
Evaluation of Underwriter Proposals for Negotiated Municipal Bond Offerings

Glenn L. Stevens
Department of Business Administration
Franklin & Marshall College
P. O. Box 3003
Lancaster, Pa. 17604-3003
email: G_Stevens@Acad.FandM.Edu

Abstract

The debate continues about the most cost-effective method of issuing municipal securities. The emergence of online securities marketing will add a new dimension to this debate. Some analysts argue that the competitive sale process is the most advantageous because of the inherent protections of open bidding. Others argue that a negotiated sale produces comparable financing costs and affords issuers considerably more flexibility in the marketing of municipal securities. However, the negotiated sale remains the dominant bond marketing strategy. Thus, it is important for issuers to have tools to accurately and fairly evaluate the actual costs of proposed bond offerings. This paper reviews the techniques that are available for comparing alternative pricing proposals and examines their strengths and weaknesses. It includes a description of a process that issuers of negotiated offerings can use to determine the appropriateness of a proposed pricing along with a description of a computer-based evaluation model.

Issuers of municipal bonds can use either of two marketing strategies the competitive sale and the negotiated sale. While there continues to be debate about which strategy is the most cost-effective, negotiated bond sales have become increasingly more common, a trend that is consistent with practices in the corporate bond market. This article describes a process that an issuer of municipal bonds sold by negotiated sale can use to evaluate an underwriter's purchase proposal on the day a bond

issue is priced. Various measures that are used to compare the relative costs of bond financing proposals are described. Reliance on net interest cost (NIC), one commonly used measure of relative cost, can lead to improper financing decisions. A better process to evaluate the effective cost of negotiated bond sales that incorporates true interest cost (TIC) and duration is described along with the related computer spreadsheet model.

Arranging debt financing through the issuance of municipal bonds is an important business activity for state and local governments, special districts and public authorities. The purpose of this article is to describe a process that an issuer of municipal bonds sold by negotiated offering can use to evaluate an underwriter's purchase proposal on the day a bond offering is approved and priced.

The analytical process utilizes true interest cost (TIC), the duration of the bond issue, and a comparison to the relative pricings of other similar bond issues. A computer spreadsheet model is presented that calculates net interest cost (NIC), net present value (NPV), TIC, and duration. The spreadsheet model and the evaluation process described in this article were developed in conjunction with the analysis and marketing of a recent negotiated bond issue by a large Pennsylvania school district. They were useful in determining the lowest cost financing alternative from several proposals submitted by the designated underwriter.

Issuers of municipal bonds can use either of two marketing strategies. They are the competitive, i.e., public, sale, or a negotiated, i.e., private, sale. Bond issuers have several methods to evaluate bond purchase proposals submitted by underwriters and other potential buyers. The municipal finance literature describes how such issuers can assess net interest cost (NIC) and true interest cost (TIC), two traditional measures of overall financing cost (*Public Securities Association 1990, 180-186; Petersen and McLoughlin 1991, 282-282; and, McLoughlin 1996, 553-554*). NIC and TIC are both percentage measures. TIC incorporates the time value of money, an important consideration

ignored by NIC. Puelz (1996, 410) summarizes and compares NIC and TIC and includes a description of the net present value method (NPV) that measures the total dollar cost of a bond issue. NPV, like TIC, is a measure that incorporates the time value of money. Bierman (1996) examines NIC, TIC, and NPV, but concludes that an alternate strategy, "none of the above", also called NOTA or the Bierman technique, is a simpler and theoretically correct measure for selecting the least cost financing proposal from a group of competitive bids. The Bierman technique identifies the lowest cost proposal as the one that presents the highest bid.

While NIC, TIC, NPV, and the Bierman technique are important measures of relative cost, they do not answer the most important question for an issuer that uses the negotiated sale, i.e., does the underwriter's final pricing proposal, or one of two or more alternatives presented by the underwriter, represent the lowest cost financing option? The traditional measures are inadequate because, on the pricing date for a negotiated offering, the issuer is only considering the proposal, or alternatives, of the designated underwriter or syndicate. The issuer, at that point, does not have financing proposals from competing underwriters.

The article begins with an overview of the mechanics of negotiated and competitive municipal bond marketing strategies and the comparative advantages and disadvantages of the two strategies. Various measures that are used to compare the relative costs of bond financing proposals, including a comparison of the relative advantages and disadvantages of the various evaluation methods, are then described. An example shows how reliance on NIC, one commonly used measure of relative cost, can lead to improper financing decisions. The final section describes a better process used to evaluate the effective cost of negotiated bond offerings.

I. Bond Marketing Strategies

Issuers of municipal bonds can use either of two marketing strategies the competitive and the negotiated. While there

continues to be debate about which strategy is the most cost-effective, negotiated bond offerings have become increasingly more common. In 1970, 83 percent were sold competitively, and only 17 percent sold by negotiation. By 1994 approximately 80 percent of municipal bonds were sold by negotiation, and only about 20 percent were sold by competitive offerings. This trend in the increased utilization of negotiated municipal bond sales, Leonard (1996, 43) explains, is consistent with practices in the corporate bond market where most bonds are sold by negotiation.

Due, in part, to allegations of improper influence peddling involving municipal bond offerings in several jurisdictions, there is heightened interest in the procedures issuers use to market tax-exempt municipal bonds. Concerns about this problem led the Municipal Securities Rulemaking Board (MSRB) to issue Rule G-37 in April 1994. This so-called "pay-to-play" rule prohibits municipal securities brokers and dealers from handling negotiated bond offerings for an issuer within two years of contributing directly, or indirectly, to an official of the issuer who can influence the underwriter selection process. These concerns also prompted a number of governments to consider mandating competitive sales for all bond issues.

