

# The Cost Burden of Negotiated Sales Restrictions: A Natural Experiment Using Heterogeneous State Laws

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## ABSTRACT

Should legislation restrict the use of negotiated sales of municipal bonds? What are the costs of such a restriction? We estimate the effects that the restrictions on negotiated sales have on gross spreads and reoffering yields by comparing the bond issues of unrestricted school districts to the bond issues of school districts that are bound by law to use competitive sales. We develop a standardized way of classifying a bond's statutory security, and use this classification to obtain a sample of comparable bonds. The classification is informative, parsimonious, and scalable. We classify the statutory security of 42,493 new-money bonds, and collect the statutory sales provisions and amendments thereof of 40 states. Restrictions on negotiated sales increase gross spreads by \$1.03 for every \$1000 of par value. Restrictions also increase reoffering yields for maturities up to 20 years, and decrease them for longer maturities.

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# 1. Introduction

Each year, states and municipalities in the U.S. issue approximately \$400 billion of municipal bonds (about 40% of the corporate bond issue volume). States and municipalities issue bonds either through negotiated sales or through competitive sales. In a negotiated sale, the issuer sells the bonds directly to the underwriter without previous public bidding by the underwriters. In a competitive sale, the issuer requests the underwriters to submit a firm offer to purchase the bonds, and the issuer awards the new issue to the underwriter providing the lowest interest rate cost. Many states have laws restricting bond issuers to use only competitive sales for new municipal bond issues. We use the presence of such statutory restrictions on the negotiated sale to estimate the costs of the restrictions, measuring the costs by the yields at which underwriters offer new issues for sale to the public and by the gross underwriter spreads paid to underwriters.

For decades, policymakers, bond lawyers, financial advisors, and scholars have debated which method is better for issuing securities. The debate concerns not only municipal bonds, but also many other asset classes. For example, DeGeorge, Derrien & Womack (2010) find that auctioned IPOs are effective alternatives to book building in a sample of U.S. IPOs and Derrien & Womack (2003) find similar results in a sample of French IPOs.

The solution to this debate has so far been elusive because we cannot observe and compare the potential costs of both selling methods for all bond issuers. We only observe the cost of competitive sales for those issuers that choose competitive sales and observe the negotiated costs for those issuers that choose negotiated sales. Heckman (1974) shows that the average difference between observed competitive and negotiated costs is a biased estimate of the true average difference because of selection bias. Several authors correct for selection bias by explicitly modeling the issuers' choice problem or by using instrumental variables methods. Liu (2017), Guzman & Moldogaziev (2012), Robbins & Simonsen (2007), and Robbins & Simonsen (2015) find that competitive sales have lower interest costs than negotiated costs, while Fruits, Booth, Pozdena & Smith (2008), Kriz (2003), and Peng & Brucato (2003) find that negotiated sales have lower costs. However, the selection bias corrections used by these researchers either require strong assumptions or face potential issues from weak instruments (Newey, Powell & Walker (1990)).

In this paper we use the legal restrictions on issue choice to directly answer several policy questions. Should legislation restrict the negotiated sale of bonds? What are the costs of such restrictions? Such questions avoid the choice problem because municipal issuers must abide by the legal restrictions on the method of sale. If there is no choice involved, there is no estimation bias. The municipal bond market is a valuable empirical setting to study many economic problems because of the many natural experiments from the heterogeneity in bond laws and the laws' frequent changes. For example, Cestau (2016) uses state CDS spreads and bond authorizations to measure investors' beliefs about which political party is most fiscally responsible. Robbins (2002) uses the exogenous variation in the volume of competitive sales caused by a policy change to show that competitive issues do not face higher costs with higher volumes.

Several states restrict school districts from using negotiated sales. We estimate the effect of the legal restrictions on negotiated sales by comparing unrestricted school districts' bond issues to restricted school

districts' bond issues. School district bonds are generally regulated only by state laws, while several other bond types are regulated by local, private, and state laws. Using school district bonds therefore allows us to use state regulations in our empirical approach. Another advantage of using school bonds is they are a large part of the municipal market, accounting for about 15% of municipal issues.

The key in our analysis is to compare bonds with similar legal security, with legal security meaning the legal sources of funds to pay the bonds and the legal remedies for investors stated in the law and indentures. We cannot obtain samples of bonds of comparable legal security by distinguishing between general obligation (GO) bonds and revenue bonds since different GO bonds can have very different legal security with each other. Practitioners do not have simple ways to measure and classify differences in legal security between GO bonds, while researchers tend to drop one-year maturity GO bonds from their samples because they tend to behave differently from longer maturity bonds, but do not further distinguish the bonds' legal security.

We develop a new and standardized way of classifying a bond's legal security. Our classification method is informative, parsimonious, and scalable. The method is informative because the collected data truly capture the bonds' statutory security. The method is parsimonious because the data have few fields, because the fields take few values, and because the values are not exclusive to any particular data type. The method is scalable because it possible to increase the sample size without adding new fields and field values. We develop a standardized language to summarize the type and security of the bonds with short descriptions. We use our method to classify the statutory security of 42,493 new-money school bonds and notes. We collect the bonds' statutory sales provisions and any amendments to the sales provisions over last 20-30 years in 40 states.

Issuers predominantly use negotiated sales whenever they are legally allowed to use them according to our measure. On the other hand, every year competitive sales represent more than 80% of total school bond issues when negotiated sales are legally restricted according to our measure. Thus, our legal restriction measure is "valid" and "reliable". We estimate that restrictions on negotiated sales increase gross spreads by \$1.03 for every \$1000 of par value issued. Restrictions also increase the reoffering yield by 0.2 percentage points for 1-yr maturity bonds. The increase on reoffering yields decreases with maturities but remains positive for maturities up to 20 years. For longer maturities, the restrictions decrease reoffering yields. The decrease is larger in absolute terms for longer maturities and reaches a peak reduction of 0.53 percentage points in yields for 28-year maturity bonds. Considering that there are around four trillion of municipal bonds outstanding every year, our estimated yield effects have more than a \$300 billion impact on taxpayer costs each year.

