Municipal bond insurance: identifying the best payment plan

Andrew Kalotay and Leslie Abreo
Andrew Kalotay Associates, Inc., New York, New York, USA

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Abstract

Purpose – The volume of municipal bond insurance declined dramatically following the financial crisis of 2008. Insurance now is making a gradual comeback. Two related considerations complicate identification of the best insurance plan. One is the current practice in the municipal market of issuing callable bonds with an above-market coupon; such bonds are very likely to be refunded. The other is that the cost of insurance may depend on when the bonds are refunded. This paper shows how contemporary fixed income analytics can be applied to identifying the best payment plan.

Design/methodology/approach – When the structure of the bond issue is fixed, the benefit from insurance is simply in the increase in proceeds from the better pricing. The debt service is adjusted to incorporate the cashflows associated with insurance. The optimum time of refunding depends on the adjusted cashflows. The effective insurance cost is the difference between the present value of the debt service with and without the adjustment for insurance payments.

Findings – The timing of refunding is a critical determinant of which premium payment plan is the best deal. For a given bond structure, the likelihood of refunding favors plans that are contingent on that event.

Originality/value – The paper proposes an analytically rigorous approach to identifying the most cost-effective bond insurance plan. The findings are relevant to participants in municipal finance, including issuers and their advisors, underwriters and bond insurance companies.

Keywords Advance refunding, Bond insurance, Insurance plan selection, Insuring callable bonds, Municipal bonds, OAS analysis

Paper type Technical paper

Background

Before the financial crisis of 2008, around 50 per cent of municipal issues by volume were insured. Several major companies competed for the business. Insured bonds were priced in the market as AAA or strong AA, depending on the credit of the insurer. Following the collapse of the large bond insurance companies' ratings (because of their exposure to mortgage-backed securities), the volume declined dramatically, reaching a low point of 3.4 per cent in 2013 (Bergstresser *et al.*, 2015). At present, insurance for smaller issues is making a modest comeback; the first quarter of 2016 saw about 5.9 per cent of new issues insured (Weitzman, 2016). In a departure from previous experience, insured bonds presently trade in the range of A+ to AA−, rather than AA to AAA, credit. These days, the providers of insurance are referred to as financial guarantors.

Another form of financial guarantee is provided by credit default swaps. CDS are related to bond insurance; however, there are some significant differences (Schmaltz and Thivaios, 2012). For example, CDS are secondary market derivatives typically used by large investors, while conventional bond insurance applies to the primary market, and is purchased by issuers. Following the collapse of the conventional bond insurance companies, Berkshire Hathaway entered the arena by offering CDS for selected municipal bonds (Campbell, 2008). It is noteworthy that the company recently abandoned the CDS business (Durden, 2016).

Municipalities buy insurance to obtain a higher credit rating and a commensurately lower borrowing cost for a bond issue. The economic rationale for insurance is discussed in Nanda

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and Singh (2004). The savings arise either from a lower coupon that generates the desired proceeds or, if the coupon is fixed, a lower yield (Wilkoff, 2013) and higher price (resulting in greater proceeds or less debt issuance generating the desired amount of funds).

In recent years, it has become customary to issue municipal bonds with an above-market coupon, usually 5 per cent, at a substantial premium over par. Munis are usually callable at par after 10 years, and they may also be eligible for advance refunding. The likelihood of bonds issued with an above-market coupon being refunded is obviously much greater than those issued at par.

Investors prefer premium bonds for accounting and tax reasons, and also because of their improved credit in case they are advance refunded. From the perspective of the municipal treasurer, the cashflow savings due to ongoing refundings provide cosmetic appeal (Kalotay, 2012).

The traditional plan for insurance used to be a single upfront payment at the time of issuance. The risk in this case is that in the event the bonds are refunded, the issuer does not realize the full benefit of the insurance. This problem can be mitigated by two types of payment plans (discussed below), whose cost depends on whether the bonds are refunded.

