General Purpose Local Government Defaults: Type, Trend, and Impact

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Abstract: Local governments default on their bonds when fail to comply with the monetary and nonmonetary aspects of the debt contracts. Analyses of these defaults have relied on reports from credit rating agencies, which include only rated bonds undergoing monetary defaults. Using a unique dataset of default events, we examine all general purpose government defaults from 2009 to 2015. After including nonrated bonds and nonmonetary defaults, we find that general purpose local government defaults are more common than reported by the rating agencies. We present a spectrum of default types based on the severity of fiscal distress they represent and tabulate the characteristics of the defaulted bonds. Most defaults occurred among non-general obligation bonds. We test and find evidence for the credit segmentation hypothesis: defaulting on a non-general obligation bond does not significantly affect the yield of future credits of the same issuer.

Keywords: municipal bond, disclosure, default, fiscal stress

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INTRODUCTION

The Great Recession that led to fiscal stress in many local governments and high-profile municipal bankruptcy filings has reignited public and academic interest in the extent of and trends in municipal bond defaults.[1] The credit rating agencies (CRA), which have been the primary sources of default statistics, state in their recent reports that municipal bond defaults remain rare (for example, Moody's 2015). The CRA reports, however, include only rated bonds, while nonrated bonds usually have lower creditworthiness and higher probabilities of defaults. Some academic studies examine both rated and nonrated bonds. For instance, Appleson et al. (2012) identify 2,521 defaults from 1970 to 2011, and Gao et al. (2017) report 2,063 bonds experiencing defaults from 1999 and 2010. It is difficult to reconcile these numbers due to the lack of a precise definition of default. The authors do not separate failure to pay interest and principal from the failure to comply with other aspects of the bond indenture. As a result, there is no clear understanding of the extent and severity of municipal bond defaults.

As a start, this study provides a more detailed look on the types and magnitude of municipal bond defaults, by focusing on defaults reported by general purpose local government issuers from 2009 to 2015.[2] First, we delineate a spectrum of defaults, based on continuing disclosure requirements of the Securities and Exchange Commission (SEC). Second, following Gao et al. (2017), we identify all significant events including defaults recorded by Bloomberg from 2009 to 2015. We collect and code the events based on continuing disclosure documents posted on the Electronic Municipal Market Access (EMMA) website. The detailed information

[1] With limited resources, local governments must prioritize among competing demands for outlays such as employee salaries, retiree benefits, contractor payments, and debt service costs on outstanding bonds. While one may use the term "default" to describe any type of failure in fulfilling payment liability, in this paper, it refers to the infringement of bond contracts.

[2] Throughout the paper, data and discussion on year 2009 refer to the partial year starting on July 1, 2009, the date when the Electronic Municipal Market Access website began to post default disclosure documents.

regarding default events, combined with primary market bond data obtained from IPREO Muni Analytics, enable us to show the characteristics, magnitude, and trends of defaulted bonds.

We categorize defaults based on severity. Technical default represents failure to comply with provisions of the bond indenture that are not directly related to paying interest and principal. Pre-monetary default includes unscheduled draws on debt service reserves or backup credits. Monetary default, the most severe type, refers to the failure to pay interest or principal. Our data show that, excluding Detroit, Jefferson County, and Puerto Rico, there is no discernible fluctuation in default trends over the years. Nonmonetary defaults are more prevalent and most defaulted bonds are nonrated and uninsured. We also observe defaults on general obligation (GO) bonds only for very severe cases of fiscal distress: almost all borrowers defaulting on GO bonds eventually filed for bankruptcy to restructure liabilities. Defaults on non-GO bonds are more common. One possible explanation is that these bonds are supported by specific revenue sources, which may be insufficient at times, and the issuers are not legally obligated to commit other revenue to repay non-GO debt.

An issuer, however, could choose to use general revenue to prevent non-GO bond defaults, particularly out of the concern about spillover effects of the defaults to its other credits. Therefore, the relative willingness of issuers to have non-GO defaults begs the question whether bonds backed by different revenue sources are sufficiently segmented. In other words, whether new bonds, especially new GO bonds, backed by credits different from the defaulting credit will not be impacted by previous non-GO defaults. To test this "credit segmentation hypothesis," we run a series of difference-in-differences regressions comparing bonds from issuers experiencing non-GO defaults to bonds of issuers who have never defaulted. Results consistently show support for the credit segmentation hypothesis.

The paper contributes to the fiscal health and fiscal sustainability literature by compiling and understanding data on the most severe type of fiscal stress, or fiscal distress of defaulting on debt. Previous research attempting to predict fiscal distress often starts from identifying such events (Stone et al. 2015; Gorina et al 2017). Relatedly, recent stories of local fiscal distress have led policymakers and bond investors to question whether we will see a rising number of defaults and bankruptcies (Peterson 2013). This paper provides a much-needed snapshot of the years following the Great Recession. Finally, findings in support of the credit segmentation hypothesis add to our understanding of the municipal bond market. While the literature on municipal bond yield suggests that borrower and bond characteristics affect bond price (for example, Johnson and Kriz 2005; Guzman and Moldogaziev 2012) and that the fiscal decision of one borrower could spill over to other borrowers (Greer 2015; Yang 2018), there has been no examination of the interaction between different debt instruments of the same issuer. This paper shows that the market looks beyond issuer names and evaluates non-GO bond supported by a specific revenue stream in isolation of bonds supported by other types of revenues.

MUNICIPAL BOND DEFAULT

Defaults, especially monetary defaults, are signs of cash insolvency and liquidity problems. Cash insolvency could result from one-time events such as natural disasters and undetected corruption. However, it is often a consequence of the persistence of other types of insolvency (Nollenberger et al. 2003), including budgetary insolvency (annual deficit), long-term insolvency (failure to meet long-term obligations), and service-level insolvency (difficulty in paying for services demanded). A defaulting local government faces the constant legal pressure to dedicate possible resources to pay creditors and “cure” the default. If the revenue committed in the debt contract is insufficient for debt repayment, creditors of the defaulting bond may agree to partial or no repayment in a settlement. When a locality faces multiple competing claims on the same revenue source, negotiation with each creditor separately is impractical, costly, and potentially harmful for the majority of creditors (Spiotto 2012). Federal Bankruptcy Codes Chapter 9 allows local governments to continue public service provision while working with all creditors simultaneously to negotiate a debt adjustment plan. Therefore, defaults are not synonymous with bankruptcies. A local government may default on a particular bond without the need for bankruptcy, or it may file for bankruptcy without having missed principal or interest payments.

Due to the lack of comprehensive data on municipal bond default, academic discussion around the issue largely focuses on case studies of predominant default events. For example, Cohen (1989) describes revenue bond defaults in multiple sectors and shows that financial health of the underlying project affects bond repayment prospect. Jones (1984) studies the impact of Washington Public Power Supply System default, and argues that the default has diminished the borrowing capability of the issuer and increased the borrowing cost of the state. Case studies offer understanding of the nuanced reasons behind the failure of a project or a government issuer. However, they do not provide data on the size and trend of municipal defaults, nor do they enable any statistical analyses of the impact of defaults.