The Securities and Exchange Commission (SEC) and the Internal Revenue Service (IRS) are concerned about procedures associated with new issues and refinancings in the \$1.3 trillion municipal bond market (Pare 1995; Beckett 1997). Both agencies have launched intensive probes in several jurisdictions aimed at "pay-to-play" violations and "yield burning" abuses (Connor 1997; Gasparino and Connor 1997; Mysak 1995). Yield burning involves transactions where underwriters overcharge issuers for temporary investments made in conjunction with municipal bond refinancings. The investigations include bond transactions in Massachusetts, Florida, California and New Jersey, and Pennsylvania is now a major focus of the inquiries. The investigations include deals managed by leading underwriters including Prudential Securities, Alex. Brown, New Jersey's First Fidelity Bank, Lazard Freres, Goldman Sachs, and Meridian Capital Markets, now a subsidiary of Core States Bank. These

investigations should remind issuers of their responsibilities to follow proper bond marketing procedures and regulations, and to apply improved decision-making techniques that are available for evaluating the costs of underwriter proposals (*Puelz and Lee 1989, 153*).

There is also new research interest in the cost implications of municipal bond marketing strategies. Leonard (*1994*) reviewed and evaluated the existing literature concerning the cost differential between competitive and negotiated bond marketing strategies. Neither method has proven to be superior in terms of consistently producing lower overall financing costs. In a recent large-sample study of 2,333 municipal bonds sold in 1992, Leonard (*1996*) concluded that there is no evidence to suggest that financing costs as measured by reoffer yields on negotiated bonds are different from the costs on competitive sales. Similarly, Stevens and Wood (*1997*) compared the TICs of competitive and negotiated school district bond sales in Pennsylvania during 1993 and concluded that the bond marketing strategy does not systematically influence overall financing costs. In contrast, a study of Oregon bond sales during 1992 and 1993 suggests that, on average, competitive sales result in lower interest costs for issuers compared to negotiated offerings (*Simonsen and Robbins 1996, 57*). Simonsen and Robbins contend that this finding is consistent with research done in the 1970s and 1980s, which they believe suggests that interest costs are generally lower for competitive municipal bond sales.

In related research, Stevens (*1997*) observes that the negotiated sale may not be a single strategy. Negotiation may represent a range of private sale strategies that are differentiated on the basis of the competitiveness of the underwriter search and selection process. This suggests that some negotiated sales may be equally as competitive as so-called competitive sales.

II. Comparison of Competitive and Negotiated Offerings

A competitive bond offering involves bid solicitation from potential purchasers, principally underwriters. Puelz (1996, 407) describes it as a public auction where the bonds are sold to the underwriter or other purchaser that offers the highest price, resulting in the lowest financing costs. Because a competitive sale is a time consuming process and many issuers sell bonds infrequently, a financial advisor is often employed to assist with the process (Clarke 1997, 75). The financial advisor's duties include preparation of the preliminary and final official statements, recommending the amount and structure of the bond issue, proposing a sale date, and evaluating the competitive proposals submitted by competing underwriters and investors. Puelz (1996, 405) explains that the key feature of a competitive sale is that the structure of the bond issue, including the principal redemption schedule and coupon interest rates, is determined by the issuer prior to the solicitation of competitive bids for the purchase of the bond issue.

A negotiated offering differs from a competitive offering in the method used for selecting the underwriter, the role of the underwriter in the bond marketing process, and the procedures used for determining interest rates and underwriter compensation. In a negotiated offering, the underwriter is selected first, often through the solicitation of competitive requests for proposals (Leonard 1994, 15). In some cases, the underwriter selection process is noncompetitive, e.g., the underwriter selection is based on a previous business or personal relationship with the issuer. In a negotiated offering, the interest costs and other terms of the bond issue, including underwriter compensation, are negotiated between the issuer and the underwriter. The underwriter handles most of the administrative activities associated with the bond issue. In addition, the underwriter often engages in pre-sale marketing activities for the bond issue. Those activities, including making contacts with other potential underwriters and conducting informational meetings

with interested investors, are designed to increase investor demand in the forthcoming bond issue, which can result in higher prices and lower financing costs.

There are advantages and disadvantages for both competitive and negotiated offerings. Proponents of the competitive sale believe that the inherent protections afforded by the open, competitive nature of the public bidding process lead to lower costs (*McLoughlin 1996, 553*). The traditional view of the negotiated offering is that it may allow the designated underwriter to commit more resources to the bond marketing process, resulting in higher investor demand and lower financing costs (*Leonard 1996, 40*). Leonard's (*1996, 41*) compilation of the advantages and disadvantages of competitive bidding and negotiation cited in the public finance literature is presented in Table 1.

TABLE 1

**ADVANTAGES AND DISADVANTAGES OF
COMPETITIVE AND NEGOTIATED SALES**

ADVANTAGES OF COMPETITIVE BIDDING

Lowest possible cost is achieved due to underwriter search for investors with highest offer prices. Historically, gross underwriter spreads have been lower. Avoids appearance of unfairness or impropriety in selecting underwriter.

DISADVANTAGES OF COMPETITIVE
BIDDING

Bids may include risk premium since bidders do not know if they will be successful. Issuer has less flexibility to change the sale date or the structure of the bond issue once the notice of sale has been issued. Issuer has less control over

the composition of the underwriting syndicate. Terms of the offering may not be the best possible terms.

