-2019 of $30.8 billion, thus our estimations are similar on the value of the subsidy. However, CBO believes more than two-thirds of those subsidy payments will be offset by increased income tax revenue from shifting tax-exempt issuance into the taxable market.

Based on my findings of implied marginal tax rates, a two-thirds offset seems unlikely. Because the Federal government pays 35% of coupon and receives roughly 16.7% of coupon on a bond sold at par, the implied recovery rate of subsidy payments would be 48%, rather than the two-thirds estimated by CBO (which would in turn imply
an estimate of 23% as the average tax rate for BAB holders). Furthermore, 48% recovery is only possible if every BAB investor pays income taxes at each bond’s implied marginal rate. This rate is an upper bound on the taxes paid by investors willing to invest in BABs, so the recovery rate is also an upper bound. However, the numerous institutional and 401(k) investors clustered around the 25-30 year maturities might not pay income taxes at all.\(^\text{10}\)

If every investor paid the implied marginal tax rate on their bond returns, then the value of subsidy recovered through taxes would be the same as the lost tax revenue calculation above, $32.1 billion. Without access to actual tax receipts over the life of the program, however, one cannot accurately calculate the total additional subsidy provided by the BABs program versus tax exemption. In my analysis of implied marginal tax rate, I suggested that because the subsidy was too high relative to the necessary marginal tax rate to encourage BAB investment, some fraction of the subsidy must be paid to bond holders. However while some fraction of subsidy dollars may indeed make its way to bond holders, the savings to issuers provided are greater than additional Federal expenditure, especially when considered net of increased tax revenue. As Treasury (2011) notes, “savings to borrowers [are] considerably greater than the net cost to the federal government of the BABs program. This reflects the efficiency gains from the BABs program, which attracts new investors to the municipal bond market, especially at longer maturities” (p. 12).

\[^\text{10}\] There is a limit on the amount of assets that can be held in a 401(k) account. If investors are moving BABs into the accounts, they may have to move other taxable assets out of the accounts, so some 401k investors may end up paying additional taxes as a result of holding BABs.
As the program intended, additional savings are coming primarily from providing access to the $30 trillion taxable market, with its much larger pool of investors, alongside the traditional $2.8 trillion tax exempt market (Treasury, 2011). While the subsidy is necessary to encourage issuers to borrow and to raise nominal rates high enough for municipal issuers to participate in the taxable market, income taxes recover a significant fraction of the subsidy so investors are not reacting so much to the Federal subsidy as they are to the potential of investing in strong municipal credits, for a reasonable pre-tax interest rate in the taxable market. Municipal issuers in turn are generally not willing to borrow in the taxable market without a subsidy because it requires forgoing the implied subsidy of tax exemption, and because without a Federal subsidy pre-tax rates in the taxable market must be higher; indeed, without a subsidy, some fraction of the higher municipal interest payments would actually be reclaimed by the Federal government through taxes, so unsubsidized taxable municipal issuance is effectively a municipal government subsidy paid to the Federal government.

It is important to note that the magnitude of the savings from issuing in the taxable market over the period 2009-2010 is not necessarily indicative of the potential for savings in the future given the turmoil in tax-exempt markets during the financial crisis. However the BAB program clearly demonstrated the potential for savings as a result of shifting municipal borrowers from the tax-exempt to taxable market. Taking advantage of a direct Federal subsidy greater than the indirect subsidy in tax-exempt markets, issuers were spurred to borrow in the cheaper taxable market, thus this program provided the additional incentive needed to get municipal issuers borrowing, and therefore spending, again.
IV. Conclusions

After analysing the entire period during which state and local governments had the option to issue Build America Bonds, I find that the program offered significant savings to issuers in line with the results from Treasury (2011), and the alternate methodology presented in Ang, Bhansali, and Xing (2010). I find savings of 69 basis points on average for issuing Build America Bonds versus tax-exempt bonds, increasing with years to maturity so that at the 30-year maturity, savings averaged 98 basis points. In present value terms, the program saved issuers a total of $43.3 billion versus issuing in the tax-exempt market. I also find low (roughly 10%) implied marginal tax rates for investors in 20-30 year maturities, where approximately 55% of issuance occurred, suggesting that the program’s goal of targeting non-traditional investors with long-term obligations and low tax burdens such as pension funds, 401(k) plans, and sovereign wealth funds was met.