Related, researchers are interested in understanding factors contributing to fiscal distress, including defaults, so that policymakers can better predict fiscal crises. Some have taken a historical approach, focusing on the frequent local government defaults before and during the Great Depression (Hempel 1972; Dove 2016). Revenue capacity factors, including tax delinquency rate, and factors related to debt burden, such as debt to assess value ratio, are associated with defaults during that era. Gorina et al. (2017) examine the causes of broadly defined distress events including employee layoff, payment deferral, and default. They find lower general fund balance, higher debt burden, and lower reliance on property taxes to be associated with a higher probability of distress.

With high-profile bankruptcy cases in the national spotlight, a question that policymakers and the public are increasingly interested in is whether we will see more general purpose local government defaults and bankruptcies. Doty (2013) suggests that the overheated prediction of massive defaults among general purpose debt will not come to pass, but greater risks are present when debt payment is dependent on the performance of private parties or on special taxes and assessments. Peterson (2013) draws a contrast in social and economic factors between the depression era and the recent recession, in supporting the conclusion that widespread defaults seen in the 1930s will unlikely repeat. By assuming a default rate among nonrated bonds to double that of bonds rated BBB/Baa or lower, he shows that net of two major defaults from 1970 through 2009, the dollar value of bonds in default fluctuates between 0.1 and 0.24 percent of the market total.

As part of the credit monitoring process, CRAs track defaults in the municipal bond market. For example, Moody's conducts and updates studies on monetary defaults and recoveries for municipal bonds rated by the agency. Recently, Moody's (2015) reported that although defaults were and will remain rare, a fragile budgetary balance may be the "new normal" for many local governments. From 1970 to 2014, there were 95 Moody's-rated municipal defaults, 87 of which were defaults on non-GO debt. A limitation of the Moody's reports is that they capture neither defaults on bonds unrated by the agency nor non-monetary defaults. Therefore, the scale of defaults across the universe of municipal bond issuers remains unknown.

Two articles attempt to provide such a comprehensive measure and report a high frequency of defaults. Appleson et al. (2012) identify 2,521 defaults from 1970 to 2011. With data on only the defaults but not characteristics of the defaulting bonds, the authors could not provide detailed analysis. However, they state that GO defaults remain rare. Gao et al. (2017) report 2,063 bond deals issued by 679 local governments experiencing defaults between 1999 and 2010, without specifying types of defaults. Defaulted bonds are more likely to be conduit debt and unrated, and less likely to be insured and GO. They also find states that unconditionally allow municipal bankruptcy to have a higher probability of state and local defaults.

Several questions remain unanswered by the literature. First, because the most detailed reports on municipal defaults come from the CRAs and cover only rated bonds, we do not know the extent of defaults among unrated bonds. The frequencies of all bond defaults reported by Appleson et al. (2012) and Gao et al. (2017) seem to suggest relative prevalence of defaults among unrated bonds but analyses were not conducted to understand the types and changes of defaults over time. Second, there is no consistent definition of default. For example, CRAs report only on failure to pay interest and principal while Gao et al. (2017) use "events" as reported by Bloomberg without distinguishing between different types of default. To address this issue, we develop in the next section a default spectrum based on the SEC continuing disclosure rules.

TYPES OF BOND DEFAULTS: A SPECTRUM

The SEC Rule 15c2-12 requires underwriters of municipal bonds to ensure that state and local government issuers agree on providing certain information to the Municipal Securities Rulemaking Board (MSRB) on an ongoing basis. Such continuing disclosure agreements make information on "significant events" available through MSRB's EMMA website after July 1, 2009. The significant events required for continuing disclosure include but are not limited to default-related events.[3] Table 1 lists what we consider default-related events and categorizes them based on the bond repayment prospect given the types of events.[4]

[Table 1 about here]

First, technical defaults are failure to comply with provisions of the bond indenture that are not directly related to paying interest and principal. This often includes the failure to file an audited financial report on time or to maintain a sufficient revenue to debt service cost ratio. Technical defaults may suggest a lack of financial management capacity to comply with requirements in the bond indenture. When projected revenue appears to be low for a bond backed by such revenue, technical defaults may also suggest a reduced probability of debt repayment. If actual revenue collection is and continues to be insufficient, a technical default could become the precursor of other types of defaults. For example, Independence County of Arkansas issued a hydroelectric power revenue bond secured by revenue derived from power generation facilities. After the debt service ratio fell below the required threshold, signaling a declining revenue-generating capacity of the power plants, the county had to draw on debt service reserves from 2011 to 2013 and eventually relied on insurance companies for repayment in 2014.

Second, what we categorize “pre-monetary” defaults include unscheduled draws on debt service reserves or backup credits. Bond contracts often require the issuer to maintain a debt service reserve fund at a fixed percentage of the outstanding par value or the maximum annual debt service cost, to ensure continuous debt repayment given possible fluctuation in the pledged revenue. Unscheduled draws on the reserve fund could suggest a problem with the underlying

[3] Significant events as defined by Rule 15c2-12 but are not considered defaults include the following: adverse tax opinions or events affecting the tax-exempted status of the security, bond calls and tender offers, defeasances, and rating changes.

[4] In 2018, SEC issued an amendment to Rule 15c2-12 which expended the list of significant events to include incurrence of a “material financial obligation” and default-related event of an issuer. That is, disclosure of defaults is due not for the defaulting bond only but all bonds of the same issuer. While the amendment is effective after the period of analysis of this paper, it will be interesting to see whether it improves the visibility of default information.

revenue pledge, although improved revenue collection may remedy this default later by replenishing the reserve. For instance, Lancaster County, South Carolina issued a special assessment revenue bond in 2006, payable solely from property tax collection in the business improvement district. After repeatedly drawing from the debt service reserve due to low tax collection, the county failed to pay interests on the bond in 2010 and 2011. Similarly, when an issuer does not have sufficient cash to pay interest and principal, they may request credit and liquidity providers, such as the insurance company or the bank that offers a line of credit, to fulfill the payment responsibility if such arrangements are part of the bond contract.[5] In severe cases where the credit enhancement entities do not have sufficient funds for debt service, which was seen among insurers after the 2007 financial crisis, monetary defaults could follow.

Monetary default, the third type listed in table 1, refers to the failure to pay interest or principal due. Monetary default is at the core of fiscal distress because it directly affects the fulfillment of bond repayments to creditors, and could affect bond prices on the secondary market (Gao et al. 2017; Jones 1984). In few incidences, local governments failed to pay interests on time due to clerical errors or pure forgetfulness (as seen in the case of City of Rome, New York for missed payment in 2015 for just a few days). These defaults are often cured promptly. In some other circumstances, a temporary decline in pledged revenue could lead to failure in servicing a bond, and later recovery in revenue collection cures the monetary default. In many cases, however, a monetary default signifies persistent shortage in the pledged revenue. A bond issuer and the ultimate borrower, if different from the issuer, have to pursue structural changes in assets and liabilities, sometime voluntarily and other times at the request of bond

[5] Not all issuers choose to pay for bond insurance or a line of credit. Because these credit providers and debt service reserve are alternative backups for decreased issuer liquidity, the issuer's decision to purchase insurance or line of credit may affect the probability of specific types of pre-monetary defaults but not the overall probability of pre-monetary defaults on which we report summary statistics later.

trustees. In the case of general obligation bonds, local governments could seek assistance from the state government, have a receiver appointed, or file in the federal bankruptcy court if bankruptcy is an option.[6] In fact, local governments sometimes file for bankruptcy before having to default monetarily (as seen in Detroit, Michigan) or file for bankruptcy without having missed interest and principal payments (as seen in Central Falls, Rhode Island). For non-GO bonds, the trustee may exert a claim over the property providing a lien to the bond and request sale of the property for recovery of missed interest and principal. For bonds ultimately supported by the payments by a private borrower, the borrower may seek merger and acquisition, as well as file for receivership and bankruptcy. The fact that the underlying project failed to generate sufficient revenue for repaying the bond often means that proceeds from property foreclosure, merger, acquisition, or debt restructuring would not fully cover debt service costs and creditors have to accept a "haircut" in repayment. In sum, the "organizational" types of default events represent attempts to resolve or terminate existing defaults, and thus we exclude this type from later descriptive statistics.