Clearly, the *ex post* cost of insuring a callable bond depends on when it is refunded. To compare alternative premium plans *ex ante*, we have to estimate the likelihood of a bond with a specified coupon and maturity being refunded at any given time. This problem can be handled using standard contemporary bond analytics, the so-called option-adjusted spread (OAS) approach (Kalotay *et al.*, 1993). The rule is to refund when the resulting savings equal the value of the forfeited refunding option, i.e. when the refunding efficiency is 100 per cent (Kalotay *et al.*, 2007; Kalotay and Raineri, 2016).

We note that, among other factors, the refunding decision depends on the coupon of the outstanding bonds relative to the issuer's current uninsured borrowing cost. Everything else being the same, bonds with higher coupons are refunded sooner.

Net benefit of insurance

How can municipalities ensure that bond insurance makes economic sense? The answer is to pay close attention to the costs and benefits. In the case of a single upfront payment, the analysis is easy. If the coupon is fixed, say 5 per cent, and the entire insurance premium is paid at the beginning, the increase in proceeds should exceed the cost of insurance:

$$\textit{Net Benefit of Insurance} = \textit{Increase in Proceeds} - \textit{Full Premium Paid}$$

The bond cash flows are identical whether or not the bond is insured. Also, if the bond is refundable, insurance does not affect the refunding decision; all that matters is the bond's coupon relative to prevailing rates.

But if the benefit of insurance is in the form of a lower coupon rather than greater proceeds, the answer is more elusive. Consider the case of an advance refundable 30-year bond sold to the public at par. The coupon is 4.25 per cent without insurance and 4.00 per cent with it. It is easy to determine the better alternative if neither bond is refunded – let us suppose that the choice is the 4.00 per cent insured bond. But, if shortly after issuance rates decline to a level where the 4.00 per cent insured bonds could be advance refunded economically, insurance would provide little benefit. This consideration is hardly academic. Millions of dollars of prepaid premiums are washed away when issues are refunded.

In short, if the contemplated insured and uninsured structures are not identical, refundability complicates the determination of whether the bond should be insured. Below we assume that the issue structure is fixed – 5 per cent coupon and 10-year par call. Because the debt service is unaffected by insurance, we can focus on the cost of insurance. But even in this case the decision can be difficult because there are alternatives to the upfront insurance premium, and the cost of these alternatives depends on when the bond is refunded.

As discussed above, under the one-time upfront payment plan the benefit from insurance immediately vanishes once the bond is refunded. Responding to client demand, some insurers now split the premium into a smaller upfront portion and "pay-as-you-go" instalments starting on the call date and ending when the bond is refunded. In another alternative, the issuer pays an upfront premium, but receives a credit toward future insurance costs if the bond is refunded. So in the present brave new world, there are three competing payment plans to consider:

(1) *Plan A*: single upfront payment;
(2) *Plan B*: smaller upfront payment followed by instalments commencing on the call date; and
(3) *Plan C*: single upfront payment and a credit toward future insurance cost if the bond is refunded.

The choice should recognize the possibility of refunding, and that the refunding decision may depend on the insurance plan. For example, under Plan B the "effective" interest payments beyond the call date include the premium instalments (Kalotay and Abreo, 2003), and this creates an incentive to refund earlier than under Plan A.

Modeling the cash flows and options for the alternatives

Plan A: single upfront payment. Here, insurance is a sunk cost. The refunding decision depends only on the terms of the bond; insurance is irrelevant.

Plan B: smaller upfront payment followed by instalments commencing on the call date. This is modeled as a step-up coupon callable bond. The upfront payment is a sunk cost, and commencing on the call date, the instalments are added to the coupon.

Plan C: single upfront payment and a credit toward future insurance cost. This is modeled by reducing the call prices of the bond by the credit applicable toward future insurance cost.

The salient observation is that the structure of the insurance payment plan affects the refunding strategy. Refunding will be accelerated under Plans B or C because under Plan B, it terminates the installment payments, and under Plan C it triggers a credit.

How then can a municipality determine the best plan? There is no clear-cut choice; the answer depends on when the bond is refunded, which in turn depends on the evolution of interest rates. The calculation of the expected net benefit requires sophisticated option-based machinery. The effective cost of the premium under Plan B is the sum of the upfront premium and the probability-weighted present value of the pay-as-you-go premium installments. In case of Plan C, it is the upfront premium less the probability-weighted present value of the refunding insurance credit. The critical problem is to determine the timing of refundings, once the relevant cashflows have been properly modeled. This is done using an industry-standard approach described below.

