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BUILD AMERICA BONDS

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**ABSTRACT**

Build America Bonds (BABs) are a new form of municipal financing introduced in 2009. Investors in BAB municipal bonds receive interest payments that are taxable, but issuers receive a subsidy from the U.S. Treasury. The BAB program has succeeded in lowering the cost of funding for state and local governments with BAB issuers obtaining finance 54 basis points lower, on average, compared to issuing regular municipal bonds. For institutional investors, BAB issue yields are 116 basis points higher than comparable Treasuries and 88 basis points higher than comparable highly rated corporate bonds. For individual investors, BABs have lower yields than regular municipal bonds. Thus, on average the Federal government subsidy disadvantages individual U.S. taxpayers, who are the main holders of municipal bonds, and benefits new entrants in the municipal bond market.

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# 1 Introduction

Build America Bonds (BABs) were introduced by the federal government as part of the American Recovery and Reinvestment Act signed into law by President Obama on February 17, 2009.<sup>1</sup> The Build America Bond program is designed to help state and local governments pursue various capital projects such as the construction of public buildings, schools, roads, energy projects, public utilities, and other public infrastructure projects. The first BAB was issued by the University of Virginia with an award date of April 15, 2009 and a dated date of April 22, 2009. By the end of December 2009, around \$63.4 billion of BABs have been issued compared with \$332.2 billion of regular municipal bonds. Thus, BABs represent 16% of all municipal finance raised during this period.

Funding for states and local governments is traditionally done through regular municipal bond issues, where investors receive tax-exempt coupon interest payments from municipal issuers.<sup>2</sup> Since traditional municipal bonds provide tax-exempt income, municipal bonds are attractive investments for individuals and, not surprisingly, over two-thirds of municipal bonds are held by individuals (see Ang, Bhansali and Xing, 2010). Consequently, tax-exempt municipal bond yields have, on average, been lower than taxable Treasury and corporate bond yields (see, among others, Green, 1993).<sup>3</sup>

Under the BAB program, municipalities issue bonds with taxable coupon payments, but they receive a subsidy from the federal government to offset their borrowing costs.<sup>4</sup> This sub-

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<sup>1</sup> This is also commonly known as the “Stimulus Bill.” Details of the BAB program are available at the Treasury website at <http://www.ustreas.gov/press/releases/tg80.htm>

<sup>2</sup> There are some bonds issued by municipalities that are taxable as they do not meet requirements that the bond proceeds provide a significant benefit to the general public. Certain municipal bonds payments are also subject to the Alternative Minimum Tax. For the majority of municipal bond issues, investors receive interest payments exempt from Federal income tax.

<sup>3</sup> However, in the aftermath of the recent financial crisis, which has substantially impaired the finances of many municipal issuers, municipal bond yields have often been higher than equivalent maturity Treasury yields. Another reason for this reversal is the greater liquidity demand of Treasuries by investors not able to take advantage of the tax exemptions of municipal bonds.

<sup>4</sup> There is a second, much less common type of of BAB where BAB holders receive a tax credit from the federal government equal to 35% of the bond each year (or 45% in certain cases). We do not analyze this type of BAB.

sidy enables state and municipal governments to tap additional sources of capital other than individuals. BABs can only be issued during 2009 and 2010, but the subsidy is for the life of the BABs.

The subsidy is set at 35% of the BAB coupon, which is currently the same as the highest marginal federal income tax rate and the highest marginal corporate income tax rate. For example, suppose a state issues a BAB with a 5% taxable interest rate. The United States Treasury pays the state government  $0.35 \times 0.05 = 1.75\%$  making the state government's net borrowing cost 3.25% on a bond that pays a 5% coupon. An investor receiving the 5% coupon is subject to taxes: an individual in the highest Federal marginal income tax rate holding the BAB would receive  $(1 - 0.35) \times 0.05 = 3.25\%$  net of Federal taxes while a non-taxable entity such as a pension fund would receive the full 5% coupon. Hence, from the perspective of an investor, the BAB is a special type of a regular taxable bond.

