A Comprehensive Evaluation of the Comparative Cost of Negotiated and Competitive Methods of Municipal Bond Issuance*

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Abstract

Municipal finance relies heavily on the issuance of debt and the debt is issued by a diverse range of public entities. The issuer of the debt has a choice in how the debt is issued. The issuer may choose a negotiated method or a competitive method. Some analysts believe they have observed systematic differences in the cost to the issuer by type of issuance. These findings have, in turn, led researchers to evaluate whether—or under what conditions—one method of issuance is superior to another. The empirical findings presented in this study suggest that there is no general advantage of competitive over negotiated issuance processes. Rather, there appears to be a strong tendency for issuers to select the method of issuance that best suits the nature of the issue at hand such that efforts to mandate one type of issuance over the other will likely increase, rather than decrease, issuance costs. Research indicates that there is no difference in the post-marketing behavior of new issue prices between the negotiated and competitive issuances that redounds to the disbenefit of the issuer

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Executive Summary

This study performs the first comprehensive analysis of the comparative interest costs of negotiated and competitive municipal bond issuance. In contrast to prior studies that relied upon data on a few hundred issues, the current study analyzes more than 250,000 new issues in the 1990-2006 time period.

In addition, the study explicitly recognizes and treats two potential sources of bias. The first of these is so-called self-selection bias that arises out of the fact that the method of issuance is not random but, rather, selected by the issuer with ultimate issuance cost in mind. The second source of bias is sample selection bias. This addresses the fact that not all issues are able to be included in a study due to non-random missing data processes.

The study also reports on the results of interviews of market participants including issuers, underwriters, broker-dealers, and investment bankers. These interviews probed participants for their assessment of the pros and cons of negotiated and competitive issue processes. The interviews generally yielded the opinion that neither method of issue has advantage over the other in every case. The interview participants identified qualitative aspects of each method of issue that are material but may not be captured easily in available data.

The analysis performed in this study compares true interest cost. Bias control is effected with both Heckman two stage modeling and with switching regression formulations. In addition, recent literature regarding the post-marketing behavior of new issue prices is examined for the comparative effects in this regard of the method of issue.

Key Findings

Our analysis statistically indicates no difference in true interest cost between negotiated and competitive issuances. In particular:

1. **There is no difference in the true interest cost associated with issues offered by negotiated or competitive issuance methods.** Once sample selection and self selection biases have been controlled any putative difference in true interest costs disappears.
2. **Issuers choose the issuance method that minimizes their expected costs of issuance**. Efforts to mandate one type of issuance over the other will likely *increase* issuance costs.
3. **Any under- or overpricing of a issuance is rapidly revealed by the over- or undersubscription of the issue.** On negotiated issues in particular, substantial over- or undersubscription tends to lead to repricing. Sophisticated buyers with strong market knowledge would tend to arbitrage out any systemic over- or underpricing resulting from choice of method of sale.
4. **There is no difference in the post-marketing behavior of new issue prices between the negotiated and competitive issuances that redounds to the disbenefit of the issuer**. This is contrary to what would be expected if negoti-

ated issuance were significantly and persistently underpriced relative to the efficient price.

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Municipal finance relies heavily on the issuance of debt and the debt is issued by a diverse range of public entities. Entities include state and local governments, public agencies, and school and special districts. Debt is issued in a wide range of maturities from short-term revenue anticipation notes to long-term debt associated with public sector project development. In addition to general obligation debt that relies on the full faith and credit of an issuing government, other municipal issues rely on diverse revenue streams as well as various types of security and insurance overlays to secure investor confidence in the quality of the issue.

A debt issuer has a choice in how its debt is issued. Most debt is issued via negotiated or competitive methods. With *negotiated* issuance, one or more underwriting firms acting together purchase the bonds from the issuer. The issuer and the underwriter negotiate many of the terms of the issuance. With *competitive* issuance, bidders buy all the bonds according to take-it-or-leave-it terms proposed by the issuer in a widely circulated prospectus.

Some analysts believe they have observed systematic differences in the cost to the issuer by type of issuance. These findings have, in turn, led researchers to evaluate whether—or under what conditions—one method of issuance is superior to another. Earlier studies found relatively large price advantages associated with competitive issuance. The analysis presented here is consistent with more recent research. This recent research suggests that, on average, issuers tend to optimally select the method of issuance that minimizes their costs. In other words, when the self-selection and sample selection processes are controlled, issuers using a negotiated method would be no better off with competitive issuance and vice versa.

The following two sections describe the basic features and issuance procedures used in the municipal bond market.

1 The Municipal Bond Market

Municipal bonds (also known as *munis*) are issued by state and local governments and agencies. These government entities use municipal bonds to finance development of new public infrastructure and to provide working capital to public sector operations where there is a mismatch between the spending obligations of the agency and the pace of receipt of its fiscal resources. As with corporate fixed income securities, municipal securities come in a wide range of maturities and credit qualities. They are associated with a wide variety of public sector endeavors and display a wide variety of debt structures.

1.1 Tax policy and the municipal bond market

The distinguishing feature of municipal bonds is that coupon income is exempt from federal and, in many cases, state or local income tax. The tax-exempt income of municipal bonds makes them attractive to individuals who face high marginal income tax rates. As a result, individuals, rather than institutions, tend to be the largest investor market for municipal securities. It is estimated that about three-quarters of municipal bond issues are owned by—or held by fund managers for the benefit of—individuals.

The tax-exempt treatment of municipal bond income also influences other aspects of the market. The yield offered by municipal bonds is affected, through competition with taxable issues, by the general interest rate environment and the marginal tax rates faced by high-income individuals. In equilibrium, municipal bonds offer lower pre-tax but higher after-tax returns than other fixed income securities of comparable credit quality, liquidity and maturity. In addition, under stable tax conditions, municipal bond values display lower volatility with respect to market interest rate fluctuations than many other securities. This is one reason that municipal bonds trade in the secondary market at a much lower volume than taxable bonds and corporate equities.[1]

Because state and/or local income tax exemption is available only to tax filers in the state or locale of issue, not all municipal bonds are equally attractive to all investors. Moreover, features of tax law can make the effective tax exemption less than its nominal exemption. For example, under the alternative minimum tax (AMT) rules of the federal tax code, individuals holding certain types of municipal bonds may find that they are taxed on some portion of their municipal bond income. For investors, some bonds are treated better in this regard than others because of special statutory provisions of the AMT. In addition, some investors prefer, for tax reasons, to acquire municipal bonds that are issued at a discount to par because the tax treatment of capital gains and losses in the sale of such securities is not symmetric.

The details of these tax policies are complex and create some partitioning of the market for municipal bonds by geography, bond type, or the target investor class.

1.2 Credit risk and the municipal bond market

There are two main types of municipal bonds. First, there are so-called general obligation (GO) bonds. GO bonds are secured by the full faith and credit of the issuing government entity.[2] This is usually limited only to the extent that the government issuer has limited recourse to taxing authority.

Revenue bonds are the second main type of municipal bond. Revenue bonds provide security to the investor by having claim to the stream of revenues of a government agency or operating authority. Revenue bonds commonly are issued to finance highways, water and sewer treatment plants, and other revenue-generating entities.

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[1] Other reasons that municipal bonds trade in the secondary market at a much lower volume than taxable bonds include tax considerations, municipal bonds' more heterogeneous issuer base, municipal bonds' smaller/less liquid block size, and the predominance of buy-and-hold retail investors in municipal bonds.

[2] A *plain vanilla* municipal bond is typically a GO bond with a fixed maturity date and a known cash flow pattern.

From the investor's perspective, GO and revenue bonds offer quite different risk prospects. All other things being equal, a GO bond issued by an agency with taxing power and a healthy tax base provides fairly robust protection against credit risk. In addition, the risk is relatively easy to assess with publicly available information about the economic conditions of the issuing government and the available taxing resources.

Again, all things being equal a revenue bond, because it is has recourse to a less broad revenue source, exposes the investor to both a potentially higher credit risk and a more difficult credit evaluation challenge. The revenues supporting such issues are sometimes difficult to forecast with certainty and may bear complex relationships to the local economy and the costs associated with developing and operating the project that generates the revenues. In general, therefore, it is more difficult to perform due diligence on the prospects of a revenue issue and the structure that the issue must take to contain risk may need to be more complex.[3]

Most municipal debt has relatively high credit quality, displaying bond ratings reserved for investment grade securities. This can be achieved by structuring the issue in a conservative manner. For example, if the revenue prospects of a revenue bond are uncertain, the issuer may use conservative assumptions about the growth and availability of revenue.

The marketability of an issue can be improved by wrapping the issue with an insurance product offered by specialized municipal bond insurers. In these cases, the insurer does additional due diligence on the issue and the issuer pays a premium to enjoy the default protection offered by the insurer. If an insured municipal bond defaults, an insurance company should step in and make all principal and interest payments on the bond. Although most issuers that use insurance already have investment grade ratings, the use of insurance can boost a bond's rating to a higher level and thereby improve its marketability.

2 Negotiated and Competitive: The Municipal Bond Issue Process

A new municipal bond issue comes to the marketplace when an issuer develops a need for new funding. This may occur because economic growth in the community has increased the demand for public facilities and services, or because some outstanding debt may be refinanced for interest cost savings. In the latter case, the new issue is called a *refunding*.

The goal of the issuer is to obtain funding at the lowest lifetime cost of the issue. The lifetime cost of the issue is a function of the term to maturity of the issue, the coupon rate at which the bond is issued, the pattern of coupon payments called for in the bond indenture, the pattern of risks to which the underlying security of the issue is likely to be exposed over its life, and the up-front transaction costs associated with the issuance.

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[3] Other factors affect the costs of performing due diligence. One industry participant noted that a bond's rating may be as important as the type of bond. For example, he notes that a AAA-rated single stream revenue bond is much easier to evaluate than an A-rated general obligation bond.

The structure of a particular bond issue can be very complex, containing call provisions, credit enhancement features, and many other features. For revenue bonds, complexity refers to the underlying revenue stream supporting the bonds. In addition, the issue may be structured so as to maximize access to the investor marketplace factoring in consideration such as the geography of the issuer, the tax characteristics of the issuer, and the preferences of the target investor class. Whatever the structure, however, the primary goal of the issuer is to sell the issue into the primary market at the lowest possible cost given existing market conditions.

To achieve this goal, the issuer marshals the resources of its own staff and outside experts. The primary types of outside experts engaged by the issuer are financial advisors, underwriters, and bond counsel. Other players in the issue process are the rating agencies, providers of credit enhancements, and bond trustees or paying agents. Exactly which kinds of resources are utilized depends upon the method of issuance.

2.1 Competitive issuance

In the case of competitive offerings, the new issue is developed by the issuer, a financial advisor (who may be independent or affiliated with an underwriter), and bond counsel. Some experienced issuers may depend on internal staff to a greater degree than others who may rely more heavily on financial advisors. Rating agencies and bond insurers will review the new issue if requested. Their review may result in a rating of the bond and, where relevant, a bid from the insurer. Bond counsel prepare the legal documents and attest to the legality and tax status of the issue. The official statement is the equivalent of a prospectus and describes the issue's features and the other terms of the borrowing.

In a competitive issue, the new bonds are offered publicly via a bidding process. Broker-dealers and underwriters bid to acquire the new issue. When a public offering is selected, the issue is usually underwritten by investment bankers and municipal bond departments of banks. For large issues, broker dealers or underwriters may bid as a syndicate. This increases access to potential investors.

The broker dealers or underwriters who prevail in the competitive bidding process are responsible for distributing the issue. They accept the risk that investors might fail to purchase the issues at the expected prices reflected in the bids. The pricing of the security is fixed on the day of bidding (known as the *sale* date), but the issue transaction may not be settled and delivered for two weeks or more.[4] The amount of retail business on large competitive issues is relatively small because such issues have no ability to pre-market to retail customers nor do they have a retail order period.

[4] For tax reasons, dealers must certify to the IRS that they sell at least ten percent of each issue at the reoffering yield. Subject to the constraint, however, once trading begins and the syndicate is disbanded, dealers holding the bonds in inventory are free to sell bonds at whatever price the market will bear. Customers who are informed about an upcoming or recent issue, and about the reoffering price, can ask their broker to fill an order for that particular bond at the reoffering price, or close to it. Other customers, who simply wish to purchase a municipal bond with certain characteristics, may be quoted different prices when their brokers contact their firm's retail trading desk.

There is no municipal bond exchange in the secondary market. Rather, markets in individual bonds are made by municipal bond dealers. They buy and sell to other dealers and investors and for their own account. Bond brokers also play a significant role in the market for municipal bonds. These brokers are a small number of interdealer brokers who act as agents for registered dealers and dealer banks. In recent years, web sites have developed that provide the marketplace with near real-time pricing of individual trades. Standards and practices for the municipal securities activities of market participants are set by the Municipal Securities Rulemaking Board (MSRB). The MSRB is a self-regulatory organization, chartered by Congress, that is overseen by the Securities and Exchange Commission (SEC).

2.1.1 Market competition in competitive issues

In a competitive issue, competitive discipline in the pricing of the issue is brought to bear by the bidding process. The market is apprised of the forthcoming issue and prospective bidders for the issue have an opportunity to evaluate the issue and formulate bids. The willingness of an individual bidder to pay for a particular issue depends on the bidder's sense of the strength of demand downstream in its distribution channel.