DATA ON RECENT DEFAULTS

Following Gao et al. (2017), we collected default information from the Bloomberg Default Event Calendar, which include the announcement and effective dates of the defaults and the CUSIPs. However, Bloomberg records contents of only the most recent default. Therefore, we searched the EMMA website based on CUSIPs to download disclosure documents related to each event, by ensuring the date reported on the disclosure document matches that recorded in Bloomberg. We then read the disclosure documents to code the events based on the typology in table 1. Because coding documents is a time-consuming process and because the primary interest of this

[6] A court or a state, depending on the state laws, can appoint a receiver. A receiver takes custodial responsibility for the property of the distressed local government, to ensure financial prudence and asset security.

paper is on general purpose governments, we limited our sample to general purpose local governments and their bonds only. Because EMMA only started posting disclosure documents in mid-2009, our default data cover the period from July 1, 2009 to December 31, 2015.

In addition, we obtained data from IPREO Muni Analytics on bond features of the defaulted bonds and all bonds issued from 2005 to 2017 (longer timespan for regression analyses later in the paper), such as size, maturity, tax and insurance status, issuing method, GO status, and underlying rating at issuance. Bond data and default data were merged based on CUSIP.

First, to understand the distribution of defaults along the spectrum, we focus on bond deals as the unit of observation.[7] One should not interpret the spectrum as the necessary path of evolution. For example, a bond deal could default on principal and coupon payments without ever experiencing a technical or pre-monetary default. Similarly, an issuer could cure a technical default and avoid more severe defaults. However, due to the severity of monetary default, an issuer could be willing to draw on debt service reserves to avoid monetary default, thus triggering pre-monetary default. We track bond deals that experienced a default during the period of analysis. Among the 415 bond deals, 52 experienced technical default only, 78 pre-monetary default only, 142 monetary default only, and 82 settlement only during the analysis period. Among the remaining 61 bond deals, a majority experienced first a milder type of default followed by a more severe default. Seven bond deals had both technical and pre-monetary default, 14 experienced technical and monetary default, and 28 had pre-monetary and monetary default. Lastly, 12 bond deals reported all three types of default between 2009 and 2015.

Next, we provide summary statistics for a better understanding of the characteristics of defaulted bonds and trends in default. The unit of analysis is a serial bond as opposed to a bond

[7] A bond deal is often structured with a portion of the principal maturing on an annual or biannual basis, referred to as bond series. Each bond (i.e. serial bond) within the bond deal thus has its own CUSIP identifier.

deal because a default could occur when some serial bonds of a deal have matured and thus the default would only affect serial bonds still outstanding. Focusing on the serial bonds ensures accurate calculation of the amount of par value in default.

Size and Trends

Table 2 shows the number of bonds that defaulted in each year for each default type, as well as the par value they represent. Table 2A includes all bonds and Table 2B excludes big issuers including Detroit, Jefferson County and Puerto Rico.

[Table 2 about here]

From 2009 to 2012, pre-monetary default was the most common type in our sample while monetary defaults dominated after 2013. The surge in monetary defaults was largely a result of big bankruptcy filers. Table 2B shows that excluding the big defaulters, all types of defaults experienced a general increase from 2009 to 2012 and then declined after 2013. The peak around 2012 could reflect a lingering impact of the Great Recession. While a larger number of bonds experienced pre-monetary defaults, their par value was similar to that of monetary defaults.

The last two columns in table 2 present statistics on all defaults, which is not a simple sum of the previous categories of defaults because one bond could experience different types of defaults in a single year. The annual defaulted par value—excluding year 2009 because default information was only available for partial year—ranges from $1.3 to $13 billion including and $0.8 to $1.88 billion excluding the three large defaulters. How big is this given the size of the overall municipal market? While we know that total bond outstanding on the market is roughly $3.9 trillion (SIFMA 2018), finding the size of the subsection of general purpose local government bonds is difficult. We rely on the 2012 Census of Government Finance data to infer that about 54% of bond outstanding is issued by general purpose local governments, which is estimated to be $2.1 trillion.[8] Therefore, the $2 billion defaulted bonds in 2012 represent about 0.1 percent of all general purpose government bonds (0.04 percent for monetary defaults).

Figure 1 presents the geographical distribution of defaults during the 2009-2015 period. Thirty-three states saw general-purpose local government defaults and twenty-seven states have general-purpose governments that experienced monetary defaults. Illinois has the largest number of technical defaults, with a par value of $609 million. Alabama has the highest par value in pre-monetary default due to Jefferson County, but the most frequent pre-monetary default state is California (197 CUSIPs for $655 million in par value). Alabama and Michigan have the highest monetary default par value due to the Jefferson County and Detroit crises.[9]

[Figure 1 about here]

Rating and Insurance

Credit rating and bond insurance are the most common third-party certifications used in the municipal market (Kidwell et al. 1987; Thakor 1982; Peng 2002). Credit ratings reflect creditworthiness of the bonds, with higher ratings represent higher creditworthiness. The upper panel of table 3 shows that most of the defaulted bonds are nonrated. Therefore, it is unsurprising that while Moody's (2015) reports no Moody's-rated bond default in 2014 but table 2 of this paper shows a significant number of defaults in that year. Default statistics reported by CRAs underrepresent the actual number of defaults.

[Table 3 about here]

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[8] To obtain the estimate, we include all state and local government observations from the 2012 Census, and calculate the total long-term debt outstanding for general purpose localities as opposed to special purpose localities and states. We use the long-term debt outstanding for general purpose localities as a percentage of the total as the proxy for the share of general purpose local bond on the municipal market. This proxy should be read with caution because the Census definition of long-term debt outstanding includes bonded debt but also judgments and mortgages.

[9] It is worth noting that states ranking high on the amount-in-default list are states that have large amounts of bond outstanding. While the ideal measure here is par value in default as a percentage of all bonds outstanding, we are not able to obtain this measure due to a lack of nationwide data on outstanding bonds.

Similarly, bond insurance is associated with lowered default risk. Statistics in the middle panel of table 3 show that most of the defaulted bonds are uninsured. Disclosure documents in various default cases demonstrate that local borrowers were able to avoid monetary defaults due to insurance coverage.