Because I find that the program offered savings to issuers, successfully attracted a wider base of new investors, and efficiently targeted issuers rather than bondholders for subsidy dollars, I conclude that the Build America Bonds program appears to be an example of how a direct subsidy system in municipal finance could be more efficient than the tax exemption approach that has been the norm since the Federal income tax was created. The incidence of cost to the Federal government of subsidizing municipal debt is not affected by changing from a direct-pay subsidy to a loss of tax revenue; the
government either spends additional money it receives from taxes, or receives less tax revenue. Either way, the government's other fiscal policy goals are equally affected.

However, because the borrowing costs for BABs were markedly lower (lower yields) and both types of subsidy are paid as a percentage of borrowing costs, the total amount of a direct subsidy established at parity with tax exemption would be strictly lower for the Federal government. As a result, not only was the BAB program a bargain for municipal governments, but a long term program with a lower subsidy has the potential to provide cost savings to the Federal government as well. In terms of cost, shifting public finance away from tax exemption with higher yields to subsidization with lower yields appears to have the potential for a fiscal policy win-win.

As Joulfaian and Matheson (2009) remark, “tax exemption of local government debt is widely recognized as an inefficient subsidy because it costs more in federal revenue than the reduction in interest costs for the states. The difference between its costs and benefits accrues to municipal bond investors… [who] receive a higher interest rate than they require to make them willing to hold tax-exempt debt” (p. 3). Unfortunately, as my analysis of implied marginal tax rates and savings for the Build America Bonds program has shown, a direct subsidy of 35% also offers issuers more subsidy than necessary to reduce their borrowing costs. I find a more appropriate rate, if breaking even were the only consideration, would be closer to 17%. However, providing cost savings was not the only goal of the program, which also focused on increasing stimulus infrastructure spending during the recession.

While a key goal of this program was to spur additional infrastructure investment by lowering borrowing costs, it is impossible to determine whether the bonds simply
helped pay for projects that would have been undertaken anyway by municipal issuers, or whether they led to additional municipal spending. Looking to the future, however, the results of the Build America Bonds program provide conclusive evidence that a direct subsidy approach could be more efficient than tax exemption. By opening up the market to new sources of demand, and thereby keeping borrowing costs low, both Federal and municipal governments could see cost reductions. Treasury (2010) claims that the program achieves target efficiency, meaning that “each dollar of revenue foregone by the federal government benefits state and local governments by a dollar,” unlike tax exemption, where the Federal benefit is paid to bondholders clouding the value of the subsidy to issuers (p. 4). This claim confuses statutory incidence with economic incidence, assuming that paying a subsidy to issuers rather than indirectly to buyers changes the incidence of who benefits, an argument that economic theory rejects. While my results do not support claims of target efficiency, I still find that the Build America Bonds program provided substantial savings to issuers versus tax exemption, and with a lower subsidy rate, could provide an extremely efficient alternative instrument to tax exemption for municipal issuers.

The Build America Bonds Program was a component of President Obama’s stimulus package. As a result, it was largely supported by Democrats and opposed by Republicans. Democrats viewed it as a program to stimulate necessary infrastructure investment by state and local governments. Republicans viewed it as yet another Federal spending program that encouraged irresponsible growth in government debt. The program expired at the end of 2010, and the Democrats’ efforts failed to extend the

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program in the 2011 Budget. Despite this defeat, Mr. Obama has proposed reinstating the program permanently in the 2013 Budget, with a subsidy rate of 30% for 2013, and 28% thereafter. According to the Congressional Budget Office (2012), the net effect of this subsidy would be to increase the deficit between 2013 and 2023 by $7 billion dollars. Since programs that increase the Federal budget deficit meet with extreme resistance in the current political climate, it is important to notice that based on my findings from analysing the 2009-2010 Build America Bonds program, the subsidy rates in Mr. Obama’s proposal are still too high, and as a result, extension of the program as proposed cannot be revenue neutral for the Federal budget.