Suppose the state government issued a regular municipal bond at 3.25%. This is the same out-of-pocket cost as the BAB which carries a 5% coupon. An individual investor buying the regular municipal bond receives the full 3.25% and pays no tax. In this case, the individual investor is indifferent between the BAB and a regular municipal bond. However, in practice taxable interest rates tend to be, on average, higher than tax-exempt yields. This makes regular municipal bonds unattractive investments for pension funds, foreign investors, and investors in low tax brackets. Since BABs are taxable, the BAB program theoretically enlarges the market for municipal issuers and enables a much broader group of investors to finance state and local government projects.

In this article we examine if opening up the municipal bond market to a larger clientele has lowered the cost of borrowing for state and local governments. Since the subsidy is provided by the Federal government, and thus ultimately U.S. taxpayers, we also compare the prices of

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This second type is rare because in order to take advantage of the tax credit, the BAB investor must have U.S. taxable income, which is not the case for tax-exempt investors such as pension plans and many foreign investors. We also do not consider other types of issuance under this program, which are the "Qualified School Construction Bonds" or "Qualified Zone Academy Bonds."

BABs relative to traditional municipal markets, Treasury bonds, and high credit quality corporate bonds. Finally, we investigate if individuals receive any benefit from holding BABs relative to regular municipal bonds and estimate the role of the Federal subsidy in determining the value of BABs.<sup>5</sup> In particular, we discuss the transfer issues regarding the U.S. Treasury payments from individual taxpayers to new entrants in the municipal bond market. To our knowledge, our paper is the first formal analysis of the BAB market not produced by the Federal government.<sup>6</sup>

## **2 BABs and Tax-Exempt Municipal Bonds**

Our data are obtained from Bloomberg and include all 6,177 BABs (CUSIPs) issued during 2009 as Direct Pay BABs. Table 1 reports summary statistics of the BABs over April to December 2009 and compares the issuance of BABs with the issuance of regular municipal bonds. Over this period 6,177 BAB securities were issued carrying distinct CUSIPS representing 663 unique issuers. The amount of local and state government finance raised in 2009 through BABs totals \$63.4 billion.

To compare the BAB issuance with regular municipal issues, we collect all municipal bond issues occurring between April and December 2009 which have subsequent secondary market trades reported by the MSRB. There were 95,233 regular tax-exempt municipal bonds issued totaling \$332.2 billion. Municipal bonds tend to be much smaller, with an average issue size of \$3.5 million, compared to BABs with an average issue size of \$10.2 million. Thus, BABs are more attractive to institutions because of their larger issue size. In our analysis we take only straight bonds to avoid potentially complex computations involved in valuing embedded

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<sup>5</sup> We are implicitly assuming that the issuer does not have the ability to re-finance or pre-refund existing tax-exempt or BABs into each other and thus “arbitrage” the benefits of the subsidy. Generally, the tax code prevents such arbitrage. The ability to refinance BABs into other BABs is being considered in policy circles.

<sup>6</sup> The U.S. Treasury has issued a report, Treasury Analysis of Build America Bonds and Issuer Net Borrowing Costs, showing that the BAB program has reduced borrowing costs of states and municipalities, consistent with our findings. However, their analysis uses linear fixed effect regressions on yields, which are by definition non-linear functions of cashflows. We avoid any linearizations, deal with truly comparable BABs issued in other conventional bond markets, and handle risk consistently by discounting by different zero-coupon yield curves. The Treasury report also does not compare BABs to Treasuries and corporate bond markets.

options. Straight bonds constitute 39% of all BABs and 60% of all regular municipal securities.

Table 1 also reports information on the maturities of BABs and municipal bonds. BABs tend to have longer maturities than regular municipal bonds. While 54% of BABs have longer maturities than 10 years, only 36% of regular municipal bonds have similar maturities. S&P credit ratings on BABs are similar to the ratings on regular municipals with the majority of all issues rated AA or AAA.

