Municipal Manager Responsiveness: Evidence from a Regulatory Shock

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December 2023

Abstract

Advance refunding transactions are an important fiscal tool that accounted for 44 percent of municipal debt issuances in 2017. These transactions allow municipalities to refinance not-yet-callable debt, thereby acting as early "synthetic" call options. The Tax Cuts and Jobs Act of 2017 (TCJA) repealed the interest income tax exemption on advance refunding bonds. Using this setting, we examine how responsive municipal managers are to regulatory shocks. We present several major insights. First, advance refunding temporarily surged in the short window between TCJA's passage and implementation. Second, advance refunding then declined sharply to only 8 percent of municipal debt issuances. Third, taxing interest from advance refunding bonds did not appear to change the contracting terms for new municipal debt. In sum, municipal managers quickly adjusted their advance refunding behavior, but the taxation of advance refunding transactions did not have spillovers effects on the structure of new debt issuances. These findings about the responsiveness of municipal managers offer contrasting evidence to a mosaic of recent studies criticizing municipal managers' efficiency.

We thank Dale Okerlund, Jon Kerr, Cristi Gleason, and Miles Romney, as well as workshop participants at George Mason University, University of Texas at El Paso, and the 2022 Brigham Young University Accounting Research Symposium for their helpful comments and suggestions. We thank Sean McCauley and Qinyi Shi for research assistance. Braden Williams gratefully acknowledges support from the PricewaterhouseCoopers Endowed Faculty Fellowship. All errors are our own.

1. Introduction

State and local governments in the U.S. have $4.2 trillion of outstanding municipal debt obligations (MSRB 2021). Advance refunding transactions offer a mechanism for municipalities to refinance callable bonds before their call date—effectively mimicking the early exercise decision of an American option and functioning as an early "synthetic" call option. Historically, advance refunding transactions accounted for up to half of the municipal debt issued each year (Ang et al. 2017). Like interest from other forms of municipal debt, interest income from advance refunding bonds was tax-exempt. However, in a short time frame at the end of 2017 and in the face of substantive skepticism about legislative effectiveness, Congress passed the Tax Cuts and Jobs Act (TCJA). Among other things, this regulatory shock repealed the tax-exemption of interest income from advance refunding bonds issued after December 31, 2017. Given a growing chorus of literature documenting that municipal managers are inattentive, face internal resource constraints, need external monitoring, and generally make inefficient decisions, we study how municipal managers respond to the abrupt imposition of investor-level taxes on advance refunding debt.

Despite their popularity and economic importance, advance refunding transactions are not widely understood. Original issuances of callable municipal debt frequently have a call feature (e.g., 10-year call). Advance refunding offers municipalities a mechanism to refinance that debt before the call date, thereby providing opportunities for cost savings and debt restructuring.[1] Loosely speaking, prior to TCJA, municipalities could issue a new, tax-exempt bond and then invest the proceeds in U.S. Treasury securities until the original bond is callable,

[1] IRC §149(d)(2) defines *advance* refunding bonds as those "issued more than 90 days before the redemption of the refunded bond." Refunding transactions issued less than 90 days before a bond is callable and those issued after a bond is callable are referred to as *current* refunding transactions. TCJA did not change the tax-exempt status of current refunding transactions.

at which point the original bond would be called with the invested funds. Following TCJA, municipalities can still engage in advance refunding transactions, but interest earned from advance refunding bonds is no longer tax-exempt.

Several recent and concurrent studies have scrutinized municipal financing, in general, and advance refunding transactions, specifically. Gao et al. (2020) document a variety of negative public finance outcomes following the loss of municipal monitoring by local newspapers (e.g., higher borrowing costs and increased advance refunding activity). Other studies scrutinize municipal managers' timing of refunding transactions and reveal multiple channels of municipal debt refinancing inefficiency and irresponsiveness. For example, Ang et al. (2017) find that 85 percent of advance refunding transactions are issued with a negative net present value (NPV), especially among financially constrained municipalities.[2] Additionally, Chen et al. (2022) find that municipalities sustain sizeable losses by waiting an average of seven months to refinance debt that could have been favorably called earlier. They also find these delays are longer during busy times and for smaller municipal finance departments. Taken together, these studies suggest that municipalities lack the internal resources to ensure municipal managers are efficient and responsive in municipal financing decisions.

In contrast to studies that examine municipal managers' actions around the time a bond becomes callable, we examine municipal managers' responsiveness in the face of an unexpected, major, and timely regulatory shock (i.e., the rapid passage of new federal tax law). Our unique setting allows us to offer triangulating evidence on municipal financing practices. Specifically,

[2] In order to reach the 85% negative NPV conclusion, Ang et al. (2017) compares the NPV of an advance refunding transaction to the NPV of a refunding transaction wherein the bond is called optimally (i.e., either advance refunded or refunded in the optimal year after the call date). In contrast, conversations with practitioners indicate that they view the relative NPV of an advance refunding transaction as a comparison between the advance refunded bond and the original bond—not a theoretically optimal transaction.

we analyze how quickly resource-constrained municipal managers navigate this passage of new tax law, as well as the law's consequences. Additionally, we examine whether the taxation of advance refunding transactions had spillover effects on the contracting terms of original municipal debt issuances.

Before we examine these primary research questions, we first validate the assumption that the imposition of an investor-level income tax on advance refunding transactions increases the bond yields for these instruments. Implicit tax theory maintains that the after-tax returns on two substantively equivalent securities must be equal in a competitive equilibrium (Scholes et al. 2014). Therefore, the imposition of a tax on interest from one type of bond, but not another, would reduce relative demand for the taxable bond, thereby driving its yield higher. Empirically, we observe the expected increase in bond yields relative to three distinct control groups. Having confirmed that investor-level taxation increased the cost of advanced refunding to municipalities and corroborated known dynamics in our setting, we turn our attention to our primary research questions about the behavior of municipal managers.

To examine the responsiveness of municipal managers, we examine changes in the number of advance refunding transactions and the amount of advance refunding debt issued during a short-window regulatory shock. The TCJA was formally introduced in both houses of the U.S. Congress in early November 2017, signed into law by the President on December 22, 2017, and ultimately took effect for debt issued after December 31, 2017 (Gaertner et al. 2020). Because restructuring municipal debt is typically a multi-month process that involves many parties, municipal managers that wanted to take advantage of the last opportunity to issue more favorable debt needed to anticipate and rush to complete transactions in a very short window. Univariate statistics show that municipalities issued four times the amount of advance refunding

debt in December than they did in any other month of 2017. Multivariate analysis shows this temporary increase is significant when compared to contemporaneous trends in original issued debt and current refunding debt. Consistent with the intuition of recent and concurrent papers, we find that this short-run response is moderated by our proxy for municipal resource constraints (i.e., both large and small municipalities accelerated the issuance of a large amount of advance refunding debt, but large municipalities with lower resource constraints were able to successfully advance refund an even greater amount of debt). Overall, municipal managers' rapid response suggests they have adequate incentives and resources to nimbly react to major abrupt regulatory changes.

To investigate the longer-term impact of the imposition of investor-level taxes on advance refunding bonds, we examine changes in the number of advance refunding transactions and the amount of advance refunding debt issued after the repeal of the tax-exemption of advance refunding bonds. Based on implicit tax theory, introducing taxes on advance refunding bonds increases the cost of advance refunding transactions. However, Ang et al. (2017) suggest municipalities could predominately use advance refunding transactions to restructure debt rather than for cost savings. Debt restructuring broadly includes the elimination of debt covenants, retirement of senior or subordinate debt, acceleration or extension of due dates, alteration of debt payments or service requirements, etc. Given the benefits of these changes and the few alternative mechanisms to achieve the debt restructuring benefits, the increased costs may not diminish the prevalence of advance refunding. We find the frequency of advance refunding transactions decreased significantly and account for just 8.2 percent of all municipal debt issued in 2018. In more formalized difference-in-differences tests, we find that the long-term effect is statistically and economically significant. The imposition of federal taxation on interest from

advance refunding halted the rapid two-decade rise in the popularity of these transactions.

To determine the spillover effects of the imposition of investor-level taxes on advance refunding transactions, we examine changes to several common contracting terms of original (i.e., new) municipal bond issuances. To the extent that TCJA removes (or at least increases the cost of) the early synthetic call option offered by advance refunding, municipalities that issue new debt could alter non-price contracting terms to protect themselves from the loss in financial flexibility. Consistent with this expectation, some market experts predicted that original issued debt after TCJA would have shorter calls (Kalotay 2018). We use a difference-in-differences test to compare the contracting terms of new issuances of traditional tax-exempt municipal debt with new issuances of taxable municipal debt (e.g., public debt issued to support private activities like stadiums that do not qualify for the tax-exempt treatment) around the passage of TCJA. Across a battery of tests, we do not find significant changes in callability, call dates, and term length of new municipal debt issuances around TCJA across these groups. One potential explanation for this non-result is that investors hold market power and set the terms of municipal debt contracts. Therefore, municipalities are unable to alter standard or sticky contracting terms to compensate for the decreased financial flexibility that results from imposing investor-level taxes on advance refunding.

Our study contributes to both research and practice around municipal financing. First, we add empirical evidence to the debate about the responsiveness and efficiency of municipal managers. Overall, state and local government budgeting practices are frequently criticized for being inflexible (McGranahan 2002). Further, prior studies find municipalities sub-optimally advance refund debt (Ang et al. 2017) *and* sub-optimally delay refinancing (Chen et al. 2022). In contrast, our results show municipalities quickly reacted to tax changes in the federal taxation of

interest on advance refunding bonds—even during a holiday season. This triangulating evidence should help bond investors, as well as those who monitor municipal debt, calibrate expectations of municipal managers' responsiveness in public financing decisions.

Second, our study documents a tax-induced structural change in the practice of advance refunding transactions. Despite the hundreds of billions of dollars invested annually in advance refunding bonds, research differentiating between advance refunding and other forms of municipal financing is rather scarce. The few academic studies on advance refunding have focused on the transaction's rapid expansion despite its negative valuation implications (Ang et al. 2017; Vijayakumar 1995; Moldogaziev and Luby 2012). We contribute to the literature on advance refunding by documenting the effects of federal, investor-level taxation, which ultimately caused a severe curtailing of the practice. Others have noted a decline in advance refunding (Fidelity 2019 and Curry 2021), but none have studied the trend with the empirical rigor required for evidence-based policy making (Leuz and Wysocki 2016).

Finally, our study also contributes to understanding the interplay between advance refunding and original municipal debt issuances. Because municipal debt contracts have such a long-time horizon, one could expect rational managers to consider potential later refinancing options into their initial debt contracting decisions. Our finding that the callability, call dates, and term length of original municipal debt issuances did not change around TCJA suggests municipal debt contracting terms are not made with refunding in mind or that there are frictions that prevent managers from adjusting sticky contracting processes. Regardless of the specific reasons, these findings should be useful to those tasked with monitoring municipal managers.

2. Background and Hypothesis Development

2.1 Background

Municipalities that need to raise capital via financial markets frequently issue multi-decade bonds that are non-callable for the first 10 years. This period of non-callability guarantees bond investors will receive at least 10-years of tax-exempt interest at the stated coupon rate. However, this practice, by itself, locks municipalities into a financing commitment for a minimum of 10 years. After which, municipalities can continue to service the debt, call the obligation to retire (i.e., payoff), or refund (i.e., refinance) the debt.

A refunding transaction occurs when municipalities issue new debt in order to replace their old debt. Refunding of callable debt (i.e., debt that typically has been held for at least 10 years) is referred to as *current* refunding. However, municipalities often find it advantageous or necessary to refinance bonds *before* their call date, and frequently do so through a process called *advance* refunding.

Municipalities may engage in advance refunding for several reasons. First, when market interest rates drop or before they potentially rise, municipalities may take advantage of currently lower rates by locking-in a long-term reduction of their debt service cash outflows. This reduction begins after the call date of their originally issued debt which is not yet callable. We refer to these transactions as *cost savings* transactions. Second, municipal managers may desire or feel the need to restructure their debt and bond covenants before it is callable. This may occur for political reasons such as before or after the political winds change, to score political points at a crucial time with their electorate, or while the political will to do so is available. This may also or alternatively occur for long-term planning reasons, such as to restructure current debt to remove restrictions so that other or new projects can be funded sooner. Changes to debt

covenants may include, but are not limited to, the acceleration or lengthening of key maturity dates, the removal of negative or affirmative bond covenants, or the altering of certain financial and numerical metric restrictions. We refer to these types of transactions as *debt restructuring* transactions.