Depending on the features of the issue, the bidder's assessment of the risk of the issue, general market conditions, the level of saturation of the candidate investors in the municipal bond market, and other factors, the bidder may offer a strong or a weak bid. In the competitive offering process, market intelligence is brought to the design and timing of the issue by the issuer, the financial advisor, or others in the marketplace consulted by the issuer or financial advisor.

In an environment of good information about the issue, well-informed bidders, and a strong showing of candidate bidders, competitive discipline should yield pricing that represents the market value of the security in the ambient market environment. The primary market is not, however, highly atomistic. The number of bidders is limited by the cost of appraising the prospects of the issue, the accessibility enjoyed by the bidder to the downstream retail or institutional investors, and the perceived ability of the bidders to prevail against their rivals.

2.2 Negotiated issuance

A negotiated issue differs from competitive issues in that the initial price is struck not by competitive bidding but directly between the issuer and underwriters. In negotiated offerings, the underwriter plays an important part in the structuring of the issue and works with the issuer, its financial advisor (if this service is not provided by the issuer or the underwriter), bond counsel, rating agencies and bond insurers. Unlike an independent financial advisor, an underwriter is involved intimately with the aftermarket and, arguably, brings a comprehensive sense of market conditions to the bond offering process.

In a negotiated offering, the underwriters negotiate the offering price of the new issue with the issuer. The underwriters take the risk of mispricing relative to the demand for the issue in downstream distribution. The underwriter investigates risk associated with the issue and the downstream potential of the issue through a process of analysis and premarketing inquiries in the marketplace. Downstream potential is also assessed during the

order period where the bonds are sold. Unlike the competitive bid process, the negotiated process likely involves iterative development of the bond features throughout the pricing process.

2.2.1 Market competition in negotiated issues

Whether or not the negotiated process brings adequate competitive discipline to the marketplace is a matter of much debate. However, potential sources of competitive discipline are manifold. First, the underwriters usually have attained their status as part of an issuer's underwriting team through a competitive proposal process. In so doing, they have likely been determined by other clients to be effective analysts and marketers.

Second, the market for underwriter relationships is highly competitive. Other underwriters are eager to replace the underwriter who fails to satisfy an issuer or who generates poor aftermarket performance of issues. Underwriters thus have a strong incentive to bring creativity, analytical and marketing resources to bear on behalf of their clients. Indeed, even within firms, competition among the underwriter's own sales staff to fill an order tends to work for the benefit of the issuer.

Finally, underwriters' performance is readily tracked in the aftermarket. If an issue displays sharp upward positive increases in price in the immediate aftermarket, the issuer may conclude that the underwriters caused the issuer to "leave too much money on the table," and may seek either other underwriters or a competitive issuance method to improve issue pricing. All of these forces discipline new offering pricing to the benefit of the issuer. Thus, it is not clear, *a priori*, whether one process brings more competitive discipline to pricing.

3 Earlier Published Research

The debate concerning the effects of the method of issuance on the new issue marketplace has taken place in both public policy and academic circles. This section summarizes the debates and some of the associated efforts by academics to address the debate.

3.1 The public policy debate

In the political context, there has been concern that the negotiated process provides insufficient competitive discipline to ensure that the issuers obtain the best possible price for their new issues. Superficially, at least, the competitive issuance method appears to more directly engage competition and impose competitive discipline on the costs associated with issuance.

Because issuer relationships with underwriter teams often are durable over time, some have been concerned that the intimacy of the relationship between the issuer and the underwriters in a negotiated process might compromise the issuer's (and, hence, the public's) interest in minimizing issuance costs. The fact that state treasurers and other elected officials involved in the issuance process have sometimes sought and obtained campaign contributions from the underwriting industry is consistent with this concern.

In response to public and political concerns, some jurisdictions have imposed legislative limitations on the use of negotiated issuance; other jurisdictions have developed an informal preference for competitive issuance. From interviews with market participants, *de facto* or *de jure* limitations on the use of negotiated issuance procedures are in place in a number jurisdictions. The states of California, Florida, and New Jersey, for example, have at various times imposed restrictions on the use of the negotiated issue method, except in special circumstances. It seems often the case that the strength of the restrictions ebbs and flows with changes in administrations and the bond issuance calendar. The strength of the admonition to use competitive bidding also can be somewhat vague.[5]

Similarly, it is reported that the municipalities in the New England region have a tradition of restrictions on negotiated issuance. In Missouri, the State Auditor recently published a second study of the comparative costs of issuance (McCaskill, 2005). The study recommended the competitive method for all general obligation bond issues with a credit rating of "A" or higher. In California and Georgia, the press have suggested that the states' use of negotiated issuance was more costly than competitive issuance (Rabin, 2004; Jordan, 2002). In some instances, the bias in favor of competitive issuance is embodied in the attitudes of individual public officials. Some state treasurers and other market participants have indicated, for example, that some officials are disinclined to use negotiated issuance methods even though there is no formal policy in favor of competitive issuance.

There are a number of reasons why the public policy debate has tended to argue in favor of competitive issuance methods. One is that the terminology of the issuance process itself may, at some superficial "sound bite level," be more acceptable to constituencies than negotiated. The latter implies a bilateral or only weakly multilateral process and opponents of the negotiated method can easily evoke in voters the notion of smoke-filled rooms and cronyism. The fact that there was once a practice of politicians seeking campaign contributions from underwriting teams also makes it easy to evoke conspiratorial processes. In some cases, actual kickbacks from underwriters to public officials have been observed; the prevalence of such practices is impossible to quantify but seems rare. It is unclear what effect, if any, such practices have had on the cost of issuance.

Another basis for criticism of the process of negotiated issuance has been the publication of a relatively small number of academic articles that purport to have identified higher interest costs associated with negotiated issues relative to competitive issues (discussed more thoroughly in Section 3.2). Studies that found such seeming disparities found a receptive audience among public officials already suspicious of the efficiency or objectivity of the negotiated issuance process.

What is interesting in this regard, however, is the fact that despite the idiosyncratic allegations of malfeasance and critical academic work, the share of new issues that use the negotiated issuance process has been rising rather than falling over time, from 49 percent of issues in 1990 to 62 percent of issues in 2005 (Table 3). This increase is

[5] For example, City of Memphis (2006) states: "The City, as a matter of policy, shall seek to issue its new debt obligations in a competitive sale unless it is determined by the Deputy Director of Finance that such a sale method will not produce the best results for the City."

occurring despite advancements in electronic bidding systems that support the competitive bidding process, greater transparency in the aftermarket pricing behavior of new issues, and implementation in the late 1990s of MSRB Rule G-37, a general bar on underwriter contributions to political campaigns.

3.2 The academic debate

Academic research on the issue is somewhat sparse, but several academics and industry professionals have joined in the debate over the comparative costs of the two primary means of issuance. Over the past thirty years or so, there have been fewer than 20 peer-reviewed empirical studies of the comparative cost of negotiated and competitive municipal bond issuance.

3.2.1 Studies of comparative interest cost

Many published studies comparing the costs of negotiated and competitive issuances have found that the interest cost of negotiated issuance over competitively issued bonds is in the range of 10 to 70 basis points.[6] If true, these findings represent a significant premium in borrowing costs and would support the greater use of competitive issuance. Numerous crucial problems, however, call into question the findings of the early studies of comparative issuance costs.

Nearly all of the studies performed use a small number of issues in the empirical analysis (Table 1).[7] Although it is well known that the power of statistical tests depends crucially upon sample size, a smaller sample allows for the investigation and collection of issue-specific factors and allows for greater control of the factors that influence borrowing costs. However, in many cases, some samples may be too small to control for the variation in issues that occurs within a specific jurisdiction over a short time period.[8]

In addition, most studies ignore the statistical fact that the choice of method of issue is not independent of the nature of the bond issue, the bond issuer, and the bond's likely performance in the marketplace. Although some researchers acknowledge that certain types of issues may be more effectively marketed through negotiated means, most of the studies ignore the simultaneity of the choice of issue method and cost of issuance in the statistical analysis.[9] This simultaneity issue can be seen as a form of self-selection bias, wherein the negotiated issues that come to market are those that have characteristics such that, had they been brought to market in a competitive bidding process, would have been more costly still to the issuer. Smith (1987), Leonard (1996), Peng and Brucato

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[6] See Robbins (2002), Gershberg et al. (2001), Simonsen et al. (2001), Simonsen and Robbins (1996), Maese (1985), Braswell et al. (1983), Joehnk and Kidwell (1979), and Sorenson (1979).

[7] Table 1 shows that most studies have fewer than 500 observations and the the largest study (Gershberg et al., 2001) had fewer than 5,000 observations involving tax-exempt hospitals.

[8] For example, McCaskill (2005) has a sample of 161 issuances of which 17 were issued competitively. Of the competitive issuances only three were for fire/ambulance districts (11 used a negotiated method). Such a small number of observations makes it difficult draw any statistically relevant conclusion regarding the relative costs of negotiated or competitive issuance for fire/ambulance districts.

[9] Leonard (1996), for example, tests for the possibility of self selection but does not account for it in estimating the cost of issuance.

(2003); and Kriz (2003), are the only known studies that report results after controlling for self selection.

Many of the earlier studies used the net interest cost (NIC) of the issue as the measure of issue interest cost.[10] Net interest cost is a simple arithmetic measure that does not respect that the time pattern of payments influencing the effective interest cost. An alternative measure, true interest cost, or TIC, is such a measure.[11] In effect, TIC is the interest rate that, when used in an internal rate of return calculation, equalizes the present value of the future stream of interest payment obligations and the issue price value. Unfortunately, TIC is not always reported in publicly available databases. In fact, since 1990, only 16 percent of new issues in the Thomson database report a TIC.

As with any empirical study, many of the earlier studies must discard certain issues from the sample because the available record does not capture all of the variables or characteristics of the issue that the researcher deems relevant. To the extent the absence or presence of a necessary variable is associated non-randomly with another important variable, such as method of issuance, the resulting analysis may be affected by what is known as sample-selection bias. Ironically, the paucity of published data on the TIC variable itself suggests the possibility of sample selection bias in a manner that is particularly germane to studies of the effect of issuance method. Specifically, TIC data for negotiated issues is particularly sparsely represented in published bond databases despite the dominance of the negotiated method of issuance. As noted above, only 16 percent of new issues in the Thomson database report a TIC, yet only 7.2 percent of new negotiated issues report a TIC. In more recent years, the number of negotiated issues reporting a TIC has been fewer than 2 percent of number of negotiated issues in the database.

We are unaware of any studies that have used large samples and corrections for self-selection and sample selection biases. There are a few instances of studies that control for self-selection bias.[12] No study, however, uses large samples and controls for both types of potential bias.

3.2.2 Other studies

Recently, there have been a small number of studies that have approached the question of comparative issuance costs in a different manner. Robbins (2002) examines the cost of competitive issuance only. Specifically, the study examines the comparative issuance costs of certain competitive issues in the state of New Jersey before and after policy was adopted to promote greater use of the competitive issuance method. The study hypothesizes that if negotiated issues are inherently more costly to issue because of complexity or other independent factors, then "forcing" competitive issuance should cause the observed cost of competitive issue to rise. The study fails to find this elevation in competitive issue costs and concludes that there is latitude to increase the use of competitive bid processes over the negotiated issue process. Indeed, the study concludes that competitive issues have a 35 basis point cost advantage over negotiated issues.

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[10] See Smith (1987), Bland (1985), Maese (1985), Joenk and Kidwell (1979), and Sorenson (1979).

[11] Competitive issuances have moved from NIC to TIC pricing because the coupon structure can be easily manipulated to reduce NIC without necessarily affecting (or increasing) the true interest cost.

[12] See Kriz (2003), Peng and Brucato (2003), and Smith (1987).

The New Jersey study, however, has a number of significant flaws. First, there is no way to know what the terms of the issuance would have been had the issuance regulation not been in place. It is possible that the cost of issuing under a less desirable method was shifted back on the issuing agency in the form of a more constraining or conservative structure than would otherwise have been adopted. Indeed, it is even possible that some new issues simply did not come to market that otherwise might have—a type of selection bias that, by its nature, cannot be controlled for. Second, the encouragement to use competitive bidding processes was far from absolute. Indeed, more than half of the new issues continued to be issued via negotiated means. One can imagine the possibility that the structure of financing within or across agencies was changed so as to strip some complexity out of the competitively issued securities and add it to other securities that could more easily obtain approval for negotiated issuance.

In contrast to Robbins (2002), Peng and Brucato (2001) find that "competitive only" laws have only a minimal affect on borrowing costs. They use this result to support the implementation "competitive only" laws because they argue that such regulations achieve accountability goals without necessarily increasing issuance costs. This conclusion is refuted, however, by our research and the research of Smith (1987) who control for selection biases and find that issuers optimally choose the method that minimizes issuance costs.

Another approach to the question of comparative issuance costs is to examine not the comparative issue interest cost, but rather the behavior of new issue prices in the aftermarket of the issue. If there is a tendency for the negotiated method to cause the issuer to "leave money on the table" versus the issue pricing obtained under the competitive method, then one might expect to see post-issuance price "pops" that are greater for negotiated than competitive issues even when sold to equally-informed buyers.