Security Type

General obligation bonds are secured by the full faith credit and taxing power of the issuer. GO bond default thus indicates problems with a government's ability to raise general revenues. The lower panel in table 3 shows that most of the bonds experiencing technical and pre-monetary defaults are non-GO Bonds, while a larger par value of bonds experiencing monetary defaults are GO Bonds. However, excluding the three big defaulters, all types of defaults predominantly occurred on non-GO bonds.

GO bonds can be further classified into unlimited GO and limited GO, with the latter being limited as to how much taxes can be raised to repay the bonds. Analysis along this dimension (not tabulated due to space constraint but available upon request) indicates that, except for Puerto Rico, all GO Bond defaults are on limited GOs.

CREDIT SEGMENTATION HYPOTHESIS

Hypothesis Building

The municipal bond market consists of a diversity of credits beyond the simply dichotomy of GO and revenue debt (Doty 2013), and issuers could benefit from this diversity in various ways. For example, they may be able to get around limits placed on GO debt, to match the benefits and costs of certain public services, or to borrow on behalf of another entity without legally committing own resources (i.e., conduit debt). Investors in turn may evaluate the different types of credits separately based on their respective risk levels and demand a yield that reflects the perceived creditworthiness of the bond. The diversity in credits represents a fundamental feature of the municipal market that appeals to diverse investor preferences.

Because a bond contract specifies the credit for the bond, an issuer is legally not obliged to commit other revenue for servicing the debt. Therefore, the different credits of the same issuer may be segmented in that the failure to service one bond does not directly impair the ability to pay back a different type of debt. However, anecdotal press reports suggest that the segmentation may not be complete. For example, in December 2018, Platte County, Missouri resisted to bail out revenue bonds issued for a shopping center, and the announcement led to immediate rating downgrade for the county. Some market analysts argued that the refusal to use general revenue for bailout would eventually cost taxpayers money because future borrowing costs of the county will rise, as investors become skeptical of the issuer "walking away from a bond" (Farmer 2018).

Imperfect credit segmentation may result from incomplete information on the market. Researchers often refer to the municipal market as "opaque" because issuer disclosure is poor and pre-trade price quotations are only available upon request (Green et al. 2007; Harris and Piwowar 2006). In the opaque environment, the market may quickly respond to many types of new information. First, new information directly related to the underlying credit obviously matter. For example, prices of GO bonds already trading on the secondary market adjust to information disclosed at the time of subsequent new GO issues of the same entity as well as financial disclosure throughout the year (Reck and Wilson 2006). Information on related bonds of *different* issuers may also trigger market reactions. Such "spillover" effects could be due to the competitive nature of these bonds as they rely on the same tax base. Greer (2015) finds that an increase in the total amount of debt issued by subcounty governments and increase in the number of overlapping governments increase the interest cost paid by county governments on tax-backed debt. Another reason for cross-issuer spillover may be attributed to the market opaqueness. Yang (2018) postulates that in an incomplete information environment, investors may assess and infer risk based on new information regarding one bond in a risk cluster composed of related bonds of different issuers. Indeed, Yang (2018) finds that the 2011 Jefferson County bankruptcy caused increase in yields across new GO bonds issued in the region, as investors adjusted their evaluation of "full faith and credit."

What remains unclear from the literature is whether investors infer risk on a bond based on information available on other bonds of the same borrower. For example, while a sewer revenue bond relies on sewer charges, a special assessment bond by the same issuer hinges on property tax collection from property owners in a designated area. Without sufficient information about the various projects or the issuer in general, investors may perceive the sewer revenue bond to be less creditworthy as a default on the special assessment bond suggests broad uncertainties associated with the issuer. That is, an issuer-brand effect is at play, which in the eyes of investors may be a proxy for underlying economic strength, local political effectiveness, and other factors that are common to all credits of the same issuer. Previous research on issuer-brand effect points to lower borrowing costs associated with more market experience and frequent borrowing (Hildreth 1993). To our knowledge, no literature has directly tested the within-issuer information spillover. Defaults are bond-, and thus credit-, specific events that reveal negative information; they provide us an opportunity to test if credit segmentation or issuer brand effect dominates.

Empirical Model

Given that a predominant majority of defaulted bonds are non-GO, this section presents a test of the credit segmentation hypothesis that the default on a non-GO bond will not affect the yields of future bonds backed by different assets or revenue streams. We exclude issuers with GO defaults because almost all of them have filed for bankruptcy and thus, unlike other issuers, face extraordinary fiscal challenges, which will likely affect non-defaulting credits.

We merge the default bond data with data on all new primary market bonds issued by general purpose local governments from 2005 to 2017. First, the default bond data enable us to identify issuers (based on their names) of non-GO bonds that have defaulted between July 1, 2009 and December 31, 2015, as well as the date when the first default event occurred.[10] Second, we identify all bonds issued by these issuers from 2005 to 2017 but exclude defaulted bonds, as well as bonds with the same type of underlying credit as the defaulted bonds based on the first six digits of the CUSIP. We exclude the latter group because bonds supported by the same revenue streams as the defaulting bonds may experience increases in yields due to the deteriorating creditworthiness of the non-GO credit, as opposed to the informational shock conveyed through the defaults.[11]

We therefore obtain a dataset where the "treated" group consists of bonds issued by general purpose localities that have experienced non-GO defaults. Bonds issued by other general purpose localities who have not experienced any defaults during the 2009-2015 period serve as the comparison. To mitigate the concern that the underlying economy and tax bases are different between the treated and comparison groups, an alternative comparison group includes only

[10] It is possible that issuers have defaulted prior to July 1, 2009, but we do not know the details of these earlier defaults because EMMA had not started publicizing disclosure information. The issuer fixed effects in the empirical model mitigate this issue, as any impact of prior defaults, if it is time-invariant, will be absorbed by the fixed effects.
[11] Defaults happen often due to a weak collection of revenue pledged. Therefore, for new bonds backed by the same type of revenue as the defaulted bonds, the unobserved underlying revenue collection is an omitted variable correlated with both the default and yield. For example, a sewer revenue bond default signals declining sewer revenue collection. If we observe that a new sewer revenue bond by the same issuer after the default pays a higher yield, it is difficult to attribute the finding to the default as opposed to the changes in sewer revenue collection.

issuers located in the same county as the defaulting governments.[12] The sample size, and thus statistical power of the regression, is smaller with this alternative comparison group.

We estimate difference-in-differences regressions to examine whether new bonds of borrowers after defaults pay higher initial offering yields.[13] For bond i issued by local government g in year t, we estimate:

$$(1) \qquad Y_{igt} = \alpha_0 + \beta * treated_g * post_t + \alpha_1 * X_{igt} + \mu_g + \tau_t + \varepsilon_{igt}$$

where Y_{igt} represent the dependent variable of yield, measured in percentage points.[14] The vector X_{igt} represents bond characteristics, including GO status, size, maturity, tax exemption status, availability of insurance, call option, financial advisor, underlying ratings (good and speculative ratings with strong rating as the left-out group),[15] whether placed through negotiated offers, and the number of bids submitted for competitively issued bonds. The standard errors are clustered at the issuer level to account for heteroscedasticity and autocorrelation within the cluster.