Prior to the Tax Reform Act of 1986 (TRA86), nearly all issuances of advance refunding bonds generated tax-exempt interest income. As part of TRA86, Congress partially limited the ability of municipalities to engage in advance refunding. Cash received from advance refunding issuance must be held in escrow and invested in a portfolio of Treasury bonds (specifically, the State and Local Government Series securities) that provide a yield that is not more than 0.001% above the yield on the new refunding bond issued. In other words, positive yield arbitrage is limited to a 0.001% gain, effectively requiring municipalities to accept either a neutral or negative arbitrage position in order to issue advance refunding bonds as tax-exempt. If positive arbitrage exceeds 0.001%, then interest payments from the advance refunding bonds become federally taxable to bond investors.

Additionally, for original bonds issued after December 31, 1986, only the *first* advance refunding bond issued for that original debt could be issued as a tax-exempt bond. Both the original bond and advance refunding bond can concurrently exist, both with tax-exempt statuses, up through the first call date of the original bond. If the original bond is called and refunded on the original bond's call date, then the advance refunding bond retains its tax-exempt status, if not then the advance refunding bond becomes a taxable bond and its future coupon interest payments become federally taxable to bond investors. This escrow process also allowed municipalities to technically have two concurrently outstanding bonds, but only record one of them on their financial statements. The tax treatment under TRA86 remained significantly unchanged for over

30 years, effectively limiting advance refunding as a single-time use tool.

On December 22, 2017, the Tax Cuts and Jobs Act was enacted and repealed the tax-exempt status of all advance refunding bonds issued after December 31, 2017. As a result, investors would be subject to Federal income taxes on interest income from advance refunding bonds. For several reasons outlined below, it is unclear ex-ante how municipalities would react to this change.

2.2 Validation and Hypothesis Development

2.2.1 Validation Test

Before developing hypothesis, we validate that municipal bond markets in our sample behaved in accordance with implicit tax theory. Implicit tax theory suggests that in a competitive market, the risk-adjusted total tax rate is the same for all assets (Engel et al. 1999; Erickson and Maydew 1998; Guenther and Sansing 2023). The total tax rate is the summation of the explicit tax rate (i.e., the rate paid to a tax authority) and the implicit tax rate (i.e., the "difference between the before-tax return on a fully taxable bond and the risk-adjusted before-tax return on an alternative asset") (Scholes et al. 2014). Put differently, implicit tax theory states that the after-tax returns on two assets will be the same in a competitive market.

Differences in explicit tax treatment alter supply and demand for the two assets, which cause their pre-tax rates of return to be different. This difference is the implicit tax. At the lower bound, the theoretical implicit tax rate is zero. This situation also reflects the pre-TCJA tax regime when interest income from new money and advance refunding debt were both tax-exempt. In the post-TCJA tax regime, individuals in the highest tax bracket are subject to a 40.8 percent tax rate on interest income from advance refunding.[3] This tax rate reflects the upper

[3] The 40.8 percent is the sum of the highest Federal individual income tax rate of 37 percent and the net investment income tax surcharge of 3.8 percent. However, corporations, especially insurance companies, also invest in

bound of the implicit tax rate. Given the implicit tax, we expect higher bond yields for advance refunding bonds issued in 2018 relative to tax-exempt issuances in 2018. Thus, we expect the following:

Validation: Bond yields increase for advance refunding bonds following their interest being subject to investor-level taxes.

2.2.2 Hypothesis Tests

Our first hypothesis deals with the municipal managers' responsiveness to a regulatory shock. Two features of the passage of TCJA make this an appropriate setting. First, municipalities faced uncertainty over the passage of TCJA. For example, TCJA passed in the Senate by a close vote of 51 to 49. The vote recalled earlier 2017 legislative efforts to reform health care, but that effort ultimately failed. Consistent with uncertainty over TCJA, equity markets reveal substantial changes in opinions about TCJA's likelihood of passage and provisions in the bill (Wagner et al. 2018). Although the provision to remove tax-exempt status for advance refunding debt was part of every TCJA bill starting from its introduction to the House, many provisions were removed, added, or changed throughout TCJA's uncertain legislative process. As debt issuance transaction costs are substantial, municipalities are unlikely to preemptively advance refund debt for a law change with uncertainty over its passage.

Second, TCJA's legislative window lasted a mere 50 calendar days starting with its introduction in the House of Representatives on November 2, 2017 and ending with its enactment on December 22, 2017. The key date resolving uncertainty over TCJA's passage is likely its Senate vote on December 2 (note that earlier 2017 health care reform failed due to its inability to pass the Senate). Excluding weekends and Christmas Day, municipalities had 19

municipal debt and are subject to a 21 percent income tax rate. Pension funds also invest in municipal debt and investment earnings in the plan are generally not taxed until distribution.

working days in December after TCJA's Senate vote to finalize the issuance of tax-exempt advance refunding debt. The short window suggests that constrained municipalities—especially those that had not anticipated a potential regulatory change—would be unable to issue advance refunding debt in 2017.

The cost savings of completing an advance refunding transaction in 2017, rather than waiting until 2018, creates a clear incentive for managers to accelerate advance refunding transactions in December 2017. However, it is not obvious that municipal managers would be able to successfully accelerate transactions. Chen et al. (2022) find that municipalities delay refinancing by an average of seven months and thereby substantially increase their cost of debt. The delay in refinancing is greater during busy times of the year. They conclude that the suboptimality is due to the resource constraints faced by municipal managers. To the extent that municipal managers face binding resource constraints, they would not be able to accelerate advance refunding transactions despite having a clear incentive to do so.

We state our initial hypothesis in the alternate form:

H1A: Municipal managers are able to quickly adjust public financing in response to regulatory shocks.

To the extent that municipality-specific internal resource constraints affect municipal managers responsiveness, we expect differences across municipalities in their responsiveness to regulatory shocks. Consistent with municipality-specific internal resource constraints, Chen et al. (2022) find smaller municipalities delay refinancing more than larger municipalities. However, municipalities generally assemble external financing teams to assist in their debt issuances. External teams consist of bond counsels (e.g., attorneys knowledgeable in federal and local regulations), fiduciary municipal and financial advisors registered with the SEC and MSRB, and

underwriters or investment bankers (GFOA 2020). While the typical government compensation structure of municipal managers does not explicitly reward them for responsiveness, the deal- and fee-based compensation structure of banks and advisers may incentivize these other actors to help municipalities overcome internal resource constraints.

We also state our next hypothesis in alternate form:

H1B: Municipal managers' responsiveness to a regulatory shock is moderated by internal resource constraints.

We also consider the longer-term decision of municipal managers to engage in advance refunding transactions. On the one hand, we expect municipal managers to engage in fewer advance refunding transactions after the interest on the replacement debt becomes taxable because implicit tax theory suggests they would be more costly. However, there are very few commonly used alternatives besides advance refunding for municipalities that need to restructure debt before it is callable.

While we can think of no reason why the imposition of federal income taxes on the interest income would increase municipalities use of advance refunding debt transactions, we do have several reasons for a credible null hypothesis. Ang et al. (2017) find that 85% of all advance refunding bonds from 1995 to 2013 were value destroying and had a negative NPV, meaning that advance refunding transactions created less favorable cash flows that municipalities would have otherwise had if they had not advance refunded the original bond—at least in terms of the NPV. The authors find strong evidence that financial constraints are a primary driver in the decision to issue advance refund. Relatedly, Gao et al. (2020) find that advance refunding transactions increase and less favorable interest costs are agreed to when a reduction in municipality monitoring provided by local newspapers occurs. Further, municipal managers use

advance refunding transactions because advance refunding generally does not need voter approval whereas issuing new debt sometimes requires voter approval.[4] To the extent municipal managers are forced to utilize advance refunding to manage debt, municipalities may continue to issue advance refunding bonds at the same rate after the imposition of an investor-level tax on interest from advance refunding bonds.

We state this hypothesis in alternate form as follows:

H1C: Municipal managers are able to decrease their reliance on advance refunding transactions after regulation that introduces investor-level taxes.

Our second hypothesis examines the interplay between advance refunding transactions and the financial flexibility afforded by the contracting terms in original municipal debt issuances. We start our hypothesis development generally. To the extent that entities value flexibility, an optimal contract gives either party the right to renegotiate the contract in certain states of the world (Smith 1993). This is a major reason why options are written into so many kinds of contracts. We argue that options can exist explicitly within the legal terms of a contract, and options also can arise from the institutional environment in which the contract is executed and enforced. We follow convention and refer to these latter options as synthetic options. When a synthetic option that is part of a contracting environment is removed, the contracting entity's financial flexibility decreases. Therefore, both parties engaged in contracting may agree to adjust other terms of the contract to maintain a similar, mutually beneficial level of financial flexibility.

In the municipal bond market, call options are explicit options written into most debt contracts lasting more than 10 years. Since advance refunding transactions gave municipalities the option to refinance debt even in the window before the call option was available, advance

[4] For example, general obligation bonds typically require voter approval. However, some utility revenue bonds do not require voter approval. Requirements vary by state.

refunding served as a meaningful determinant of municipalities' financial flexibility. TCJA did not disallow advance refunding transactions, but implicit tax theory would predict that it significantly increased the cost of advance refunding because bond yields became subject to explicit taxes.

To the extent that municipalities have a desired level of financial flexibility and the imposition of investor-level taxes on municipal bonds decreases that flexibility by increasing the price of an early synthetic call option, then a debt-issuing municipality may look for alternative ways to increase financial flexibility. In the realm of explicit contract terms, this flexibility could be improved by shortening the term life of bonds, accelerating the call date, or issuing a larger portion of a debt series as callable debt.

While we can think of no reason why removal of the early synthetic call option afforded by advanced refunding bonds would cause municipalities to undertake measures to decrease financial flexibility, there is nonetheless theory for a credible null. Investor processing costs influence trading decisions (Blankespoor et al. 2020). To the extent that increased processing costs associated from atypical municipal debt terms deter investors from investing in municipal debt that does not have traditional terms, then municipalities may accept the decreased financial flexibility resulting from investor-level taxes and not adjust the terms of their new debt issuances.

Hence, we state our second hypothesis in alternate form as follows:

H2: As the cost of an early synthetic call option on new debt increases, municipal managers respond by altering explicit contracting terms to increase financial flexibility.

3. Data and Sample Selection

3.1 Sample Selection

We follow Ang et al. (2017) and collect municipal bond issuance data from Bloomberg. Because TCJA happened near the end of 2017, we collect the 24 months from January 2017 to December 2018 as our sample period. Table 1 reports descriptive statistics on municipal debt issuances from that period that are available on Bloomberg. During our sample period, Bloomberg has data on 209,565 issuances (both new issuances and refunding transactions). We drop issuances missing the issuance amount, coupon rate, U.S. state information, and bonds not issued in one of the 50 U.S. states or the District of Columbia. This yields a sample of 203,021 bond issuances consisting of 37,355 advance refunding bonds, 141,710 new money bonds, and 23,956 current refunding bonds. Of the 37,355 advance refunding bond issuances, 18,547 of those issuances listed advance refunding as its sole-purpose.[5]

Municipalities typically issue bonds in a series, which means that the municipality issued numerous bonds with various maturity dates and debt amounts in a single underwriting. As we examine different types of debt issuances (i.e., new money, current refunding, and advance refunding bonds), we refer to bonds issued on the same day by the same issuer as a "bond series" and specify the type of debt issuance. The sample contains 3,418 advance refunding bond series and 14,340 new money and current refunding bond series.