Similarly, if negotiated issuances "leave money on the table" because they tend to be "underpriced," then competitive issuances must, in turn, be "overpriced." If this were the case, however, than one would not expect to see institutions buying into competitive issuances. Institutions can put in as many orders as they want on negotiated issues. Thus, if the issue is "underpriced," then institutions tend to oversubscribe the issue. With a negotiated issuance, repricing can occur during the order period. Thus, through repricing, the oversubscription would tend to bid down the extra yield cost. Competition makes it virtually impossible for underwriters to systematically underprice in order to sell in the secondary market at a large markup.

The only study we are aware of regarding post-issuance price "pops" is Green et al. (2006), although others have examined reoffering yields (Leonard, 1996; Maese, 1985). The approach in Green et al. (2006) offers a potential advantage over the studies of TIC in that the model need only analyze changes in price rather than the interest cost or issue price in the aggregate. Also, by using high frequency trading data, the study's formulation offers the prospect of larger datasets and better opportunities for yielding robust findings. A potential complication, however, arises when relevant market events occur in the time period under examination.

From this review, it is clear that there are several, fundamental issues that call into question the empirical value of much of the work done to date regarding the effects of

issuance method on bond pricing efficiency. The history of the public policy and academic debates confirms that the topic is one about which strong beliefs and opinions prevail.

4 Observations and Issues Raised by Market Participants

To inform the design and implementation of the empirical analysis, we conducted a series of interviews with investment bankers, issuers, and investors in municipal debt. The investment bankers ranged from very large national firms with extensive involvement in the municipal debt market to boutique firms that concentrated primarily on their regional markets. Some had high levels of involvement in negotiated issuances, whereas others tended to focus on competitive issuances.

4.1 General observations

Interview participants provided a rich variety of perspectives on perceived advantages and disadvantages of both negotiated and competitive offering methods. In some cases, the perceptions relate directly to differences in issue cost and are amenable to the empirical analysis of interest cost. However, many of the respondents identified, and sometimes emphasized, considerations that are more qualitative in nature and that we cannot examine directly or control for in the empirical analysis.

It is noteworthy that all of the participants whom we interviewed, including underwriters, issuers, and investors, perceived that what they were doing was a source of economic value creation. The interviews yielded a number of common perceptions and several apparent differences of opinion. Most centrally, none of the parties interviewed appeared to believe that either the negotiation process or the competitive bid process uniformly would produce the best outcomes for all issuers. Rather, every interviewee who offered an opinion on the topic indicated that some kinds of issues are better suited to competitive bid and others are better suited to negotiated. In addition several interviewees noted that the difference in fees between negotiated and competitive issuance has declined in recent years.

4.2 Earlier published research

Several of the respondents were familiar with previous academic studies of comparative interest costs. The common view of those who offered opinions was that much of the literature to date tended toward black-and-white conclusions that fail to capture subtle but important differences between the two offering methods. Some interviewees were concerned that the academic studies could lead policy makers to implement policies that are unwarranted and would not be supported if the academic studies were conducted correctly or the results were interpreted properly. In particular, no respondent believed that requiring the use of a competitive bid process would benefit all issuers.

Problems with the academic studies were seen as arising from three different sources. First, the methodology employed in many of the studies is technically flawed. Empirical analyses comparing the interest cost of negotiated and competitive issues often employs methods that, in essence, assume that issuers randomly select the competitive bid process or the negotiation process. Common sense and economic logic suggest that,

instead, issuers choose between the two based on the perceived advantages and disadvantages of each. If so, then the empirical evidence will yield biased estimates of expected interest cost by the two approaches unless the factors that bear on the negotiated/competitive choice are specifically controlled for.

A second, related concern is that even a properly designed study cannot fully correct for bias related to selection unless all of the important factors that contribute to the selection can be measured and controlled for in the analysis. Some interviewees expressed concern that highly qualitative features of one method of issuance over another could not be captured in the available data characterizing new issues. In particular, one respondent indicated that earlier studies failed to adequately control for whether the issue was bank qualified or qualified for an exemption from the AMT.[13] Others were concerned about the quality of the available new issue data, questioning whether the indicators in those databases properly measured such things as true interest cost, given the complexity of issues and/or the fact that some costs of issuance may not be included in such measures. Similarly, the concern was expressed that the growing use of derivatives may confound efforts to develop a consistent database on issue characteristics. For example, new issues that employ a variable rate structure often are issued alongside a derivative instrument that, when combined, synthesizes a fixed rate obligation.

Finally, an expressed concern is that the studies generally were focused on small samples of issues. The motivation for many of the studies is the analysis of an individual jurisdiction's behavior, or the effect of issuance restrictions on issuance efficiency. Interviewees familiar with the recent empirical studies were concerned that the small number of issues analyzed made the results difficult to generalize and raised issues of advertent or inadvertent cherry-picking of cases to make the desired point.

4.3 Fundamental differences between negotiated and competitive issuances

Interview respondents identified a number of factors that they perceive to affect the relative advantages of negotiated and competitive issuance. Generally, they indicated that risky issues, very large issues, and issues with complex factors (also know as "complex stories") are likely to be better conducted via negotiated issuance rather than competitive bid. Risky issues pose problems for the competitive bid process because underwriters will hesitate to bid aggressively on issues that require extensive investigation in order to fully understand the risks. Negotiated issues ostensibly enable the underwriter to commit the necessary resources to risk assessment so that the issue can be fully priced. Issues with complex stories, such as difficult credits, and issues with complex derivative structures pose problems because accurate pricing may require extensive modeling and the underwriter may have trouble anticipating the demand for the various tranches.

The concern about large issues is more fundamentally about market saturation. Because of tax and other considerations, the municipal debt market is highly segmented

[13] For example, the interviewee noted that bank qualified issues are nearly always bid competitively but have a lower yield than straight GO issues, while AMT issues are nearly always bid on a negotiated basis with a higher yield than straight GO issues.

and some parts of the market are saturated. When saturation is a concern, pre-marketing is more important, and is generally not done to the same degree for competitive bid issues, where the underwriter is not certain of getting the deal. Thus, lack of pre-marketing can lead to more conservative bidding when the debt is to be sold into a saturated market. Further, competitive bidding impedes customization of portions of the issue to fit the idiosyncratic preferences of specific investors. For example, customization may include things as simple as modifying the maturity structure or the coupon to meet pockets of demand. In addition, when a market segment is saturated, customization has potential value for reducing the adverse impact of the saturation.

Beyond the factors that can be controlled directly, the respondents identified many more-qualitative considerations that could bear on the choice. In some cases these considerations have implications for the relative interest cost of the two approaches. In others, their effect on interest cost is less clear, but other placement objectives may be served. Sections 4.3.1 through 4.3.8 describe the qualitative factors that were most commonly identified by respondents

4.3.1 Access to individual investors and non-traditional buyers

Several respondents indicated that negotiated offerings provide greater access to individual, as opposed to institutional, investors and that negotiated issues could enable a municipality to place debt with non-traditional buyers. They indicated that negotiated issues offer more flexibility, such as the ability to offer discount bonds to individuals and premium bonds to institutions, the ability to market first to individuals and then to reprice the issue to better fit the preferences of institutions, and the ability to customize the debt to particular investors. Placing an issue partly with individuals and non-traditional buyers could reduce interest cost on the issue.

4.3.2 Split coupons

A split coupon is a differential coupon on portions of the issue so as to broaden the appeal to a heterogeneous investor marketplace. Moreover, retail investors tend to demand par bond or bonds issued at a slight discount. Institutions, on the other hand, tend to demand premiums. The only way to effectively market to both types of customers is through the use of split coupons. Respondents indicated that negotiated issues are amenable to split coupon issues. They also indicated that with competitive issues it is difficult to offer more than one coupon per maturity.

4.3.3 Market timing

Respondents appeared to agree that negotiation enables issuers to engage in market timing in order to place issues during times when demand for an issue is likely to be relatively high. Understandably, some interviewees were skeptical that underwriters had a better grasp of the future path of interest rates than other market participants. Hence, interviewees disagreed about the importance of this difference, with at least one respondent indicating that the benefit of better market timing is likely to be trivial. To the extent some participants have superior ability to understand future market conditions, however, the effect of market timing should be that issue cost is lower than it would be if the issue were done at a somewhat earlier or later time.

Some interviewees noted, however, that the notion of market timing has less to do with forecasts of market conditions than with flexibility in modifying an issue's features in response to changes in market conditions over the period of analysis of the issue.[14] Better market timing, in this sense could, for example, enable an issuer to adjust the size of the offering upward at the last minute if market conditions have strengthened. In particular, respondents noted that market timing can be critical in refunding issues because meeting a savings target often requires that the issue quickly be brought to market. Some respondents indicated that competitive issuance, because of limitations on the rapidity with which changes to the issue documentation can be made, may offer less flexibility. In the empirical analysis, we control for market conditions at the time of the issue, but we cannot observe or control for the effects of market timing. Thus, to the extent that the negotiated offering method yields a benefit related to market timing, that benefit cannot be reflected in an empirical analysis that focuses on comparative issuance costs.

4.3.4 Advice and innovation

Respondents indicated that competition among underwriters for negotiated offerings can provide issuers with access to "free" advice from underwriters and that competition in the context of the negotiation process fosters innovation and creativity by investment bankers. In addition, because underwriters are regularly involved in the market, they have first-hand knowledge of factors that may affect issuance costs. Somewhat offsetting these advantages, respondents indicated that issuers can sometimes realize similar benefits from financial advisors. While both competitive and negotiated issuers can retain financial advisors, they indicated that the advisor tends to do more in competitive bid underwritings. Several respondents indicated that investment banks tend to specialize either in underwriting or advising.

Some issuers indicated that they had sophisticated staffs and did not need to rely on financial advisors. In the empirical analysis, we are unable to observe or measure the benefits of financial innovations arising from the negotiation process and cannot observe the advice provided to issuers without compensation. Presumably, the fees paid to underwriters of negotiated offerings compensate indirectly for the cost of providing advice to issuers and for efforts to innovate.[15] All else equal, the higher fees could result in higher costs for negotiated issues. If the advice and innovations result in the ability to place issues at lower yields, the net effect on the issuer's interest cost of a given issue could be either positive or negative.

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[14] As an example, one interviewee noted that in the last full week of October 2006, the bond market rallied sharply as the week progressed. In response, many of the week's deals were repriced with yields 3 to 4 basis points below the initial yields. This decrease was in the face of one of the heaviest new issue calendars in the prior six months. Competitive issues do not allow for such flexibility in response to market conditions.

The interviewee also noted that market timing can also refer to issue-specific conditions, including the existence of a large amount of similar issues within a state or sector during the same day or week.

[15] An interviewee noted, however, that if negotiated issuances included fees for advice, then such fees would be reflected in higher average spreads.

On the other hand, several interviewers noted, a financial advisor on a negotiated issuance acts to discipline the underwriter—the tension between the senior managing underwriter and the financial advisor guides the issue to the optimal cost.

There is no reason for the cost necessarily to be offset by a lower interest rate paid to investors. Rather, the effects could be to lower the overall interest cost of the issuer's entire structure of municipal debt or to mitigate market saturation so that the quantity of debt can be increased. We cannot observe these effects. Additionally, to the extent that a competitive bid issuer relies on financial advisors or internal resources to substitute for the advice and innovation efforts provided by investment bankers, these costs are not reflected in the issue's "true interest cost." Thus, the cost of competitive bid offerings may be understated relative to the cost of negotiated offerings.

4.3.5 Risk exposure of the underwriter

Respondents noted that the competitive bid process discourages pre-marketing, since bidders are not certain of winning the bid. Because they are less involved in preparing the official statement than negotiated underwriters, they have less opportunity to examine the revenue projections that underlie revenue-based issues. In addition, competitive underwriter face additional risk from their inability to reprice the issue if conditions change. In marketing the issue, competitive underwriters are unable to structure the issue to meet pockets of demand and are limited in their abilities to expand pockets of demand to include direct retail investors. The result is that the underwriter of a competitive bid offering is exposed to greater risk of being unable to place the issue. This risk exposure is greater, as noted above, when the issue is risky or complex, and when the market segment is saturated. The implication is that competitive bid underwriters are likely to bid conservatively in circumstances when their exposure to mispricing risk is high.

4.3.6 Aftermarket support

Several respondents indicated that underwriters of negotiated issues provide greater aftermarket support for the offerings and greater liquidity for investors in the issue. If investors value liquidity, the difference in aftermarket support could result in lower interest cost. Related to this argument, at least one respondent indicated that clients of negotiated underwriters are likely to be willing to pay higher prices for an issue. Several respondents indicated that aftermarket support plays a relatively weak role in the selection decision.

4.3.7 Loss leader pricing

Several respondents suggested that underwriters may sometimes bid aggressively for a competitive issue when they believe winning the bid will give them greater exposure to the issuer and increase the probability of being selected for the issuer's negotiated offerings. If so, then direct comparisons of interest cost between competitive and negotiated issues are biased in favor of competitive issues. One respondent pointed out that an issuer who occasionally used competitive bid would face higher interest costs if the issuer were to announce that it no longer would use negotiated issues. This observation implies that issuers who are precluded from using negotiation will face higher competitive-bid interest costs, as would issuers who predominantly used competitive bid.

4.3.8 Agency concerns

Some respondents indicated that historically issuers who selected negotiation have been accused of doing so for reasons that do not benefit the issuer, such as for campaign contributions from the investment banker. The respondents indicated that MSRB Rules G-37 and G-38 now have substantially removed this potential concern about the negotiated issuance process.