### 3 Comparing BABs with Other Bond Markets

We compare the yield on BABs with more traditional debt by comparing the BAB issue yield with hypothetical yields computed using different discount rates. The motivation is as follows. In equilibrium, the price of any security is given by summing a series of discounted expected cashflows. The yield is a (non-linear) transformation of that price. The discount rate reflects the risk associated with the cashflow stream. Following Duffie and Singleton (1999), we can transform the risk of default into the discount rate and treat the cashflow stream to be default-free. That is, suppose the cashflows of the BAB are given by  $CF_t$  at time  $t$ . Then, we can value the BAB by standard discounting:

$$P_t = \sum_{i=1}^{2N} \frac{CF_{t+i}}{(1 + r_{t+i}/2)^i}, \quad (1)$$

where we use semi-annual compounding so  $N$  is the maturity of the bond in years and  $r_{t+i}$  is the zero-coupon rate from  $t$  to  $t + i$  in annualized terms. This formula treats the cashflow as default-free because the risk of default is absorbed by the discount rate.<sup>7</sup>

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<sup>7</sup>This valuation framework is very general; Duffie and Singleton (1999) show that the discount rate captures default risk even when the default risk is time varying as long as the loss given default does not depend on the size of the defaultable claim at the time of default.

We consider three sets of discount rates:<sup>8</sup>

### 1. Municipal Bonds

If the BAB cashflows have the same default rate as a regular municipal bond, then we can discount using municipal bond discount rates. In this case, we construct municipal bond zero curves taking only interdealer trades of fully tax-exempt bonds with S&P ratings of A and above following Ang, Bhansali and Xing (2010).

### 2. Treasuries

This is an extreme assumption as it specifies that BABs carry the same risk as the Federal government. We take zero coupon Treasury yields from the Federal Reserve constructed following Gürkaynak, Sack and Wright (2007).

### 3. Swaps

In this case, we assume BABs to carry the same credit risk as AA-rated financial institutions. We obtain swap zeros from Bloomberg.

In each case, we express the discounted BAB cashflows as a yield. The yield obtained using the municipal zero curve can be interpreted as the yield the BAB issuer would receive if a bond with equivalent cashflows was issued in the regular municipal bond market instead of as a BAB. Similarly, if the U.S. Treasury issued a bond with the same cashflows as the BAB, the implied Treasury yield would be the effective yield earned by an investor buying the comparable Treasury security. Finally, if an equivalent corporate bond were issued with the same cashflows as the BAB and the investor purchased this equivalent corporate bond, he would earn the implied yield obtained from discounting using the swap curve. Thus, each of the yields implied by the different sets of discount rates represent the price of a bond with the same cashflows as the BAB issued in different markets.

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<sup>8</sup> We do not consider corporate bond discount rates other than swaps or rates implied by CDS because we are unable to obtain zero-coupon curves for these types of securities.

Since the natural comparison of BABs is the traditional municipal market which is exempt from tax, we compute tax-adjusted yields. This is done using methods similar to Ang, Bhansali and Xing (2010). We take the viewpoint of an individual investor subject to a 35% tax rate held constant for the life of the bond. For example, for a par bond, the coupon cashflows net-of-tax are 65% of the original coupon. We compute an after-tax Treasury and after-tax swap yield discounting the net-of-tax cashflows received by the individual investor.

The issue yield of the BAB is not the borrowing cost to the issuer because the local or state government receives a 35% subsidy from the U.S. Treasury. We compute the effective issuer yield by discounting the original bond coupons multiplied by 65%, which is the actual coupon paid by the issuer when applying the municipal discount rates. Note that this is the same yield earned by an individual investor assuming the BAB carries the same default risk as a regular municipal bond. However, this effective yield does not include underwriting fees which are not available. Anecdotal evidence suggests underwriting fees on BABs are significantly higher than regular municipal issues.<sup>9</sup>

We summarize these definitions in Table 2.

## 4 Results

Table 3 presents the main results and compares the yields on BABs with the implied yields representing equivalent securities issued in other conventional bond markets. The average original issue yield of BABs in 2009 is 3.69%. It should be noted that there is well-known large heterogeneity in municipal market yields in general and the BAB market is no exception. The 10th and 90th percentile original BAB issue yields are 2.00% and 5.10%, respectively. We do not analyze this dispersion as we are interested in average level effects. Note that the implied municipal, Treasury, and swap yields we compute preserve their rankings no matter what the original BAB issue yields are because all the zero yield curves are upward sloping over our sample. Thus, our results on the yields of BABs relative to other markets are unaffected by the

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<sup>9</sup> See Dugan, I. J., "Build America Pays Off on Wall Street," *Wall Street Journal*, March 10, 2010.



dispersion.