ADVANTAGES OF NEGOTIATION

Negotiating underwriter can perform origination tasks, eliminating need for and cost of an outside advisor. Higher level of pre-sale search can be conducted, thereby increasing the likelihood of finding investors with the highest offer prices. Greater flexibility to change the sale date or the structure of the bond issue in response to changing market conditions. Greater control over the composition of the underwriting syndicate.

DISADVANTAGES OF NEGOTIATION

No direct underwriter competition in setting the terms of the bond issue. Difficult to determine if gross underwriter spread is appropriate since a wider range of services is provided. May result in charges of favoritism toward firms that are selected to underwrite the bond issue.

Source: Paul A. Leonard (1996). "An Empirical Analysis of Competitive Bid and Negotiated Offerings of Municipal Bonds." Municipal Finance Journal 17 (Spring): 41.

An important reason that issuers select the negotiated offering strategy is that it affords issuers the opportunity to search for new ideas and financing techniques. Many issuers of municipal securities are infrequent participants in the bond market and are often not always well-informed about the best way to structure a bond issue or about current pricing practices. A school district, for example, may only need to access the municipal bond market when it must finance a new building or undertake extensive capital improvements to existing facilities. A

sewer or water authority may only need bond financing to expand processing facilities or the distribution infrastructure, events that may only occur every ten or twenty years. Similarly, a waste disposal authority may only need bond financing to develop a refuse facility or to install a new incinerator, again, activities that may occur only once every five, ten or fifteen years.

The negotiated offering that involves soliciting multiple underwriter proposals allows the issuer to solicit the advice of several underwriters about how to structure and price a proposed bond issue without the need to incur the additional cost of an independent financial advisor or consultant. It is a way for the issuer to learn about new ways to structure and market a bond issue by soliciting suggestions from underwriters, the individuals and organizations that are the most actively involved in the market for municipal securities and, presumably, the most knowledgeable.

A principal advantage of the negotiated offering is the ability to time market entry. The flexibility to time entry into the financial markets can produce lower financing costs, because the issuer is not restricted to a specific sale date. The most significant disadvantage of the negotiated offering is that the interest rates for the bond issue and the underwriter's fees and charges are negotiated, they are not determined by an open, competitive bidding process. This creates a situation where the issuer cannot be sure that the bond issue is marketed at the lowest possible cost available in the financial markets at the time of the sale.

III. Calculation of Financing Cost

Calculating the overall financing cost of a municipal bond issue is often not simple because most municipal bonds are issued with serial maturities, i.e., a portion of the total bond principal matures each year over a period of years. The individual serial bonds usually carry different coupon interest rates, thereby complicating the computation. Another complicating factor is that many municipal bond issues are sold with premiums or discounts. For example, capital appreciation bonds, or CABs, may be sold as

zero-coupon bonds, or with below-market interest rates. These pricing patterns result in substantial original issue discounts. With the complexity associated with many municipal bond issues, it is surprising that a relatively unsophisticated interest cost calculation, NIC, remains a popular and commonly used measure of the cost of a municipal bond issue.

A. Net Interest Cost

NIC is the simple average annual interest rate for a bond issue. For bonds issued with serial maturities, it can be computed using the following formula (*Public Securities Association 1990, 181*):

$$\text{NIC} = (\text{Total Interest Payments}) - (\text{Original Issue Premium}) + (\text{Original Issue Discount})$$

Bond Year Dollars (i.e., Principal of each serial x Maturity of each serial)

The numerator in the formula represents the sum of interest payments to be made over the life of the bond issue, minus or plus any original issue premiums or discounts for the individual serial bonds. Accrued interest may be treated as a premium in the computation of NIC (*Public Securities Association 1990, 181*). The denominator in the formula, bond year dollars, measures the total principal amount of the bonds outstanding over the time the bonds are outstanding. It is computed by multiplying the principal of each serial in the bond issue by the number of years to its maturity.

NIC continues to be a widely used method of presenting the cost of a municipal bond issue (*McLoughlin 1996, 553; Clarke 1997, 80*). For example, in a recent negotiated bond offering that involved the solicitation of proposals from several leading underwriters, the NIC was the only measure of cost presented in the proposals. One underwriter even offered to guarantee that the NIC of its bond issue would be lower than comparable issues marketed in the state for a period including two days before the actual date of the proposed sale. Despite its widespread use, there is an obvious fundamental weakness in the use of NIC as the

measure of total financing costs, it ignores the time value of money. Other measures, NPV and TIC, correct for this fatal flaw.

B. Net Present Value Method

Net Present Value (NPV) is a second method that is utilized to compare the costs of competing underwriter proposals. Because NPV incorporates the time value of money, it is theoretically superior to NIC. The net present value of the cash flows associated with alternative proposed bond issues must be calculated. The proposal that offers the highest positive NPV, or lowest negative NPV, is the option that affords the least costly financing option. The computation of the NPV involves comparing the sum of the present values of the cash inflows, e.g., bond proceeds plus fees received, less discounts, fees paid, insurance premiums, and other origination charges, with the sum of the present values of the cash outflows over the life of the bond issue, i.e., principal and interest payments.

The most significant problem with utilizing the NPV method is selecting of the appropriate interest rate, i.e., discount rate, to use in determining the present values of the cash flows. Bierman (1996, 559) explains that selecting a single rate is particularly difficult for municipal bonds because most issues are serialized, i.e., they involve periodic principal redemptions over the term of the bond issue. For example, a ten-year \$100 million bond issue may be structured so that \$10 million of principal matures each year over the life of the bond issue. To remedy this problem, Puelz (1996, 410) suggests discounting the cash flows at the expected forward rate for each compounding period. For example, the discount rates for four 6-month periods would be determined from the implied forward rates for current 6-month, 1-year, 18-month, and 2-year borrowings.