4.4 Implications for empirical analysis

The comments on the academic studies have been addressed in this study to the extent possible. First, the very important issue of self selection bias is addressed using widely-adopted statistical procedures. These procedures recognize that negotiated or competitive issuance decisions are not made randomly. Rather, they are made with a view of the implications of the choice of issuance method for issue cost.

Second, the associated concern regarding lack of measures of some of the features of issues is mitigated to some degree by this self-selection bias treatment. Indeed, the self-selection bias correction procedure used herein contemplates that some aspects of the choice of issuance method are unobservable.

Finally, to our knowledge, the study presented here uses the largest sample of new issues ever presented in the literature. This permits a large number of descriptive characteristics to be captured in the analysis. It also obviates the need to pre-select or "match" competitive and negotiated issues as a proxy for such comprehensive control. Unlike previous studies, a large time period is also spanned by the analysis. The data used in this study span more than fifteen years of new issues.

The many qualitative differences between the two issue methods reported by interviewees generally argue in favor of more efficient issuance under negotiated, rather than competitive issuance for certain types of issues or issue circumstances. To the extent this is true, of course, the observed issuance cost of negotiated debt will appear to be higher without control for this self-selection. Thus, simplistic "matched" comparisons of negotiated and competitive issues will tend to yield what the literature has historically found: a somewhat higher issuance cost of negotiated versus competitive issues. However, with fuller control over self selection, the difference in apparent issue cost should be reduced or eliminated.

5 Hypotheses

The approach taken in this study is to test three, related hypotheses regarding the behavior of municipal bonds issued under negotiated and competitive methods. The first is to perform a traditional analysis of the comparative costs of issuance. The primary innovations that are offered in the current study are the use of a large dataset and the use of statistical controls for both sample and self-selection bias. The null hypotheses are that there is no difference in the true interest cost associated with issues offered by negotiated or competitive issuance methods and that issuers optimally select the issuance method that minimizes their issuance costs.

The second approach taken in this study draws on literature that speaks to the post-marketing behavior of new municipal bond issue prices. This approach tests whether the post-marketing behavior of municipal bond prices is different, when full information is available, under one issuance method or the other. One potential advantage of this approach over the comparative interest cost approach is that the measured variables may be less subject to some of the problems caused by incompleteness of issuance cost information.

To summarize, the analysis in this study tests three hypotheses:

1. There is no difference in the true interest cost associated with issues offered by negotiated or competitive issuance methods once sample selection and self selection biases have been controlled.
2. Issuers choose the issuance method that minimizes their expected costs of issuance.
3. There is no difference in the post-marketing behavior of new issue prices between the negotiated and competitive issuances that redounds to the disbenefit of the issuer.

5.1 Comparative interest costs

As noted in Section 3.2.1, most published studies comparing the costs of negotiated and competitive issuances have found that the interest cost of negotiated issuance are 10 to 70 basis points more than for competitively issued bonds. Smith (1987), Leonard (1996), Peng and Brucato (2003); and Kriz (2003), suggest that self selection bias may be affecting these conclusions. In other words, factors that affect the negotiated/competitive issuance choice may also affect the interest cost. For example, a complex issuance by an entity with a lower credit rating would be more likely to use a negotiated issuance method and would be more likely to be associated with higher interest costs.[16] Failure to control for such simultaneity would tend to ascribe differences in the costs of negotiated and competitive issuances to issuance method rather than to underlying fundamentals of the issuance itself.

In addition to possible self-selection bias, a sample selection bias may also be affecting the conclusion that the interest cost of negotiated issuance are greater than for competitively issued bonds. In particular, most issuances—especially negotiated issuances—do not report TIC. It is possible, therefore, that many of the characteristics that affect the negotiated/competitive decision and the TIC also affect whether a TIC is reported.

Section 7 describes a two-step procedure described by Heckman (1979), Maddala (1983), and Amemiya (1985) in which we first examine the factors affecting TIC report-

[16] Note that even within rating categories and "mega-sectors" (e.g., revenue bonds), credit characteristics and complexity may differ from sector to sector. For example, an A-rated hospital bond may be perceived to be riskier, may be less likely to be eligible for bond insurance, and may be more complex to analyze than an A-rated water and sewer revenue bond. Thus, such a hospital bond would yield more in a given state would also be more likely to be a negotiated issuance than the similarly rated water and sewer bond.

ing and the factors determining negotiated/competitive decision in a sample of municipal bond issues and then incorporate these factors into a comparison of TIC for negotiated and competitive issuances. Specifically, we examine (a) whether the probability that a TIC is reported in the dataset is a function of bond and issuer characteristics and (b) whether the probability that an issuance is negotiated is a function of bond and issuer characteristics. We next examine the TIC for negotiated and competitive offerings, using a vector of variables believed to affect issuance costs, and controlling for the interdependence between the decision to use a negotiated process and the issuance costs. We then estimate the selectivity-bias-adjusted TIC for both negotiated and competitive issuances under the alternative issuance method.

5.2 Post issuance price behavior

Another method for comparing the efficiency of negotiated and competitive issuance is to examine the post-issuance behavior of municipal bond prices. If the prices of municipal bonds evolve differently after issuance depending upon the manner in which they were initially sold, this could suggest that one method of issuance offers the issuer a more favorable initial price than another.

In order to evaluate the available information on this phenomenon, it is necessary to recall the process by which municipal bonds find their way into the hands of the ultimate investor. The first step is the determination of the initial sale or offering prices. In the negotiated case this is set in negotiation with the issuer, and it is the price at which the underwriters agree to acquire the new issue. In the case of the competitive bid process, the initial sale or offering price is determined by a single-price auction process. In either case, the pricing occurs on the sale date; the issue, delivery and settlement dates are subsequent to the sale date. Trading of the security can occur at any time on or after the sale date. Trading that occurs before the sale is settled involves, in essence, forward sales against the issue date.

The initial sale price is captured in the bond prospectus as the initial re-offering price. This is the price at which the underwriters or bidding syndicates agree to trade at least 10 percent of the issue acquired. Hence, for purposes of evaluating the subsequent price behavior of the bonds, the re-offering price is the relevant benchmark against which to measure subsequent pricing. Subsequent trades occurring at prices in excess of the re-offering price indicate that the issuer may have received something less than the full market value of its issue or that market conditions have changed.[17]The tendency for securities to trade at prices in excess of their initial or offering price is a common phenomenon in securities issues.[18] The phenomenon has been called a “price pop,” the cause of which has been the subject of vigorous debate among financial economists. One common argument is that the underwriters and broker dealers who acquire a new issue in the primary market have an informational advantage over, say, retail customers who buy subsequently after the large primary market blocks of securities have been broken up. In other

[17] Subsequent trades at prices in excess of re-offering prices may also be because of liquidity, marketing costs and other size-related premiums in small offerings.

[18] As noted in Section 3.2.2, however, competition among investors makes it virtually impossible for underwriters to systematically underprice in order to sell in the secondary at a large markup.

words, "informed" market participants may have a better appreciation of the true value of the bond than the "uninformed" retail market participant. A lack of regular involvement in the marketplace cause uninformed investors to be willing to pay more for an issue than the informed investors would pay. This viewpoint argues that as the bonds move into the hands of retail investors, observed trades will thus be at higher prices than the re-offering price.

By this line of reasoning, there are three possible reasons why a larger price "pop" might be observed with negotiated issuance than competitive issuance. The first is that the price pop is larger because the negotiated price does not offer the issuer as good a re-offering price as does the competitive process. This price pop should be observed whether the bonds are sold to informed or uninformed investors. Another reason why there might be a differential price pop is that the bonds brought to market by the negotiated process may be "more opaque" to retail investors than are the types of bonds brought to the market by the competitive process. Finally, a larger price pop might be observed in the negotiated case because it is the beginning of a more retail-intensive distribution process. Note that neither of the last two arguments imply that the issuer necessarily receives an inefficiently lower price under negotiated issuance than under competitive issuance. Rather, it is simply the case that the retail margins are greater to these bonds and the marketing channel.

Green et al. (2006) examines the process of dealer intermediation and aftermarket price behavior in the US municipal bond market, using data from 2003. The study examines trades using data obtained from the MSRB and hand collected information from bond prospectus publications. The study examines the emergence of price pops (premiums of sale prices over re-offering prices) in a five-day period and 50-day period after issuance. The statistical model used permits evaluation of the pricing behavior differentially for informed and uninformed investors. The main findings of the study that are relevant to the research in this study are:

1. For the market as a whole, there is a fixed effect premium over the re-offering yield of 56 basis points irrespective of the method of issuance.
2. For sales to informed investors, the fixed effect premium is positive, but negligible at 4 basis points.
3. For the market as a whole, markups on competitive offers are, on average, 9 basis points lower than in negotiated deals.
4. But, when focused on informed investors only, markups on competitive offers are, on average, a *de minimis* 0.04 basis points lower than in negotiated deals.

The implications of this study for the research at hand are important. They suggest that the negotiated issuance channel involves issuance of securities and channels of distribution that offer greater retail spread opportunities over the re-offering price. However, since both the fixed effect and negotiated sale premiums are absent when "informed" investors are involved, the results imply that the negotiated channel does not put issuers at a

disadvantage relative to the competitively bid issuance channel.[19] That is, the issuer can expect to enjoy the same proceeds for its new issues, everything else being equal, regardless of whether the issue is marketed through underwriters and negotiated process or broker/dealers and a competitive bid process.

This research is not without some weaknesses. The main weakness is that the competitive and negotiated issue process is treated as exogenous, rather than as part of a self-selected determination of the issuer. It is conceivable that correcting for this bias by explicit modeling of the issuance method choice behavior might alter the findings.

6 Data

The data used for the comparative cost analysis are all U.S. municipal new issues between January 1, 1990 and June 30, 2006, available from Thomson Financial Services. The original data set consists of a total of 270,265 issues. Descriptive statistics are provided in Table 2. In the sample, 260,649 issues are either negotiated or competitive issuances. Of the negotiated and competitive issuances, 41,655 (16 percent) reported TIC (Table 3).

The data include variables measuring the characteristics of the issue, the issuer, and the market itself at the time of issue. The variables used in the analysis are as follows.

TIC. True interest cost or the rate, compounded semi-annually, necessary to discount the amounts payable on the respective principal and interest payment dates to the purchase price received for the new issue of bonds.

TIC dummy. Dummy variable equal to 1 if issuance reports TIC, 0 otherwise.

Negotiated issuance. Dummy variable equal to 1 if negotiated issuance, 0 if competitive.

Issue amount. Dollar amount issued, in millions; natural log used in regressions.

Years to maturity. Number of years from date of issue until date of maturity.

Revenue bond. Dummy variable equal to 1 for revenue bond issuance, 0 otherwise.

Serial bond. Dummy variable equal to 1 for serial bond issuance, 0 otherwise.

Callable bond. Dummy variable equal to 1 if bond is callable, 0 otherwise.

Refund. Dummy variable equal to 1 if issuance is a refund, 0 otherwise.

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[19] In contrast to Green et al. (2006), Booth and Booth (2003) contend that price pops occur because regulations or industry practices that require fair distribution of access to new issues causes some buyers with high willingness to pay to be rationed out on the date of issue. They reassert their strong demand in the aftermarket, causing prices to increase subsequent to the initial offering. Viewed from this perspective, the switching regression model of Green et al. (2006) is not detecting an information asymmetry, but rather a "rationed in" and "rationed out" market partitioning. From the standpoint of the negotiated versus competitive municipal bond issuance, the cause of this partitioning is irrelevant, whether it is liquidity, issue size, or market partitioning. In either case, Green et al. (2006) confirms that price pops are not associated with the method of issuance.

Credit enhancement. Dummy variable equal to 1 if issuance has credit enhancement (e.g., insurance), 0 otherwise.

Highest bond rating from Moody's or S&P. Dummy variable equal to 1 if the underlying long-term rating is the highest given by either Moody's or Standard & Poor's, 0 otherwise.

2nd highest bond rating from Moody's or S&P. Dummy variable equal to 1 if the underlying long-term rating is the second highest given by either Moody's or Standard & Poor's, 0 otherwise.

Issuer type. Dummy variable equal to 1 for particular issuer, 0 otherwise. Issuer types are (a) city, town, village, (b) county/parish (c) local authority, (d) district (e) state (f) state authority, and (g) college or university.

***Bond Buyer* use of proceeds**. Use of the proceeds from the issuance, as reported in *Bond Buyer*. Dummy variable equal to 1 for particular use of proceeds, 0 otherwise. Use of proceeds types are (a) general purpose, (b) public facilities, (c) general purpose, (d) education, (e) electric power, (f) housing, (g) utilities, (h) healthcare, (i) development, (j) transportation, and (k) environmental facilities.

***Bond Buyer* GO bond index**. *Bond Buyer* general obligation municipal bond index on date of issue.

***Bond Buyer* revenue bond index**. *Bond Buyer* revenue municipal bond index on date of issue.

State of issue. Dummy variable equal to 1 for particular state, 0 otherwise. Variable coded for each state and the District of Columbia.

Year of issue. Dummy variable equal to 1 for each year, 0 otherwise. Variable coded for each year 1990-2006.