Because of the Federal subsidy, the issuing entity does not pay the original issue yield. The effective yield to the issuer is 2.32%, on average, which is lower than the average BAB raw issue yield of 3.69% because 35% of the coupon payments are being made by the Federal government. This is the same after-tax yield, on average, an individual investor would earn buying BABs.

We compare the BAB effective issuer yield with the comparable regular municipal yield in the next line of Table 3. If local and state governments had issued equivalent municipal bonds instead of BABs, their financing rates would rise from 2.32% to 2.86%, a difference of 54 basis points per year. In fact, this is likely an understatement because the regular municipal yield is lower than what it otherwise would have been had the regular municipal market been forced to absorb the extra BAB issuance. Thus, the Obama stimulus package has succeeded in reducing the financing costs of local and state governments in funding infrastructure projects.

From an individual investor point of view, however, BABs have lower yields than regular municipal bonds. Buying a regular municipal bond yields 2.86%, which is higher than purchasing a BAB and receiving an after-tax yield of 2.32% (the same as the effective issuer yield). Thus, for individuals municipal bonds dominate BABs, on average. If the same clientele who regularly hold municipal bonds purchased the whole BAB issuance, individual investors would have received the higher yields of municipal bonds. In this light, the BAB program can be interpreted as a wealth transfer from the natural holders of municipal bonds, who are individual U.S. taxpayers, to corporations, pension funds, and foreign investors not subject to individual U.S. income taxes.

The next line in Table 3 compares BAB yields with Treasuries. For a tax-exempt entity such as an endowment, pension fund, or some foreign investors, BABs have higher yields compared to holding Treasuries. If equivalent Treasury securities were issued with the same cashflows as the BABs, these securities would yield 2.53%, on average. BABs yield 3.69%, on average, and dominate Treasuries, but some of the extra 116 basis points per year represents compensation

for bearing municipal risk rather than risk-free Treasuries. However, the credit risk in municipal issues, especially at the local government and state level, has been small.<sup>10</sup>

The relevant yield for an individual purchasing the equivalent Treasury bonds is 1.31% on an after-tax basis. For the individual investor, purchasing BABs yields 2.32%, on average, after taxes, which is a difference of 101 basis points. Again, a small part of this spread represents compensation for increased default risk. But, if BABs carry the same risk as regular municipal bonds, the yields on municipal bonds are higher than BABs for individual investors in the 35% tax bracket.

The next two lines of Table 3 report the equivalent swap yields and after-tax swap yields. For tax-exempt institutions and assuming that that BABs have the same, or better, credit risk as highly rated financial institutions, BABs have higher yields than high-grade corporate bonds: the implied yield is 2.81% on equivalent BAB cashflows issued in the swap market versus 3.69% for straight BABs. For individuals, after-tax swap yields are also dominated by BABs.

We report the percentage of the BAB issue price that is due to the Federal subsidy in the last line of Table 3. This is computed as the sum of the present value of the coupon stream multiplied by 35%, which is the amount paid by the Federal government, divided by the issue price. The Federal subsidy contributes 7.47%, on average, to the total value of BABs.

Finally, we also report the average implied yields each month from May to December 2009. (We exclude April as there is only one BAB issue during that month.) This shows that the corresponding rankings of the yields of BABs relative to other investments is very stable. The implied BAB yields are not very volatile because interest rates have not exhibited much variation during the sample period.

There are at least two reasons why BABs have lower after-tax yields relative to regular municipal bonds. One is that the BAB program has succeeded in opening up the municipal market to non-taxable and other non-traditional investors. Enhanced liquidity of BABs relative to regular municipal bonds would make BABs less risky and hence holders of BABs require

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<sup>10</sup> See, for example, The U.S. Municipal Bond Rating Scale: Mapping to the Global Rating Scale And Assigning Global Scale Ratings to Municipal Obligations, 2007, Moody's Investors Service.

lower after-tax yields compared to municipal bonds. We will explore this avenue in future research.<sup>11</sup> Consistent with a liquidity explanation is the fact that BABs are issued at higher raw yields than the implied swap and Treasury yields, with corporate bond and Treasury markets presumably being more liquid than BABs.