The variable $treated_g$ measures whether a new bond is issued by a general purpose local government that had a non-GO bond default during the 2009-2015 period. For bonds issued by non-defaulting issuers, $post_t$ always equals zero; for bonds issued by defaulting issuers, $post_t$

[12] We identify county jurisdiction by merging the bond data with 2012 Census Survey of Local Government Finance data based on locality names.

[13] While time fixed effects included in the later regression can control for changes in the overall market environment, the shape of yield curve could change over time. To address this possibility, as a robustness check, we estimate the same regressions but use yield spread to a synthetic riskless bond as the dependent variable. This method of calculating the spread can be found in Gao et al. (2017). Findings using this yield spread dependent variable remain unchanged.

[14] While the initial offering yield captures the return demanded by investors, it does not fully reflect the borrowing costs paid by issuers because it leaves out issuance costs. If default experience makes it more difficult to market new bonds, issuance costs may increase which in turn implies higher borrowing costs. Unfortunately, we do not have data on issuance costs or true interest costs, a better measure of borrowing costs.

[15] Credit rating variables are based on underlying ratings assigned by Moody's and augmented by that from Standard and Poor's when Moody's rating is missing. The baseline group is bonds with strong ratings: A2 to Aaa for long-term bonds and MIG1 for short-term bonds (A to AAA for long-term bonds and SP-1 for short-term bonds for Standard and Poor's). Good ratings include Baa to A3 and MIG3 to MIG2 (BBB- to A- or SP-2 for Standard and Poor's). The rest are speculative grade bonds. When Moody's categorization disagrees with that of Standard and Poor's, the variable split rating is assigned value one.

equals one when the bond's sales date is after the announcement date of the first default. Local government, i.e. issuer, fixed effects are represented by μ_g, to control for locality-specific, time-invariant characteristics that could affect yields. The year fixed effects τ_t capture the intertemporal change in yields (first level of difference), while issuer fixed effects capture intrinsic differences between issuers with and without default experience (second level of difference). Therefore, the $treat_g * pos_t$ interaction term captures the relative change in yields after a default for defaulting localities (difference-in-differences). As long as the average yield difference between the treated and comparison groups would have remained constant without the default, any relative change in yields for the treated group could be causally attributed to the default. If β is statistically indistinguishable from zero, the default of a non-GO bond does not affect bonds backed by different credits later issued by the same borrower. That is, we find empirical support for the credit segmentation hypothesis. However, if β is statistically bigger than zero, the default negatively spills over to other credits of the same issuer.

It is plausible that creditors are responsive to monetary defaults only, because these defaults represent a more severe breach of contract. Therefore, we estimate a variation of equation 1 focusing on monetary defaults instead of all defaults. In this specification, $treated_g$ equals one for local governments experiencing monetary defaults and $post_t$ equals one for the period after the first monetary default. Bonds issued by local governments experiencing only non-monetary defaults are excluded in this analysis while the comparison group stays the same.

Table 4 presents the summary statistics of all variables, first for the full sample. Next to the full sample columns, we compare the mean of bonds issued by default local governments (treatment group) versus all other general purpose issuers and find them to be different in some aspects. For example, bonds issued by localities experiencing non-GO defaults are less likely to be GO bonds and more likely to be placed through negotiated offering. When we limit the comparison group to non-defaulting issuers located in the same counties as the defaulting issuers, as shown in column 4, the differences decrease in magnitude for some variables but by no means disappear. This suggests that defaulted localities may be different even from others in the same county, and highlights the importance of controlling for locality fixed effects.

[Table 4 about here]

Regression Results

Table 5 presents results from the difference-in-differences regressions based on the two comparison groups. In the first four columns, the comparison group consists of municipal bonds issued by all local governments that did not experience any defaults. In column 1, the "treated" group is non-defaulting bonds issued by localities having experienced any type of non-GO defaults, while column 2 is limited to those experiencing monetary defaults only, thus a smaller number of observations. The statistically insignificant coefficient estimates of the interaction term between defaulted issuer and post default issuance show that a non-GO default has no discernible effect on future credits of the same issuer. This is true for monetary defaults in column 2 as well. In fact, a coefficient test shows no statistically significant difference between the estimates for the interaction term in the two specifications.

[Table 5 about here]

General obligation bonds are backed by the full faith and credit of an issuer, and compete with other types of credit in bankruptcy proceeding, especially if a statutory lien is not available (Moldogaziev et al. 2018; Yang 2018). Therefore, one may expect any spillover of a non-GO default to occur to GO bonds of the same issuer, but not to other types of non-GO bonds as they are secured by separate revenue streams. Therefore, columns 3 and 4 present estimates from the subsample of GO bonds. The magnitude of the estimates are very similar to those from previous columns and remain statistically insignificant.

Columns 5 to 8 present estimates from the alternative comparison group of issuers located in the same counties as the defaulting issuers. Regardless of the comparison groups, types of defaults, and types of securities, we observe, across the columns, statistically insignificant coefficient estimates of the interaction term. In fact, estimates from the same-county sample are smaller in magnitude and closer to zero than those from the full sample.

Therefore, the empirical results consistently provide support for the credit segmentation hypothesis. Despite the incomplete information environment on the municipal market, investors do not assess and infer risk of a new bond based on known non-GO defaults of the same issuer. Failure to comply with a non-GO bond contract does not lead investors to charge a risk premium on future bonds of the same issuer, as long as the new bonds have a different type of underlying revenue support from the defaulting bonds. Further, the impact of a monetary default does not differ in a statistically different way from other types of defaults.

Finally, the coefficient estimates of covariates are in line with what literature suggests. For example, larger bonds had lower yields due to the economy of scale. Bonds with longer maturities had higher yields, indicating that the market exhibited an upward sloping yield curve. Taxable bonds had a higher yield than tax-exempted bonds because the no arbitrage principle suggests that the after-tax yields should be the same. Insured bonds on average had lower yields as the insurers promised to back debt repayments. Callable bonds pay call premiums. Negotiated issues had higher yields than competitive issues. Compared to the baseline group of bonds with strong credit ratings, bonds rated good or speculative paid higher yields. Nonrated bonds lacked the credit signal sent through rating assignments and were charged a risk premium.

Robustness Checks

We conduct various robustness checks and summarize the findings in Figure 2. First, to further ensure the comparability between the treatment and comparison observations, we construct a comparison group from the same-county sample using propensity score matching with two matching algorithms. We identify the nearest neighbor and nearest three neighbors for bonds issued by defaulting localities prior to the first default, based on a probit regression of all bond features. Then, we identify issuers of the matched bonds and include in the comparison group only bonds issued by these matched local governments. The assumption is that because these localities issued bonds with similar features as the pre-default treated localities, they constitute a better comparison group. The coefficient estimates of the interaction term remain statistically insignificant, as shown in the first two lines in figure 2.

[Figure 2 about here]

Second, defaults may have heterogeneous effects and lead to yield changes in some subgroups of issuers or bonds. For example, investors may pay more attention to frequent defaulters, i.e. those who defaulted on more than one type of credits. Further, defaults alone may not signify a problem but could be concerning if coupled with other factors. One factor is the strength of the underlying economy; defaults in a poor economic environment could be suggestive of further problems associated with the issuer. Another factor is the institutional rules applicable to distressed local governments. Defaults of localities in states that allow for municipal bankruptcy could imply the possibility a spillover effect from the defaulting bond to other debt of the borrower if all liabilities are subject to restructuring in bankruptcy. Lastly, although EMMA has made default disclosure timely and publicly available, a difficulty in interpreting our finding is that we cannot directly test if investors are aware of the defaults.