## 2. Our Empirical Approach

Are competitive sales cheaper than negotiated sales of school bonds? Simply comparing the observed cost of competitive sales to the observed cost of negotiated sales can lead to biased estimates of the difference between costs. As a numerical example, suppose that the cost of negotiated sales is \$20 for all issuers and that the cost of competitive sales is \$10 for half of the issuers and \$90 for the other half of the issuers. The average negotiated cost is \$20 and the average competitive cost is \$50. Now assume that issuers who can choose either sale method will choose the least expensive method. Issuers with high competitive costs of \$90 will use a negotiated sale and have observed issuance costs of \$20, and issuers with low competitive

costs of \$10 will use a competitive sale and have observed issuance cost of \$10. No issuer with competitive issuance costs of \$90 will ever choose a competitive sale. Samples will therefore have observed negotiated costs of \$20 and observed competitive costs of \$10; a naive comparison of the observed costs of both methods yields an average cost difference of \$10 in favor of competitive sales even though the true difference in average costs is \$30 in favor of negotiated sales. Selection bias is the disparity between the naive estimate of the difference and the true difference occurring because we observe the costs of competitive sales only for the issuers that have low competitive costs.

Selection bias can be avoided by using the state laws regulating debt issuance. State laws impose a number of provisions for bond issuance such as the legal purposes for which the bond may be issued; the bond's maximum maturity; the sources of funds for the debt service; the taxes and funds created for the bond payments; any pledges and liens thereon; different bond features such as call provisions and other options; debt levels and rate limits; and the bond's maximum discount or premium. State laws also prescribe the bond's manner of sale. In some cases, the law does not restrict school districts from choosing either competitive or negotiated sales, while in other cases, school districts are required by law to use competitive sales. The decision to enact a law precluding or allowing the negotiated sale of school bonds is independent of the idiosyncratic and purely individual characteristics of the school districts in the state. That is, sales laws are not correlated with individual issuers' characteristics conditioning on the state, and the law obliges both low-competitive-cost issuers and high-competitive-cost issuers. In order to avoid selection bias, instead of estimating the cost difference between negotiated and competitive sales, we estimate the effect on gross spreads and reoffering yields of enacting laws proscribing the negotiated sale of school bonds.

Our policy variable — statutory sales provisions — varies only at the state level, but not at the issuer level. Therefore, the source of omitted variable bias when evaluating the sales provisions policy must be unobserved variables at the state level. That is, the statutory sales provisions may be correlated with common characteristics or systemic characteristics of the school districts in the state. For example, state laws might allow negotiated sales in states where all school districts tend to have high competitive costs to begin with. If we do not observe or control for these characteristics, estimates will be biased. Unobserved state characteristics can be accounted for by using a differences-in-differences (DD) estimation strategy.

Let  $GS_{sti}$  denote issue  $i$ 's gross spread from a given school district in state  $s$  at time  $t$ . Assume that  $GS_{sti}$  is a function of an unobserved state level coefficient  $\gamma_s$  common to every school district in state  $s$ , a national time trend  $\lambda_t$ , the policy variable of interest  $Rest_{st}$  indicating if negotiated sales are restricted in state  $s$  at time  $t$  or not, and unobserved idiosyncratic characteristics of the school district,  $\varepsilon_{sti}$ :

$$GS_{sti} = \gamma_s + \lambda_t + \delta * Rest_{st} + \varepsilon_{sti} \quad (1)$$

Here  $E(\varepsilon_{sti} | s, t) = 0$  so that the average effect on gross spreads of unobserved idiosyncratic characteristics is zero, and  $\delta$  is the effect of restricting negotiated sales on gross spreads, i.e. the coefficient of interest.

As an example, suppose that negotiated sales were restricted in Texas and New Mexico in 1999, but that an amendment to the Texas statutes in 2000 allowed school districts to use negotiated sales. The average gross spreads in Texas and New Mexico for both years are:

$$\begin{aligned} E[GS_{sti} | s = TX, t = 99] &= \gamma_{TX} + \lambda_{99} + \delta, & (2) \\ E[GS_{sti} | s = TX, t = 00] &= \gamma_{TX} + \lambda_{00}, \\ E[GS_{sti} | s = NM, t = 99] &= \gamma_{NM} + \lambda_{99} + \delta, \\ E[GS_{sti} | s = NM, t = 00] &= \gamma_{NM} + \lambda_{00} + \delta. \end{aligned}$$

The difference in average gross spreads between 1999 and 2000 in each state are:

$$E[GS_{sti} | s = TX, t = 99] - E[GS_{sti} | s = TX, t = 00] = \lambda_{99} - \lambda_{00} + \delta, \quad (3)$$

$$E[GS_{sti} | s = NM, t = 99] - E[GS_{sti} | s = NM, t = 00] = \lambda_{99} - \lambda_{00}. \quad (4)$$

The DD approach subtracts Equation (4) from Equation (3) to obtain the difference-in-difference estimate of  $\delta$ :

$$\begin{aligned} \delta_{DD} &= (E[GS_{sti} | s = TX, t = 99] - E[GS_{sti} | s = TX, t = 00]) \\ &\quad - (E[GS_{sti} | s = NM, t = 99] - E[GS_{sti} | s = NM, t = 00]) \\ &= \lambda_{99} - \lambda_{00} + \delta - (\lambda_{99} - \lambda_{00}) = \delta. \end{aligned} \quad (5)$$

We can also use a within-difference (WD) estimation strategy to account for the unobserved state variables, and therefore, obtain unbiased estimates of  $\lambda$ . All states have multiple sets of laws that authorize the school districts in the state to issue bonds. The manner of sale provided by law may be different from one set of laws to another set of laws. The WD estimation is as follows. Suppose for example, that one set of laws in Wisconsin, Set 1, prohibit the negotiated sale of school bonds issued under such laws. A second set of laws in the same state, Set 2, authorizes school districts to choose either sale method. Whether a school district issues bonds under one set or the other depends on exogenous circumstances. The average gross spreads of the bonds issued under each set are:

$$E[GS_{sti} | s = WI, t, Set 1] = \gamma_{WI} + \lambda_t + \delta, \quad (6)$$

$$E[GS_{sti} | s = WI, t, Set 2] = \gamma_{WI} + \lambda_t. \quad (7)$$

The within-state difference or WD approach subtracts Equation (7) from Equation (6):

$$\begin{aligned} \delta_{WD} &= E[GS_{sti} | s = WI, t, Set 1] - E[GS_{sti} | s = WI, t, Set 2] \\ &= \gamma_{WI} + \lambda_t + \delta - (\gamma_{WI} + \lambda_t) = \delta. \end{aligned} \quad (8)$$

The key identifying assumption in the difference-in-difference and within-difference estimation strategies is that the gross spread trend  $\lambda_t$  is the same across the bonds issued under the different laws. However, bonds issued under different sets of laws can be quite different, across and within states, because the law provisions for the issuance of the bonds may differ much from set to set. To ensure that our empirical approach meets the required assumption, the sample must include only bonds that are similar to each other, or we need to include controls for the statutory provisions that can make two bonds different from each other.