For our validation tests, we examine bond trade data, and therefore merge our bond

[5] Determining the type of debt in a bond series is difficult because municipalities frequently issue multipurpose bonds (e.g., a new bond refinances some old debt that is callable, so it is a current refunding transaction, and also some old debt that is not yet callable, so it is also an advance refunding transaction). We refer to this debt as "multipurpose" because it contains both advance and non-advance refunding transactions. In many of our analyses, we use two different treatment groups. The first group is all bond series that contain any advance refunding debt. The second, smaller group is all bond series that are solely comprised of advance refunding debt. We recognize the tradeoffs of using the two groups (e.g., sample size versus noise), and generally tabulate and draw inferences from both. Our control group is comprised of bonds that are issued as either solely new money bonds or solely current refunding, and are therefore unaffected by the changes of TCJA.

issuance sample with secondary trade transaction data from the Municipal Securities Rulemaking Board (MSRB). We only use 2018 trading data, so for these tests, we drop the 60,437 bonds that are not traded in 2018. We also drop 29,197 trades missing the trade yield of the secondary trade. Our sample contains 2,122,704 bond trades.

3.2 Sample Descriptive Information

Table 2 presents descriptive information about the sample. Panel A shows the monthly, weekly, and daily average number of individual bond issuances and total average size (in millions) of issuances in the pre-TCJA and post-TCJA periods. The average number of daily municipal bond issuances falls from 434 individual bonds in 2017 to 353 individual bonds in 2018. The average total size (in millions) of bonds issued per day also falls from $1,451 in 2017 to $1,170 in 2018. Note that these figures represent *individual* bond issuances. As noted above, municipalities generally issue bonds in a series.

To examine whether bond issuances are concentrated in certain localities, Panel B presents the top 5 states by total number of issuances and the total size of issuances. Municipalities in Texas issue 15.5% of the sample by count and 11.4% of the sample by total dollar issuance size. Municipalities in California issue 10.9% of the sample by count and 14.0% of the sample by total dollar issuance size. Overall, issuers in Texas, California, New York, Wisconsin, and Minnesota issue 41.4% of individual bonds by count and 41.5% by total dollar amount. Thus, no single state dominates the sample for number of bond issuances nor size of total issuances.

Panel C shows descriptive statistics for our regression variables. The average size of an individual bond issuance is $3.3 million and the median size is $615,000. The average bond series issuance is $38 million and the median is $8.8 million. The average size of total issuances

occurring within a state in a month is $380 million and the median size is $136 million. Thus, large issuances skew the distributions of both individual bond issuance and total issuances occurring within a state in a month. The average yield of a secondary trade is 3.08% and the median yield is 3.15%. The average years to maturity of traded bonds is 14.5 years and the median years to maturity is 13.9 years.

Panel D compares pre- vs. post-TCJA descriptive statistics for our regression variables. Interestingly, the average size of an individual bond, bond series, and monthly state issuance amount, are all not significantly different from each other the full bond issuance sample. In the MSRB trade sample, both bond yields and Yrs_to_Maturity significantly increase post-TCJA.

Panel E presents univariate correlations among our variables. Correlations are grouped by sample. As expected, in the MRSB bond trade sample, bond yield and Yrs_to_Maturity have a significant and positive correlation.

Figure 1, Panel A shows the total municipal bond issuance amount by month for *all* advance refunding compared to non-advance refunding issuances. Figure 1, Panel B shows a similar graph, but for just *sole-purpose* advance refunding vs. non-advance refunding. Thus, these two graphs are the same except for bonds included in the "advance refunding" line.

Several insights from these figures are noteworthy. First, the number of advance refunding issuances throughout 2017 were fairly constant until the passage of the TCJA at the end of 2017, when advance refunding issuances spike. Second, throughout 2018, advance refunding issuances, especially sole-purpose advance refunding issuances, are reduced to near zero. Third, these trends appear to be pronounced beyond a trend in a combined control group that includes both new bond and current refunding issuances.

4. Empirical Tests and Results

4.1 Validation Test–Bond Yields

To validate that bond yields increase in response to investor-level taxes for advance refunding municipal bonds issued in 2018, we compare the yield of the taxable advance refunding bonds issued in 2018 to three control groups of tax-exempt bonds—new money bonds issued in 2018, current refunding bonds issued in 2018, and advance refunding bonds issued in 2017. Because implicit taxes depend on explicit taxes (Guenther and Sansing 2023), the lower bound of the implicit tax cost is 0 percent and the upper bound is the maximum marginal individual tax rate of 40.8 percent.[6] Table 3 shows the results and follows the structure of estimating implicit taxes from Engle et al. (1998). We find the implicit tax rate between taxable advance refunding bonds issued in 2018 and tax-exempt new money bonds issued in 2018 is 15.331%. When replacing new money bonds with current refunding bonds as the comparison, the implicit tax is slightly higher at 20.039%. Last, when replacing new money bonds with tax-exempt advance refunding bonds issued in 2017, the implicit tax rate is slightly higher at 22.480%. We estimate the magnitude of the implicit tax rate in this setting ranges between 37.6% and 55.1% of what is suggested by stylized models. These estimates come from dividing the estimated implicit tax by the highest marginal tax rate. Each estimate of the implicit tax rate is much lower than the theoretical maximum, which could suggest that some bondholders may not be in the highest 40.8% marginal tax rate. Alternatively, we acknowledge that municipalities issuing advance refund bonds in 2018 may be unlike municipalities that issue advance refund bonds in 2017 (e.g., 2018 issuers could have greater risk of default). As such, our estimate of the implicit tax rate is potentially influenced by selection effects. Hence, we only intend to validate

[6] We use 40.8 percent because it is the sum of the highest Federal individual marginal tax rate of 37 percent plus the net investment income surtax of 3.8 percent.

implicit taxes at work in our sample and do not claim that these are precise magnitude estimates.

4.2 Parallel Trends Analysis – Monthly Impact on Advance Refunding Transactions

To assess the parallel trends assumption that will be required in later tests, we examine whether municipalities exhibited similar trends in their issuance of advance refunding debt and other forms of municipal debt in the months leading up the TCJA. Specifically, we aggregate total monthly municipal debt issuances by state-month-type. (Type refers to whether debt was advance refunding or not.). For this analysis, we aggregate debt at the state level because debt issuance is lumpy at the municipality level. We then investigate parallel trends by estimating the following least squares regression.

$$Monthly\_State\_Size_{sit} =$$

$$\sum \beta Month_{sit} \times Adv\_Refunding_{sit} + \beta_2 Adv\_Refunding_{sit} + \sum \beta_3 Month_{sit} + \sum State_{sit} + e_{sit} \quad (1)$$

where *s* represents the state of the issuing municipality, *i* represents whether the bond is an advance refunding bond or new money/current refunding bond, and *t* represents the calendar month of the bond issuance. $Monthly\_State\_Size_{sit}$ equals the log of the total size of bond issuances (in dollars) by all issuing municipalities in a state and month. $Month_{sit}$ is a vector of 23 indicator variables equal to 1 for the corresponding calendar month. We exclude the indicator variable for October 2017. We select October 2017 as our baseline month because TCJA legislation was introduced to the House in November 2017. $Adv\_Refunding_{sit}$ is an indicator variable equal to 1 for the advance refunding bond and 0 otherwise. We include state fixed effects and cluster standard errors by state.

We present the results of estimating equation (1) in Table 4, and also in Figure 2, Panels A and B. We present the results for full sample advance refunding in column 1 and results for sole-purpose advance refunding in column 2. In both columns, we generally find insignificant

coefficients on the interaction between the month indicator variable from January 2017 to November 2017 and *Adv_Refunding*, with two exceptions. The interaction of the advance refunding indicator and the August 2017 indicator is positive and significant in column 1—but not for column 2. We know of no systemic reason for this anomalous month. Also, the interaction of the advance refunding indicator and the November 2017 indicator is positive and marginally significant in Column 1. Because the legislation was introduced in both houses of Congress in early November, this result could be an anticipation effect.

In sum, we do not find systemic differences between advance refunding transactions and other municipal debt issuances in the time leading up to the TCJA. These results generally support the parallel trends assumption.

4.3 Hypothesis 1 – Managerial Responsiveness and Advance Refunding Transactions

4.3.1 Research Design – Tests of H1A, H1B, and H1C

We first investigate the impact of investor-level taxation on short-term municipal debt issuances. We examine the total amount of advance refunding debt issued from January to November 2017 versus December 2017, as compared to new money debt and current refunding debt. We estimate the following ordinary least squares regression:

$$LnBondSize_{mit} =$$

$$\beta_1 Dec2017_{mit} + \beta_2 Adv\_Refunding_{mit} + \beta_3 Dec2017_{mit} \times Adv\_Refunding_{mit}$$

$$+ \sum Month2017 + \sum State + e_{mit} \quad (2)$$

where *m* represents the municipality of issuance, *i* represents whether the bond is advance refunding or new money/current refunding, and *t* represents the bond series issuance date. $LnBondSize_{mit}$ equals the log of the sum in dollars of the bond series issuance. $Dec2017_{mit}$ equals 1 if the bond series issuance occurs in December 2017 and 0 if the issuance occurs in other

months of 2017. $Adv\_Refunding_{mit}$ equals 1 if the bond issuance is for advance refunding and 0 otherwise. To control for the impact of macroeconomic events on bond issuance size, we include fixed effects for the month of issuance (i.e., indicator variables for each month of 2017) and the state of the municipality issuing the bond series. We cluster standard errors by issuer (i.e., unique 6-digit CUSIP).

For *H1A*, our coefficient of interest is the interaction term of $Dec2017_{mit} \times Adv\_Refunding_{mit}$. A positive coefficient on the interaction term suggests municipalities issue more advance refunding debt in December 2017 prior to investor-level taxation on advance refunding bonds, relative to issuances of new money or current refunding bonds in the rest of 2017.

To test the prediction in *H1B* that internal resource constraints moderate municipalities' responses to this regulatory shock, we conduct two tests. First, we partition our sample based on our proxy for resource constraints. Specifically, we follow the intuition in Chen et al. (2022) that municipal officers in smaller municipalities "often wear multiple hats" and are responsible for a number of tasks, whereas municipal officers in larger municipalities are more likely to specialize and those in large metro areas are more likely to a network of close, related specialists that can share expertise.[7] We identify municipalities located within the 100 largest counties (measured by Census estimates for July 2022) as less resource constrained, and all remaining counties as more resource constrained. We exclude state-issued debt from this analysis (i.e., if issuer type in Bloomberg is "state" or "state enterprise fund").[8] We then re-estimate equation (2) for each

[7] Chen et al. (2022) define a small issuer as one that issues fewer than five bonds over their 18-year sample. We are not able to adopt this exact definition in our study because we examine only two years of data.
[8] We omit state debt for two reasons. First, we expect states to generally have adequate and high internal resources dedicated to managing public finances. Second, comparing states to cities and counties would therefore add non-comparable noise and reduce statistical power relative to comparing resource constraints within the cross section of municipalities.

sample. Second, we use multivariate regression to examine whether municipalities' post-TCJA refunding behavior was moderated by internal resource constraints. $Large_{mit}$ is an indicator variable equal to 1 if the issuing municipality is located within the largest 100 counties and 0 otherwise. We estimate the following equation:

$$LnBondSize_{mit} =$$

$$\beta_1 Dec2017_{mit} + \beta_2 Adv\_Refunding_{mit} + \beta_3 Dec2017_{mit} \times Adv\_Refunding_{mit}$$
$$+ \beta_4 Large_{mit} + \beta_5 Dec2017_{mit} \times Large_{mit} + \beta_6 Dec2017_{mit} \times Adv\_Refunding_{mit} \times Large_{mit}$$
$$+ \sum Month2017 + \sum State + e_{mit} \quad (3)$$

To examine *H1C*, we investigate the longer-run impact of investor-level taxes on advance refunding transactions using a classic univariate difference-in-difference test of all bonds issued in 2017 versus 2018. We then confirm these findings using multivariate analysis by examining the total amount of advance refunding debt issued from January to November 2017 versus January to December 2018, as compared to new money debt and current refunding debt. We exclude bond issuances occurring in December 2017 because our prior results show that month contained an abnormally high amount of advance refunding issuances. Specifically, we estimate the following ordinary least squares regression:

$$LnBondSeriesSize_{mit} =$$

$$\beta_1 Post2017_{mit} + \beta_2 Adv\_Refunding_{mit} + \beta_3 Post2017_{mit} \, x \, Adv\_Refunding_{mit}$$
$$+ \sum Month\text{-}Year + \sum State + e_{mit} \quad (4)$$

Equation (4)'s variables and controls are identical to equation (2) with differences highlighted as follows. Equation (4)'s sample contains 23 months of bond issuance data from January 2017 to December 2018 (excluding December 2017) and we include indicator variables for each in the vector *Month-Year*. $Post2017_{mit}$ equals 1 if the bond series issuance occurs in

2018 and 0 if the issuance occurs in 2017.