TIC (true interest costs) is the dependent variable of interest and is the dependent variable in the impact regressions. Whether a bond is a *negotiated issuance* is an independent variable in the selection regressions and an independent variable in the impact regression. *Issue amount* and *years to maturity* are continuous variables of issue characteristics. *Revenue*, *serial*, *callable*, *refund*, *credit enhancement*, and *bond rating*, are indicator variables of an issue's riskiness and complexity and proxy, to the extent possible, for any contingent claims. *Issuer type* indicates which level of government or which type of agency is issuing the bond. *GO bond index* and *revenue bond index* are continuous variables designed to control for market conditions at the time of issuance. *State of issue* and *year of issue* are control variable designed to control for differences in regulations, preferences, and other ambient conditions across geography and time. Because these variable capture many factors that are not explicitly modeled, caution should be exercised in interpreting their coefficients and signficance.

The data used include control variables to take account of such factors as the risk and size of an issue. However, the available measures of these factors are much less than perfect measures of the factors, and are likely not to fully control for them. For example, Fabozzi et al. (1988) indicate that market uncertainty may be an important determinant of the relative costs of negotiated and competitive issuance. The data used in this analysis,

however, is not amenable to relatively complex calculation of market variability at the time of issuance. In addition, although our methodology is designed to control for selection, it does so imperfectly and therefore still may understate the advantages of negotiation when issues are risky, complex, or large relative to the market.

As noted in interviews with market participants, timing of issuance or last minute changes to the terms of issuance can play a key role in the negotiated/competitive choice as well as the cost of issuance. However, it is impossible with the available data to observe or control for the effects of such timing issues. Thus, to the extent that the negotiated offering method yields a benefit related to market timing, that benefit cannot be reflected in an empirical analysis that focuses on comparative issuance costs.

TIC is a variable that is reported by the issuer, its financial advisor, or its underwriter. To the extent that a competitive bid issuer relies on financial advisors or its own internal resources to substitute for the advice and innovation efforts provided by investment bankers, these costs may not be reflected in the issue's TIC. Depending on the extent of such underreporting, the TIC on competitive issues would tend to be lower than the economically "true" cost of issuance.

7 Results

The following section describe the empirical results from our analysis. A description of the theory and methodology is provided in Appendix A.

7.1 A naïve model

Several early studies comparing the costs of negotiated and competitive offerings employ a linear regression model to evaluate the relationship between issuance costs and the negotiated/competitive decision and other factors. In the basic formulation, the negotiated/competitive issuance decision is indicated by a dummy variable that, for example, takes on the value of 1 for a negotiated issuance and 0 for a competitive issuance. The estimated coefficient on this dummy variable thus is intended to capture any effect of negotiated/competitive choice on TIC. However, as noted elsewhere, such analysis does not control for self-selection or sample selection biases.

Table 4 presents the results from a naïve model that does not account for selection biases. The results are consistent with earlier studies: all other things being held constant, the average TIC associated with negotiated issuances is 25 basis points higher than the average TIC associated with competitive issuance and is statistically significantly different from zero.

7.2 Controlling for self selection

A municipal bond issuer faces two prospective pricing outcomes depending on whether the issuance is negotiated or competitive. Although the issuer theoretically faces two different TICs, only the actual choice—associated with either negotiated or competitive—is observed. This choice reveals something about the value of the issuer's private information regarding its decision to use a negotiated or competitive issuance method.

Indeed, the issuer would be expected to use a negotiated method if the costs of doing so are less than the costs of using a competitive method and vice versa.

Because the TIC associated with the method not chosen cannot be observed, it is estimated on the basis of the bond and bond issuer's characteristics. Statistically, a probit regression is used to estimate the probability that an issuer chose a negotiated issuance method. The *t*-statistics for the estimated coefficients and the marginal effects indicate that many of the independent variables are important in explaining the negotiated/competitive issuance decision (Table 5). For example, all other things being equal, larger issues and more complex issues tend to be negotiated while GO issues with better credit ratings tend be competitive.

The results from the probit regression are incorporated into the impact regression to obtain consistent estimation of the TIC.

7.3 Controlling for sample selection

Bond issuance data is notoriously incomplete. Among the 260,649 negotiated or competitive observations in the dataset, 16 percent report TIC. Whether TIC is reported does not seem to be random. Negotiated issuances are much less likely to report TIC than competitive issuances (Table 3). For example, in 2004 through 2006, fewer than 1.5 percent of negotiated issuances reported TIC but more than 40 percent of competitive issuances reported TIC.

Several factors may explain whether TIC would be reported. For example, TIC is a key component that issuers demand of bidders in some competitive issuances. Thus competitive issuances would be more likely to report TIC. As noted above, it is possible that many of the characteristics that affect the negotiated/competitive decision and the TIC also affect whether a TIC is reported. Because the TIC reporting decision is unobservable, it is estimated on the basis of the bond and bond issuer characteristics.

Statistically, a probit regression is used to estimate the probability that an issuance will report a TIC. The *t*-statistics for the estimated coefficients and the marginal effects indicate that many of the independent variables are important in explaining whether the TIC is reported (Table 6). The results from the probit regression—known as the inverse Mills ratio—are incorporated into the impact regression to obtain consistent estimation of TIC.

7.4 Impact

The results from the probit regressions in Sections 7.3 and 7.2 are added to the naïve model, along the line of the procedure described by Heckman (1979), Maddala (1983), and Amemiya (1985). The inclusion of the inverse Mills ratio from the sample selection regression and the fitted values from the self selection regression control for the interdependence between TIC reporting, the negotiated/competitive decision, and TIC.

When the sample selection and self selection corrections are applied to the naïve model, the negative coefficient on NEG_f indicates that, after controlling for selection biases, negotiated issuances may have lower TICs than competitive issues. The small *t*-statistic indicates, however, that such costs are not statistically significant. Thus, once

selection biases are accounted for, the additional costs associated with negotiated issuance disappear (Table 7).[20]

Table 8 is based on an assumption that the relationship between TIC and the independent variables differ across negotiated and competitive issuances. This assumption is useful for developing a "what if" scenario to describe the effect of the negotiated/competitive decision on TIC. Table 9 shows the TIC associated with each type of issuance if the opposite type had been chosen instead. That is, it shows the costs of competitive issues if they had been negotiated instead, and vice versa. Under the assumption that issuers act rationally to minimize their expected issuance costs, one would expect to see higher issuance costs under the alternative method of issuance. Consistent with economic expectation, the results of what-if analysis indicate that, on average, issuers tend to select the least cost issuance method. Table 9 shows that if issuers were forced to choose the "wrong" issuance method, the TIC for negotiated issuances would be 7 basis points higher that what was actually incurred.

8 Conclusion

Municipal finance relies heavily on the issuance of debt and the debt is issued by a diverse range of public entities. The issuer of the debt has a choice in how the debt is issued. The issuer may choose a negotiated method or a competitive method. A negotiated issue differs from competitive issues in that the initial price is struck not by competitive bidding but directly between the issuer and underwriters. In a negotiated offering, the underwriters negotiate the offering price of the new issue with issuer. Some analysts believe they have observed systematic differences in the cost to the issuer by type of issuance. These findings have, in turn, led to research to evaluate whether—or under what conditions—one method of issuance is superior to another.

The empirical findings presented in this study suggest that once selection biases are accounted for, there is no general advantage of competitive over negotiated issuance processes. Rather, there appears to be a strong tendency for issuers to select the method of issuance that best suits the nature of the issue at hand. Indeed, our analysis indicates that efforts to mandate one type of issuance over the other will like increase issuance costs.

[20] The positive and significant coefficient on the sample selection variable, implies that issuances reporting TIC would be expected to have higher TICs than issuances that do not report TIC.

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A Technical Appendix

Sample selection bias and endogeneity bias refer to two distinct concepts, both entailing distinct solutions. In general, *sample selection bias* refers to problems where the dependent variable (e.g., TIC) is observed only for a restricted, nonrandom sample. For example, one observes an issuance's negotiated TIC only negotiated issuances. Conversely, one observes an issuance's competitive TIC only for competitive issuances. It is impossible to know with certainty what a negotiated issuance's TIC would have been had it been issued competitively (and vice versa). *Endogeneity*, also known as *self selection bias*, refers to the fact that an independent variable included in the model (e.g., whether a bond is issued via negotiated or competitive methods) is potentially a choice variable, correlated with unobservable factors captured by the error term. For instance, if more complex issuances are more likely to be issued through a negotiated process and if more complex issuances tend to have higher TICs ceteris paribus, then failure to control for this correlation will yield an estimated negotiated effect on TIC that is biased upward.

Gershberg et al. (2001) recognize the possibility that a low response rate to a survey they conducted may introduce sample selection bias. They suggest Heckman's (1979) methodology to account for potential sample selection, but instead opt to interpret their results as being conditional on receiving a survey response.

As the following table indicates, any statistical analysis of comparative issuance costs should account for the possibility of sample selection bias in addition to self selection bias. The table shows that negotiated issuances are less likely to report TIC than competitive issuances. Thus, it is possible that factors affecting the negotiated/competitive issuance decision also affect whether the issuer reports TIC in the database.

	Negotiated	**Competitive**
TIC Reported	10,762 obs. 4.1%	30,778 obs. 11.8%
TIC Not Reported	138,551 obs. 53.2%	80,233 obs. 30.8%

The relationship between the negotiated/competitive decision and TICs can be treated as a sample selection problem or as an endogeneity problem or both. The "appropriate" model depends on how one believes the negotiated/competitive decision affect TIC.

A.1 Naïve OLS model

If one believes that the competitive/negotiated decision has merely an intercept effect on TIC (i.e., results in a parallel shift up or down in TIC), then the appropriate model includes the negotiated/competitive decision as a right-hand-side variable and pools the entire sample of negotiated and competitive issuances. One can then proceed to estimate a typical TIC regression equation via ordinary least squares (OLS). The estimating equation would be as follows.

$$TIC = X_1\beta_1 + NEG\ \delta_1 + u_1, \tag{A1}$$

where *TIC* is a vector the true interest cost for each issue, X_1 is a matrix of independent variables for each issue, *NEG* is a dummy variable representing the negotiated/competitive choice (e.g., *NEG* = 1 if the issue is negotiated and *NEG* = 0 if the issue is competitive); β_1 and δ_1 are the estimated coefficients and u_1 is the error term.

Gershberg et al. (2001), Simonsen et al. (2001), Simonsen and Robbins (1996), and Braswell et al. (1983) estimated cost using OLS and included one or more dummy variables to capture the negotiated/competitive decision. Each of these studies estimated a higher cost associated with negotiated issuances. Fabozzi et al. (1988) used a similar methodology, however by controlling for measures of market uncertainty, they conclude that competitive issuances may cost more in high market uncertainty periods.

The results from this method applied to our data are presented in Table 4, and finds a higher cost associated with negotiated issues.

A.2 Endogeneity model

If one believes the negotiated/competitive decision is endogenous and that issuers self-select into negotiated or competitive issuances, then one must instrument for the negotiated/competitive decision, in which case a two-step method is used.

Kriz (2003), Peng and Brucato (2003), and Smith (1987) have identified endogeneity in the negotiated/competitive decision in bond issuance and have developed statistical methods to account for the endogeneity. Peng and Brucato (2003) found no difference in the costs of issuance after controlling for endogeneity. Kriz (2003) and Smith (1987) found that negotiated issuances tend to have lower costs of issuance.

A.2.1 Method 1

Under this method the betas (the coefficients on the independent variables) are restricted to be the same for negotiated and competitive issuances. For example, it assumes that the effect of bond rating is restricted to be the same regardless of whether an issuance is negotiated or competitive.

Step 1: Estimate with probit the following equation.

$$NEG = X_1\beta_1 + u_1 \tag{A2}$$

Step 2: Substitute the fitted values for the competitive/negotiated decision into the OLS regression, where NEG_f denotes the fitted value from the probit in Step 1.

$$TIC = X_2\beta_2 + NEG_f\ \delta_2 + u_2 \tag{A3}$$

A.2.2 Method 2

Under this method, the negotiated/competitive decision has not only an intercept effect but also a slope effect (i.e., the estimated coefficients on the independent variables differ according to the negotiated/competitive decision as well). For example, it assumes that the effect of bond rating on TIC can differ across negotiated and competitive issu-

ances. Rather than combining all the observations, a TIC equation is estimated for each subsample of negotiated issuances and competitive issuances.

Step 1: Estimate with probit the following equation.

$$NEG = X_1\beta_1 + u_1 \tag{A4}$$

Step 2: Use the results from Step 1 to calculate the inverse Mills ratio for each observation. Substitute the inverse Mills ratio into the OLS regression, where IMR_n denotes $f(\psi_i)/F(\psi_i)$, the ratio of the density of to the is designated as ratio of the density function of ψ_i (a standard normal random variable) to the cumulative distribution of ψ_i. IMR_c denotes $f(\psi_i)/[1\text{-}F(\psi_i)]$. The inverse Mills ratios are selectivity variables that measure the expected value of the issuer's private information about its decision to use a negotiated or competitive method of issuance, conditional on bond and the issuer's observed characteristics. A significant coefficient for the inversed Mills ratio indicates that TIC is affected by the competitive/negotiated decision.

$$TIC_n = X_2\beta_2 + IMR_n\ \delta_2 + u_2 \tag{A5}$$

$$TIC_c = X_3\beta_3 + IMR_c\ \delta_3 + u_3 \tag{A6}$$

A.3 Sample selection model

As noted elsewhere, statistical analysis of comparative issuance costs should account for the possibility of sample selection bias in addition to self selection bias. One way to do so is to instrument for the TIC reporting decision, in which case a two-step method is used.