In general, statutory authorizations to issue bonds are divided by: Temporary Borrowings, such as Tax and Revenue Anticipation Notes (TRANS), Bond Anticipation Notes (BANs), and a few other anticipation notes; Certificates of Participation, or Installment Agreements, or Lease agreements (COP/Ins); General-Law Purpose Bonds; a number of Special-Law Purpose Bonds and Notes. TRANS are short-term obligations, normally with statutory maximum maturity of no more than 15 months, that are secured by budgeted revenues for the current fiscal year, and by liens thereon. BANs are notes issued in

anticipation of bonds to be issued in the upcoming years, paid non-exclusively from the proceeds thereof, that normally have a statutory maximum maturity of no more than 3 years. COP/Ins are obligations not secured by continuing appropriations or by mandatory annual or biennial appropriations, i.e. issuers may legally omit to include debt service in the budget. General bond laws consist of a list of purposes for authorizing bonds and legal dispositions not specific to any school bond type, and in many cases, not specific to any bond type issued by any political subdivision of the state. Special laws are sets of laws that confer additional powers to the powers conferred by any other laws for issuing some specific types of bonds or notes, and/or to fund specific purposes. General-Law Purpose Bonds, and Special-Law Purpose Bonds and Notes are obligations issued under the two type of laws respectively.

School districts may issue bonds only to fund those purposes that are prescribed in particular sets of laws — the purpose will determine the set of laws under which the school district may issue the bonds. Variation in laws is the source of exogeneity we need to obtain unbiased estimates of  $\delta$ . For example, a high-competitive-cost issuer may not issue under a law that allows negotiated sales if the purpose is not provided for in that particular set of laws. Examples of legal purposes are erecting new facilities; building improvements; land acquisitions; bus purchases; and asbestos abatement. We believe that the purposes underlying the bond issues are exogenous from the idiosyncratic school characteristics that determine gross spreads and bond yields. The purposes do determine the statutory sales provisions that govern the bond issuance,  $Rest_{st}$ .

Bonds are normally issued under general provisions, while a high proportion of notes are issued under special provisions. Revenue bonds are issued under special provisions. Table 1 compares TRANs, BANs, COPs/Ins, bonds, notes, and revenue bonds issued between 2004 and 2015 across multiple dimensions. The differences between types are evident. TRANs and BANs have average maturities of around one year. COPs/Ins, bonds, and revenue bonds are long-term obligations having average maturities 10 years or longer. Notes have average maturity between both groups. TRANs and BANs tend to have very low gross spreads, whereas revenue bonds and COPs have much higher gross spreads than notes and bonds. Bonds and notes have the highest proportions of rated issues, and TRANs and BANs the lowest proportional of rated issues. Restrictions on negotiated sales are only prevalent for bonds, but only half of the bonds are issued through competitive bids, while a high percentage of TRANs and BANs are sold through public bids. COPs/Ins and revenue bonds offer the highest average reoffering yields, TRANs and BANs the lowest reoffering yields, with bond and note reoffering yields in between.

We conjecture that the trends and state fixed effects are also different across bond types, and also that the effects on gross spreads and yields of the restrictions on the negotiated sale of school bonds are different. We therefore focus the analysis only on bonds and notes to avoid mixing potentially different effects, and because they constitute the highest fraction of all bond issues. We also drop deals with 1-yr maturity or less as in Cestau, Green & Schürhoff (2013), and Green, Hollifield & Schürhoff (2007).

General laws in different states, and particular laws within a state may provide different provisions for bond issuance, based on the statutory security of the bonds issued. We conjecture that if we control for maturity, size, and other features, bonds with the same type of statutory security will share the same time-trends,  $\lambda_t$  across states, and share the same state fixed-effects,  $\gamma_s$ , within states. To date, there is no standardized and satisfactory way to classify a bond's statutory security. Data providers generally classify the statutory security of a bond as being a general obligation or not. But this classification is not enough to obtain a sample of comparable bonds across and within states. For example, bonds of any of the

indebtedness types reported in Table 1, except revenue bonds, may be classified as general obligations although these obligations are different from each other.

Issuers generally provide abundant and varied qualitative information about the security of a new bond issue. The challenge is to store this qualitative information in the most informative, parsimonious, and scalable way possible to enable the use of it for quantitative analyses. Informative is that the stored data should be a true reflection of the security of the bond. Parsimonious is that the data should be stored using the least possible number of fields, that fields should take the lowest possible number of values, and to avoid fields and field values that are exclusive to few particular sets of laws. Scalable is that it should be possible to increase the sample size, to add more bond types issued under different sets of laws, and to add different issuer types, without creating new fields and/or adding new field values. We believe that we achieve these objectives with the classification in Table 2.

### 3. Sample Construction

All bond issues have a short issue description with a brief statement of the bond's type and legal security. However, these descriptions have no standardized language. Thus, they cannot be used in quantitative analyses. Bonds of the same type and the same or similar legal security may have very different descriptions. Our sample of school bonds from 44 states has 4,032 different issue descriptions, when in general, there are no more than 10 sets of laws that authorize school bond issues per state.

We match every bond issue to a bond type in Table 1 and an authorizing law in two steps. First, we use a number of regular expressions<sup>1</sup> to separate TRANs, BANs, COP/Ins, revenue bonds, and refunding bonds from general-law bonds, and special-law bonds and notes. Second, we select a random sample of bonds for each issue description, and use their official statements to obtain the authorization laws under which the bonds were issued. That search cannot be automated; we use hand-collected data from the official statements.

For the bonds issued under general laws as herein defined, and the bonds issued under special laws with substantial number of issues, we collect the variables listed in Table 2 from the bonds' official statements. This data collection cannot be automated; it is hand-collected data. Subsequently, we assign the authorization laws and security data of the sampled bonds to the non-sampled bonds with the same issue description, and also to issues with similar issue descriptions that do not have official statements available. We develop a standardized language to summarize the type and security of the bonds with short issue descriptions.