Our coefficient of interest for *H1C* is the interaction term of $Post2017_{mit}$ × $Adv\_Refunding_{mit}$. A negative coefficient on the interaction term, suggests municipalities issue less advance refunding debt after TCJA's implementation of investor-level taxation on advance refunding bonds, relative to issuances of new money or current refunding bonds in 2017.

4.3.2 Results –Tests of H1A, H1B, and H1C

Table 5 tabulates the results of estimating equation (2), which tests *H1A* using a difference-in-difference regression analysis. Columns 1 and 2 show the full sample of advance refunding bonds and columns 3 and 4 show the sole-purpose advance refunding bonds (as previously noted, the classification of treated bonds expands depending on whether we examine the full or sole-purpose advance refunding sample, but the control sample remains the same regardless). We exclude fixed effects in columns 1 and 3 and include fixed effects for Month and State in columns 2 and 4.

In all columns, we find a significantly positive value on the interaction of *Dec2017* and *Adv_Refunding*, showing that municipalities issued more advance refunding debt in the short December window before the implementation of investor-level taxes on advance refunding debt. Our results in column 1 indicate the December 2017 increase in the average size of an advance refunding bond series (relative to earlier months) was approximately 43% larger than the contemporaneous December 2017 increase in the size of other municipal debt. In short, these results are consistent with our prediction in *H1A* that municipal managers accelerate advance refunding transactions to avoid the effects of a regulatory shock. Given the foresight and flexibility needed to anticipate and/or respond quickly to changes created by TCJA—during the holiday season no less—these tests provide evidence of a baseline level of municipal manager

flexibility.

Table 6 tabulates the results of our tests of *H1B*. Columns 1 and 2 present the results of estimating equation (2) for large (unconstrained) and small (constrained) municipalities, respectively. The interaction of $Dec2017_{mit} \times Adv\_Refunding_{mit}$ is positive and significant both groups of municipalities, but greater in magnitude for the larger municipalities that face lower resource constraints. Column 3 presents the results of estimating equation (3). The estimate of $Dec2017_{mit} \times Adv\_Refunding_{mit} \times Large_{mit}$ is positive and significant, which suggests that while still statistically significant, the near-term responsiveness to the shock created by TCJA was moderated for internally resource constrained municipalities relative to larger municipalities with more resources.

Tables 7 and 8 tabulate the results of our tests of *H1C* using univariate and multivariate tests, respectively. Table 7, Panel A presents univariate t-test comparisons on the difference-in-differences of the mean size of bond series issued using bond series that included any advance refunding bonds as the treatment group. Panel B presents a similar analysis using the narrower group of series that contained sole-purpose advance refunding bonds as the treatment group. In both panels, columns 1 and 2 show the number of bond series issuances. Issuances of control bonds (i.e., "non-advance refunding") modestly increase from 7,045 in the pre-TCJA period to 7,295 in the post-TCJA period. In contrast, issuances in both samples of advance refunding bonds ('full sample of advance refunding' and 'sole-purpose sample of advance refunding") substantially decline. In Panel A, advance refunding declines from 2,581 in 2017 to 837 in 2018. In Panel B, the decline in "sole-purpose" is especially stark from 1,370 series issuances in the pre-TCJA period to 142 series issuances in the post-TCJA period.

In both panels of Table 7, columns 4 and 5 we examine the mean series issuance size in

each period. In Panel A, advance refunding bond series issuances decline by $22.5 million and non-advance refunding bond series issuances increase by $3.8 million. The univariate difference-in-difference is a significant decrease of $26.3 million. In Panel B, the mean issuance series of sole-purpose advance refunding bonds declines by $11.6 million, but is not statistically significant at conventional levels. Meanwhile, non-advance refunding issuances increased by $3.8 million. The univariate difference-in-difference between bond type and across years is a decrease of $15.4 million, but the decrease is not statistically significant at conventional levels.

Table 8 tabulates the results of estimating equation (4), which is our test of *H1C*. Columns 1 and 2 show the full sample of advance refunding bonds and columns 3 and 4 show the sole-purpose advance refunding bonds. We exclude fixed effects in columns 1 and 3 and include fixed effects for Month-Year and State in columns 2 and 4. In columns 1, 2, and 4, we find a significantly negative value on the interaction of *Post2017* and *Adv_Refunding*, which shows that municipalities issued less advance refunding debt in 2018, the year investor-level taxes were implemented on advance refunding debt. In summary, the introduction of investor-level taxes reduced municipalities' use of advance refunding transactions after TCJA.[9]

4.4 Hypothesis 2 – New Issuance Contracting Terms

4.4.1 Research Design – Test of H2

In *H2*, we examine whether municipalities change original issuance contracting terms to retain flexibility in response to an increase in the cost of advance refunding transactions. We expect the imposition of investor-level taxes on advance refunding interest income should

[9] We note that other major events after 2018 (e.g., the COVID-19 pandemic) have subsequently affected the municipal financing landscape. In fact, some reports indicate a subsequent resurgence in advance refunding transactions (Hernandez Barcena and Wessel 2020). Because our study focusses primarily on managers' responsiveness to a regulatory shock, we choose not to use longer sample periods wherein the effects of other confounding trends or events could be misattributed to the regulatory shock we are interested in studying.

primarily impact contracting terms of new tax-exempt debt issuances. In contrast, we do not expect an impact to contracting terms of new taxable debt, which are primarily bonds that meet the private activity bond tests (Liu and Denison 2014; Chen, Hutchens, and Xia 2023).[10] Thus, we estimate the following regression:

$$Contract\ Term_{mjt} = \beta_1 Post\_2017_{mjt} + \beta_2 TaxExempt_{mjt} + \beta_3 Post\_2017_{mjt} \times TaxExempt_{mjt} + \sum State + e_{mjt} \quad (5)$$

where *m* represents the municipality of issuance, *j* represents whether the bond series is tax-exempt or taxable, and *t* represents the bond series issuance date. $Contract\ Term_{mjt}$ reflects the contract terms on each bond issuance and equals either: (1) $YrsToPayoff_{mjt}$, (2) $YrsToMaturity_{mjt}$, or (3) $\%Callable_{mjt}$. For each variable, the unit of observation is a bond series, which consists of many individual bonds, so we calculate a weighted average for each bond series by weighting each individual bond by its issuance size relative to the total issuance size of the bond series. For clarity, we define variables based on their definition for an individual bond. $YrsToPayoff_{mjt}$ equals the earliest payoff year (call year or maturity year) minus the issuance year. $YrsToMaturity_{mjt}$ equals the bond's maturity year minus the issuance year. *%Callable* is the ratio of callable debt to total debt.

$Post\_2017_{mjt}$ is an indicator variable equal to 1 if the bond series is issued in 2018 and 0 otherwise. $TaxExempt_{mjt}$ is an indicator variable equal to 1 if the bond series is a tax-exempt bond and 0 if the bond is taxable.

The coefficient of interest is β_3, the interaction of $Post\_2017_{mjt}$ and $TaxExempt_{mjt}$. Based on *H2*, we expect a negative value on β_3 for $YrsToPayoff_{mjt}$ and $YrsToMaturity_{mjt}$ and positive values on β_3 for $\%Callable_{mjt}$ as we predict municipalities desire more debt contract flexibility.

[10] IRC Section 141 explains tests to identify private activity bonds, such as examining if more than 10% of the proceeds of an issue are to be used for private business use.

4.4.2 Results – Tests of H2

Because we are interested in examining how contracting terms changed for new issuances, we exclude refunding (current and advance) transactions from the sample. We further exclude bond series where Bloomberg does not provide a tax-exempt designation. Table 9, Panel A shows we have 7,737 bond series. For descriptive statistics, Panel B shows 83.9% of our bond series are tax-exempt, each bond series has a weighted average of 7.0 years to the earliest payoff and 13.3 years to maturity, and a call provision is found for 55.5% of the debt within each bond series.

In Table 10, we estimate the difference-in-difference regression in equation (5). We find that the change in contracting terms on tax-exempt original municipal debt issuance before and after TCJA is not significantly different than the contemporaneous change in the contracting terms of taxable forms of original municipal debt issuances (e.g., private activity bonds). Specifically, we do not find significant differences in the number of years to first payoff (column 1), the number of years to maturity (column 2), and the percentage of debt that is issued as callable (column 3). These findings are consistent with the notion that managers appear to lack the ability or incentives to alter the terms of their debt issuances, even in the face of a significant reduction in their ability to flexibly refinance on favorable terms is imposed.

Table 11 and Figure 4 break out this analysis in event time and check the parallel trends assumption. The contracting terms of tax-exempt and taxable forms of municipal debt appears to follow parallel trends before TCJA. We also do not observe even short-term differences in the contracting terms of the two different types of debt. This suggests that municipalities do not use explicit contracting provisions to compensate for the loss of financial flexibility created by the elimination of the early synthetic call option afforded by advance refunding transactions. Our

data is not detailed enough to disentangle why, but one plausible and potential reason is that the information processing costs of irregular to non-standard municipal debt contracts may drive away potential investors of these bonds.

5. Conclusion

We use the TCJA as a setting to examine municipal managers' responsiveness. In contrast with recent and concurrent studies that suggest municipal managers are unresponsive, constrained, and inefficient, we find a large spike in the frequency of advance refunding transactions in the short, holiday window between when TCJA was passed and took effect at the end of 2017. While we find evidence for some moderating effect of resource constraints, even the most resource constrained municipalities had significant increases in advance refunding transactions during this prime transaction window. We also find a severe reduction in the prevalence of advance refunding transactions following their taxation. Finally, we do not find significant changes in the contracting terms of original municipal debt issuances following the taxation of advance refunding. This lack of spillovers between the advance refunding market and the market for original municipal debt suggests that resource constraints, market power, or some other friction prevents interplay between those two markets.

Overall, our results provide new insights on municipal manager responsiveness. Our evidence suggests municipal managers are nimble and have adequate incentives and resources to respond on some dimensions to large regulatory shocks. However, our evidence also suggests that managers did not impound these changes into new contracting decisions. In sum, our study offers additional nuance to the mosaic of studies examining municipal financing practice.

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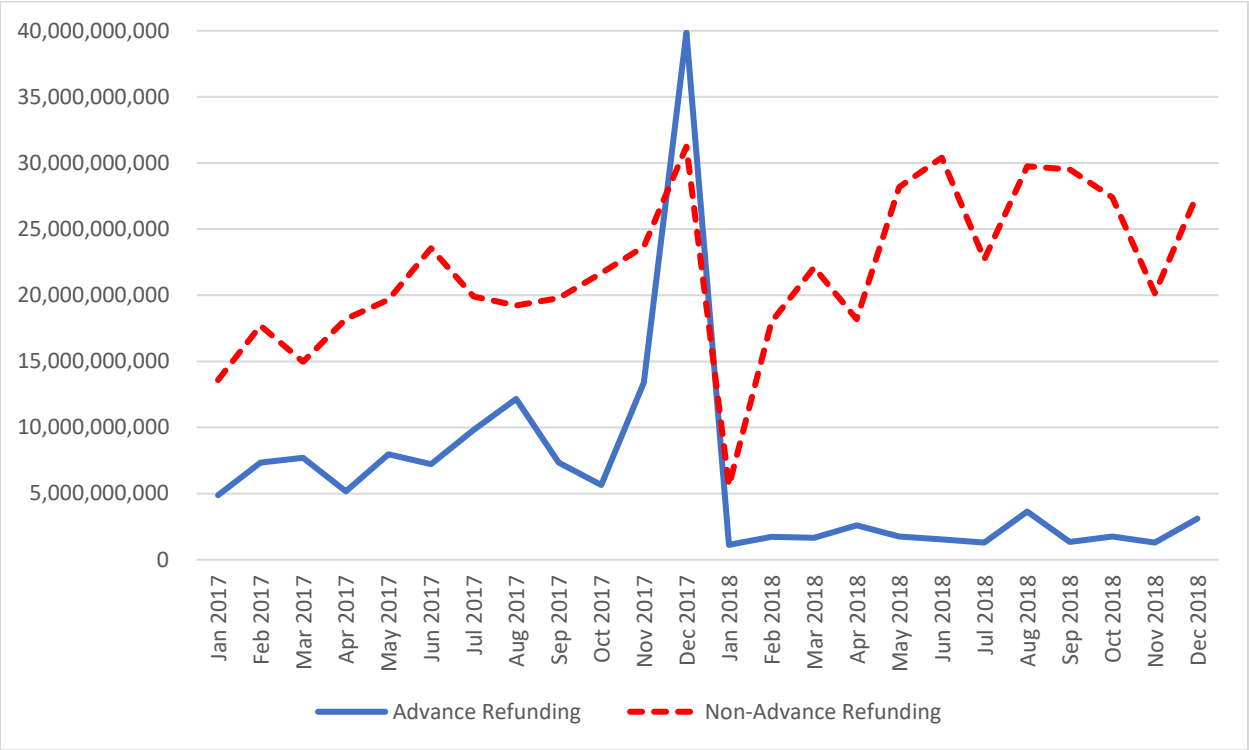
Appendix A