C. True Interest Cost

A measure of the effective cost of a bond issue is the TIC. Like NPV, it also incorporates the time value of money in the determination of overall financing costs. Unlike NPV where the selection of the appropriate discount rate is problematic, the TIC

method assumes the discount rate is the internal rate of return of the bond issue. TIC can be referred to as the cost to maturity and is equal to the internal rate of return, or yield to maturity, that is received by investors over the life of a bond issue (*Gitman 1997, 433*). It is computed by calculating the interest rate that equalizes the present values of the issuer's future cash payments, i.e., principal and interest payments, with the net proceeds of the bond issue, i.e., total principal of the serial bonds adjusted for fees, sales charges, administrative expenses and any original issue premiums or discounts (*Nauss 1986, 870*). The equation defining TIC, where n equals the number of years to maturity, is (*Weston, Besley and Brigham 1996, 499*):

$$\begin{array}{rcl}
 \text{Net Proceeds of Bond} & + & (1 + \text{Interest \& Principal})^n = 0 \\
 \text{Issue} & & \hline
 \text{(i.e., sum of principal of each} & & \text{(1 + TIC)^n} \\
 \text{serial} & & \\
 \text{adjusted for fees,} & & \\
 \text{administrative expenses} & & \\
 \text{and original issue premiums \&} & & \\
 \text{discounts)} & &
 \end{array}$$

TIC is generally regarded in the municipal finance literature as the preferred method of determining the effective cost of a bond issue (*McLoughlin 1996, 554*). By incorporating the time value of money, this measure gives more weight to earlier payments than to later payments. Thus, the TIC appropriately measures the effects of changes in the maturity patterns of serial bonds and differences in the structure of coupon rates.

Which is the better method, NPV or TIC, for determining the effective cost of a bond issue? It is difficult to determine the better method because the theoretical and practical strengths of the approaches differ. The theoretical strength of NPV is that it implicitly assumes the reinvestment of cash flows at the discount rate, the assumed cost of capital. In contrast, TIC assumes reinvestment at the IRR. On the other hand, evidence suggests that financial managers, underwriters, and investors prefer to

use percentage cost measures such as TIC rather than dollar cost measures like NPV (*Gitman 1997, 382*).

D. Bierman Technique

Bierman (*1985*) rejected the traditional methods for evaluating competitively bid bond issues discussed previously. He suggested an alternative measure, "None of the Above," also labeled NOTA or the Bierman technique. This technique requires the issuer, with the help of an independent financial advisor or consultant, to structure the bond issue prior to soliciting competing purchase proposals. This involves determining the amount of funds required, assigning appropriate market interest rates, and establishing the repayment schedule. The bond issue is then sold to the bidder that offers the most immediate cash for the issue, i.e., the highest price.

Bierman describes his technique as "straightforward" because a bond issue is sold to the underwriter that offers the highest price. Zinn (*1996, 567*) suggests that public confidence in municipal financings is improved because the underwriter selection process is reduced to "the one with the biggest check wins." This allegedly represents a decision rule that encourages public trust because it is simple to measure, easy to understand, and free from conflicts of interest. On the other hand, Anderson (*1986*) concludes that the Bierman technique is an oversimplification. For example, the Bierman technique is not appropriate for issuers that use a negotiated offering strategy, because the structure and pricing of the bond issue are determined only after an underwriter has been selected.

IV. Comparison of Cost Evaluation Methods

Table 2 compares the four methods for determining the overall cost of a municipal bond issue.

TABLE 2

**ADVANTAGES AND DISADVANTAGES OF
METHODS FOR COMPARING FINANCING COSTS
OF COMPETING MUNICIPAL BOND OFFERINGS**

Method - NIC

What is Measured? Average nominal interest rate.

Principal Advantage: Easy to calculate.

Principal Disadvantage: Ignores time value of money, thus it cannot be used to produce reliable cost rankings for alternative proposals.

Method - NPV

What is Measured? Net Present value (in dollars) of cash inflows (bond proceeds) and cash outflows (interest and principal payments).

Principal Advantages: Recognizes time value of money (i.e., timing of payments). Produces an absolute measure in dollars of the NPV.

Principal Disadvantages: Difficult to determine the appropriate discount rate. Choice of alternative proposals depends heavily on selected discount

rate.

Method - TIC

What is Measured? Rate of interest that equates present value of cash inflows (bond proceeds) and cash outflows (interest and principal payments)

Principal Advantages: Recognizes time value of money (i.e., timing of payments). Produces a relative measure in percent of the cost of a bond issue.

Principal Disadvantage: The IRR reinvestment assumption (i.e., the IRR) may result in incorrect decision if actual cost of financing is considerably higher than TIC.

Method - NOTA (Bierman Technique)

What is Measured? Highest price offered for bonds.

Principal Advantages: Theoretically correct measure of least cost alternative. Simple to identify, evaluate, and understand.

Principal Disadvantages: Inappropriate evaluation method for negotiated bond offering, which represents marketing strategy for most municipal bonds.

The deficiency associated with the use of NIC to evaluate bond financing proposals is best illustrated by an example. Assume that an issuer is considering three proposals for a \$100 million bond issue. The first proposal, Proposal 1, requires principal redemptions of \$20 million each year and coupon rates that increase with time to maturity. The second proposal, Proposal 2, also requires principal redemptions of \$20 million each year, but has a high coupon rate for the first serial. The third proposal, Proposal 3, is a 5-year maturity, zero-coupon bond with net proceeds of \$100 million, priced at \$130,383,000. A summary of the cash flows and the NIC, NPV, and TIC for each of the alternatives is presented in Table 3.