We collect the sales provisions of the general bond laws and the special laws. This is a challenging task for three reasons. First, laws are dynamic sets of provisions that override, complement, and offer alternatives to each other so it is not always easy to determine the specific provisions that oblige the issuers. Second, general sales provisions that restrict negotiated sales often provide for a number of exceptions to the restriction. For example, if it is a small issue, or interest income is not exempt from federal income tax, or bonds are to be issued to finance the purchase of school buses, or in many other

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1. A regular expression is a specific sequence of symbols and characters that represents a text pattern to be searched for in a longer text. For example the regular expression 'G\*Obl\*Bo' is found in the text 'General Obligation Bonds'.

cases. Third, sometimes the texts of the laws have no direct interpretation; the same text in two different statutes can take opposite meanings. In such cases, we contact bond lawyers to correctly interpret the laws.<sup>2</sup>

Sales provisions are often amended. In addition to collecting current sales provisions, we also collect the entire history of amendments of them. These amendments to the sales provisions enable the difference-in-differences estimation strategy. We track and obtain all the amendments to sales provisions from online repositories of every legislative act passed in past legislative sessions. These online repositories of legislative acts normally go as far as 1997, and in a few cases they go beyond 1990.

In general, the lists of purposes for authorizing bonds or notes in special laws are subsets of the lists of purposes prescribed in general laws. The legislators' intentions when enacting such special laws is to expedite the issuance of debt for some specific purposes. For example, to avoid a referendum, or to provide means to issue debt for specific purposes that do not count for the constitutional debt limits. Although many special laws do not restrict negotiated sales of bonds and notes, this is not the reason why a school district would choose to issue under such laws, i.e. not only school districts with high competitive costs choose to issue under such special authorizations. Our policy variable  $Rest_{st}$  therefore will be uncorrelated with  $\varepsilon_{sti}$ , even if the issue purpose is provided for under more than one set of laws.

## 4. Data

We obtain information about bonds and issuers from SDC Platinum. These data include issuer characteristics such as name, state, type, reoffering prices or yields for each bond issue, and issue characteristics such as issue description, maturity, sale date, coupon, coupon type, call schedule, taxable status, bank qualified indicator, ratings, a refunding indicator, and sinking fund provisions. These data also provide information on the underwriting syndicate including the gross spread. Municipal bonds are typically issued in series. Multiple bonds with different maturities are underwritten simultaneously in one deal. Each maturity of the deal trades as a separate security in the primary and the secondary market.

We start with a sample of 129,519 deals by districts and boards of education from 1966 to the end of 2014. More complete data starts from 1997. We analyze the names of the issuers to be able to separate school districts from other types of districts such as water districts, and fire districts, universities, community colleges, vocational schools, and financial authorities. School districts deals are issued under separate authorization laws than these other deals.

We use 45 regular expressions to capture all the name patterns of all school districts in every state, and identify 94,477 school deals between 1966 and 2014. Of those, we keep just the 67,452 new money deals since refunding deals are issued under separate statutory provisions. We are able to assign a bond type to 65,687 of these deals, we obtain statutory sales provisions for 46,759 deals and security data for 42,493 deals. Our self-constructed 'issue descriptions' take just 14 different values as compared to the 4,032 different 'issue descriptions' in the original data. We separate TRANS, BANs, COP/Ins, and revenue bonds from this sample, which leads to a sample of 42,469 school deals in 40 states between 1966 and 2014. We drop data from states with less than 30 deals because most issuers in such states use a

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2. We have contacted more than 400 bond lawyers. We appreciate their help.



municipal bank to fund projects, and we drop data from Tennessee because school districts in Tennessee are generally created by private acts that are not codified. This filter eliminates four states and 131 deals. Of the 42,338 deals remaining in the sample, 41,072 have security data and statutory sales provisions data. Of these, 16,661 were issued between 2004 and the end of 2014. Our yield data are from 2004 to the end of 2014. Of the 16,661 deals described above, 13,815 have yield data, and 6,138 have gross spread data.<sup>3</sup>

## 5. Results

Figure 1 compares states' sales provisions to issuers' choices. For each state, the column on the left shows the percentage of bonds sold by negotiated sale per year since 1997. The column on the right shows the percentage of the bonds sold per year that had no sales restrictions since 1997. Lighter shades of gray indicate higher proportions of competitive sales and higher proportions of restricted bonds respectively. Darker shades of gray indicate higher proportions of negotiated sales and higher proportions of unrestricted bonds. White indicates no data<sup>4</sup>. Figure 1 is computed using a sample of unlimited general obligation fixed-rate tax-exempt bonds issued to fund building or purchasing of school buildings, purchasing of school lots, alterations or additions to the school building or buildings other than those necessary for current maintenance, operation, or repairs, and other similar purposes. We use these bonds in order to minimize the probability of sales provisions misclassification.

Every year and in every state, darker shades of gray in the columns on the left correspond to darker shades of gray in the columns on the right, i.e. issuers predominantly use negotiated sales whenever they are legally allowed to use them according to our measure. Noticeable exceptions are issuers in Utah and Connecticut. In New York, what appear to be competitive sales are often hybrids between competitive sales and negotiated sales, and used for small size issues with no sales restrictions. On the same hand, every year and in every state, lighter shades of gray in the columns on the left correspond to lighter shades of gray in the columns on the right, i.e. issuers predominantly use competitive sales whenever they are legally restricted to use negotiated sales according to our measure. Most of the exceptions come from data errors such as misclassifications of the sale method or misclassifications of the bond's refunding status. In the case of Kansas, exceptions occur because new money bonds may be sold by negotiated sale if they are issued with refunding bonds. In some other few cases bonds were issued under home rule charters or private acts that provided exceptions to the general bond laws. Therefore, our restriction measure has validity and reliability in the sample.

The matching between shades of gray between columns is almost perfect. The correlation between an unrestricted bond indicator and a negotiated sale indicator is 0.82. It is striking that issuers predominantly use negotiated sales when they are not restricted from doing so.

The first row of Table 3 reports average gross spreads for deals where negotiated sales are restricted, and deals where negotiated sales are not restricted in the full sample. In order to avoid selection bias, we do not compare gross spreads for competitive and negotiated sales. Instead, we compare the gross spreads

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3.  $\text{Gross Spread} = (\text{Underwriter's discount}) / (\text{Par Value}) * 1000$

4. Observations are grouped together

of bonds issued under sets of laws where negotiated sales are restricted to the spreads of bonds issued under sets of laws where negotiated sales are not restricted, regardless the proportion of deals sold by either method. That is, we measure the cost of the restrictions and not the issuer's optimal choice. Consider an extreme example. Suppose that the gross spread of competitive sales is \$10 for every issuer and that of negotiated sales is \$12 for every issuer. The optimal choice is to use always competitive sales because they are \$2 cheaper. The cost of the restriction is \$0, because a restriction on negotiated sales does not impose a cost on school districts because nobody wants to use them anyway. Thus, the issuer's optimal choice and the cost of the restriction are two different matters. Between 2004 and 2014, the average gross spread of restricted deals was \$1.38 higher for every \$1000 of par value than the average gross spread of unrestricted deals.