Variable Definitions

Bond Size	Size of the individual bond issued (SIZE), stated in millions.
Bond Series Size	Total amount of debt issued in a bond series, calculated as the sum of all Bond Size amounts that were issued on the same day, by the same issuer, of the same issuance type (adv_refunding vs non-adv_refunding), and from the same state, stated in millions.
Monthly State Size	Total amount of state debt issued per month, calculated as the sum of Bond Series Size by state and month, stated in millions.
Adv_Refunding	Indicator variable equal to 1 if Bloomberg's muni bond purpose (MUNI BOND PURPOSE) is Advance Refunding, 0 otherwise.
Yield	Bond Yield from trade date data in MSRB.
Yrs_to_Maturity	Year of maturity (MATURITY_DATE) less the year issuance (DATED_DATE) from Bloomberg.
Yrs_to_Payoff	Year of first available payoff date [lessor of year of first call date (CALL_DATE) or year of maturity (MATURITY_DATE)] less the year issuance (DATED_DATE) from Bloomberg.
%Callable	Percent Callable Year of maturity (MATURITY_DATE) less the year issuance (DATED_DATE) from Bloomberg.
Issued_2018	Indicator variable if the bond's issuance date (DATED_DATE) is in 2018.
Post_2017	Indicator variable if the bond's issuance date (DATED_DATE) is after 2017.
TaxExempt	Indicator variable coded as 1 if the bond is designated in Bloomberg (TAX_FEDERAL) as Tax-Exempt, 0 if Taxable, and dropped if missing.

Figure 1
Total Monthly Bond Issuance Amount by Category

Panel A: Full Sample



Panel B: Sole-purpose Sample

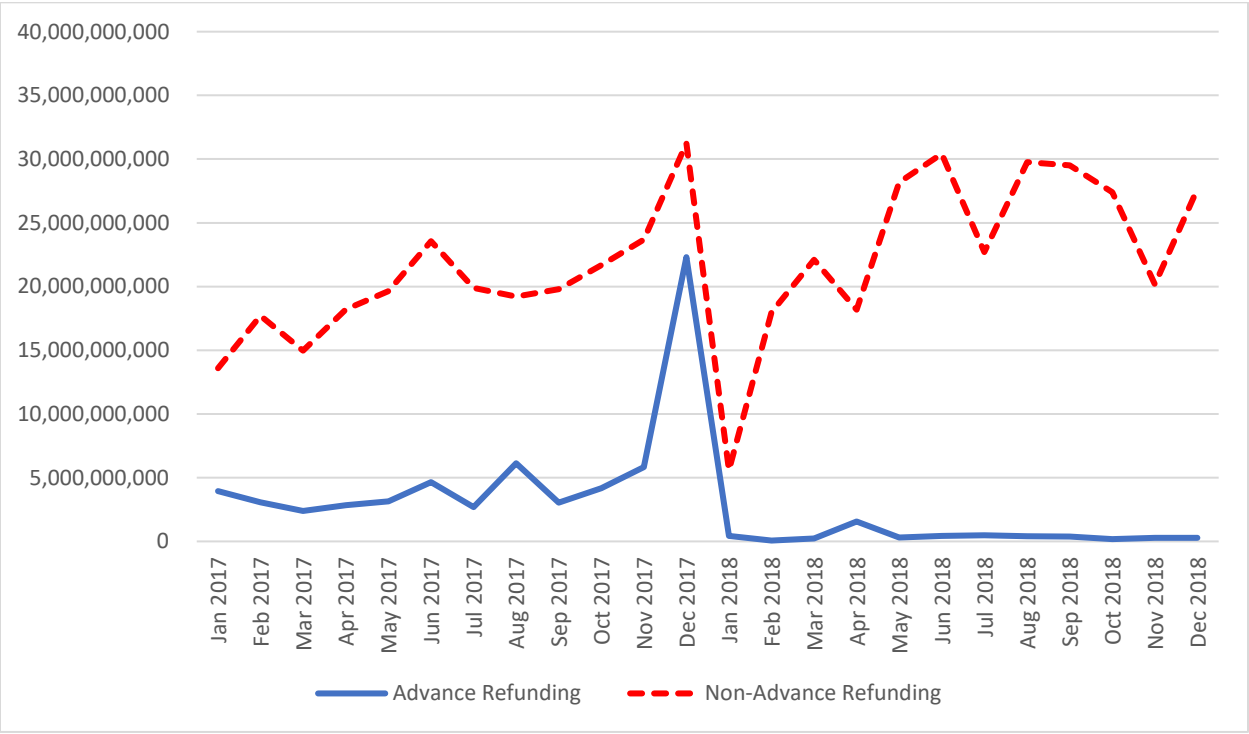
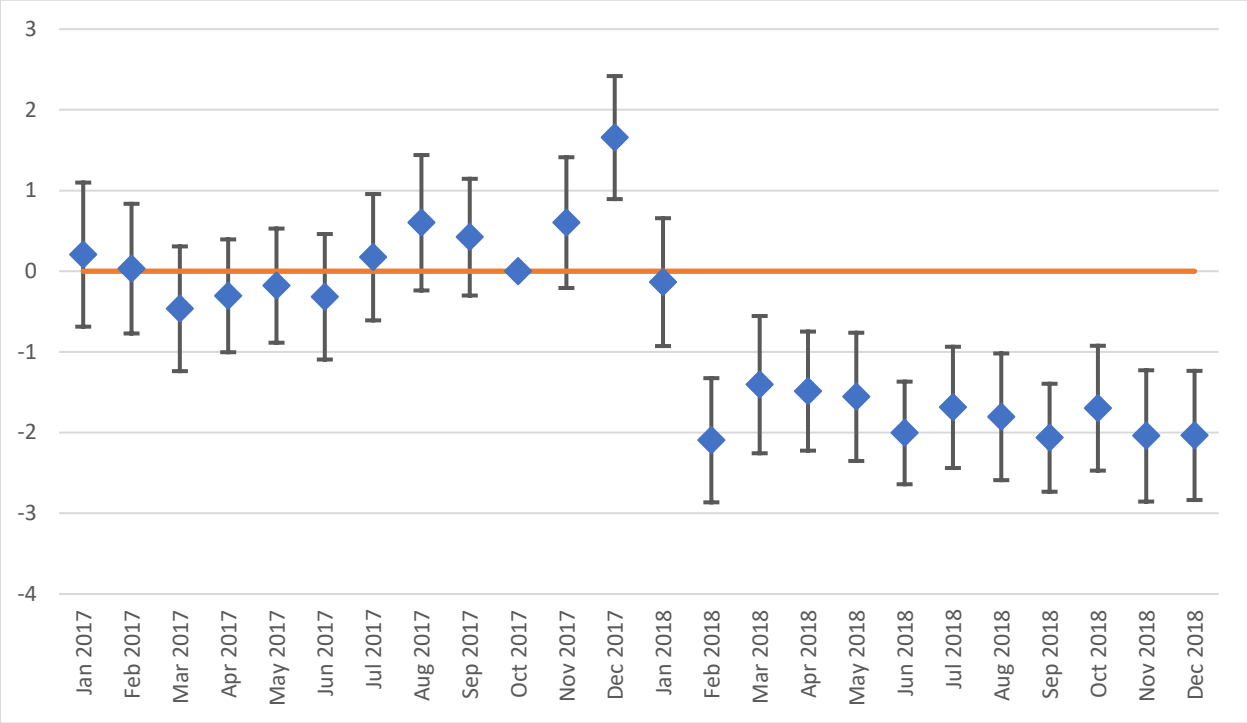


Figure 1 presents the total dollar amount of municipal bond issuances each month by bond categorization from January 2017 to December 2018. In Panel A, the total value of bond issuances in the *Advance Refunding* group includes the *full* sample of all issuances that included at least one advance refunding bond. In other words, Bloomberg designates advance refunding as *one of* the purposes for these issuances, so there are other types of non-refunding bonds included in the issuance. The *Non-advance Refunding* line is comprised of issuances that Bloomberg designates the purpose as either *solely* new money issuances or *solely* current refunding. In Panel B, the total dollar amount of Advance Refunding bond issuances is the group of bonds comprised only of advance refunding bonds. We refer to this group as our *sole-purpose* advance refunding sample.