TABLE 3
COMPARATIVE COSTS OF THREE PROPOSALS
FOR \$100 MILLION 5-YEAR BOND ISSUE
USING NIC, NPV, TIC AND DURATION
(Assumes semiannual compounding;
Annual cash flows in millions, non-discounted)

Time Period	Proposal 1			Proposal 2		
	Coupon	Principal	Interest	Coupon	Principal	Interest
At Issue		\$100.00			\$100.00	
Year 1	4.15%	\$(20.00)	\$(5.580)	15.00%	\$(20.00)	\$(7.278)
Year 2	4.75%	\$(20.00)	\$(4.750)	5.02%	\$(20.00)	\$(4.278)
Year 3	5.50%	\$(20.00)	\$(3.800)	5.12%	\$(20.00)	\$(3.274)
Year 4	6.50%	\$(20.00)	\$(2.700)	5.50%	\$(20.00)	\$(2.250)
Year 5	7.00%	\$(20.00)	\$(1.400)	5.75%	\$(20.00)	\$(1.150)
NIC		6.0767%			6.0767%	
NPV @ 6%		\$(.349)			\$(.549)	
TIC		6.1341			6.2136%	
Duration		2.7526 years			2.7155 years	

Proposal 3			
Time Period	Coupon	Principal	Interest
At Issue		\$100.00	
Year 1	0.0%	--	--
Year 2	0.0%	--	--
Year 3	0.0%	--	--
Year 4	0.0%	--	--
Year 5	0.0%	\$(130.383)	--
NIC		6.0767%	
NPV @ 6%		\$2.570	
TIC		5.4495%	
Duration		5.0000 years	

An obvious conclusion of the analysis summarized in Table 3 is that, based on NIC alone, the issuer is indifferent to the three proposals, all of which have a NIC of 6.0767 percent. However, the NPV and TIC measures, which incorporate the time value of money, reveal that the true costs, i.e., the effective interest costs, of the three alternatives are not the same. The NPV analysis, which uses a 6 percent discount rate, shows that Proposal 3, the 5-year zero-coupon bond, has the highest NPV and is, therefore, the lowest cost option. The TIC analysis produces the same conclusion. The TIC of the 5-year, zero coupon bond is 5.4495, compared to the TICs of the other proposals, which are both approximately 6 percent. This analysis shows how the structure

of a bond issue, in particular the timing of principal repayments and coupon rates, affects the effective financing cost.

Several other conclusions can be developed from this analysis. On its own, NIC is not an appropriate measure for an issuer to use in evaluating competing bond financing proposals from underwriters and other investors because it is subject to manipulation since it ignores the time value of money. The motivation to manipulate NIC results from an inherent conflict on price, or effective interest rate, between the issuer and the underwriter. Generally, the underwriter seeks to purchase a bond issue at the lowest price, the highest effective rate, but the issuer wants the highest price, the lowest effective rate possible. Thus, an issuer needs to be financially sophisticated and able to make comparisons of the effective rates of alternative bond issues so the underwriter is forced to submit a purchase proposal that is priced close to the market (*Weston, Besley and Brigham 1996, 687*).

Table 3 shows the danger of awarding a bond issue on the basis of NIC without placing constraints on the structure of the serial amounts and the coupon rates. The analysis shows that the NIC of each proposal is 6.0767 percent, presumably making the issuer indifferent among the three options. However, when the time value of money is considered in the analysis by using NPV or TIC measures, it is clear that Proposal 3 carries a lower overall financing cost. To avoid this pitfall of NIC, issuers of municipal bonds can impose one or more bidding rules for the structure of a proposed bond issue to prevent underwriters from manipulating NIC (*McLoughlin 1996, 555*). One such rule, the "maximum coupon spread constraint," places a limit on the allowable variance among coupon rates. This is accomplished by placing a maximum limit on the absolute coupon rates, or limiting the allowable differences between coupon rates on serial bonds. This prevents an underwriter from proposing a bond issue with excessively large premiums for the early maturities in a serialized issue. A second rule involves placing a limit on the size of the discount associated with any individual maturity in the serial issue. Issuers can also limit manipulation of NIC by imposing the nondescending coupon rule. This rule specifies that each

succeeding maturity in a serialized bond issue must carry a higher coupon rate than the previous maturity. Such rules can mitigate, but not eliminate, the potential for an issuer to award a bond issue to an underwriter other than the one that submits the lowest cost proposal.

The analysis also introduces the concept of duration, a measure of a bond issue's effective maturity (*Bodie, Kane and Marcus 1996, 454*). It is computed by determining the weighted average maturity, in years, of a bond's cash flows on a present value basis (*Jones 1996, 377*). The duration of a bond issue is a useful measure for making comparisons of competing bond purchase proposals because it provides a measure of the timing of the cash flows, principal redemptions and interest payments associated with alternative bond issues.

This analysis shows that the NIC and TIC for a proposed bond issue can be significantly different. The factor that accounts for the difference is that NIC, unlike TIC, does not account for the time value of money. Underwriters can take advantage of this difference between NIC and TIC by presenting proposals that only show the NICs of the proposed bond issues. Two ways that underwriters manipulate the NIC in bond financing proposals are to structure a serialized bond issue with relatively higher coupon interest rates for early maturities, or to require proportionately higher principal redemption amounts for the later maturities.