The second row of Table 3 shows average gross spreads for restricted deals and unrestricted deals in a sample of deals secured by unlimited ad-valorem taxes. The intention here is to compare similar deals in terms of statutory security. The average gross spread of restricted deals was \$0.53 higher than the average gross spread of unrestricted deals.

The third row of the table shows average gross spreads in a sample of deals secured by unlimited ad-valorem taxes, and issued to fund building or purchasing of school buildings, purchasing of school lots, making of alterations or additions to the school building or buildings other than as may be necessary for current maintenance, operation, or repairs. In general, deals issued to fund such purposes do not have exceptions to the general sales provisions, while occasionally, deals issued to fund other purposes benefit from exceptions to the general sales provisions. We drop the deals that finance other purposes to the previously described to avoid estimation bias caused by the misclassification of the sales provisions caused by unobserved exceptions. When deals have no purpose data we drop those deals where the longest maturity bond maturity in the deal is 10 years or less for the following reasons. Deals that finance "building" purposes have maximum statutory maturities between 20 years and 40 years. Consistent with the laws, bonds with observed "building" purposes generally have maturities longer than 10 years in the sample. Deals that finance other purposes, such as the purchase of school equipment or school buses, often have maximum statutory maturities of 10 years. The legislator's intention is to match the financing maturity with the underlying project's useful life. In this sample of "building" bonds, restricted deals have an average gross spread of \$2.00 higher than unrestricted deals.

The last row of Table 3 shows average gross spreads in a sample of deals secured by unlimited ad-valorem taxes issued to fund building projects with fixed coupon rates and interest income exempt from federal income tax. Most general bond laws do not restrict the negotiated sale of variable rate bonds, taxable bonds, and in some instances, appreciation bonds—zero-coupon bonds. These types of bonds naturally have higher gross spreads because they are harder to sell. Our intention is to avoid the selection bias from comparing restricted deals with bonds that are not restricted because they are naturally harder to sell and naturally have higher gross spreads. Not surprisingly, once we correct the selection bias, the difference between average gross spreads increases. In this sample, the average gross spread of restricted deals was \$2.47 higher than the average gross spread of unrestricted deals.

Table 3 provides evidence that the restrictions on negotiated sales increase the gross spreads that school district have to pay to issue bonds. It is possible that the states where negotiated sales are restricted are states where gross spreads are naturally high and legislation requires competitive sales to force lower prices than absent a restriction. Although at first sight the states where negotiated sales are

restricted do not look intrinsically different from the states where negotiated sales are not restricted, this issue can be formally addressed by using difference-in-difference and within-difference estimation strategies. In order to meet the aforementioned identifying assumptions, in addition to comparing just similar bond types, i.e. bonds and notes, we add issue-specific variables that capture the underlying statutory security of the bonds. We also add other issue-specific control variables to increase precision to the estimates. Our baseline specification for estimating the effect on gross spreads of the restrictions on the negotiated sale of school bonds is

$$GS_{sti} = \gamma_s \lambda_t + \delta * Rest_{st} + S'_{sti} \theta + X'_{sti} \beta + \varepsilon_{sti} \quad (9)$$

Here  $S$  are security covariates,  $X$  are other control covariates, and  $\theta$  and  $\beta$  are parameters to be estimated. The security covariates include the primary source of funds, a dummy variable that indicates whether the bond is secured by unlimited ad-valorem taxes but not necessarily the primary source of security, and a dummy variable that indicates whether debt service is guaranteed by the full faith and credit of the state. We do not include the whole set of security covariates discussed in Section 2 because some of them are constant in the sample, because we cannot accurately measure some of them, such as liens, secondary revenue pledges, and guarantee programs, and also to avoid overflowing the model with indicator variables that erroneously capture the entire within-difference identification channel. The other control covariates include: the issue amount, the deal maturity, the deal rating, and a set of dummy variables that indicate whether it is a fixed-rate deal, not exempt from federal income tax, callable, sinkable, and bank qualified.

The first row of Table 5 reports estimates of the effect on gross spreads  $\delta$  for five different specifications for Equation (9). The first specification does not include security covariates or state fixed effects. The second specification adds the security covariates and other control covariates. The third specification adds state fixed effects. The fourth specification measures the effect in a sample of deals secured by unlimited ad-valorem taxes — the unlimited sample. Two of the security covariates take constant values in this sample, so they are dropped from the estimation. The fifth specification measures the effect in the Building sample above described. Consistent with Table 3, the estimated effects are always positive, statistically significant at the 1% or 5% significance levels, and economically meaningful. Restricting the negotiated sale of school bonds increases the gross spread that school districts have to pay when they issue bonds.

Although not shown in the table, the coefficients on the control variables have the expected sign. Deals not exempt from federal income tax, deals that do not pay fixed coupons, and small size deals are more expensive to issue. The gross spread decreases with better ratings and increases with longer maturities. Infrequent or small issuers, as measured by the bank qualified dummy variable, face higher gross spreads. Deals secured by the full faith and credit of the state, and deals secured by unlimited Ad-valorem taxes face lower gross spreads. Deals that are secured by special taxes are more expensive to issue.

We now analyze the effect of the sales restrictions on reoffering yields. We do not compare the reoffering yields of competitive sales to the reoffering yields of negotiated sales, instead we compare the reoffering yields of bonds issued under sets of laws where negotiated sales are restricted to the reoffering yields of bonds issued under sets of laws where negotiated sales are not restricted, regardless the

proportion of deals sold by either method. The baseline specification for estimating the effect on reoffering yields is similar to Equation 9, but instead of including deal-level covariates, we include analogous bond-level covariates. Because municipal bonds are issued in series, and each maturity of the deal is sold as a separate security in the primary market, we have yield observations for multiple maturities per deal. Therefore, although bond issues tend to be long-term deals, we have a large number of observations for each year of the term structure. Thus, we can estimate a separate restriction effect for each year in the term structure by including a dummy variable per maturity year, and including additional dummy variables per maturity year just for restricted bonds.