Figure 2
Advance Refunding Transactions in Event Time

Panel A: Advance Refunding (Full Sample) vs. Non-Advance Refunding Issuances



Panel B: Advance Refunding (Sole-purpose) vs. Non-Advance Refunding Issuances

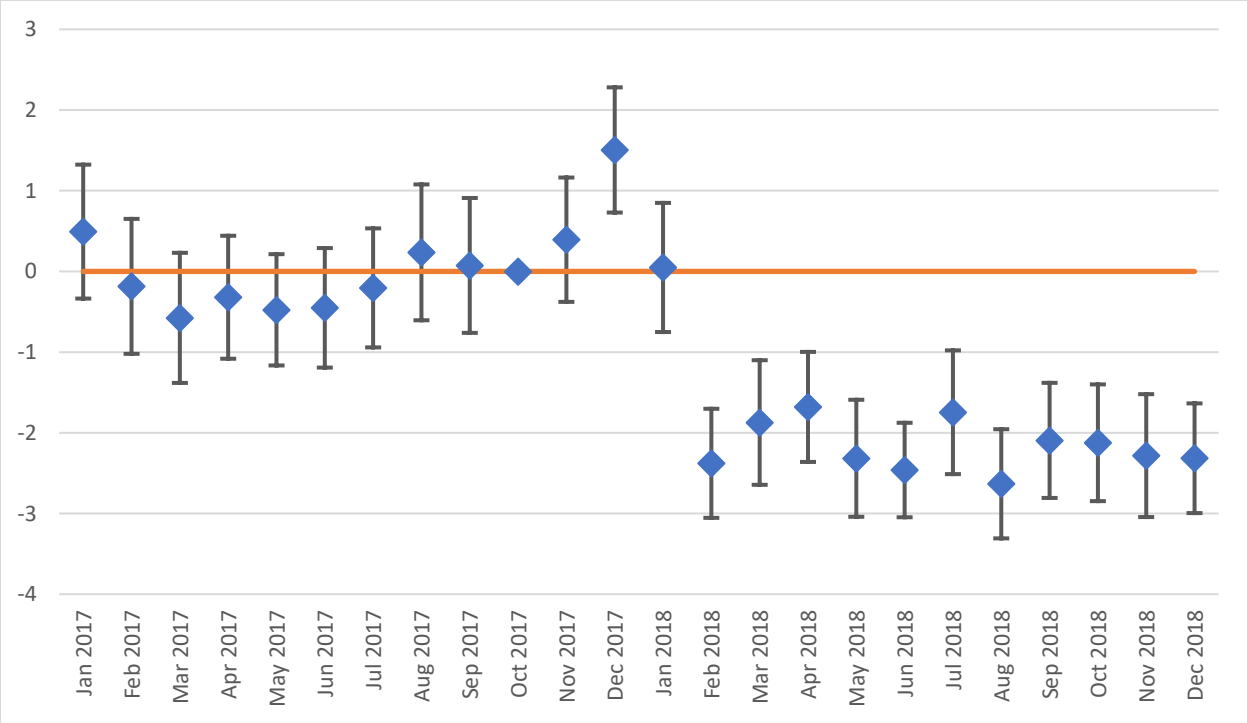
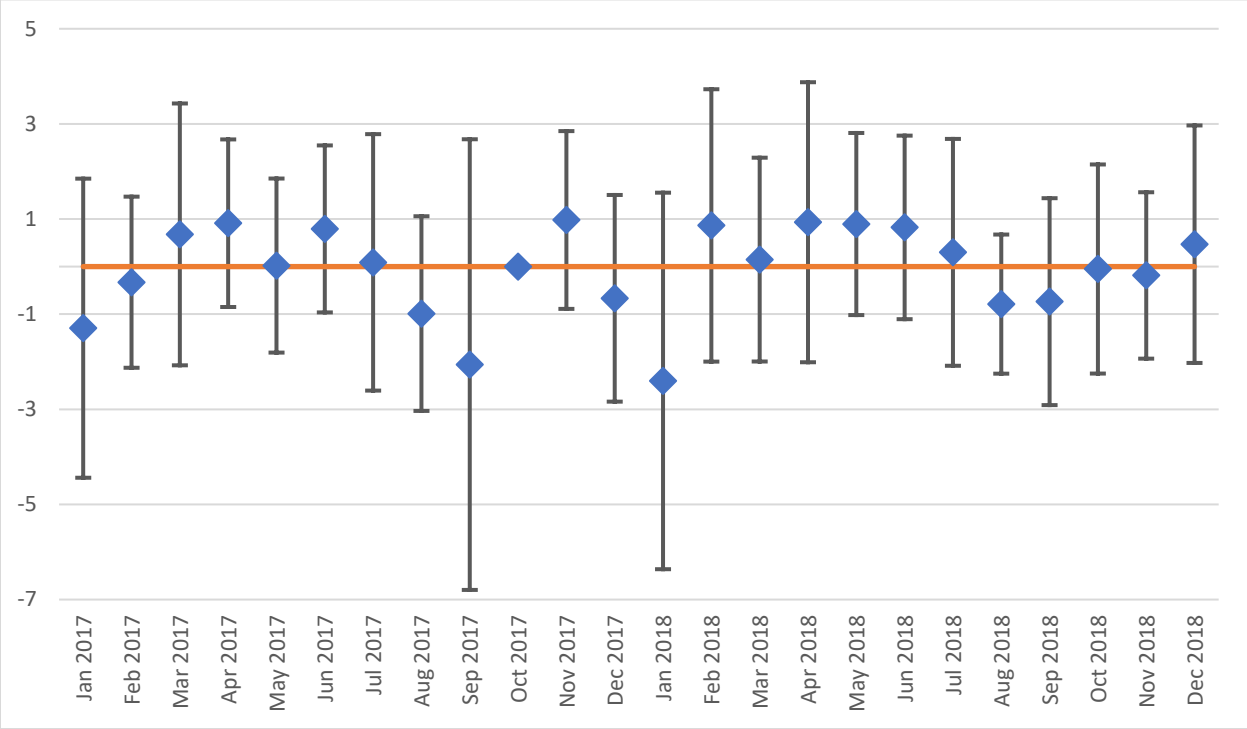


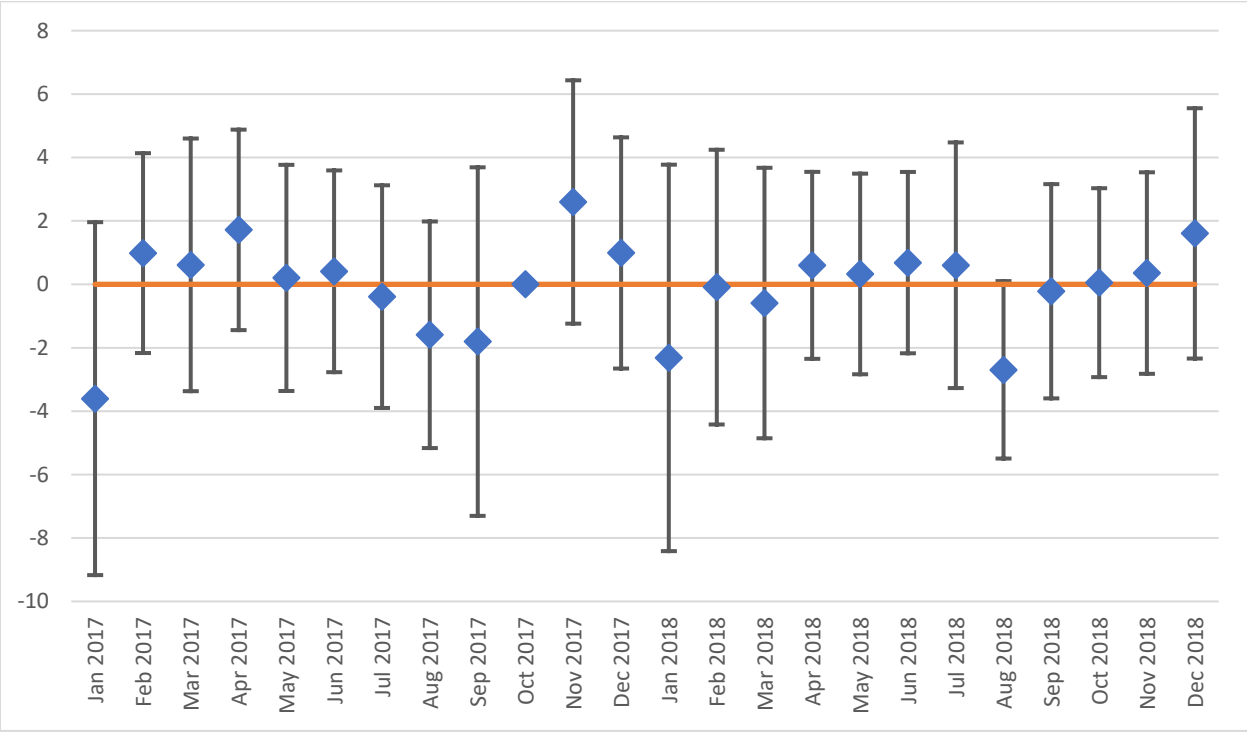
Figure 2 plots the coefficients from estimating a difference-in-differences test explaining municipal debt issuances around the passage of the TCJA. Specifically, it plots the OLS coefficient estimates tabulated in Table 4. Each coefficient estimate is also presented with a 95 percent confidence interval. In Panel A, the *Advance Refunding* sample includes the *full* sample of all issuances that included at least one advance refunding bond as designated by Bloomberg. In Panel B, the *Advance Refunding* sample includes only the issuances that were solely comprised of advance refunding bonds.

Figure 3
Original Debt Issuance Terms in Event Time

Panel A: Years to Payoff



Panel B: Years to Maturity



Panel C: Percent Callable

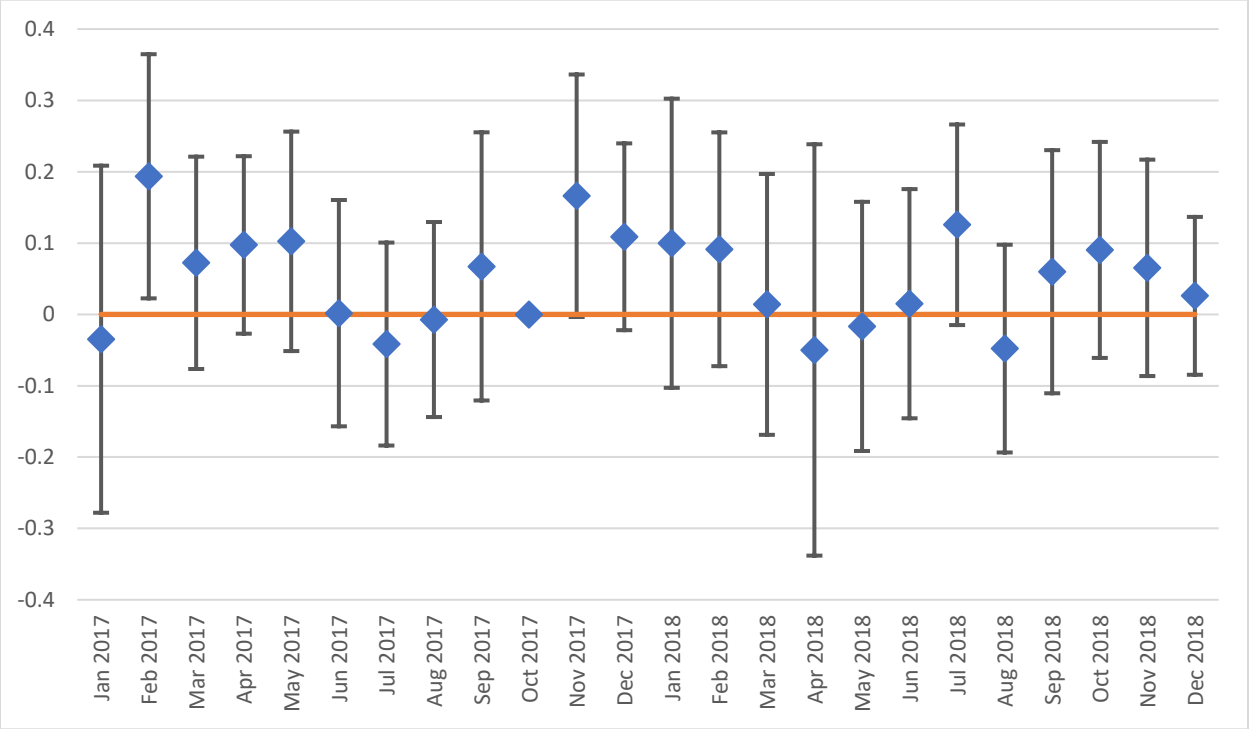


Figure 3 plots the coefficients from estimating a difference-in-differences test explaining the contract terms of original municipal debt issuances around the passage of the TCJA. Specifically, it plots the OLS coefficient estimates tabulated in Table 11. Each coefficient estimate is also presented with a 95 percent confidence interval. In this analysis, the treatment group is tax-exempt new municipal debt issuances and the control group is taxable new municipal debt issuances. Panel A examines the *Years to Payoff* of new municipal debt issuances. Panel B examines the *Years to Maturity*. Panel C examines the proportion of new debt that is callable (*Percent Callable*).

Table 1
Panel A

Sample Selection

Municipal Bond Issuance Sample - *Individual Bonds Issued*	**Advance Refunding**		**Non-Advance Refunding**		
	***All* Advance Refunding**	***Solely* Advance Refunding**	***Solely* New Money**	***Solely* Current Refunding**	**Total**
Bloomberg Database – Issuances of New Money Only or Refunding Only	40,158	19,882	143,595	25,812	209,565
Less: Missing Issue Amount	(2,255)	(1,117)	(335)	(1,726)	(4,316)
Less: Missing Coupon Rate	(510)	(181)	(1,480)	(128)	(2,118)
Less: US Territories	(38)	(37)	(70)	(2)	(110)
Total Bond Issuances	37,355	18,547	141,710	23,956	203,021
Daily Bond Series Issued by Issuer-State	**3,418**	**1,512**	**14,340**		
Daily Bond Series Issued in 2017	**2,581**	**1,370**	**7,045**		
Daily Bond Series Issued in 2018	**837**	**142**	**7,295**		
Subsets of Daily Bond Series Issued by Issuer-State					
H1A - Full Sample less 2018 issuances (Table 5)	**2,581**		**7,045**		**9,626**
H1A - *Sole Purpose* Sample less 2018 issuances (Table 5)		**1,370**	**7,045**		**8,415**
H1B - Full Sample less Dec 2017 issuances (Table 6)	**2,827**		**13,481**		**16,308**
H1B - *Sole Purpose* Sample less Dec 2017 issuances (Table 6)		**1,149**	**13,481**		**14,630**
H1C - Full Sample (Table 7)	**3,418**		**14,340**		**17,758**
H1C - *Sole Purpose* Sample (Table 7)		**1,512**	**14,340**		**15,852**

Table 1 – Panel B
Sample Selection

MSRB Trade Sample	***Solely* Advance Refunding**	***Solely* New Money**	***Solely* Current Refunding**
Total Bond Issuances (from Panel A)	18,547	141,710	23,956
Less: Missing from MSRB 2018 Trade Data	(8,766)	(42,713)	(8,958)
Municipal Bonds Issued in 2017-2108 merged with MSRB	9,781	98,997	14,998
MSRB Database – Merged Trades occurring in 2018	256,149	1,644,045	251,707
Less: Missing Yield	(276)	(25,063)	(3,858)
Total 2018 Municipal Trades	**255,873**	**1,618,982**	**247,849**
Subsets of 2018 Municipal Trade Yields			
Taxable Bonds Issued in 2018 (Table 3)	**7,410**		
Tax-Exempt Bonds Issued in 2018 (Table 3)		**937,546**	**126,341**
Tax-Exempt Bonds Issued in 2017 (Table 3)	**230,839**		

Table 1 shows sample selection procedure for municipal bond issuances of new money, current refunding, and advance refunding bonds from January 1, 2017-December 31, 2018 and yields from secondary trades from MSRB for bonds issued in 2018. The 'All Advance Refunding' column shows all bond issuances in Bloomberg with an advance refunding purpose. The 'Solely Advance Refunding' column is a subset of 'All Advance Refunding' where advance refunding was the only purpose listed. 'New Money' and 'Current Refunding' columns show bond issuances in Bloomberg with new money and current refunding, respectively, as the only purpose listed.