Table 4 presents examples of how the structuring of coupon interest rates influences TICs for two bond purchase proposals that have the same NIC. Proposal 1 is for a \$100 million bond issue with a maturity schedule that requires redemption of \$20 million each year for five years. The coupon rates for the serials increase as the time to maturity increases, a typical interest rate structure. Proposal 2 is structured with a high coupon rate for the first serial and lower rates thereafter. The NICs of the two proposals are the same, 6.1017 percent. However, the TIC for Proposal 2, 6.5096 percent, is higher than the TIC for Proposal 1, 6.2601 percent. Thus, if the issuer accepts Proposal 2, it is

committing to paying a higher effective interest cost than would be the case if Proposal 1 was accepted.

Table 4 shows how underwriters can manipulate the maturity structures to increase the TIC of a bond purchase proposal. Again, both proposals are for a 5-year, \$100 million bond issue.

TABLE 4
COMPARATIVE COSTS OF TWO PROPOSALS
FOR \$100 MILLION 5-YEAR BOND ISSUE
USING NIC, NPV, TIC AND DURATION
(Assumes semiannual compounding;
Annual cash flows in millions, non-discounted)

Time Period	Proposal 1			Proposal 2		
	Coupon	Principal	Interest	Coupon	Principal	Interest
At Issue		\$100.00			\$100.00	
Year 1	11.00%	\$(30.00)	\$(7.2322)	11.000%	\$(50.00)	\$(12.000)
Year 2	5.661%	\$(20.00)	\$(3.9322)	5.661%	\$(.00)	\$(1.500)
Year 3	6.000%	\$(20.00)	\$(2.800)	6.000%	\$(.00)	\$(1.500)
Year 4	6.500%	\$(20.00)	\$(1.600)	6.500%	\$(.00)	\$(1.500)
Year 5	3.000%	\$(10.00)	\$(.300)	3.000%	\$(50.00)	\$(1.500)
NIC		6.1017%			6.1017	
NPV @ 6%		\$(.583)			\$(1.210)	
TIC		6.2601%			6.5096%	

Duration years	2.37 years	2.63
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Proposal 2 requires redemption of a larger proportion of the total principal amount in the first year. Proposal 1 delays the remaining principal redemptions in comparison to Proposal 2. The first serial for Proposal 2, \$50 million, is priced at a \$5 million discount resulting in net proceeds of \$45 million. All other serial bonds for both proposals are priced at par. The NICs of the two proposals are the same, 6.1017 percent. However, the TIC for Proposal 2 is 6.5096 percent, which is higher than the 6.2601 percent for Proposal 1. If the issuer accepts Proposal 2, it is accepting a higher effective interest cost in comparison to Proposal 1.

The net effect of these adjustments is to produce comparable NICs, but the adjustments result in relatively higher TICs. The adjustments also affect duration. These results are seen in the data presented in Table 3 and Table 4, which are illustrations of why it is important to accurately accommodate the time value of money and measure duration when analyzing competing bond financing proposals.

V. Evaluation Models

Several models have been developed to structure and evaluate municipal bond issues. Early models use NIC to measure interest costs; later models generally use TIC (*Puelz 1996, 429*). However, most of these models were developed to analyze competitive sales. For example, while the Bierman technique may be an appropriate option for evaluation of competitive proposals, it is inappropriate for issuers that choose to market bonds through a negotiated offering. Bierman's suggestion about how to select the least costly financing proposal, i.e., to sell a bond issue to the bidder that offers the highest price,

is appropriate for competitively bid sales. But, what about negotiated offerings? The simple answer is that the Bierman technique is not appropriate, because on the day a bond issue is approved and priced, the issuer does not evaluate competing underwriter proposals.

Recognizing the need for an analytical tool to use in the assessment of coupon rates and maturity amounts simultaneously, as required for a negotiated offering, Puelz and Lee (1989) developed a decision support system (DSS). The purpose of the system is to facilitate the design of serial bonds by evaluating possible structuring alternatives given certain, known characteristics of the bond issue. The task of selecting the appropriate structure is not part of the DSS.

For issuers that choose to use the negotiated bond marketing strategy, an important question always surfaces on the day a negotiated bond offering is approved and priced. That question is, how does an issuer that selects a negotiated offering strategy, which is the case for the majority of municipal bonds sold in the market today, objectively evaluate the overall financing cost of the underwriter's proposal?

As shown previously, the NIC and the Bierman technique are inadequate measures of overall effective financing cost for negotiated bond offerings. NPV and TIC, however, also have an inherent weakness when used to evaluate a negotiated offering. The weakness is that, on the pricing date, the issuer does not have competing proposals to evaluate.

One technique issuers of bonds sold by negotiated offering can use is to calculate NIC, TIC, and NPV for preliminary evaluations of proposals submitted by various underwriters. These analyses, of course, are only preliminary because they represent evaluations of proposals, not actual offers, to purchase a bond issue. The actual purchase proposal for a negotiated offering occurs later, after the issuer has selected the underwriter and, together, they have agreed on the structure and the fees and charges associated with the bond issue.

After selecting the underwriter, the most significant financing decision, determining the price of a bond issue, is made on the date the bond issue is approved and priced. At that point, the issuer has two choices. The issuer can agree to accept the pricing recommendations of the underwriter and proceed to sell the bond issue, or the issuer can decide to delay the bond issue, temporarily or permanently. Thus, the question remains, how can the issuer of a negotiated bond sale obtain the assurance that the underwriter's purchase offer represents a reasonably cost-effective proposal? The explanation of a suggested evaluation process is the subject of the next section.

VI. Process for Evaluation of Negotiated Bond Purchase Proposal

On the day a negotiated bond offering is approved and priced, the issuer should assess the appropriateness of the overall effective financing cost of the underwriter's purchase offer prior to approving the bond sale. This process involves computing the duration and TIC of the purchase proposal and comparing them to those for a cohort group of bonds, a sample of similar bonds marketed in recent months. By using this method of comparison, an issuer can determine if the overall effective financing cost for the bond issue is relatively higher, or lower, than the costs for the bond issues included in the comparison sample.