Table 6 reports maturity-specific estimates of  $\delta$  — the effect of the restriction on reoffering yields—for five specifications similar to those presented in Table 5. The first specification does not include security covariates or state fixed effects. The second specification adds the above-mentioned security covariates and other control covariates. The third specification adds state fixed effects. The fourth specification measures the effects in the unlimited sample. The fifth specification measures the effects in the Building sample. The first thirty rows show the difference in average reoffering yields between restricted and unrestricted bonds of the same maturity. For example, the first row shows the difference in average reoffering yields between a 1-yr restricted bond and a 1-yr unrestricted bond. The second row shows the difference in average reoffering yields between a 2-yr restricted bond and a 2-yr unrestricted bond, and so on. Columns (1) and (2) provide evidence that the restrictions on negotiated sales reduce average reoffering yields regardless the maturity. Estimated coefficients are negative, statistically significant at the 1% level, and economically meaningful. Once we add state fixed effects in column (3) — our preferred specification—the coefficients are positive for shorter maturities, and negative for longer maturities. The restrictions on negotiated sales increase the financing costs for shorter maturities, and decrease them for longer ones. Once again, every coefficient is statistically significant at the 1% significance level, and economically significant except at the maturity when the coefficients change from positive to negative. We find similar results in the unlimited sample and the building sample. Most notably, in every specification the estimated effects become monotonically more negative with longer maturities. The average difference between the 1-yr effect and the 28-yr effect is -0.77 percentage points — a high magnitude compared to average bond yield levels between 2%-2.5% in the sample.

Although not shown in Table 6, all other coefficients have the expected sign. Bonds not exempt from federal income tax, bonds that do not pay fixed coupons, and small size bonds have higher reoffering yields. Reoffering yields decrease with better credit ratings, and increase with longer maturities. Bonds from infrequent or small issuers, and bonds secured by special taxes have higher yields. Bonds secured by the full faith and credit of the state, and bonds secured by unlimited Ad-valorem taxes have lower yields.

The restrictions on negotiated sales may also have other indirect financial costs, such as the lack of financial flexibility, in addition to the effects on gross spreads and reoffering yields. Table 7 shows the proportion of taxable deals and the proportion of non-fixed-rate deals in two samples: the sample of restricted bonds and the sample of unrestricted bonds. Between 2004 and 2014, less than 1% of the restricted deals in the full sample were non-fixed-rate deals, and only 3.7% were taxable bonds (probably pension and judgement bonds). These proportions rise to 14.24% and 14.03% respectively in the sample of non-restricted bonds.

## 6. Conclusion

The classification of a bond's statutory security that we developed is parsimonious by construction. It is likely that it is also scalable given that it already includes a number of bond types issued under the several chapters and sections of the statutes of 40 states. We also show evidence that it is informative: Despite including bond ratings covariates, the security parameters are statistically significant and economically meaningful in every regression. Nevertheless, we do not test whether they capture all the relevant information of the statutory security of bond. We recommend that future research use this classification when seeking a sample of comparable bonds, regardless of the policy question being addressed.

Special laws allowing negotiated sales for specific purposes in states where negotiated sales are restricted, are usually accompanied by statutory maximum terms of ten years. Table 6 shows that the negotiated sales restrictions increase the reoffering yields for maturities up to twenty years, and decrease them thereafter. Therefore, although these special laws are a good first step, there is room for improvement. We recommend that future legislation include additional purposes in these special laws. It is also optimal to increase the maximum maturity to twenty years. It might be optimal to increase them above twenty years, or even eliminate the negotiated sales restrictions altogether. In designing these extensions, the policy maker must take into account the trade-off between lower yields and higher gross spreads of the restrictions for maturities above 20 years.

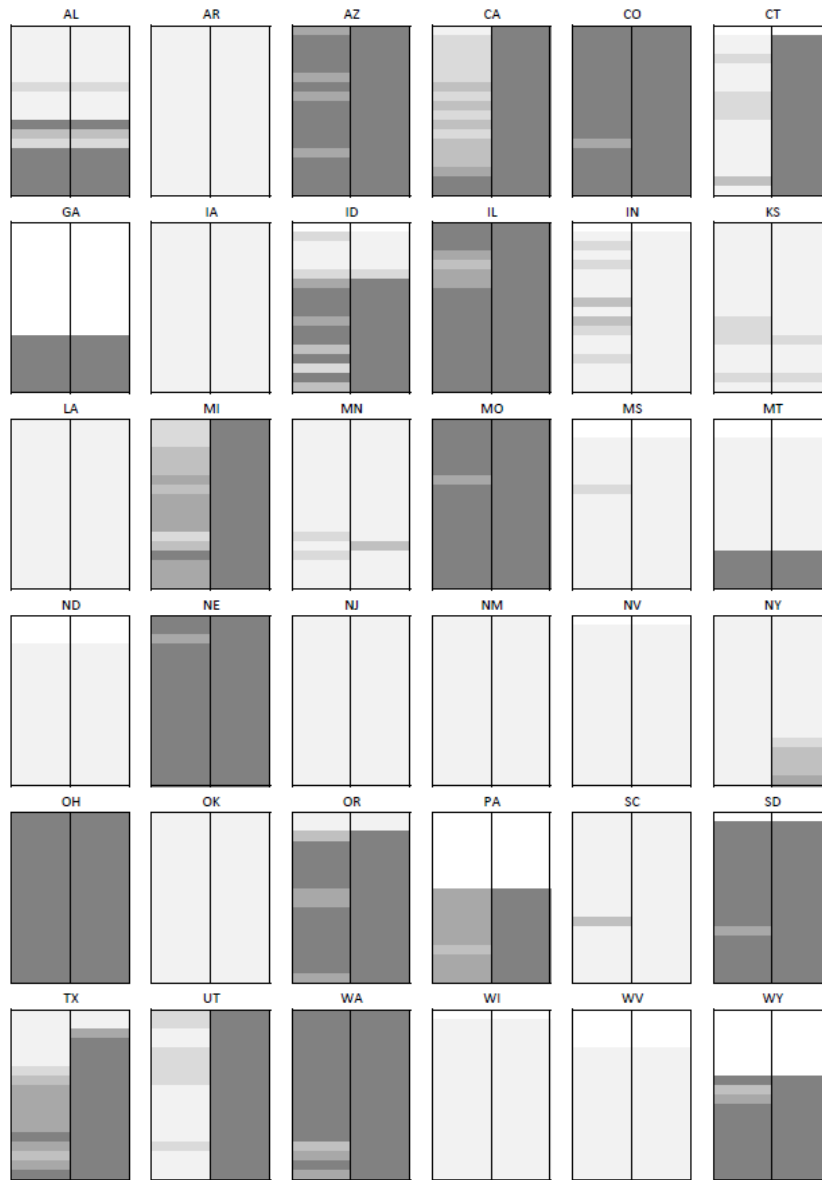
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## TABLES AND FIGURES

**Figure 1. Sales Provisions and Issuers' Choices.** The figures compare states' sales provisions to issuers' choices. Left columns show the percentage of bonds sold by negotiated sale, per year, since 1997. Right columns show the percentage of the bonds sold per year that had no sales restrictions, since 1997. The five shades of gray correspond to a partition of the 0%-100% interval into five equal-size parts. Darker shades of gray indicate higher proportions of negotiated sales and higher proportions of unrestricted bonds sold in the year. White indicates no data.