A second potential reason why regular municipal bonds have higher yields than after-tax, or effective, BAB yields is the outstanding puzzle that long municipal yields are “too high” relative to taxable yields, that is the term structure is generally steeper for municipal bonds than for Treasuries (see Green, 1993; Chalmers, 1998). In Table 4, we report a breakdown of the various implied BAB yields by maturity.<sup>12</sup> Breaking down the yields by maturity severely reduces the number of observations, particularly at the long-end of the yield curve with only seven observations, so our results have to be interpreted with caution.

The last column of Table 4 shows that the spread between implied municipal and effective BAB yields increases from 0.49% to 0.78% moving from maturities less than five years to maturities greater than 15 years, respectively. This is evidence that the municipal maturity effect plays a role. Thus, the lower financing costs of BABs for issuers comes partly from the original municipal yield curve being much steeper than the taxable yield curve. Comparing only long- versus short-maturity rates within each market, BABs have relatively small spreads for long-dated versus short-dated borrowing. The slope of the implied municipal and implied Treasury curves are very similar, at 2.56% and 2.68%, respectively. The slope of the effective BAB yield curve is 2.23%, lower than the slopes of the implied municipal and Treasury curves. But, the original BABs have the most pronounced upward-sloping yield with a slope of 3.42%.

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<sup>11</sup> Measuring liquidity in municipal bond markets is difficult because the entire municipal bond market is effectively illiquid compared to Treasury and equity markets (see, for example, Harris and Piwowar, 2006; Green, Hollifield and Schürhoff, 2007). Since the holders of municipal bonds are not known, it is impossible to directly test the ostensible purpose of the stimulus bill, that the municipal bond market has been opened up to non-individual investors through the BAB program.

<sup>12</sup> The municipal maturity puzzle is seen in Table 4 by the fact that the ratio of implied municipal to implied Treasury yields is  $2.080/1.511 = 1.38$  for maturities  $<5$  years and  $4.641/4.188 = 1.11$  for maturities  $>15$  years.

## 5 Conclusion

We analyze the prices of Build America Bonds (BABs) issued in 2009 under the American Recovery and Reinvestment Act of 2009. The BAB program is designed to broaden the clientele holding municipal debt and lower the borrowing cost of local and state governments funding capital and infrastructure projects. We find that this goal has been met: ignoring underwriting fees, local and state governments were able to obtain financing 54 basis points, on average, cheaper than issuing in the regular municipal bond market.

For tax-exempt institutions such as endowments, pension funds, and foreign investors not subject to U.S. income tax, BABs have original issue yields higher than regular tax-exempt municipal bonds. For institutional investors, BAB yields are 116 basis points higher than comparable Treasuries and 88 basis points higher than comparable highly rated corporate bonds. However, for individual investors subject to the highest 35% marginal income tax rate, BABs have lower yields compared to regular municipal bonds. This implies that the subsidies from the Federal government to local and state governments under the BAB program have accrued to new entrants in the municipal bond market and have not, on average, benefited individual U.S. taxpayers.

Under current law, BABs can only be issued in 2009 and 2010, but there is current discussion of extending the BAB program in various forms. Given the need for large continued public financing at the local and state government levels, our findings play an important role in evaluating the BAB program and the attractiveness of BABs compared to more traditional bond markets for institutions and individual investors.