Frequent borrowers on the municipal market may be more visible to investors, and we are more confident those defaults are observed by investors.

Accordingly, we estimate equation 1 respectively on the following subsamples: (1) for the treated group, bonds issued by borrowers that have experienced defaults on at least two different bond deals; (2) bonds issued in counties with an unemployment rate higher than the average unemployment rate observed in the sample (5.4 percent); (3) bonds issued by borrowers located in states that unconditionally allow for municipal bankruptcy; and (4) bonds issued by borrowers with more than the median number of issuances during the sample period (152 CUSIPs). Coefficient estimates plotted in figure 2 show that in all subsamples, defaults are not associated with statistically significant increase in yields of the issuers' future bonds.

CONCLUSION

Local governments in the United States often grapple with the challenge of funding public services that fully meet the budgeted demand of local constituents (Chapman 2008). Related research attempts to identify the best measures of local governments' ability to meet their financial and service obligations (Hendrick 2004; Johnson et al. 2013), as well as the causes of problems in meeting such obligations to inform policy discussion on fiscal distress prediction (Nollenberger et al. 2003; Stone 2015). Facing fiscal distress, local governments may adopt strategies such as expenditure cuts, borrowing, asset sales, and employee layoff. Fiscal distress culminates in the failure to service financial liabilities on time. For example, a local government may delay payments to vendors or contribution for employee retirement benefits. While such payment delays may or may not have a direct negative impact on the locality depending on the legal remedies available to vendors and retirement plans, delaying payments due on bond outstanding constitutes monetary defaults.

In this paper, we code disclosure documents to identify and categorize municipal bond defaults from 2009 through 2015. We identify more defaults compared to what have been reported by CRAs because our sample includes nonrated bonds as well as non-monetary defaults. We do not find an increasing trend in defaults; in fact, excluding the three large defaulters who filed for bankruptcy, the amount of defaults has decreased since 2012. The par value in default represents only about 0.1 percent of total general purpose local government bond outstanding, although larger than what has been reported by CRAs. Most defaulted bonds are nonrated and uninsured. Almost all GO defaulters filed for bankruptcy, indicating a lack of alternative at the time. After excluding the three big defaulters, most defaults have occurred on non-GO bonds. We then test whether non-GO defaults have a spillover effect on other credits of the same issuer after the default.

The finding that the default on a non-GO bond does not lead to increased yields of the same issuer on future bonds backed by different types of revenue has policy implications. First, it provides an empirical explanation for the phenomenon that most defaults are on non-GO as opposed to GO bonds. Issuers seem to be comfortable with issuing non-GO bonds or accessing the municipal market on behalf of private organizations despite the fact that these securities have a higher default rate, possibly because they do not observe a spillover effect of such defaults. Second, local governments should not "bail out" failing non-GO bonds using general tax revenue, at least not for concerns over spillover effects to other bonds.

While we find evidence for credit segmentation and against an issuer brand effect, the paper does not claim that investors do not respond to default information at all. But rather, because credits are sufficiently segmented, defaults on one bond do not affect other bonds backed by different types of revenue of the same issuer. In fact, if we examine new bonds issued by defaulting issuers for the same type of credit as the defaulted bond, we observe an average increase in yield. The challenge, however, is that we do not know whether investors demand higher yields due to the deteriorating creditworthiness of the project or the default event. Future research with a strategy that could separate out the impact of default from that of the underlying fundamentals could shed light on the extent to which issuer reputation is a component of bond pricing, what factors shape issuer reputation, and for how long a shock to reputation lasts.

This paper has shown characteristics of bonds in defaults but a challenge that remains is to understand the characteristics of defaulting issuers and causes of their distress. Relying on the data sources in the paper to identify issuers in default, future research may aim at expanding our understanding of what causes and how to prevent defaults. Another worthwhile question for future research is how state-imposed fiscal institutions, such as monitoring of local government finance and intervention in local distress, affect the probability of local government defaults.

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Table 1. Types of Defaults

Significant Event	Type of Default
Non-payment related defaults	technical
Modifications to rights of security holders	technical
Unscheduled draws on debt service reserves reflecting financial difficulties	pre-monetary
Unscheduled draws on credit enhancement reflecting financial difficulties	pre-monetary
Substitution of credit or liquidity providers, or their failure to perform	pre-monetary
Principal and interest delinquencies	monetary
Release, substitution, or sale of property securing repayment of the securities	organizational
Merger, acquisition or sale of assets	organizational
Bankruptcy, insolvency or receivership	organizational

Source: authors’ compilation based on the Securities and Exchange Commission Rule 15c2-12.

Table 2. Default Bond Statistics by Year

A. All Default

Year Default Reported	Technical Default		Pre-Monetary Default		Monetary Default		All Default	
	Number of Default Bonds	Total Par Value Defaulted ($)	Number of Default Bonds	Total Par Value Defaulted ($)	Number of Default Bonds	Total Par Value Defaulted ($)	Number of Default Bonds	Total Par Value Defaulted ($)
2009	40	86,900,000	123	228,000,000	42	138,000,000	205	452,900,000
2010	55	100,000,000	146	976,000,000	53	307,000,000	254	1,383,000,000
2011	98	369,000,000	179	1,430,000,000	101	411,000,000	378	2,210,000,000
2012	162	634,000,000	166	607,000,000	123	901,000,000	451	2,142,000,000
2013	80	141,000,000	156	692,000,000	237	3,680,000,000	473	4,513,000,000
2014	57	103,000,000	146	404,000,000	154	797,000,000	357	1,304,000,000
2015	77	148,000,000	108	323,000,000	260	12,600,000,000	445	13,071,000,000

B. Excluding Detroit, Jefferson County, and Puerto Rico

Year Default Reported	Technical Default		Pre-Monetary Default		Monetary Default		All Default	
	Number of Default Bonds	Total Par Value Defaulted ($)	Number of Default Bonds	Total Par Value Defaulted ($)	Number of Default Bonds	Total Par Value Defaulted ($)	Number of Default Bonds	Total Par Value Defaulted ($)
2009	40	86,900,000	123	228,000,000	42	138,000,000	205	452,900,000
2010	55	100,000,000	131	416,000,000	53	307,000,000	239	823,000,000
2011	98	369,000,000	160	500,000,000	101	411,000,000	359	1,280,000,000
2012	162	634,000,000	154	559,000,000	105	688,000,000	421	1,881,000,000
2013	80	141,000,000	155	572,000,000	87	459,000,000	322	1,172,000,000
2014	57	103,000,000	146	404,000,000	59	350,000,000	262	857,000,000
2015	77	148,000,000	108	323,000,000	56	283,000,000	241	754,000,000

Notes: year 2009 numbers are only for defaults after July 1, 2009 when EMMA started to post default disclosure documents. Number of bonds are calculated as number of unique CUSIPs (i.e. bond series) in a year. One bond can default in multiple years or experience multiple types of defaults in one year.