**Table 1. Bond types.** The table compares the six types of obligations of column 1 across six dimensions. The second column displays average maturity in years, and the third one (GS) shows the underwriter discount every 1000 USD of par value. Rated (%) is the percentage of issues with a credit rating. Rest(%) is the percentage of obligations in the sample with restricted negotiated sales. We show between parenthesis the fraction of obligations for which we have analyzed the statutory sales provisions. Bid (%) shows the percentage of issues sold through a competitive sale. Yield(%) displays average annual reoffering yield rates.

Type	Maturity	GS	Rated(%)	Rest(%)	Bid(%)	Yield(%)
TRANS	0.9	2.27	14	0 (19%)	84	2.21%
BANs	1.0	3.86	14	0 (18%)	85	2.13%
COP/Ins	13.3	12.38	54	0 (32%)	17	3.36%
Bonds	15.1	8.86	74	37 (99%)	52	3.17%
Notes	8.4	9.36	61	0 (55%)	28	2.89%
Revenue	17.7	15.06	44	13 (59%)	37	3.55%



**Table 2. Bond Classification Method.** The table describes the fields used in classifying bonds' legal security.

Field	Description
Primary source of security	– Takes six possible values that describe the primary source of funds to pay the bonds.
Primary creates new revenues	– A dummy variable that indicates whether the prime source of security creates new revenues, i.e. the issue is self-supported.
Primary source role	– Takes three possible values that indicate whether the entire issue is expected to be paid from the primary source or most of it, or 'unless and for the part not paid from other sources.'
Primary source restricted	– A dummy variable that indicates whether the primary revenues come from a legally restricted or an unrestricted source of revenues, before transfer to the debt service fund.
Pledge/Lien on primary source	– Takes three possible values that indicate whether the issuer has pledged the primary source for the repayment of the bonds, whether bondholders have a lien on the primary source, or none of the above.
Primary source continuing appropriation	– A dummy variable that indicates whether debt service is secured by an irrevocable continuing appropriation or mandatory appropriations of the primary source of funds.
Primary unlimited	– A dummy variable that indicates whether the primary source can provide unlimited revenues for the repayment of the bonds.
Unlimited	– A dummy variable that indicates whether the bond is secured by unlimited ad-valorem taxes, not necessarily the primary source of security.
Secondary source of security	– Takes seven possible values that describe any explicit secondary source of funds to pay the bonds.
Pledge/Lien on secondary source	– Takes three possible values that indicate whether the issuer has pledged the secondary source for the repayment of the bonds, whether bondholders have a lien on the secondary source, or none of the above.
Full faith and credit	– A dummy variable that indicates whether the issuer has pledged its full faith and credit for the repayment of the bonds.
Unrestricted funds and revenue sources	– A dummy variable that indicates whether the bonds can be paid from any unrestricted revenues or funds of the issuer.
State guaranty	– Takes four possible values that indicate whether debt service is guaranteed by a state program/fund, by the apportioned state aid to the issuer, by the full faith and credit of the state, or none of the above.

**Table 3. Average Gross Spreads.** The table shows average gross spreads for Restricted deals and Unrestricted deals between 2004 and 2014. Restricted deals are restricted from using negotiated sales. Unrestricted deals are not restricted from negotiated sales. The full sample is the sample of 16,661 deals described in section 3. The Unlimited sample only contains deals secured by unlimited ad-valorem taxes. The Building sample only contains unlimited-sample deals that were issued to fund building or purchasing of school buildings, purchasing of school lots, major alterations or additions to the school building or buildings, and similar purposes. The Fixed & Exempt sample only contains building-sample deals, with fixed coupon rates exempt from federal income tax. Columns three and five show the number deals with gross spread data and the total number of total observations.

Sample	Mean (\$)	Unrestricted Observations		Mean (\$)	Restricted Observations		Difference (\$)
		w/Spread	Total		w/Spread	Total	
Full Sample	9.07	5,403	10,740	10.45	735	5,921	1.38
Unlimited	8.52	4,390	8,615	9.06	538	5,376	0.53
Building	8.51	3,908	6,517	10.51	404	2,820	2.00
Fixed & Exempt	8.22	2,397	4,228	10.68	353	2,697	2.47

**Table 4. Deal and bond control variables.** The table describes the control variables.

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Issue Controls	
Not Exempt	Indicator variable for bonds in the issue being tax exempt or not
Not Fixed	Indicator variable for bonds in the issue with fixed or floating rates
Callable	Indicator variable for callable bonds in the issue
Bank Qualified	Indicator variable for bank qualified issues
Sinkable	An indicator variable for the bonds in issue with sinkable provisions
Issue Amount	The total par amount of the issue
Deal Final Mat	The longest maturity of the issue
Bond Rating	Indicator variables for the issue's credit rating:
No Rating	AAA, AA+ AA, AA-, A+, A, A-, BBB+ BBB, BBB-

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Legal Security Controls	
Primary Source of security	Categorical variable for the primary source of funds to pay the bonds.
Unlimited	Indicator variable if the bond is secured by unlimited ad-valorem taxes, not necessarily the primary source of security.
Full Faith and Credit	Indicator variable for whether the state has pledged its full faith and credit for the repayment of the bonds.

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**Table 5. The effect of issue choice restrictions on gross spreads.** The table shows the estimated coefficients of the gross spread determinants in Equation (12). Restricted is a dummy variable indicating if negotiated sales are restricted and is our variable of interest. The Unlimited sample only contains deals secured by unlimited ad-valorem taxes. The Building sample only contains unlimited-sample deals that were issued to fund building or purchasing of school buildings, purchasing of school lots, major alterations or additions to the school building or buildings, and similar purposes. The control variables are describe in Table 4. Standard errors are clustered by month of issuance.