If the effective cost is higher, the issuer should require the underwriter to submit evidence that explains or reconciles the difference. If such evidence is not forthcoming, the issuer should bargain for a higher price. In the event the underwriter fails to explain the price difference and refuses to improve the price, the issuer then faces the decision to delay the bond issue, cancel the offering, or accept the apparently higher costs associated with the underwriter's purchase offer. An illustration demonstrates how this comparison is accomplished.

The first step in the process, which can be completed prior to the date the bond issue is priced, is to develop information

about previous comparable bond sales. To accomplish this issuers should assemble TIC and duration data for recent bond issues that are similar in terms of credit quality, principal amounts, and maturity. For example, a water authority can assemble bond sales data for all water authority bonds issued in its state and neighboring jurisdictions during the past year. Required information about those bond sales includes data that are required to compute NIC, TIC, NPV, and duration. Underwriting firms should have access to the information and should provide it upon the issuer's request. It can easily be validated by comparing it to publicly available bond sale information.

For each bond included in the sample of comparable issues it is also necessary to determine the Bond Buyer's 20-Bond Index (BBI) for the weeks of the respective sales. The BBI is composed of dealers' estimates, collected by the Bond Buyer, of the yield that a hypothetical 20-year bond would have to offer if the bond came to market during the week (*Public Securities Association 1990, 95*). The BBI provides a consistent reference pricing measure for each of the comparable sales.

From the data assembled about comparable bond sales, the issuer can compute each bond's TIC expressed as a percentage of the BBI for the week of the sale. The TIC percentages are then matched with the durations of the respective bond issues. A regression equation is developed that represents the "line of best fit" for the TIC percentages and durations of the comparable bond issues. This regression equation is a model that the issuer can use to predict expected TIC based on the duration of a bond issue. For example, the analysis may reveal that, for the sample of previous similar bond issues, bonds with a duration of 10 years were sold, on average, for a TIC that was approximately 95 percent of the 20-year BBI.

The next step in the process is to compute the duration of the proposed bond issue, i.e., the issue proposed by the underwriter, and obtain the most recent BBI. The duration of the proposed bond issue can be computed easily using a computer model designed to perform this calculation. The model should also

calculate the other measures of relative cost. One model useful for this analysis is described in Appendix A.

With the necessary data assembled, the evaluation process can proceed. A proposed negotiated bond issue provides an illustration of the process. Assume that a local school district is planning to issue \$100 million in new bonds to finance construction and required maintenance of existing facilities. The issuer has already selected the underwriter through a competitive process, i.e., the issuer examined proposals from ten underwriters who are active in the municipal securities market.

During the week prior to the actual bond sale, the issuer obtained, from the underwriter, information about all school district bonds marketed in the state during the past year. The validity of the information was confirmed by comparing it to publicly available bond sale information, e.g., data obtained from Securities Data Corporation or another repository of municipal bond sales data. From these data, a scatter diagram is constructed that plots each bond's TIC as a percentage of the BBI. The bonds' TICs expressed as a percentage of the BBI are paired with the durations of the bond issues. In this example, there were 177 school district bond sales in the state during the previous year. A graph that shows a scatterplot of the bonds' TICs expressed as percentages of the BBI and the durations of the bond issues can be produced.

A computer model is used to estimate the regression, or "line of best fit," for these data. The analysis also produces the equation for the regression line. The equation is:

$$y = a + (b) (x)$$

$$\text{(Predicted TIC)} = \text{(Constant)} + \text{(Slope)} \text{(Duration)}$$

$$\text{Predicted TIC} = .611195 + (.034701) \text{(Duration)}$$

For this example, the model estimates that, on average, the TIC for a school bond issue with a duration of fifteen years is 113.2 percent of the 20-year BBI. Similarly, for a bond with a

duration of ten years, the TIC is, on average, 95.8 percent of the 20-year BBI. By using a measure that relates the TIC and duration of a bond issue to a common index, i.e., the BBI, the model accommodates changes in the absolute level of interest rates during the period covered by the bond issues included in the sample.

Two inputs to the computer model used for this bond analysis are the current BBI and the regression equation developed from the sample of previous bond sales. Inclusion of this information in the model allows it to predict the TIC for the proposed bond sale.

Table 5 summarizes the output of the model, including the results of the computations of the TIC and the duration of the proposed bond issue, and the predicted TIC for the underwriter's purchase offer on the day of the sale. The TIC of the proposed purchase price is 4.42 percent and the duration of the bond issue is 4.82 years. The regression model developed from information about previous school bond issues suggests that the TIC for a bond issue with a duration of 4.83 years is 4.44 percent. This estimated TIC can be compared to the TIC for the proposed bond issue. The TIC for the proposed bond issue is .02 percent lower than the predicted TIC. In this case, the issuer can conclude that the TIC is favorable compared to the TICs of similar bonds included in the sample. If the results were different, and the TIC of the proposed purchase offer was higher than the predicted TIC, the issuer should seek an explanation for the variation before approving the bond pricing and sale.