Step 1: Estimate with probit the following equation, where $TIC^* = 1$ if TIC is present and $TIC^* = 0$ if no TIC is present.

$$TIC^* = X_1\beta_1 + u_1 \tag{A7}$$

Step 2: Use the results from Step 1 to calculate the inverse Mills ratio for each observation. Substitute the inverse Mills ratio into the OLS regression, where IMR_t denotes $f(\psi_i)/F(\psi_i)$. The inverse Mills ratio is a selectivity variable that measures the expected value of the decision to report TIC, conditional on bond and the issuer's observed characteristics. A significant coefficient for the inversed Mills ratio indicates that TIC is affected by the decision to report TIC.

$$TIC_n = X_2\beta_2 + IMR_t\ \delta_2 + u_2 \tag{A8}$$

A.4 Both endogeneity and sample selection model

In the case at-hand, we are confronted with both sample selection and self selection biases in the same model. The data provides negotiated/competitive information for nearly every issuance, but reports TIC for only a small subset. Thus, our model must account for the possibility that factors affecting the negotiated/competitive decision also affect the TIC reporting decision as well as the reported TIC. Thus, a double selection model is appropriate for achieving consistent estimators. First, a probit model explaining the TIC reporting decision is estimated, and the inverse Mills ratio is calculated. A second probit equation explaining the negotiated/competitive decision is then estimated. The

IMR term from the first probit and the fitted values from the second probit are included in TIC equations estimated using OLS.

A.4.1 Method 1

This method combines the methods described in A.2.1 and A.3. Under this method, the coefficients on the independent variables are restricted to be the same for negotiated and competitive issuances.

Step 1: Estimate with probit the following equations.

$$TIC^* = X_1\beta_1 + u_1 \tag{A9}$$

$$NEG = X_2\beta_2 + u_2 \tag{A10}$$

Step 2: Use the results from Step 1 to calculate the inverse Mills ratio, IMR_t, from (A9). Substitute the fitted values for the competitive/negotiated decision (A10) into the OLS regression, where NEG_f denotes the fitted value from the probit in Step 1.

$$TIC = X_3\beta_3 + IMR_t\,\gamma_3 + NEG_f\,\delta_3 + u_3 \tag{A11}$$

The results from this method are present in Table 7.

A.4.2 Method 2

This method combines the methods described in A.2.2 and A.3. Under this method, the coefficients on the independent variables may differ across negotiated and competitive issuances.

Step 1: Estimate with probit the following equation.

$$TIC^* = X_1\beta_1 + u_1 \tag{A12}$$

$$NEG = X_2\beta_2 + u_2 \tag{A13}$$

Step 2: Use the results from Step 1 to calculate the inverse Mills ratio for each observation (IMR_t from the first probit, IMR_n and IMR_c from the second probit). Substitute the inverse Mills ratios into negotiated and the competitive OLS regressions, as follows.

$$TIC_n = X_3\beta_3 + IMR_t\,\gamma_3 + IMR_n\,\delta_3 + u_3 \tag{A14}$$

$$TIC_c = X_4\beta_4 + IMR_t\,\gamma_4 + IMR_c\,\delta_4 + u_4 \tag{A15}$$

The results from this method are present in Table 8.

Table 1: Summary of Research on the Comparative Costs of Negotiated and Competitive Methods of Issuance

Author	Cost	GO, Revenue, or Other	Control for Selection Bias	Results
McCaskill, 2005	TIC	GO, Missouri only (161 obs.)	Self selection (empirical analysis not provided)	Data indicates no difference in cost due to method of sale; conclusions suggest cost is higher for negotiated
Kriz, 2003	TIC	GO (521 obs.)	Self-selection	Cost is lower for negotiated when issuers' choice of issuance method accounted for
Peng and Brucato, 2003	TIC	Both (1,678 obs.)	Self-selection	No statistically significant difference in cost due to method of sale
Robbins, 2002	TIC	Revenue, New Jersey only (148 obs.)	None, but tested for endogeneity	Competitive issues have 35 basis point cost advantage over negotiated
Gershberg et al., 2001	TIC	Tax-exempt hospitals (4,576 obs.)	None	Cost of negotiated is approximately 60 basis points higher than competitive
Peng and Brucato, 2001	TIC	GO (530 obs.)	None	No difference in cost for issuances mandated to be competitive
Simonsen et al., 2001	TIC	GO, Oregon only (216 obs.)	None	Cost of negotiated is 17 basis points higher than competitive
Leonard, 1996	Reoffer yield	GO (514 obs.) and revenue (418 obs.)	Logistic regression for self-selection not incorporated in impact regression	No difference in reoffer yields due to method of sale
Simonsen and Robbins, 1996	TIC	GO, Oregon only (194 obs.)	None	Cost of negotiated is 29 basis points higher than competitive
Fabozzi et al., 1988	TIC	Public utilities (495 obs.)	None	Competitive may cost more in high market uncertainty periods
Smith, 1987	NIC	Electric and gas utilities (686 obs.)	Self selection	Cost is lower for negotiated when issuers' choice of issuance method accounted for
Bland, 1985	NIC	GO, Pennsylvania only (330 obs.)	None	Negotiated method compares favorably with competitive when previous experience of negotiators is accounted
Maese, 1985	NIC and reoffer yield	Revenue (58 obs.)	None	Higher cost and reoffer yield on negotiated issues
Braswell et al., 1983	TIC	Both, Florida only (80 obs.)	None	Cost of negotiated is 18 basis points higher than competitive
Joehnk and Kidwell, 1979	NIC	GO (404 pairs) and revenue (330 pairs)	None	Cost is higher for bond issues sold by negotiation

Author	Cost	GO, Revenue, or Other	Control for Selection Bias	Results
Sorenson, 1979	NIC	Revenue (504 obs.)	None	Cost of negotiated is slightly higher than competitive because of additional underwriter services

Table 2: Characteristics of Municipal Bond Issues in Thomson Dataset, 1990-2005

					Negotiated						Competitive					
		All Observations			TIC Reported			No TIC Reported			TIC Reported			No TIC Reported		
	Variable	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.
Bond Characteristics	True interest cost (TIC)	5.00	1.19	41,540	5.81	1.26	10,762				4.72	1.03	30,778			
	Amount of issue ($ mil.)	18.71	75.15	260,393	34.79	101.74	10,762	23.11	87.59	138,551	21.07	57.14	30,778	8.06	47.52	80,233
	Bond Buyer GO index	5.61	2.03	251,969	5.97	1.25	10,696	5.56	2.16	133,630	5.41	1.70	29,484	5.73	1.98	78,098
	Bond Buyer Revenue index	5.82	0.74	251,969	6.18	0.70	10,696	5.76	0.73	133,630	5.66	0.68	29,484	5.93	0.75	78,098
	Years to maturity	15.09	14.66	260,315	18.71	10.66	10,762	18.61	16.50	138,521	16.40	7.21	30,776	8.01	10.87	80,187
	Revenue bond	0.385		260,393	0.634		10,762	0.567		138,551	0.223		30,778	0.099		80,233
	Serial bond	0.885		260,393	0.977		10,762	0.828		138,551	0.997		30,778	0.928		80,233
	Callable bond	0.591		260,224	0.792		10,761	0.670		138,431	0.816		30,771	0.342		80,192
	Re-fund bond	0.084		260,393	0.201		10,762	0.080		138,551	0.109		30,778	0.066		80,233
	Credit enhancement	0.348		260,393	0.437		10,762	0.432		138,551	0.453		30,778	0.150		80,233
	Highest bond rating from Moody's or S&P	0.022		260,393	0.020		10,762	0.022		138,551	0.044		30,778	0.014		80,233
	2nd highest bond rating from Moody's or S&P	0.026		260,393	0.021		10,762	0.023		138,551	0.073		30,778	0.013		80,233
Issuer Type	City, town, village	0.335		260,393	0.247		10,762	0.270		138,551	0.435		30,778	0.422		80,233
	County/parish	0.086		260,393	0.087		10,762	0.084		138,551	0.101		30,778	0.081		80,233
	Local authority	0.124		260,393	0.170		10,762	0.185		138,551	0.060		30,778	0.039		80,233
	District	0.314		260,393	0.265		10,762	0.257		138,551	0.286		30,778	0.431		80,233
	State authority	0.107		260,393	0.192		10,762	0.168		138,551	0.059		30,778	0.009		80,233
	College/university	0.012		260,393	0.013		10,762	0.016		138,551	0.016		30,778	0.005		80,233
Use of proceeds	Public facilities	0.052		260,345	0.061		10,762	0.055		138,525	0.055		30,767	0.044		80,222
	Education	0.319		260,361	0.254		10,762	0.271		138,531	0.312		30,775	0.415		80,224
	Electric power	0.012		260,381	0.028		10,762	0.016		138,540	0.010		30,778	0.003		80,232
	Housing	0.063		260,381	0.070		10,762	0.108		138,540	0.017		30,778	0.003		80,232
	Utilities	0.110		260,292	0.153		10,762	0.118		138,521	0.116		30,762	0.088		80,178
	Healthcare	0.050		260,381	0.110		10,762	0.081		138,540	0.008		30,778	0.005		80,232
	Development	0.039		260,378	0.042		10,762	0.059		138,539	0.023		30,777	0.008		80,231
	Transportation	0.039		260,358	0.060		10,762	0.044		138,529	0.039		30,771	0.027		80,227
	Environmental facilities	0.016		260,381	0.024		10,762	0.025		138,540	0.009		30,778	0.004		80,232

Table 3: Number of Municipal Bond Issues in Thomson Dataset, 1990-2005

	With TIC		Without TIC		Total			
Year	Negotiated	Competitive	Negotiated	Competitive	Negotiated	Competitive	Other	Total
1990	613	625	5,111	4,886	5,724	5,511	370	11,605
1991	1,313	1,092	6,485	5,276	7,798	6,368	483	14,649
1992	1,652	1,340	7,960	5,044	9,612	6,384	420	16,416
1993	2,025	1,764	8,392	5,427	10,417	7,191	556	18,164
1994	1,226	1,492	6,635	4,983	7,861	6,475	617	14,953
1995	932	1,523	6,753	4,833	7,685	6,356	805	14,846
1996	412	1,563	8,008	5,383	8,420	6,946	797	16,163
1997	350	1,508	8,338	5,301	8,688	6,809	1,088	16,585
1998	476	2,059	10,192	5,366	10,668	7,425	903	18,996
1999	302	1,651	8,875	5,175	9,177	6,826	952	16,955
2000	190	1,791	7,497	4,982	7,687	6,773	763	15,223
2001	289	2,398	9,400	5,010	9,689	7,408	515	17,612
2002	376	2,719	9,895	4,579	10,271	7,298	381	17,950
2003	275	2,977	10,275	4,630	10,550	7,607	307	18,464
2004	181	2,547	9,898	3,924	10,079	6,471	341	16,891
2005	143	2,591	10,605	3,686	10,748	6,277	207	17,232
2006	53	1,207	4,536	1,654	4,589	2,861	111	7,561
Total	**10,808**	**30,847**	**138,855**	**80,139**	**149,663**	**110,986**	**9,616**	**270,265**

Table 4: Naïve TIC Regression Without Sample Selection of Self Selection Corrections (Dependent Variable: TIC)

Variable	Coeff.	Std. Err.	t-Stat.	
Intercept	4.95	0.11	46.41	**
Negotiated issuance	0.25	0.01	27.74	**
Amount of issue ($ mil., ln)	-0.06	0.00	-24.38	**
Bond Buyer GO index	0.04	0.00	17.18	**
Bond Buyer revenue index	0.22	0.01	24.20	**
Years to maturity	0.04	0.00	80.04	**
Revenue bond	-0.88	0.05	-16.43	**
Serial bond	0.95	0.03	27.60	**
Callable bond	0.35	0.01	36.39	**
Re-fund bond	0.08	0.01	8.07	**
Credit enhancement	-0.03	0.01	-4.48	**
Highest bond rating	-0.06	0.02	-3.68	**
2nd Highest bond rating	-0.02	0.01	-1.28	
City, town, village	-0.18	0.02	-9.98	**
County/parish	-0.19	0.02	-9.65	**
Local authority	-0.13	0.02	-6.27	**
District	-0.11	0.02	-5.32	**
State authority	-0.18	0.02	-8.47	**
College/university	-0.13	0.03	-3.90	**
Public facilities	0.00	0.01	-0.18	
Education	-0.06	0.01	-4.81	**
Electric power	0.02	0.03	0.61	
Housing	0.26	0.02	12.12	**
Utilities	0.01	0.01	0.72	
Healthcare	0.33	0.02	17.35	**
Development	0.41	0.02	20.61	**
Transportation	0.06	0.02	3.96	**
Environmental facilities	0.16	0.03	5.71	**
AK	-0.06	0.11	-0.52	
AL	-0.15	0.10	-1.47	
AR	-0.09	0.10	-0.94	
AZ	-0.04	0.10	-0.39	
CA	-0.15	0.10	-1.61	
CO	-0.15	0.10	-1.50	
CT	-0.23	0.10	-2.31	*
DC	0.16	0.14	1.18	
DE	-0.35	0.12	-2.85	**
FL	-0.24	0.10	-2.44	*
GA	-0.21	0.10	-2.12	*
HI	-0.22	0.14	-1.60	
IA	-0.21	0.10	-2.18	*
ID	-0.23	0.10	-2.19	*
IL	-0.15	0.10	-1.52	
IN	-0.12	0.10	-1.21	
KS	-0.30	0.10	-3.00	**
KY	-0.24	0.10	-2.37	*
LA	-0.09	0.10	-0.95	
MA	-0.27	0.10	-2.81	**
MD	-0.19	0.10	-1.92	
ME	-0.15	0.10	-1.52	
MI	-0.21	0.10	-2.12	*
MN	-0.27	0.10	-2.86	**