Dependent: Gross Spread	(1)	(2)	(3)	Unlimited	Building
Restricted	0.878 (0.19)	0.507 (0.20)	1.032 (0.48)	1.359 (0.49)	2.379 (0.55)
Security Control Variables	No	Yes	Yes	Yes	Yes
Other Control Variables	No	Yes	Yes	Yes	Yes
State Fixed Effects	No	No	Yes	Yes	Yes
Month-Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
N	6135	6135	6135	4926	4311
R-sq	0.259	0.288	0.372	0.316	0.305

**Table 6. Yield Regressions.** The table shows the effect on reoffering yields, by maturity year, of the restrictions on negotiated sales. Rest \*yr mat is a dummy variable that takes a unit value for restricted bonds of a given maturity. Columns (1) to (5) are analogous to columns (1) to (5) in Table 3. Standard errors are clustered by month of issuance. The table is continued on the next page.

	(1)	(2)	(3)	Unlimited	Building
Rest * 1-yr Mat	-0.0963 (0.02)	-0.100 (0.02)	0.197 (0.02)	0.199 (0.02)	0.201 (0.02)
Rest * 2-yr Mat	-0.248 (0.01)	-0.246 (0.01)	0.132 (0.02)	0.130 (0.02)	0.186 (0.02)
Rest * 3-yr Mat	-0.172 (0.01)	-0.173 (0.01)	0.182 (0.02)	0.176 (0.02)	0.171 (0.02)
Rest * 4-yr Mat	-0.158 (0.01)	-0.159 (0.01)	0.185 (0.02)	0.179 (0.02)	0.166 (0.02)
Rest * 5-yr Mat	-0.149 (0.01)	-0.152 (0.01)	0.183 (0.02)	0.180 (0.02)	0.168 (0.02)
Rest * 6-yr Mat	-0.137 (0.01)	-0.140 (0.01)	0.162 (0.02)	0.164 (0.02)	0.162 (0.02)
Rest * 7-yr Mat	-0.135 (0.01)	-0.138 (0.01)	0.158 (0.02)	0.163 (0.02)	0.171 (0.02)
Rest * 8-yr Mat	-0.137 (0.01)	-0.141 (0.01)	0.153 (0.02)	0.164 (0.02)	0.171 (0.02)
Rest * 9-yr Mat	-0.141 (0.01)	-0.145 (0.01)	0.146 (0.02)	0.160 (0.02)	0.169 (0.02)
Rest * 10-yr Mat	-0.145 (0.01)	-0.150 (0.02)	0.141 (0.02)	0.154 (0.02)	0.165 (0.02)
Rest * 11-yr Mat	-0.154 (0.02)	-0.160 (0.02)	0.134 (0.02)	0.150 (0.02)	0.162 (0.02)
Rest * 12-yr Mat	-0.158 (0.02)	-0.165 (0.02)	0.131 (0.02)	0.146 (0.02)	0.157 (0.02)
Rest * 13-yr Mat	-0.169 (0.02)	-0.176 (0.02)	0.119 (0.02)	0.132 (0.02)	0.144 (0.02)
Rest * 14-yr Mat	-0.175 (0.02)	-0.183 (0.02)	0.110 (0.02)	0.123 (0.02)	0.135 (0.02)
Rest * 15-yr Mat	-0.160 (0.02)	-0.168 (0.02)	0.126 (0.02)	0.148 (0.02)	0.162 (0.02)

**Table 6. Yield Regressions (continued).** The table shows the effect on reoffering yields, by maturity year, of the restrictions on negotiated sales. Rest \*yr mat is a dummy variable that takes a unit value for restricted bonds of a given maturity. Columns (1) to (5) are analogous to columns (1) to (5) in Table 3. Standard errors are clustered by month of issuance.

	(1)	(2)	(3)	Unlimited	Building
Rest * 16-yr Mat	-0.187 (0.02)	-0.196 (0.02)	0.1000 (0.02)	0.117 (0.02)	0.132 (0.02)
Rest * 17-yr Mat	-0.178 (0.02)	-0.187 (0.02)	0.108 (0.02)	0.123 (0.02)	0.139 (0.02)
Rest * 18-yr Mat	-0.195 (0.02)	-0.205 (0.02)	0.0929 (0.02)	0.107 (0.02)	0.125 (0.02)
Rest * 19-yr Mat	-0.191 (0.02)	-0.200 (0.02)	0.0967 (0.02)	0.104 (0.02)	0.123 (0.03)
Rest * 20-yr Mat	-0.196 (0.02)	-0.208 (0.02)	0.0871 (0.02)	0.0989 (0.02)	0.115 (0.03)
Rest * 21-yr Mat	-0.372 (0.03)	-0.384 (0.03)	-0.0575 (0.03)	-0.0381 (0.04)	-0.0187 (0.04)
Rest * 22-yr Mat	-0.419 (0.04)	-0.436 (0.04)	-0.0852 (0.04)	-0.101 (0.05)	-0.0811 (0.05)
Rest * 23-yr Mat	-0.524 (0.04)	-0.538 (0.04)	-0.176 (0.04)	-0.192 (0.05)	-0.171 (0.05)
Rest * 24-yr Mat	-0.569 (0.04)	-0.583 (0.04)	-0.203 (0.04)	-0.191 (0.05)	-0.169 (0.05)
Rest * 25-yr Mat	-0.423 (0.04)	-0.440 (0.04)	-0.0912 (0.04)	-0.107 (0.05)	-0.0846 (0.05)
Rest * 26-yr Mat	-0.740 (0.06)	-0.761 (0.06)	-0.406 (0.06)	-0.424 (0.08)	-0.391 (0.08)
Rest * 27-yr Mat	-0.843 (0.08)	-0.872 (0.08)	-0.488 (0.07)	-0.532 (0.11)	-0.489 (0.11)
Rest * 28-yr Mat	-0.899 (0.09)	-0.923 (0.09)	-0.527 (0.08)	-0.556 (0.11)	-0.525 (0.11)
Rest * 29-yr Mat	-0.710 (0.08)	-0.733 (0.08)	-0.305 (0.08)	-0.328 (0.11)	-0.296 (0.11)
Rest * 30-yr Mat	-0.435 (0.08)	-0.462 (0.08)	-0.0490 (0.08)	-0.0713 (0.12)	-0.0644 (0.12)
State Fixed Effects.	No	No	Yes	Yes	Yes
Maturity Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Additional Controls	Yes	Yes	Yes	Yes	Yes
Month-Year Fixed effects	Yes	Yes	Yes	Yes	Yes
N	124,556	124,556	124,556	108,994	97,794
R-sq	0.815	0.815	0.824	0.822	0.809

**Table 7. Indirect Costs.** The table reports the proportion of taxable deals and the proportion of non-fixed-rate deals between 2004 and 2014 in the sample of restricted bonds, and the sample of unrestricted bonds.

	Not Fixed	Taxable
Restricted	0.07%	3.65%
Unrestricted	14.24%	14.03%



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