While normative statements regarding Federal intervention in state and local government investment decisions can be debated endlessly, the Build America Bonds program offers an interesting alternative to the traditional approach of subsidizing municipalities for desirable infrastructure projects on an ad hoc basis. As Luby (2010) notes, the Federal government could “offer varying subsidies depending on the nature of the projects,” and the lead sponsor of BAB legislation, Senator Ron Wyden (D-OR), has supported this approach (p. 24-25). Varying rates would allow Congress to simply raise the subsidy on school construction, for example, rather than setting aside a pool of funds and then administering a subsidy program as school districts applied for funding. A program in which Congress could control subsidy levels for specific purposes would make direct subsidy municipal bonds a versatile tool, not just as a substitute for traditional municipal borrowing, but also as a more market-based substitute for existing fiscal policy instruments designed to help pay for programs on a state and local level.
Although the current political environment may not be conducive to extending the BAB program as an alternative to tax exemption, the program was a very successful component of the 2009 stimulus program. It lowered borrowing costs, enabling municipal governments to invest in infrastructure for American communities, and provided an efficient direct subsidy with issuer savings far exceeding increased Federal costs. The Build America Bonds program was a successful short-term program, and with a lower subsidy, could provide an efficient long-term alternative to municipal tax exemption.
Works Cited


Institute on Taxation and Economic Policy. (February 2012). “‘High Rate’ Income Tax States are Outperforming No-Tax States.”


Appendix

Stated Purposes of Build America Bonds

Source: Stated Purpose Data from Bloomberg
**Average Implied Marginal Tax Rate of High Grade (AA- or better) Non-Callable Direct Pay BABs**

<table>
<thead>
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<th>Robust</th>
<th></th>
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<th>[95% Conf. Interval]</th>
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<td></td>
<td>Coef.</td>
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<td>P&gt;</td>
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<td>ln&gt;ytm</td>
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<td>.000</td>
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</table>

Notes: Average Implied Marginal Tax Rate at each year to maturity is weighted by par amount, ignores bonds with years to maturity < 1

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**Average Implied Marginal Tax Rate of High Grade (AA- or better) Direct Pay BABs**

<table>
<thead>
<tr>
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<th>[95% Conf. Interval]</th>
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<td>Coef.</td>
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</tbody>
</table>

Notes: Average Implied Marginal Tax Rate at each year to maturity is weighted by par amount, ignores bonds with years to maturity < 1
Average Implied Marginal Tax Rate of All Direct Pay BABs

Linear regression

Number of obs = 30
F( 1, 28) = 17.54
Prob > F = 0.0063
R-squared = 0.5990
Root MSE = 0.07149

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<tr>
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<th>Robust</th>
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Notes: Average Implied Marginal Tax Rate at each year to maturity is weighted by par amount, ignores bonds with years to maturity<1

Average Yield Savings of High Grade (AA- and above) Non-Callable Direct Pay BABs

<table>
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<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>Number of obs = 30</th>
</tr>
</thead>
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<tr>
<td></td>
<td>F( 1, 28) = 82.83</td>
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<td></td>
<td></td>
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<tr>
<td>Model</td>
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<td>31204.9973</td>
<td></td>
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<tr>
<td>Residual</td>
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<td>376.755963</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>41754.1642</td>
<td>29</td>
<td>1439.79877</td>
<td></td>
</tr>
</tbody>
</table>

| yield savings | Coef. | Std. Err. | t     | P>|t|   | [95% Conf. Interval] |
|---------------|-------|-----------|-------|-------|---------------------|
| lnym          | 38.57194 | 4.238278 | 9.18  | 0.000 | 29.89022-47.25365  |
| _cons         | -26.91975 | 11.12683 | -2.42 | 0.022 | -49.71203-4.127461 |

Notes: Average Yield Savings at each year to maturity is weighted by par amount, ignores bonds with years to maturity<1; I cannot reject null hypothesis of homoskedasticity for this regression, so these results do not report White standard errors.