Table 3: Default Bond Statistics by Rating, Bond Insurance, and GO Status

Default Type	Number of Default Bonds	Total Par Value Defaulted ($)	Number of Default Bonds	Total Par Value Defaulted ($)
	Rated		Unrated	
A: all defaults				
Technical Default	272	872,000,000	297	710,000,000
Pre-monetary Default	353	2,960,000,000	671	1,710,000,000
Monetary Default	447	14,900,000,000	523	3,970,000,000
B: Excluding Detroit, Jefferson County, and Puerto Rico				
Technical Default	272	872,000,000	297	710,000,000
Pre-monetary Default	306	1,300,000,000	671	1,710,000,000
Monetary Default	31	256,000,000	472	2,380,000,000
	Insured		Uninsured	
A: all defaults				
Technical Default	178	660,000,000	391	922,000,000
Pre-monetary Default	291	1,360,000,000	733	3,310,000,000
Monetary Default	332	6,280,000,000	638	12,600,000,000
B: Excluding Detroit, Jefferson County, and Puerto Rico				
Technical Default	178	660,000,000	391	922,000,000
Pre-monetary Default	274	908,000,000	703	2,090,000,000
Monetary Default	17	141,000,000	486	2,500,000,000
	GO		Non-GO	
A: all defaults				
Technical Default	85	22,000,000	484	1,560,000,000
Pre-monetary Default	137	2,090,000,000	887	2,570,000,000
Monetary Default	459	13,500,000,000	511	5,320,000,000
B: Excluding Detroit, Jefferson County, and Puerto Rico				
Technical Default	85	22,000,000	484	1,560,000,000
Pre-monetary Default	90	427,000,000	887	2,570,000,000
Monetary Default	38	184,000,000	465	2,450,000,000

Notes: covers general purpose local government defaults from July 1, 2009 to December 31, 2015. Number of bonds are calculated as number of unique CUSIPs (i.e. bond series). GO stands for general obligation.

Table 4. Descriptive Statistics

	(1) Full Sample				(2) Default Issuer	(3) Nondefault Issuer	(4) Nondefault Issuer: Same County
	Mean	Std. Dev.	Min	Max	Mean	Mean	Mean
Yield (%)	2.7150	1.2950	0.05	14.716	2.9613	2.7062	2.7818
Defaulted issuer	0.0344	0.1823	0	1			
Defaulted issuer: monetary	0.0070	0.0836	0	1			
Non-GO	0.2289	0.4201	0	1	0.3837	0.2234	0.2552
Issue size ($million)	1.6109	8.3039	0.0586	1386.2	3.6908	1.5367	1.5252
Maturity (year)	8.7992	5.8559	0.0136	44.959	9.3596	8.7792	8.6838
Federally taxable	0.0636	0.2441	0	1	0.1110	0.0619	0.0825
Tax credit bond	0.0225	0.1483	0	1	0.0388	0.0219	0.0369
Insured	0.2454	0.0000	0	0	0.2122	0.2466	0.1964
Callable	0.1703	0.3759	0	1	0.1956	0.1694	0.1667
Negotiated	0.4719	0.4992	0	1	0.5574	0.4688	0.4714
Financial advisor	0.7751	0.4175	0	1	0.7629	0.7755	0.7659
Number of bids	3.5915	4.1516	1	54	3.1785	3.6063	3.6245
Unrated	0.1268	0.3328	0	1	0.0988	0.1278	0.1115
Good rating	0.0736	0.2611	0	1	0.0810	0.0733	0.0580
Speculative rating	0.0002	0.0131	0	1	0	0.0002	0
Split rating	0.0129	0.1128	0	1	0.0329	0.0122	0.0133
Unemployment rate (%)	5.9771	2.2789	1.1	28.8	5.7996	5.9834	6.2079
N		563,593			19,406	544,187	71,144

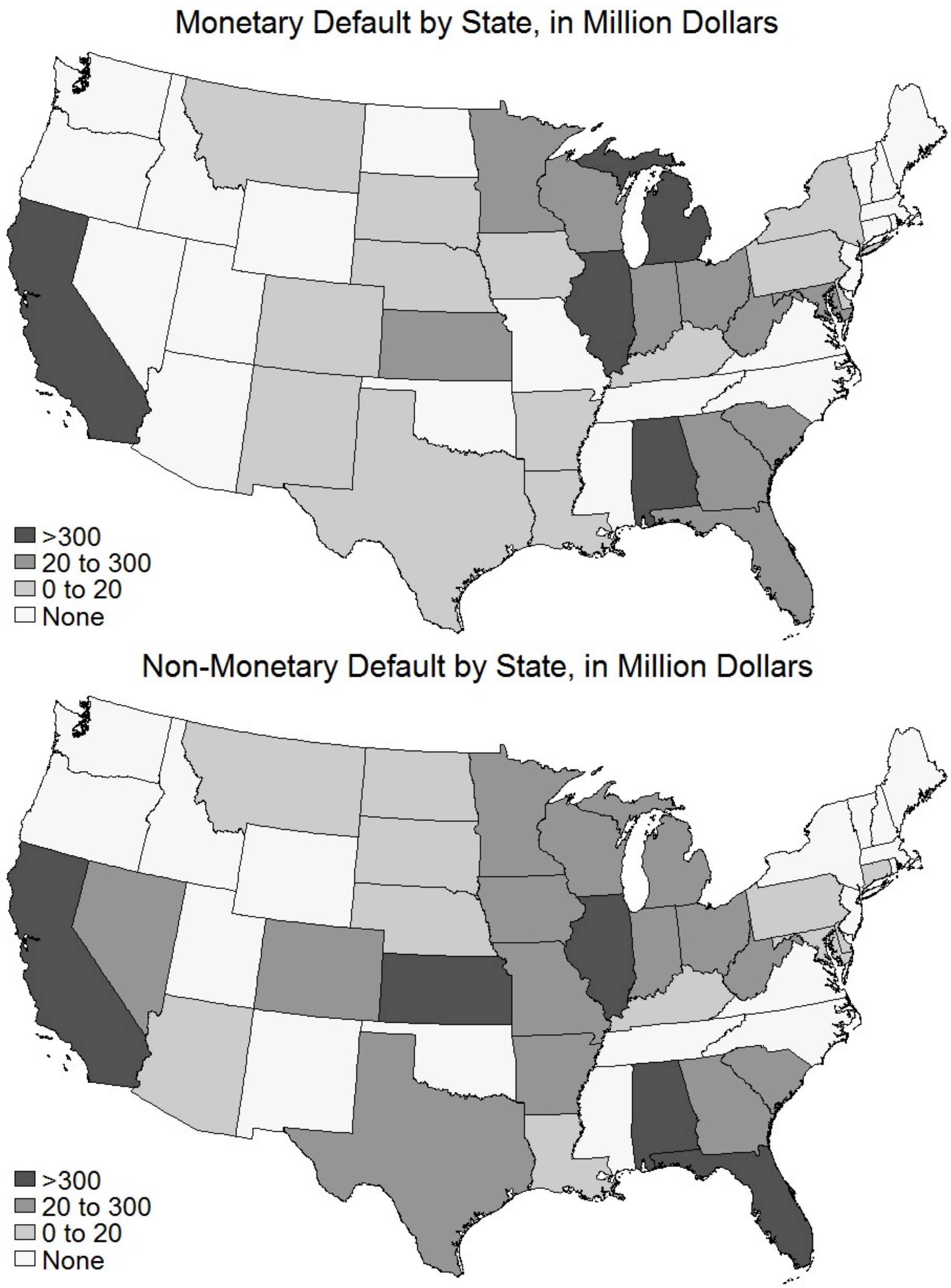
Notes: Non-GO refers to non-general obligation bonds. Data are from Bloomberg and Ipreo Muni Analytics.