Table 2
Descriptive Statistics

Panel A

Averages by Period

	Average Number of Issuances		Average Total Size Issued (millions)	
	Pre-TCJA	Post-TCJA	Pre-TCJA	Post-TCJA
Monthly	9,301	7,618	$31,066	$25,252
Weekly	2,146	1,758	7,169	5,827
Daily	434	353	1,451	1,170

Panel B

Top 5 States

	Total Number of Issuances		Total Size Issued (millions)	
State	Pre-TCJA	Post-TCJA	Pre-TCJA	Post-TCJA
Texas	17,250	14,310	$37,763	$39,179
California	12,855	9,181	57,084	37,734
New York	6,953	5,931	41,757	37,209
Wisconsin	4,671	4,318	10,624	7,537
Minnesota	4,327	4,349	5,413	6,237
Other	65,550	53,326	220,149	175,123
Total	111,606	91,415	372,790	303,019

Panel C

Descriptive Statistics

	N	Mean	SD	p25	Median	p75
Bond Size (Millions)	203,021	3.329	25.261	0.250	0.615	1.860
Bond Series Size (Millions)	17,758	38.057	140.750	3.380	8.815	25.000
Monthly State Size (Millions)	1,779	379.881	728.496	37.055	135.715	405.170
Yield	2,375,135	3.084	0.846	2.583	3.146	3.572
Yrs_to_Maturity	2,375,135	14.529	8.459	7.863	13.863	19.984

Table 2 continued – Panel D

Descriptive statistics – Pre Vs. Post

	N	Mean	SD	p25	Median	p75	Diff		t-stat
Pre–TCJA									
Bond Size (Millions)	111,606	3.340	21.797	0.255	0.635	1.955	0.025		(0.23)
Bond Series Size (Millions)	9,626	38.727	142.399	3.500	8.993	26.000	1.465		(0.69)
Monthly State Size (Millions)	992	375.796	711.673	41.313	136.613	394.443	-9.235		(-0.27)
Yield	1,020,813	2.958	0.707	2.470	2.964	3.426	-0.221	***	(-200)
Yrs_to_Maturity	1,020,813	13.413	8.229	7.145	11.879	18.764	-1.958	***	(-180)
Post–TCJA									
Bond Size (Millions)	91,415	3.315	28.934	0.235	0.585	1.740			
Bond Series Size (Millions)	8,132	37.263	138.778	3.275	8.538	23.627			
Monthly State Size (Millions)	787	385.031	749.588	33.185	135.558	418.514			
Yield	1,354,322	3.179	0.925	2.730	3.273	3.647			
Yrs_to_Maturity	1,354,322	15.371	8.533	8.803	15.027	20.534			

Table 2 continued – Panel E

Correlation Table

		N	(1)	(2)	(3)	(4)	(5)
	Panel A - MRSB Bond Trades						
(1)	*Yield*	2,375,135	1				
(2)	*Adv_Refunding*	2,375,135	-0.0860*	1			
(3)	*Issued_2018*	2,375,135	0.1295*	-0.4329*	1		
(4)	*Adv_Refunding × Issued_2018*	2,375,135	0.0182*	0.3602*	0.1632*	1	
(5)	*Years_to_Maturity*	2,375,135	0.6330*	-0.1068*	0.1146*	-0.0306*	1
	Panel B - Bond Series Issuances						
(1)	*Bond Series Size (Millions)*	17,758	1				
(2)	*Adv_Refunding*	17,758	0.0516*	1			
(3)	*Post2017*	17,758	-0.0161*	-0.2088*	1		
(4)	*Adv_Refunding × Post2017*	17,758	-0.0311*	0.4556*	0.2420*	1	
	Panel C - State Bond Issuances						
(1)	*Montly State Size (Millions)*	2,448	1				
(2)	*Adv_Refunding*	2,448	-0.4737*	1			
(3)	*Post2017*	2,448	-0.4342*	0.1048*	1		
(4)	*Adv_Refunding × Post2017*	2,448	-0.6524*	0.6909*	0.5703*	1	

Table 2 shows descriptive statistics of municipal bond issuances. Panel A shows average number of issuances and size in millions of dollars by month, week, and daily in the pre- and post-TCJA periods. Panel B shows the average number of issuances and size in millions for the five largest issuing states and all other states combined in the pre- and post-TCJA periods. Panel C shows descriptive statistics on bond size, bond series size, monthly state size of issuances, bond trade yield, and years to maturity. Panel D shows descriptive statistics in the pre- and post-TCJA periods with differences in means and t-statistics reported in parentheses. Panel E shows Pearson correlation coefficients. ***, **, * denote statistical significance at the 1 percent, 5 percent, and 10 percent levels (two-tailed), respectively.

Table 3
Validating Implicit Taxes

	Yield of Adv Refund Bonds issued in 2018	Yield of New Money Bonds issued in 2018	Estimated Implicit Tax Cost	Estimated Implicit Tax Cost Expressed as a Rate
	(1)	(2)	(1)-(2)	[(1)-(2)]÷(1)
Mean	3.786%	3.206%	0.581%	15.331%
Median	3.839%	3.305%	0.534%	13.910%
Standard Deviation	0.679%	0.687%		
# Observations	7,410	937,546		
	Yield of Adv Refund Bonds issued in 2018	Yield of Current Refund Bonds issued in 2018		
	(1)	(3)	(1)-(3)	[(1)-(3)]÷(1)
Mean	3.786%	3.028%	0.759%	20.039%
Median	3.839%	3.112%	0.727%	18.937%
Standard Deviation	0.679%	2.105%		
# Observations	7,410	126,341		
	Yield of Adv Refund Bonds issued in 2018	Yield of Adv Refund Bonds issued in 2017		
	(1)	(4)	(1)-(4)	[(1)-(4)]÷(1)
Mean	3.786%	2.935%	0.851%	22.480%
Median	3.839%	2.935%	0.904%	23.548%
Standard Deviation	0.679%	0.575%		
# Observations	7,410	230,839		

Table 3 shows the yield calculated from bond trades occurring in 2018. Column 1 contains taxable bonds (i.e., advance refund bonds issued in 2018) and Columns 2, 3, and 4 contain a subset of tax-exempt bonds (new money bonds issued in 2018, current refunding bonds issued in 2018, or advance refund bonds issued in 2017). The Estimated Implicit Tax Cost equals the taxable bond yield in Column 1 minus the tax-exempt bond yield in Column 2, 3, or 4. The Estimated Implicit Tax Cost Expressed as a Rate equals the Estimated Implicit Tax Cost divided by the taxable bond yield in Column 1.

Table 4
Testing parallel trends: monthly changes in advance refunding

	Full Sample	Sole-Purpose Sample
	(1)	(2)
DV	Monthly State Size	Monthly State Size
Jan_2017 × Adv_Refunding	0.206	0.494
	(0.45)	(1.17)
Feb_2017 × Adv_Refunding	0.032	-0.185
	(0.08)	(-0.43)
Mar_2017 × Adv_Refunding	-0.465	-0.575
	(-1.18)	(-1.40)
Apr_2017 × Adv_Refunding	-0.305	-0.320
	(-0.85)	(-0.82)
May_2017 × Adv_Refunding	-0.179	-0.476
	(-0.50)	(-1.35)
Jun_2017 × Adv_Refunding	-0.317	-0.451
	(-0.80)	(-1.19)
Jul_2017 × Adv_Refunding	0.174	-0.204
	(0.43)	(-0.54)
Aug_2017 × Adv_Refunding	0.601	0.236
	(1.40)	(0.55)
Sep_2017 × Adv_Refunding	0.422	0.074
	(1.14)	(0.17)
Nov_2017 × Adv_Refunding	0.602	0.393
	(1.46)	(1.00)
Dec_2017 × Adv_Refunding	1.656***	1.505***
	(4.26)	(3.80)
Jan_2018 × Adv_Refunding	-0.135	0.049
	(-0.33)	(0.12)
Feb_2018 × Adv_Refunding	-2.095***	-2.378***
	(-5.33)	(-6.90)
Mar_2018 × Adv_Refunding	-1.405***	-1.872***
	(-3.24)	(-4.75)
Apr_2018 × Adv_Refunding	-1.486***	-1.679***
	(-3.95)	(-4.83)
May_2018 × Adv_Refunding	-1.557***	-2.315***
	(-3.84)	(-6.26)
Jun_2018 × Adv_Refunding	-2.004***	-2.461***

	(-6.18)	(-8.24)
Jul_2018 × Adv_Refunding	-1.688***	-1.745***
	(-4.40)	(-4.46)
Aug_2018 × Adv_Refunding	-1.804***	-2.632***
	(-4.50)	(-7.63)
Sep_2018 × Adv_Refunding	-2.064***	-2.094***
	(-6.04)	(-5.75)
Oct_2018 × Adv_Refunding	-1.697***	-2.123***
	(-4.30)	(-5.75)
Nov_2018 × Adv_Refunding	-2.041***	-2.282***
	(-4.92)	(-5.87)
Dec_2018 × Adv_Refunding	-2.035***	-2.315***
	(-4.98)	(-6.68)
State Fixed Effect	Y	Y
Month Main Effect	Y	Y
Adv_Refunding Main Effect	Y	Y
Constant	Y	Y
Observations	2,448	2,448
Adjusted R-squared	0.663	0.688

Table 4 shows the results of estimating Equation (1) for bond issuances in 2017 and 2018. Adv_Refunding is an indicator variable equal to 1 if the bond is an advance refunding bond and 0 otherwise. We include the main effects for month and Adv_Refunding, but do not tabulate for brevity. We include state fixed effects. Standard errors are clustered by State. T-statistics are reported in parentheses. ***, **, * denote statistical significance at the 1 percent, 5 percent, and 10 percent levels (two-tailed), respectively.

Table 5
Test of Municipal Managers' Short-term Responsiveness (Test of H1A)

DV	Full Sample Size of Bond Series Issued		Sole-Purpose Sample Size of Bond Series Issued	
	(1)	(2)	(3)	(4)
Dec2017	0.155*		0.155*	
	(1.77)		(1.77)	
Adv_Refunding	0.248**	0.196***	0.478***	0.296***
	(2.18)	(5.27)	(3.08)	(5.83)
Dec2017 × Adv_Refunding	0.458***	0.409***	0.356**	0.342***
	(3.36)	(4.89)	(2.19)	(3.43)
Month Fixed Effect		Y		Y
State Fixed Effect		Y		Y
Constant	Y	Y	Y	Y
Observations	9,626	9,626	8,415	8,415
Adj R-Squared	0.018	0.219	0.023	0.220

Table 5 shows the results of estimating Equation (2) for bond issuances from January to December of 2017. Adv_Refunding is an indicator variable equal to 1 if the bond is an advance refunding bond and 0 otherwise. Dec2017 is an indicator variable equal to 1 for month of December in 2017 and 0 otherwise. We include Month and State of issuer fixed effects in Columns 2 and 4. Standard errors are clustered by state in Columns 1 and 3 and by issuer in Columns 2 and 4. T-statistics are reported in parentheses. ***, **, * denote statistical significance at the 1 percent, 5 percent, and 10 percent levels (two-tailed), respectively.