Determining when to refund

We assume that interest rates (specified by a par optionless yield curve) evolve according to the industry-standard Black and Karasinski (1991) model. The process is specified by two parameters, the volatility of the short-term rate and the mean reversion factor. If the mean reversion factor is set to 0 (as on the Bloomberg terminal), the resulting process reduces to lognormal. The appropriate volatility depends on the prevailing market conditions; it can be estimated from the prices of liquid callable bonds. At the current historically low level of interest rates, the volatility is in the 15 per cent to 20 per cent range. If rates move significantly higher, the implied volatility is certain to decline.

A complicating consideration in the case of tax-exempt bonds is that the standard municipal yield curve is specified by the yields of hypothetical 5 per cent bonds callable at par at any time after 10 years. The reason for such an unorthodox yield curve is the industry's preference for 5 per cent callable bonds, as discussed above. These callable benchmark curves are often defective, and to be useful, they have to be converted to optionless par curves (Kalotay, 2016). The related technical challenges go beyond the scope of this article.

Given the par optionless yield curve and the volatility, the challenge is to determine the value of the call/refunding option and optimal time to exercise this option. The textbook approach, using the so-called OAS methodology, is described in detail in Kalotay *et al.* (2007).

An important practical consideration is whether or not to use the issuer's uninsured or insured curve for the analysis. To answer this question, we observe that from the perspective of the municipality the risk of default is the same whether or not the bonds are insured (such is obviously not the case for the investors). Thus, the relevant yield curve is the issuer's uninsured curve (Kalotay and Abreo, 2003). If this curve is not readily available, a short-hand way of estimating it is to adjust the AAA benchmark curve by the OAS implied by the price of the uninsured bonds.

Calculation of the net benefit of insurance

If the structure is fixed, as assumed below, insurance increases the sale price. The benefit is simply the difference between the market value of the insured and uninsured issues. Calculating the cost of insurance, i.e. the effective premium, can be significantly more challenging. In the case of a single upfront payment, the cost of insurance is known; however, in other cases it may depend on when the bonds are refunded. *The net benefit from insurance is the difference between the increase in proceeds and the effective premium (i.e. the expected cost of insurance*).

The effective premium is the difference between the present value of the debt service with and without insurance. The cost with insurance should include any payment or credit related to insurance, in particular any upfront premium. The calculations should take into account refunding opportunities, keeping in mind that the refunding decisions may depend on the structure of the insurance payment plans. As discussed above, refunding decisions should be based on the issuer's uninsured borrowing rates.

In summary:

$$\textit{Net Benefit of Insurance} = \textit{Increase in Proceeds} - \textit{Effective Premium Paid}$$

An example

Table I below displays the results of the analysis[1] of the alternative insurance plans for a US$10m 30-year 5 per cent NC-10 bond, eligible for advance refunding. The uninsured yield (to worst) is 3.45 per cent, which converts to a price of 113.015, resulting in proceeds of US$11,301,500. With insurance, the yield to worst would decline to 3.00 per cent, or a price of 117.169, and proceeds of US$11,716,900, exceeding the uninsured proceeds by US$415,400.

The debt service is US$25,000,000. Plan A has an all-upfront premium of 0.75 per cent of the debt service, or US$187,500. Because this plan would save the issuer US$227,900 (US$415,400 − 187,500), insurance is clearly beneficial. But is there a preferable alternative premium plan?

Plan B charges upfront 0.75 per cent of debt service (including principal) up to the call date (US$112,500) and 0.10 per cent of par (US$10,000) every year starting from the first call date, at the end of the 10th year. Plan C has an upfront premium of 0.80 per cent of debt service (US$200,000) but provides a credit of 50 per cent of the premium (US$100,000) toward future insurance costs, if the bond is refunded.

As we see, Plan C is the best deal, with a net benefit of US$263,938. The high upfront premium is mitigated by the 50 per cent credit upon refunding.