(continued)

Variable	Coeff.	Std. Err.	t-Stat.	
MO	-0.17	0.10	-1.71	
MS	-0.06	0.10	-0.60	
MT	-0.30	0.10	-2.89	**
NC	-0.31	0.10	-3.15	**
ND	-0.21	0.10	-2.04	*
NE	-0.38	0.10	-3.74	**
NH	-0.29	0.11	-2.70	**
NJ	-0.20	0.10	-2.04	*
NM	-0.25	0.10	-2.52	*
NV	-0.07	0.10	-0.71	
NY	-0.11	0.10	-1.15	
OH	-0.40	0.10	-4.07	**
OK	-0.12	0.10	-1.17	
OR	-0.34	0.10	-3.51	**
PA	-0.28	0.10	-2.86	**
RI	-0.14	0.10	-1.32	
SC	-0.27	0.10	-2.77	**
SD	-0.28	0.12	-2.43	*
TN	-0.24	0.10	-2.48	*
TX	-0.11	0.10	-1.14	
UT	-0.16	0.10	-1.58	
VA	-0.17	0.10	-1.69	
VT	-0.34	0.12	-2.82	**
WA	-0.19	0.10	-1.94	
WI	-0.26	0.10	-2.70	**
WV	0.10	0.12	0.85	
1991	-0.42	0.02	-19.44	**
1992	-1.03	0.02	-48.44	**
1993	-1.70	0.02	-77.37	**
1994	-1.19	0.02	-54.04	**
1995	-1.32	0.02	-58.14	**
1996	-1.41	0.02	-59.44	**
1997	-1.53	0.02	-62.84	**
1998	-1.96	0.02	-81.88	**
1999	-1.71	0.02	-69.86	**
2000	-1.31	0.02	-54.51	**
2001	-2.04	0.02	-86.13	**
2002	-2.41	0.02	-102.25	**
2003	-2.87	0.02	-120.44	**
2004	-2.71	0.02	-112.37	**
2005	-2.55	0.02	-103.20	**
2006	-2.49	0.04	-60.19	**

R-squared	0.74
Adjusted R-squared	0.74
S.E. of regression	0.61
Sum squared resid	14891.82
Log likelihood	-37055.56
Obs	40140

Table 5: Probit Regressions for Self Selection
(Dependent Variable: Negotiated dummy = 1 if negotiated, 0 if competitive)

Variable	Coeff.	Std. Err.	z-Stat.	
Intercept	0.79	0.28	2.86	**
Amount of issue ($ mil., ln)	0.02	0.01	2.81	**
Bond Buyer GO index	-0.04	0.02	-2.12	*
Bond Buyer revenue index	0.09	0.03	3.40	**
Years to maturity	0.00	0.00	1.36	
Revenue bond	0.14	0.14	1.00	
Serial bond	-1.01	0.09	-11.20	**
Callable bond	-0.20	0.03	-7.50	**
Re-fund bond	-0.08	0.03	-2.97	**
Credit enhancement	-0.06	0.02	-3.12	**
Highest bond rating	-0.39	0.05	-7.23	**
2nd Highest bond rating	-0.43	0.05	-8.86	**
City, town, village	0.47	0.05	8.99	**
County/parish	0.66	0.06	11.47	**
Local authority	0.78	0.06	13.37	**
District	0.94	0.06	16.20	**
State authority	0.70	0.06	12.04	**
College/university	0.09	0.09	1.06	
Public facilities	-0.12	0.04	-3.05	**
Education	-0.16	0.03	-4.62	**
Electric power	0.02	0.07	0.31	
Housing	0.43	0.05	7.91	**
Utilities	-0.05	0.03	-1.67	
Healthcare	1.13	0.05	21.07	**
Development	0.17	0.05	3.08	**
Transportation	-0.03	0.04	-0.59	
Environmental facilities	-0.05	0.07	-0.67	
AK	-0.48	0.25	-1.92	
AL	0.30	0.23	1.29	
AR	-0.55	0.23	-2.34	*
AZ	-0.12	0.24	-0.50	
CA	-0.67	0.22	-3.02	**
CO	-0.52	0.23	-2.26	*
CT	-0.96	0.23	-4.21	**
DC	0.52	0.33	1.59	
DE	-0.52	0.30	-1.75	
FL	-0.45	0.22	-1.99	*
GA	-0.57	0.23	-2.42	*
HI	1.08	0.37	2.91	**
IA	-1.51	0.23	-6.61	**
ID	0.32	0.24	1.35	
IL	-0.13	0.22	-0.57	
IN	-0.55	0.23	-2.36	*
KS	-0.89	0.23	-3.82	**
KY	-1.69	0.24	-6.98	**
LA	-0.45	0.23	-1.95	
MA	-0.97	0.22	-4.33	**
MD	-1.17	0.23	-5.04	**
ME	-0.01	0.24	-0.06	
MI	-0.32	0.22	-1.43	
MN	-1.58	0.22	-7.09	**
MO	-0.06	0.23	-0.27	
MS	-1.18	0.25	-4.80	**

(continued)

Variable	Coeff.	Std. Err.	z-Stat.	
MT	-1.05	0.26	-4.04	**
NC	-0.69	0.23	-2.95	**
ND	-1.60	0.27	-5.99	**
NE	0.83	0.23	3.52	**
NH	-0.77	0.25	-3.05	**
NJ	-0.77	0.23	-3.40	**
NM	-1.07	0.24	-4.40	**
NV	-1.62	0.24	-6.73	**
NY	-0.48	0.22	-2.15	*
OH	0.49	0.23	2.14	*
OK	-0.68	0.24	-2.82	**
OR	0.26	0.22	1.17	
PA	-0.57	0.22	-2.54	*
RI	-1.13	0.25	-4.53	**
SC	-1.03	0.23	-4.43	**
SD	0.40	0.27	1.46	
TN	-1.45	0.23	-6.37	**
TX	-0.70	0.22	-3.17	**
UT	-0.52	0.24	-2.18	*
VA	-1.24	0.23	-5.46	**
VT	0.24	0.29	0.83	
WA	0.60	0.22	2.67	**
WI	-1.09	0.22	-4.86	**
WV	-0.40	0.28	-1.47	
1991	0.20	0.05	3.91	**
1992	0.28	0.05	5.34	**
1993	0.30	0.06	5.23	**
1994	-0.01	0.06	-0.20	
1995	-0.13	0.06	-2.24	*
1996	-0.66	0.06	-10.37	**
1997	-0.78	0.07	-11.41	**
1998	-0.72	0.07	-10.48	**
1999	-0.88	0.07	-12.75	**
2000	-1.13	0.07	-15.99	**
2001	-1.05	0.07	-14.92	**
2002	-0.99	0.07	-14.21	**
2003	-1.22	0.07	-16.43	**
2004	-1.24	0.08	-16.22	**
2005	-1.32	0.08	-16.31	**
2006	-1.39	0.15	-9.26	**

Mean dependent var	0.27
S.E. of regression	0.33
Sum squared resid	4314.14
Log likelihood	-13816.79
Restr. log likelihood	-23268.69
LR statistic (92 df)	18903.78
Probability(LR stat)	0.00
McFadden R-squared	0.41
Obs with Dep=0	29445
Obs with Dep=1	10695

Table 6: Probit Regressions for Sample Selection
(Dependent Variable: TIC dummy = 1 if TIC reported, 0 otherwise)

Variable	Coeff.	Std. Err.	z-Stat.	
Intercept	-3.01	0.10	-31.62	**
Amount of issue ($ mil., ln)	0.08	0.00	31.85	**
Bond Buyer GO index	-0.01	0.00	-4.21	**
Bond Buyer revenue index	0.26	0.01	27.25	**
Years to maturity	0.01	0.00	21.06	**
Revenue bond	-1.89	0.06	-33.85	**
Serial bond	1.38	0.03	54.75	**
Callable bond	0.41	0.01	42.64	**
Re-fund bond	0.01	0.01	1.27	
Credit enhancement	0.22	0.01	27.14	**
Highest bond rating	0.32	0.02	15.56	**
2nd Highest bond rating	0.52	0.02	28.00	**
City, town, village	-0.21	0.02	-9.13	**
County/parish	-0.27	0.02	-10.84	**
Local authority	-0.39	0.02	-15.86	**
District	-0.41	0.02	-16.49	**
State authority	-0.21	0.02	-8.55	**
College/university	-0.22	0.04	-5.84	**
Public facilities	0.06	0.02	3.75	**
Education	-0.03	0.01	-1.88	
Electric power	-0.04	0.03	-1.17	
Housing	-0.73	0.02	-36.45	**
Utilities	-0.01	0.01	-0.99	
Healthcare	-0.37	0.02	-19.41	**
Development	-0.21	0.02	-9.88	**
Transportation	0.00	0.02	0.15	
Environmental facilities	-0.17	0.03	-5.80	**
AK	0.55	0.11	5.18	**
AL	-0.24	0.09	-2.61	**
AR	0.09	0.09	1.02	
AZ	-0.30	0.09	-3.26	**
CA	0.33	0.09	3.90	**
CO	-0.08	0.09	-0.88	
CT	0.38	0.09	4.32	**
DC	-0.21	0.14	-1.54	
DE	0.20	0.12	1.59	
FL	0.37	0.09	4.26	**
GA	0.06	0.09	0.70	
HI	-0.31	0.13	-2.34	*
IA	0.60	0.09	6.95	**
ID	0.62	0.10	6.45	**
IL	-0.20	0.09	-2.26	*
IN	-0.34	0.09	-3.86	**
KS	-0.11	0.09	-1.24	
KY	-0.20	0.09	-2.14	*
LA	0.27	0.09	3.02	**
MA	0.34	0.09	3.93	**
MD	0.85	0.09	9.31	**
ME	0.67	0.10	6.97	**
MI	0.06	0.09	0.65	
MN	0.88	0.09	10.32	**
MO	-0.15	0.09	-1.76	
MS	-0.07	0.09	-0.76	

(continued)

Variable	Coeff.	Std. Err.	z-Stat.	
MT	0.41	0.10	4.22	**
NC	0.18	0.09	2.00	*
ND	0.29	0.09	3.10	**
NE	-0.19	0.09	-2.14	*
NH	0.05	0.10	0.53	
NJ	-0.25	0.09	-2.91	**
NM	0.53	0.09	5.74	**
NV	1.08	0.09	11.55	**
NY	-0.34	0.09	-3.93	**
OH	-0.41	0.09	-4.76	**
OK	-0.05	0.09	-0.59	
OR	0.89	0.09	10.06	**
PA	0.06	0.09	0.73	
RI	0.25	0.10	2.64	**
SC	0.35	0.09	3.89	**
SD	-0.16	0.10	-1.57	
TN	0.73	0.09	8.30	**
TX	0.04	0.09	0.48	
UT	0.27	0.09	2.87	**
VA	0.85	0.09	9.59	**
VT	0.26	0.12	2.21	*
WA	0.33	0.09	3.85	**
WI	0.44	0.09	5.14	**
WV	0.17	0.11	1.59	
1991	0.38	0.02	17.33	**
1992	0.46	0.02	21.16	**
1993	0.63	0.02	28.02	**
1994	0.53	0.02	23.71	**
1995	0.50	0.02	21.63	**
1996	0.27	0.02	11.16	**
1997	0.24	0.02	9.76	**
1998	0.31	0.02	12.92	**
1999	0.23	0.02	9.35	**
2000	0.32	0.02	13.10	**
2001	0.40	0.02	16.55	**
2002	0.49	0.02	20.17	**
2003	0.52	0.02	21.15	**
2004	0.42	0.02	17.08	**
2005	0.36	0.03	14.23	**
2006	0.43	0.05	9.43	**

Mean dependent var	0.16
S.E. of regression	0.33
Sum squared resid	27833.12
Log likelihood	-89895.89
Restr. log likelihood	-110423.17
LR statistic (92 df)	41054.57
Probability(LR stat)	0.00
McFadden R-squared	0.19
Obs with Dep=0	211430
Obs with Dep=1	40140

Table 7: TIC Regression Correcting for Sample Selection and Self Selection
(Dependent Variable: TIC)