Table 6
The Moderating Role of Internal Constraints on Managerial Responsiveness (Test of H1B)

DV	Full Sample Size of Bond Series Issued			Sole-Purpose Sample Size of Bond Series Issued		
	Large	Small	All	Large	Small	All
	(1)	(2)	(3)	(4)	(5)	(6)
Adv_Refunding	0.145**	0.192***	0.207***	0.233***	0.280***	0.328***
	(2.24)	(4.66)	(4.99)	(2.74)	(4.46)	(5.47)
Dec2017 × Adv_Refunding	0.691***	0.317***	0.303***	0.657***	0.254**	0.230**
	(4.51)	(3.42)	(3.24)	(3.47)	(2.26)	(2.05)
Dec2017 × Adv_Refunding × Large			0.790***			0.781***
			(15.13)			(14.85)
Large			0.790***			0.781***
			(15.13)			(14.85)
Dec2017 × Large			-0.178*			-0.196*
			(-1.78)			(-1.91)
Adv_Refunding × Large			-0.084			-0.150
			(-1.07)			(-1.41)
Month-Year Fixed Effect	Y	Y	Y	Y	Y	Y
State Fixed Effect	Y	Y	Y	Y	Y	Y
Constant	Y	Y	Y	Y	Y	Y
Observations	2,937	6,497	9,434	2,562	5,695	8,257
Adj R-Squared	0.146	0.256	0.257	0.138	0.260	0.257

Table 6 shows the results of estimating Equation (3) for bond issuances from January to December of 2017. Adv_Refunding is an indicator variable equal to 1 if the bond is an advance refunding bond and 0 otherwise. Dec2017 is an indicator variable equal to 1 for month of December in 2017 and 0 otherwise. We exclude state-issued debt from this analysis and focus only sub-state-level jurisdictions. Large is an indicator variable equal to 1 if the bond was issued by or within one of the largest 100 counties in the U.S. (per census data) and zero otherwise. We include Month-Year and State of issuer fixed effects in all columns. Standard errors are clustered by issuer. T-statistics are reported in parentheses. ***, **, * denote statistical significance at the 1 percent, 5 percent, and 10 percent levels (two-tailed), respectively.

Table 7
Descriptive Statistics of Issuance Frequency and Amount (Test of H1C)

Panel A
Full Sample
Descriptive Statistics – Mean Bond Series Size Issued by Period

	Number of Issuances			Size of Advance Refunding vs. Non-Advance Refunding		
	(1) Pre-TCJA	(2) Post-TCJA	(3) Diff	(4) Pre-TCJA	(5) Post-TCJA	(6) *Difference (t-stat)*
Bond Series Issuances						
Advance Refunding	2,581	837	-1,744	49.864	27.330	-22.535*** (-3.88)
Non-Advance Refunding	7,045	7,295	250	34.647	38.402	3.755 (1.61)
Difference (t-stat)				15.217*** (4.65)	-11.072** (-2.19)	
Diff in Diff (t-stat)						-26.290*** (-4.33)

Table 7 continued – Panel B
Sole-Purpose Sample
Descriptive Statistics – Mean Bond Series Size Issued by Period

	Number of Issuances			Size of Advance Refunding vs. Non-Advance Refunding		
	(1) Pre-TCJA	(2) Post-TCJA	(3) Diff	(4) Pre-TCJA	(5) Post-TCJA	(6) *Difference (t-stat)*
Bond Series Issuances						
Advance Refunding	1,370	142	-1,228	47.006	35.367	-11.639
						(-1.27)
Non-Advance Refunding	7,045	7,295	250	34.647	38.402	3.755
						(1.61)
Difference				12.359***	-3.035	
(t-stat)				(3.22)	(-0.25)	
Diff in Diff						-15.394
(t-stat)						(-1.26)

Table 7 Panel A shows the univariate difference-in-differences descriptive statistics for mean bond issuance (in millions of dollars) for all advance refunding bonds and non-advance refunding (i.e., new money and current refunding) bonds in 2017 and 2018. T-statistics are reported in parentheses. ***, **, * denote statistical significance at the 1 percent, 5 percent, and 10 percent levels (two-tailed), respectively. Panel B shows the univariate difference-in-differences descriptive statistics for mean bond issuance (in millions of dollars) for sole-purpose advance refunding bonds and non-advance refunding (i.e., new money and current refunding) bonds in 2017 and 2018. T-statistics are reported in parentheses. ***, **, * denote statistical significance at the 1 percent, 5 percent, and 10 percent levels (two-tailed), respectively.

Table 8
Impact of Investor-level Taxation on Issuances of Bond Series (Test of H1C)

	Full Sample		Sole-Purpose Sample	
DV	Size of Bond Series Issued		Size of Bond Series Issued	
	(1)	(2)	(3)	(4)
Post2017	0.089**		0.089**	
	(2.26)		(2.26)	
Adv_Refunding	0.248**	0.197***	0.478***	0.282***
	(2.18)	(5.31)	(3.08)	(5.56)
Post2017 × Adv_Refunding	-0.463***	-0.353***	-0.218	-0.311**
	(-4.38)	(-5.58)	(-1.07)	(-2.41)
Month-Year Fixed Effect		Y		Y
State Fixed Effect		Y		Y
Constant	Y	Y	Y	Y
Observations	16,308	16,308	14,630	14,630
Adj R-Squared	0.003	0.199	0.006	0.199

Table 8 shows the results of estimating Equation (4) for bond issuances from January to November of 2017 and January to December of 2018. We exclude December 2017 because municipalities issued an abnormally high amount of advance refunding debt in that month. Adv_Refunding is an indicator variable equal to 1 if the bond is an advance refunding bond and 0 otherwise. Post_2017 is an indicator variable equal to 1 for months in 2018 and 0 otherwise. We include Month-Year and State of issuer fixed effects for Columns 2 and 4. Standard errors are clustered by state in Columns 1 and 3 and by issuer in Columns 2 and 4. T-statistics are reported in parentheses. ***, **, * denote statistical significance at the 1 percent, 5 percent, and 10 percent levels (two-tailed), respectively.

Table 9
Contract Terms Sample Selection

Panel A
Contract Terms Sample Selection

Daily Bond Series Issued by Issuer-State	**Total**
All Bond Series Issued (Full Sample)	17,758
Less: Advance & Current Refunding Bond Series	(4,726)
Less: Missing Bloomberg Tax Exempt Status	(5,295)
New Money Bond Series Issued	7,737

Panel B
Descriptive Statistics – Contract Terms Analysis

	N	Mean	SD	p25	Median	p75
Dependent Variables						
TaxExempt	7,737	0.839	0.367	1.000	1.000	1.000
YrsToPayoff	7,737	6.993	4.772	4.362	7.404	8.942
YrsToMaturity	7,737	13.282	9.163	5.625	12.147	19.686
%Callable	7,737	0.555	0.382	0.000	0.661	0.887
Post2017	7,737	0.531	0.499	0.000	1.000	1.000

Table 9 Panel A shows sample selection to examine contract terms of new money bond issuances in 2017 and 2018. Panel B shows descriptive statistics.

Table 10
Impact of Investor-level Taxation on Contract Terms (Test of H2)

	Contract Terms Sample – New Money Issuances Only		
	(1)	(2)	(3)
DV	YrsToPayoff	YrsToMaturity	%Callable
TaxExempt	0.810	4.592***	0.256***
	(1.66)	(5.89)	(7.48)
Post2017	-0.413	0.098	0.033
	(-0.96)	(0.19)	(1.26)
Post2017 × TaxExempt	0.272	-0.128	-0.027
	(0.59)	(-0.24)	(-1.05)
State Fixed Effects	Y	Y	Y
Constant	Y	Y	Y
Observations	7,737	7,737	7,737
Adjusted R-squared	0.106	0.178	0.194

Table 10 shows the results of estimating Equation (5) for new money bond issuances in 2017 and 2018. TaxExempt is an indicator variable equal to 1 if the bond is designated in Bloomberg as TaxExempt and 0 if the bond is designated in Bloomberg as Taxable. We include state fixed effects. Standard errors are clustered by State. T-statistics are reported in parentheses. ***, **, * denote statistical significance at the 1 percent, 5 percent, and 10 percent levels (two-tailed), respectively.

Table 11
Impact of Investor-level Taxation on Original Issuance Municipal Debt Contracting Terms by Month (Alternative Test of H3)

	(1)	(2)	(3)
DV	YrsToPayoff	YrsToMaturity	%Callable
Jan_2017 × TaxExempt	-1.295	-3.605	-0.035
	(-0.81)	(-1.27)	(-0.28)
Feb_2017 × TaxExempt	-0.328	0.985	0.194**
	(-0.36)	(0.61)	(2.22)
Mar_2017 × TaxExempt	0.713	0.677	0.072
	(0.51)	(0.33)	(0.95)
Apr_2017 × TaxExempt	0.887	1.671	0.094
	(0.99)	(1.04)	(1.48)
May_2017 × TaxExempt	0.022	0.203	0.102
	(0.02)	(0.11)	(1.31)
Jun_2017 × TaxExempt	0.792	0.410	0.002
	(0.88)	(0.25)	(0.02)
Jul_2017 × TaxExempt	0.101	-0.382	-0.043
	(0.07)	(-0.21)	(-0.60)
Aug_2017 × TaxExempt	-0.988	-1.591	-0.007
	(-0.95)	(-0.87)	(-0.10)
Sep_2017 × TaxExempt	-2.060	-1.806	0.067
	(-0.85)	(-0.64)	(0.70)
Nov_2017 × TaxExempt	0.976	2.586	0.167*
	(1.02)	(1.32)	(1.93)
Dec_2017 × TaxExempt	-0.693	0.934	0.108
	(-0.63)	(0.50)	(1.62)
Jan_2018 × TaxExempt	-2.404	-2.320	0.100
	(-1.19)	(-0.75)	(0.96)
Feb_2018 × TaxExempt	0.865	-0.089	0.091
	(0.59)	(-0.04)	(1.09)
Mar_2018 × TaxExempt	0.127	-0.621	0.012
	(0.12)	(-0.29)	(0.13)
Apr_2018 × TaxExempt	0.933	0.599	-0.050
	(0.62)	(0.40)	(-0.34)
May_2018 × TaxExempt	0.895	0.327	-0.017

	(0.92)	(0.20)	(-0.19)
Jun_2018 × TaxExempt	0.832	0.695	0.015
	(0.85)	(0.48)	(0.19)
Jul_2018 × TaxExempt	0.300	0.601	0.126*
	(0.25)	(0.30)	(1.75)
Aug_2018 × TaxExempt	-0.780	-2.665*	-0.047
	(-1.05)	(-1.87)	(-0.63)
Sep_2018 × TaxExempt	-0.737	-0.219	0.060
	(-0.66)	(-0.13)	(0.69)
Oct_2018 × TaxExempt	-0.050	0.052	0.090
	(-0.05)	(0.03)	(1.17)
Nov_2018 × TaxExempt	-0.186	0.355	0.065
	(-0.21)	(0.22)	(0.84)
Dec_2018 × TaxExempt	0.462	1.591	0.026
	(0.36)	(0.79)	(0.47)
State Fixed Effect	Y	Y	Y
Month Main Effect	Y	Y	Y
TaxExempt Main Effect	Y	Y	Y
Constant	Y	Y	Y
Observations	7,737	7,737	7,737
Adjusted R-squared	0.109	0.183	0.199

Table 11 shows the results of a monthly analysis for Equation (1) for bond issuances in 2017 and 2018, where we replace the DV with contracting terms. TaxExempt is an indicator variable equal to 1 if the bond is indicated by Bloomberg as Tax Exempt, 0 if Taxable, and dropped if missing the designation. We include the main effects for month and TaxExempt, but do not display brevity. We include state fixed effects. Standard errors are clustered by State. t-statistics are reported in parentheses. ***, **, * denote statistical significance at the 1 percent, 5 percent, and 10 percent levels (two-tailed), respectively.