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Table 1: BAB and Regular Municipal Issues Apr-Dec 2009

	BAB Issues		Regular Municipal Issues	
	Number	Proportion	Number	Proportion
Straight Bonds	2,417	39.1%	56,894	59.7%
Bonds with Option Features	3,760	60.9%	38,339	40.3%
Total Bonds	6,177		95,233	
Total Issue Size	\$63.4 bil		\$332.2 bil	
Average Issue Size	\$10.2 mil		\$3.5 mil	
Maturity at Issue				
≤5yrs	1,085	17.6%	31,425	33.0%
5-10yrs	1,711	27.7%	30,130	31.6%
10-20yrs	2,717	44.0%	28,303	29.7%
>20yrs	664	10.9%	5,375	5.6%
S&P Initial Rating				
AAA	1,262	20.4%	25,306	26.6%
AA	2,631	42.6%	29,549	31.0%
A	603	9.8%	9,164	9.6%
BBB and Below	9	0.1%	1,822	1.9%
Not Rated	1,672	27.1%	29,392	30.9%

Table 2: Yield Definitions

Original Issue Yield	Yield of the BAB at issue.
Effective Issuer Yield	Yield computed using the municipal curve taking 65% of the original BAB cashflows. This is the effective yield the local or state government is paying on the BAB. It is also the same as the after-tax yield an investor earns buying the BAB.
Implied Municipal Yield	Yield computed using the municipal curve. This is the yield if a regular municipal bond were purchased with the same cashflows as the BAB.
Implied Treasury Yield	Yield computed using the Treasury curve. This is the yield if a Treasury bond were purchased with the same cashflows as the BAB.
Implied After-Tax Treasury Yield	Yield computed taking 65% of the original BAB cashflows and discounting using the Treasury curve. This is the after-tax yield earned by an individual investor buying a Treasury bond with the same cashflows as the BAB.
Implied Swap Yield	Yield computed using the swap curve. This is the yield if a corporate bond rated above AA were purchased with the same cashflows as the BAB.
Implied After-Tax Swap Yield	Yield computed taking 65% of the original BAB cashflows and discounting using the swap curve. This is the after-tax yield earned by an individual investor buying a highly rated corporate bond with the same cashflows as the BAB.

Table 3: BAB Yields (in %) Compared to Other Bond Markets

	Months in 2009																	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec						
Overall																		
Mean	3.690	3.759	4.029	4.041	3.939	3.615	3.481	3.433	3.447	2.316	2.338	2.544	2.498	2.462	2.279	2.195	2.151	2.172
Original Issue Yield	3.690	3.759	4.029	4.041	3.939	3.615	3.481	3.433	3.447	2.316	2.338	2.544	2.498	2.462	2.279	2.195	2.151	2.172
Effective Issuer Yield	2.316	2.338	2.544	2.498	2.462	2.279	2.195	2.151	2.172	2.855	3.063	3.145	3.011	2.876	2.701	2.803	2.824	2.666
Implied Municipal Yield	2.855	3.063	3.145	3.011	2.876	2.701	2.803	2.824	2.666	2.533	2.458	2.696	2.542	2.708	2.492	2.475	2.431	2.495
Implied Treasury Yield	2.533	2.458	2.696	2.542	2.708	2.492	2.475	2.431	2.495	1.311	1.179	1.421	1.219	1.357	1.304	1.315	1.250	1.345
Implied After-Tax Treasury Yield	1.311	1.179	1.421	1.219	1.357	1.304	1.315	1.250	1.345	2.814	2.748	3.046	2.887	2.996	2.761	2.734	2.656	2.741
Implied Swap Yield	2.814	2.748	3.046	2.887	2.996	2.761	2.734	2.656	2.741	1.490	1.377	1.621	1.410	1.575	1.472	1.486	1.415	1.508
Implied After-Tax Swap Yield	1.490	1.377	1.621	1.410	1.575	1.472	1.486	1.415	1.508	Average Proportion of BAB Value	7.470							
Average Proportion of BAB Value Due to the Federal Subsidy	7.470																	



Table 4: Implied Yields by Maturity

	(1) Original Issue	(2) Effective Issue	(3) Municipal	(4) Treasury	(5) Swap	(3)–(2) Municipal – Effective	No Obs
<5 Years	2.595	1.591	2.080	1.511	2.013	0.490	861
5-10 Years	4.390	2.779	3.350	3.196	3.343	0.571	1135
10-15 Years	5.203	3.320	3.915	3.857	3.746	0.595	87
>15 Years	6.019	3.857	4.641	4.188	3.994	0.783	7
>15 Years minus <5 Years	3.424	2.226	2.561	2.677	1.981	0.293	