Variable	Coeff.	Std. Err.	t-Stat.	
Intercept	8.43	0.19	43.31	**
NEG_f	-0.06	0.04	-1.30	
IMR_t	-3.86	0.18	-20.93	**
Amount of issue ($ mil., ln)	-0.12	0.00	-31.69	**
Bond Buyer GO index	0.05	0.00	19.58	**
Bond Buyer revenue index	0.10	0.01	7.69	**
Years to maturity	0.04	0.00	68.13	**
Revenue bond	0.16	0.08	2.00	*
Serial bond	0.47	0.04	11.31	**
Callable bond	0.08	0.02	5.16	**
Re-fund bond	0.06	0.01	5.74	**
Credit enhancement	-0.19	0.01	-18.09	**
Highest bond rating	-0.30	0.02	-14.92	**
2nd Highest bond rating	-0.39	0.02	-17.61	**
City, town, village	0.00	0.02	0.11	
County/parish	0.04	0.02	1.74	
Local authority	0.19	0.03	7.33	**
District	0.24	0.03	9.04	**
State authority	0.04	0.02	1.67	
College/university	0.05	0.03	1.47	
Public facilities	-0.06	0.01	-3.73	**
Education	-0.07	0.01	-5.12	**
Electric power	0.03	0.03	1.16	
Housing	0.70	0.03	23.59	**
Utilities	0.01	0.01	1.09	
Healthcare	0.64	0.03	25.06	**
Development	0.56	0.02	26.57	**
Transportation	0.06	0.02	3.58	**
Environmental facilities	0.27	0.03	9.38	**
AK	-0.37	0.11	-3.35	**
AL	0.07	0.10	0.71	
AR	-0.10	0.10	-1.02	
AZ	0.21	0.10	1.99	*
CA	-0.33	0.10	-3.37	**
CO	-0.05	0.10	-0.50	
CT	-0.46	0.10	-4.61	**
DC	0.46	0.14	3.24	**
DE	-0.44	0.12	-3.57	**
FL	-0.42	0.10	-4.32	**
GA	-0.21	0.10	-2.03	*
HI	0.15	0.14	1.07	
IA	-0.60	0.10	-6.00	**
ID	-0.49	0.10	-4.70	**
IL	0.04	0.10	0.45	
IN	0.04	0.10	0.40	
KS	-0.19	0.10	-1.89	
KY	-0.20	0.11	-1.87	
LA	-0.22	0.10	-2.15	*
MA	-0.47	0.10	-4.79	**
MD	-0.79	0.10	-7.60	**
ME	-0.52	0.10	-4.98	**
MI	-0.17	0.10	-1.79	
MN	-0.88	0.10	-8.70	**

(continued)

Variable	Coeff.	Std. Err.	t-Stat.	
MO	0.00	0.10	0.03	
MS	0.01	0.10	0.11	
MT	-0.54	0.11	-5.06	**
NC	-0.38	0.10	-3.79	**
ND	-0.39	0.10	-3.74	**
NE	-0.15	0.10	-1.48	
NH	-0.30	0.11	-2.76	**
NJ	-0.04	0.10	-0.39	
NM	-0.57	0.10	-5.54	**
NV	-0.83	0.11	-7.82	**
NY	0.13	0.10	1.36	
OH	-0.10	0.10	-0.99	
OK	-0.08	0.10	-0.73	
OR	-0.82	0.10	-8.14	**
PA	-0.25	0.10	-2.54	*
RI	-0.29	0.11	-2.75	**
SC	-0.48	0.10	-4.74	**
SD	-0.06	0.12	-0.53	
TN	-0.76	0.10	-7.46	**
TX	-0.09	0.10	-0.92	
UT	-0.27	0.10	-2.60	**
VA	-0.75	0.10	-7.33	**
VT	-0.41	0.12	-3.38	**
WA	-0.25	0.10	-2.60	**
WI	-0.51	0.10	-5.24	**
WV	0.07	0.12	0.58	
1991	-0.62	0.02	-25.73	**
1992	-1.27	0.03	-50.42	**
1993	-2.03	0.03	-70.62	**
1994	-1.50	0.03	-55.78	**
1995	-1.62	0.03	-60.12	**
1996	-1.60	0.03	-62.42	**
1997	-1.71	0.03	-65.35	**
1998	-2.18	0.03	-82.98	**
1999	-1.88	0.03	-71.51	**
2000	-1.56	0.03	-57.00	**
2001	-2.33	0.03	-84.07	**
2002	-2.76	0.03	-95.43	**
2003	-3.24	0.03	-108.54	**
2004	-3.02	0.03	-105.44	**
2005	-2.82	0.03	-99.29	**
2006	-2.82	0.04	-63.15	**

R-squared	0.74
Adjusted R-squared	0.74
S.E. of regression	0.61
Sum squared resid	15013.28
Log likelihood	-37218.59
Obs	40140

Table 8: TIC Regressions Correcting for Sample Selection and Self Selection, Separate Regression for Negotiated and Competitive Issuances
(Dependent Variable: TIC)

	Negotiated				Competitive			
Variable	**Coeff.**	**Std. Err.**	**t-Stat.**		**Coeff.**	**Std. Err.**	**t-Stat.**	
Intercept	6.35	0.38	16.51	**	8.51	0.25	33.60	**
IMR_n	0.85	0.22	3.78	**				
IMR_c					-0.46	0.07	-7.03	**
IMR_t	-3.60	0.36	-9.93	**	-2.87	0.22	-12.94	**
Amount of issue ($ mil., ln)	-0.12	0.01	-16.88	**	-0.09	0.00	-21.83	**
Bond Buyer GO index	0.21	0.01	14.75	**	0.04	0.00	17.22	**
Bond Buyer revenue index	0.32	0.03	11.81	**	0.09	0.01	6.21	**
Years to maturity	0.03	0.00	26.23	**	0.05	0.00	73.80	**
Revenue bond	-0.08	0.16	-0.50		-0.01	0.09	-0.10	
Serial bond	0.40	0.07	5.58	**	0.40	0.06	6.93	**
Callable bond	0.17	0.03	5.23	**	0.05	0.02	2.61	**
Re-fund bond	0.06	0.02	2.91	**	0.07	0.01	6.17	**
Credit enhancement	-0.37	0.02	-17.12	**	-0.07	0.01	-5.63	**
Highest bond rating	-0.40	0.06	-6.55	**	-0.23	0.02	-11.32	**
2nd Highest bond rating	-0.63	0.07	-9.64	**	-0.28	0.02	-11.33	**
City, town, village	0.25	0.06	4.34	**	-0.05	0.02	-2.33	*
County/parish	0.24	0.06	3.90	**	-0.02	0.02	-0.68	
Local authority	0.44	0.07	6.71	**	0.11	0.03	3.90	**
District	0.58	0.07	8.46	**	0.09	0.03	3.26	**
State authority	0.24	0.06	3.98	**	0.00	0.03	-0.05	
College/university	0.27	0.09	3.10	**	-0.01	0.03	-0.27	
Public facilities	-0.09	0.04	-2.54	*	-0.03	0.01	-1.87	
Education	-0.16	0.03	-5.38	**	-0.02	0.01	-1.39	
Electric power	-0.03	0.05	-0.51		0.09	0.03	2.94	**
Housing	0.61	0.05	11.59	**	0.70	0.04	17.34	**
Utilities	-0.08	0.03	-2.72	**	0.05	0.01	4.03	**
Healthcare	0.66	0.05	13.95	**	0.50	0.04	12.61	**
Development	0.52	0.05	11.56	**	0.51	0.02	22.14	**
Transportation	0.05	0.04	1.32		0.05	0.02	3.26	**
Environmental facilities	0.27	0.05	5.01	**	0.17	0.03	4.98	**
AK	0.13	0.19	0.69		-0.74	0.14	-5.39	**
AL	0.24	0.17	1.43		-0.22	0.14	-1.61	
AR	-0.15	0.18	-0.85		-0.32	0.13	-2.52	*
AZ	0.44	0.17	2.54	*	-0.13	0.13	-0.96	
CA	-0.06	0.16	-0.37		-0.66	0.13	-5.26	**
CO	0.24	0.17	1.44		-0.45	0.13	-3.45	**
CT	-0.16	0.17	-0.93		-0.72	0.13	-5.63	**
DC	0.91	0.23	4.00	**	-0.07	0.19	-0.34	
DE	-0.08	0.22	-0.36		-0.76	0.15	-5.05	**
FL	-0.16	0.16	-0.96		-0.73	0.13	-5.74	**
GA	0.00	0.17	-0.01		-0.47	0.13	-3.57	**
HI	0.44	0.21	2.08	*	-0.10	0.26	-0.39	
IA	-0.20	0.19	-1.06		-0.73	0.13	-5.76	**
ID	-0.34	0.17	-2.01	*	-0.68	0.14	-5.02	**
IL	0.30	0.16	1.82		-0.30	0.13	-2.33	*
IN	0.18	0.17	1.06		-0.23	0.13	-1.71	
KS	-0.01	0.18	-0.03		-0.46	0.13	-3.61	**
KY	-0.02	0.20	-0.08		-0.47	0.13	-3.59	**
LA	-0.10	0.17	-0.61		-0.44	0.13	-3.44	**
MA	-0.05	0.17	-0.31		-0.74	0.13	-5.87	**
MD	-0.42	0.18	-2.27	*	-0.97	0.13	-7.37	**
ME	-0.21	0.18	-1.17		-0.74	0.13	-5.61	**
MI	-0.02	0.16	-0.14		-0.39	0.13	-3.08	**
MN	-0.67	0.18	-3.75	**	-0.96	0.13	-7.44	**

(continued)

	Negotiated			Competitive		
Variable	Coeff.	Std. Err.	t-Stat.	Coeff.	Std. Err.	t-Stat.
MO	0.13	0.16	0.79	-0.28	0.13	-2.13 *
MS	-0.21	0.20	-1.06	-0.19	0.13	-1.43
MT	-0.30	0.21	-1.38	-0.71	0.13	-5.40 **
NC	-0.18	0.17	-1.01	-0.66	0.13	-5.15 **
ND	-0.53	0.26	-2.07 *	-0.55	0.13	-4.22 **
NE	-0.12	0.17	-0.71	-0.28	0.14	-1.98 *
NH	0.20	0.20	0.98	-0.64	0.13	-4.80 **
NJ	0.04	0.17	0.25	-0.34	0.13	-2.62 **
NM	-0.58	0.20	-2.90 **	-0.70	0.13	-5.42 **
NV	-0.50	0.21	-2.35 *	-0.95	0.13	-7.15 **
NY	0.40	0.16	2.42 *	-0.23	0.13	-1.80
OH	-0.01	0.16	-0.03	-0.28	0.13	-2.11 *
OK	0.18	0.18	1.00	-0.39	0.13	-2.98 **
OR	-0.68	0.17	-4.05 **	-0.87	0.13	-6.73 **
PA	-0.06	0.16	-0.39	-0.53	0.13	-4.21 **
RI	0.06	0.20	0.31	-0.61	0.13	-4.62 **
SC	-0.26	0.18	-1.43	-0.70	0.13	-5.44 **
SD	-0.03	0.18	-0.15	-0.07	0.17	-0.43
TN	-0.64	0.18	-3.47 **	-0.93	0.13	-7.18 **
TX	0.10	0.16	0.63	-0.39	0.13	-3.06 **
UT	0.00	0.18	0.00	-0.55	0.13	-4.21 **
VA	-0.71	0.18	-3.95 **	-0.89	0.13	-6.82 **
VT	0.00	0.21	-0.02	-0.72	0.15	-4.74 **
WA	-0.08	0.16	-0.47	-0.47	0.13	-3.72 **
WI	-0.47	0.17	-2.77 **	-0.66	0.13	-5.26 **
WV	0.32	0.19	1.66	-0.41	0.15	-2.70 **
1991	-0.40	0.04	-8.85 **	-0.71	0.03	-24.39 **
1992	-0.95	0.05	-19.58 **	-1.33	0.03	-44.47 **
1993	-1.48	0.06	-24.97 **	-2.17	0.03	-64.38 **
1994	-1.14	0.05	-21.49 **	-1.56	0.03	-49.44 **
1995	-1.11	0.05	-20.29 **	-1.77	0.03	-57.32 **
1996	-1.13	0.06	-18.11 **	-1.76	0.03	-63.81 **
1997	-1.24	0.07	-18.44 **	-1.86	0.03	-67.22 **
1998	-1.62	0.07	-23.63 **	-2.33	0.03	-83.00 **
1999	-1.37	0.07	-19.07 **	-2.05	0.03	-74.35 **
2000	-1.08	0.08	-13.12 **	-1.71	0.03	-59.38 **
2001	-1.77	0.08	-22.19 **	-2.48	0.03	-83.31 **
2002	-2.19	0.08	-28.03 **	-2.89	0.03	-91.67 **
2003	-2.51	0.09	-28.26 **	-3.38	0.03	-104.21 **
2004	-2.39	0.09	-26.04 **	-3.18	0.03	-103.70 **
2005	-2.21	0.10	-22.42 **	-2.99	0.03	-100.00 **
2006	-2.16	0.19	-11.43 **	-2.99	0.04	-69.85 **
R-squared	0.63			0.76		
Adjusted R-squared	0.63			0.76		
S.E. of regression	0.77			0.51		
Sum squared resid	6256.74			7725.46		
Log likelihood	-12308.66			-22081.89		
Obs	10695			29445		

Table 9: Expected Average TIC Based on Alternative Issuance Decision

	Actual Mean TIC	Estimated TIC Under Alternative Issuance Method	Difference	Observations
Negotiated	5.82	5.89	-0.07	10,695
Std. dev.	*1.25*	*1.13*		
Competitive	4.74	5.17	-0.43	29,445
Std. dev.	*1.04*	*1.01*		