Table 5. Difference-in-Differences Results, Baseline Models

	Full Sample		GO Sample		Same County Sample		Same County GO Sample	
	All Defaults	Monetary	All Defaults	Monetary	All Defaults	Monetary	All Defaults	Monetary
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Defaulted issuer x Post	**0.0316**	**0.0203**	**0.0214**	**0.0333**	**-0.0010**	**-0.0204**	**0.0132**	**0.0149**
	(0.0380)	**(0.0525)**	**(0.0558)**	**(0.0747)**	**(0.0382)**	**(0.0537)**	**(0.0515)**	**(0.0763)**
Non-GO	0.171***	0.169***			0.199***	0.208***		
	(0.0101)	(0.0103)			(0.0250)	(0.0304)		
Issue size ($million)	-0.0048***	-0.0051***	-0.0034***	-0.0043***	-0.0026**	-0.0026**	-0.0005	-0.0022*
	(0.0012)	(0.0014)	(0.001)	(0.001)	(0.001)	(0.0013)	(0.001)	(0.0013)
Maturity (year)	0.139***	0.139***	0.142***	0.142***	0.136***	0.138***	0.143***	0.144***
	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0016)	(0.0015)	(0.0015)	(0.0015)
Federally taxable	0.924***	0.928***	0.870***	0.873***	0.933***	0.956***	0.876***	0.899***
	(0.0144)	(0.0143)	(0.0146)	(0.0147)	(0.0330)	(0.0314)	(0.0337)	(0.0344)
Tax credit bond	0.218***	0.209***	0.268***	0.263***	0.191***	0.135***	0.224***	0.182***
	(0.0228)	(0.0232)	(0.0257)	(0.0259)	(0.0448)	(0.0418)	(0.0500)	(0.0488)
Insured	-0.0519***	-0.0497***	-0.0732***	-0.0687***	-0.0694***	-0.0590***	-0.143***	-0.124***
	(0.0084)	(0.0086)	(0.009)	(0.009)	(0.0181)	(0.0202)	(0.0222)	(0.0218)
Callable	0.01**	0.0103**	0.0245***	0.0262***	-0.0074	-0.0089	-0.0062	0.0009
	(0.0044)	(0.0043)	(0.0048)	(0.0047)	(0.0112)	(0.0107)	(0.0122)	(0.0118)
Negotiated	0.120***	0.116***	0.106***	0.103***	0.141***	0.122***	0.116***	0.0922***
	(0.0094)	(0.0094)	(0.0101)	(0.01)	(0.0257)	(0.0256)	(0.0283)	(0.0252)
Financial advisor	-0.0762***	-0.0832***	0.00998	-0.000678	-0.0477	-0.0831***	0.0606	0.00808
	(0.0170)	(0.0158)	(0.0173)	(0.0157)	(0.0396)	(0.0316)	(0.0432)	(0.0272)
Number of bids	0.0011*	0.0011*	0.0011	0.0012*	-0.0029*	-0.0038**	-0.0038**	-0.0045**
	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0017)	(0.0019)	(0.0017)	(0.0019)
Unrated	0.392***	0.387***	0.160***	0.164***	0.523***	0.509***	0.172***	0.184***
	(0.0230)	(0.0228)	(0.0200)	(0.0204)	(0.0493)	(0.0443)	(0.0380)	(0.0404)
Good rating	0.139***	0.124***	0.0494**	0.0349*	0.269***	0.192***	0.157*	0.0502
	(0.0177)	(0.0156)	(0.0217)	(0.0181)	(0.0609)	(0.0465)	(0.0952)	(0.0559)
Speculative rating	2.445***	2.440***	2.564***	2.554***				
	(0.342)	(0.340)	(0.368)	(0.366)				
Split rating	0.0263	0.00860	0.0630	0.0450	0.0822	0.0115	0.131	-0.0197
	(0.0351)	(0.0329)	(0.0416)	(0.0421)	(0.0890)	(0.113)	(0.112)	(0.123)
Unemployment rate	0.0541***	0.0517***	0.0483***	0.0467***	0.0979***	0.0928***	0.0852***	0.0838***
	(0.0041)	(0.0039)	(0.0039)	(0.0039)	(0.0108)	(0.0104)	(0.0093)	(0.0101)
Locality fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.844	0.846	0.860	0.861	0.836	0.845	0.865	0.871
Observations	563,453	548,012	434,554	425,129	90,550	75,109	64,949	55,524

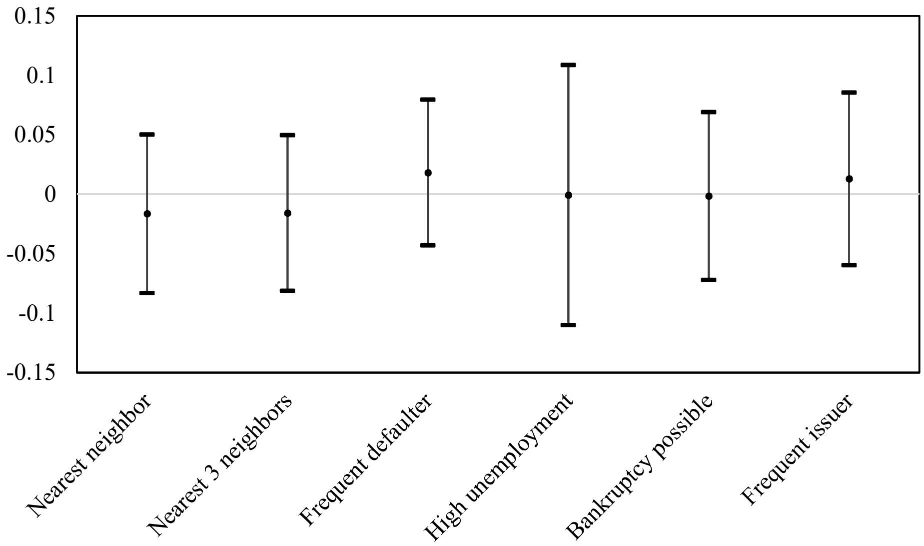
Notes: Standard errors are clustered at the issuer level and reported in the parentheses. * p<0.1, ** p<0.5, *** p<0.01.

Figure 1. Defaults by State



Note: Hawaii and Alaska not shown. No general purpose local governments in those two states experienced defaults from July 1, 2009 to December 31, 2015.

Figure 2. Robustness Check Results, Various Samples



Notes: Estimates based on various subsamples as explained in the text and summarized in the labels on the x-axis. The y-axis represents coefficient estimates of default impact from regressions on offering yields measured in percentage points. Standard errors are clustered at the issuer level. Vertical lines represent 95% confidence interval with the dots represent point estimates.