TABLE 5

**EVALUATION OF PROPOSED 10-YEAR,
\$100 MILLION SCHOOL DISTRICT BOND ISSUE**

	Structure and Pricing	
Time Period	Coupon Rate	Principal Redemption
At Issue	-	\$100,000,000

Evaluation of Underwriter Proposals

Year 1	3.50%	\$(10,000,000)
Year 2	3.70%	\$(10,000,000)
Year 3	3.90%	\$(10,000,000)
Year 4	4.10%	\$(10,000,000)
Year 5	4.20%	\$(10,000,000)
Year 6	4.30%	\$(10,000,000)
Year 7	4.40%	\$(10,000,000)
Year 8	4.50%	\$(10,000,000)
Year 9	4.60%	\$(10,000,000)
Year 10	4.70%	\$(10,000,000)

Costs and Duration

NIC	4.3818%	
..		
NPV @ 6%	\$6.921	
..		
TIC	4.4150%	
..		
Duration	4.82 years	
..		
Predicted TIC	4.44%	

There may be a satisfactory explanation for a significant difference in the TIC of a proposed bond issue and the predicted TIC. For example, the issuer's credit quality may be inferior to other issuers, there may be specific characteristics of the bond issue that cause the price to be higher than other bonds, e.g., more liberal call provisions, or the market may have a larger than usual supply of similar bonds offered for sale on the same date. On the other hand, the difference may be indicative of an unfavorable price offer, e.g., excessive underwriter fees, interest

rates that are too high, or lackluster marketing efforts on the part of the underwriter. With knowledge of the predicted TIC, the issuer is in a better position to question the underwriter's bond purchase proposal on the day a negotiated offering is approved and priced.

VII. Summary

About 80 percent of municipal bonds are sold today by negotiation; only 20 percent are sold by competitive bid. This trend is consistent with practices in the corporate bond market. However, there is increased interest in the bond marketing practices of governments, special districts, and municipal authorities due to allegations of improprieties involving underwriters and officials in several jurisdictions.

Several methods can be used to evaluate the cost of competitive bond purchase proposals from underwriters and other investors. These include NIC, NPV, TIC, and the Bierman technique. Although widely used, NIC is an incomplete and inappropriate measure of financing costs. NPV and TIC are more theoretically correct measures because they recognize the time value of money. However, none of the traditional measures are adequate to evaluate a negotiated bond offering because on the day an issue is priced, the issuer does not evaluate competitive proposals. The negotiated bond issuer is in a position that requires acceptance or rejection of the underwriter's purchase offer.

This article describes a systematic process that can be used to evaluate the effective cost of an underwriter's purchase offer for a negotiated bond offering relative to a predicted effective cost. The model facilitates the evaluation process by using information from comparable bond sales to estimate the relative cost for the proposed bond issue.

By definition, negotiated bond offerings do not involve the evaluation of competitive underwriter purchase offers. In a negotiated offering, the issuer must assess the appropriateness of

the underwriter's purchase offer on the day the issue is priced. While there is no absolute measure for making this assessment, the process and analytical techniques described in this article should help issuers of negotiated municipal bonds assess the appropriateness of an underwriter's bond purchase offer.

Appendix A

The Municipal Bond Cost Evaluation Model (MBCEM) is an Excel computer spreadsheet model, i.e., workbook, that is designed to facilitate the analysis of negotiated municipal bond financing proposals. It consists of four integrated worksheets. Three of the worksheets are used to analyze specific bond financing proposals. The fourth worksheet consolidates and summarizes information from the three individual worksheets and produces a comparative summary of the proposals. The MBCEM workbook can easily be expanded to accommodate additional financing proposals.

Principal Assumptions and Capabilities

1. The model assumes the comparative cost options are based on semiannual compounding periods.
2. The model accommodates a variety of municipal bond structures including term bonds, serial bonds, discount bonds, premium bonds, and capital appreciation bonds (e.g., original discount bonds, zero-coupon bonds).
3. All administrative and sales costs can be incorporated into the analysis of bond financing options, including administrative expenses, underwriter fees and discounts, sales and marketing discounts, municipal bond insurance premiums, and other charges. Credits can also be accommodated in the analysis of financing options, e.g., sale of a refinancing option.
4. The model does not perform the regression analysis of comparable bonds, but this analysis is easily

accommodated by any spreadsheet or other computer program that handles routine statistical functions.

Required Inputs

The required input data for the individual bond proposals are:

1. Brief definition of the option, e.g., 10-year, zero coupon bond.
2. Financial advisor's fee (in dollars).
3. Municipal bond insurance premium (expressed as a percentage of bond principal).
4. Underwriter's discount, i.e., all fees and charges expressed as a dollar cost per thousand of bond principal.
5. For each bond, i.e., term bond or each bond in a serialized issue, the net proceeds, coupon rate, and principal due at maturity.
6. The most recent BBI.
7. The regression formula for the TICs of comparable bonds expressed as percentages of the BBI and the durations of the bonds.

Output of Individual Worksheets

The worksheets that analyze the individual bond financing proposals produce the following output:

1. Cash flow summaries showing the interest and principal payments.
2. Total nominal cash flows for the bond issue.
3. Total discounted cash flows for the bond issue.
4. Bond year dollars.
5. Duration of the bond issue.

6. Comparative cost measures including NIC, NPV, TIC and duration.

Output of Summary Worksheet

The summary worksheet consolidates and summarizes information from the three individual worksheets. An example of the summary is included in the article as Table 3. The output includes:

1. NICs for the bond financing options.
2. TICs for the bond financing options.
3. Durations for the bond financing options.
4. NPVs for the bond financing options at six discount rates, i.e., 0%, NIC, and NIC plus and minus 1% and 2%.
5. Graph showing the NPV profiles of the three bond financing options.
6. Expected TICs for the bond financing options.

Additional information about the MBCEM is available by contacting the author. Dr. Glenn L. Stevens, Department of Business Administration, Franklin & Marshall College, P. O. Box 3003, Lancaster, Pa. 17604-3003; the e-mail address is G_Stevens@Acad.FandM.Edu.

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