In the above analysis, it is assumed that the credit improvement (price after insurance) would be the same for each insurer. This may not be the case in practice, but the approach discussed above is general, and it can handle this eventuality.

Related observations

Advance refunding

Eligibility for advance refunding provides more refunding opportunities. For this reason, under Plans B and C, the effective premium is lower if the bond is advance refundable than if it is not. Rates may be sufficiently low prior to the call date to warrant advance refunding, but too high beyond the call date for beneficial "current" refunding.

Interest rate volatility

The likelihood of refunding depends on the evolution of interest rates, which in turn depends on interest rate volatility. In the case of an "at-the-money" or "out-of-the-money" option, higher volatility provides more opportunities for a beneficial option exercise. But if the option is "deep-in-the-money", higher volatility increases the probability that the option cannot be exercised beneficially.

As discussed above, the current practice in municipal finance is to issue 5 per cent bonds callable at par in Year 10. Because 5 per cent exceeds current investment-grade tax-exempt rates, these bonds are sold at a substantial premium above par and (depending on maturity) are expected to be refunded. In other words, the refunding option is deep in the money. Thus, a higher volatility would decrease the likelihood of refunding, which in turn would increase the effective premium.

Optimal coupon structure

In the preceding discussion, we assumed that the coupon of the contemplated issue was given; in the example above, it was 5 per cent. But the coupon is part of the structuring process, and it affects effective premium in several ways.

First, the coupon determines the principal amount of the issue: the higher the coupon the higher the price to public, and therefore the less is the principal required to raise the authorized proceeds. Note that if the issue is callable, as assumed here, a higher coupon does not result in a commensurately linear increase in market price because high coupon callable bonds are priced to the call date. The principal amount and the coupon jointly determine the debt service. The debt service, in turn, determines the nominal cost of insurance.

Components of analysis	Plan A (Traditional)	Plan B	Plan C
Upfront premium	US$187,500	US$112,500	US$200,000
Expected value of refunding credit	N/A	N/A	US$48,538
Expected value of annual premiums	N/A	US$40,081	N/A
Effective premium	US$187,500	US$152,581	US$151,462
Net benefit*	US$227,900	US$262,819	US$263,938

Note: * Increase in Proceeds (US$415,400) – effective premium

Table I.
Which is the best insurance deal?

The likelihood of refunding also increases with the coupon. Everything else being the same, a higher coupon would favor payment plans that depend on the timing of refunding. However, as we see above, everything else is not the same because the coupon affects the principal amount and the nominal cost of insurance. Moreover, the coupon also affects the marketability of the issue. Designing the optimal structure is a challenging exercise, which is beyond the scope of this paper.

Summary

The 2008 financial crisis resulted in the demise of the major bond insurance companies. In recent years, insurance of municipal bonds has been making a modest comeback.

Municipal bonds are usually callable, and they may also be eligible for advance refunding. Analyzing the alternative premium payment plans is complicated by the fact that the effective cost of a payment plan may depend on the timing of refunding. We have shown how contemporary fixed income analytics, so-called OAS technology, can be deployed to identify the payment plan with the lowest expected cost. The basic idea is to combine the premium payments associated with the particular insurance plan with the coupon and call price schedule of the bond issue and determine the optimal refunding strategy for the resulting cashflows.

Municipal bonds are usually issued as a series of tranches, and we demonstrated how the proposed approach can be applied to a single tranche. Extending the approach to an entire series is straightforward.

Because optional redemption features are standard in municipal bond issues, even a seemingly simple decision – selecting the best insurance plan – requires contemporary option-based analytics. Issuers and their financial advisors should take note.

Note

1. Analyzed using Kalotay Analytics' independent tool, *MINER*™, available gratis on its website for comparing insurance quotes of the above types for a single bond, to enable issuers and their financial advisors to choose the plan with the best value. For our analysis, we used an industry AAA benchmark curve with a volatility of 15%. The implied OAS explaining the uninsured price of 113.015 was 155 basis points.

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Corresponding author
Andrew Kalotay can be contacted at: andy@kalotay.com