Municipal Borrowing Costs and State Policies for Distressed Municipalities*

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April 20, 2017

Abstract

Policies on financially distressed municipalities differ across U.S. states, with some allowing unconditional access to Chapter 9 bankruptcy ("Chapter 9 states") and others having proactive policies to assist distressed municipalities ("Proactive states"). These differences significantly affect borrowing costs. In Chapter 9 states, local municipal bond yields are higher, more cyclical, and more sensitive to default events than Proactive states. Default events have a contagion effect in Chapter 9 states, but not Proactive states. Lower local borrowing costs in Proactive states come at the expense of the state via higher intergovernmental revenue transfers in times of weak economic conditions.

JEL classification codes: G12, G18, H74

Keywords: default risk, government policy, municipal bonds, creditor protections

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*We thank Robert Battalio, Kevin Crotty, Robert Doty, Ravi Jagannathan, Tim Loughran, David Matsa, Steve Peterson, Paul Schultz, Jim Spiotto, Charles Trzcinka, Wei Wang, and seminar participants at the Brookings Municipal Finance Conference, DePaul University, Northwestern University, the University of Illinois at Chicago, the University of Melbourne, and the University of Notre Dame for helpful comments. We also thank George Jiang and Karl Kraus for excellent research assistance. All errors are our own.

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1 Introduction

Recent high-profile municipal default cases in Detroit (MI), Central Falls (RI), Stockton (CA), and Jefferson County (AL) highlighted different approaches that state governments take when dealing with their distressed municipalities. For example, Michigan and Rhode Island took an active role in overseeing and assisting Detroit and Central Falls, while California and Alabama left Stockton and Jefferson County to resolve their own financial problems. These anecdotal cases highlight significant differences in state municipal bankruptcy policies. However, the effects these different approaches have on municipal borrowing costs and the resolution of municipal financial distress still remain unclear. In this paper, we provide a systematic study of municipal defaults in the United States from 1999 to 2010, and investigate the tradeoffs associated with different state municipal bankruptcy policies for public finance outcomes.

We identify differences in distress-related laws and statutes across states, and examine how these differences relate to local municipal borrowing costs. When a municipality is financially distressed and unable to meet its debt obligations, it may file for Chapter 9 bankruptcy in a federal court, provided that the state government approves the motion. Some states allow unconditional access to the Chapter 9 bankruptcy procedure ("Chapter 9 states"), preferring to leave the municipalities to manage their own affairs. Meanwhile, other states allow Chapter 9 access only as a last resort, preferring to deal with financially distressed municipalities directly via state assistance programs ("Proactive states"). The former policy is advantageous for debtors, because the Chapter 9 procedure can restructure the monetary obligations of the municipality, but cannot enforce the reorganization of the municipal government or the liquidation of municipal assets. The latter policy, on the other hand, is advantageous for creditors, because the state government provides implicit insurance for its local governments in times of distress in order to protect the overall creditworthiness of the state.

We find that these policy differences significantly affect local borrowing costs. First, we show that the yield reaction following default is significantly lower in Proactive states than in Chapter 9 states. In particular, when a local municipal bond experiences a default event, the municipal bond secondary yield spread, which we will henceforth refer to as the yield, increases by 6.5 percentage points in Chapter 9 states. On the other hand, the yield only increases by 3.9 percentage points following a default event in Proactive states, for a difference of 2.6 percentage points (p-value=0.005). Second, we show that state policies also have a significant ex-ante effect on yields; local municipal bond yields in Chapter 9 states are 7.1 basis points higher than those in Proactive states. This finding is also robust to using offering yields instead. These results are consistent with the interpretation that creditors under Chapter 9 receive weak creditor protections compared to creditors under Proactive state programs.

A potential concern in our analysis is that our results capture differences in unobserved state characteristics rather than differences in distress-related state policies. We utilize two identification strategies to address this concern. The first strategy is a falsification exercise that uses conduit municipal bonds in place of regular municipal bonds. Conduit bonds are sold by local governments on behalf of non-governmental third parties; the funds generated by the third party are used to repay the bond. These bonds do not have access to the Chapter 9 bankruptcy procedure and are not subject to Proactive state programs. We find that borrowing costs for conduit bonds in Chapter 9 states are not significantly different from those issued in Proactive states. This suggests that the difference between borrowing costs for regular municipal bonds in Proactive and Chapter 9 states is due to the difference in state policies, rather than other unobserved state characteristics.

The second identification strategy compares municipal bonds issued in bordering counties of different states. Because of the geographic proximity of these counties, any differences in cross-border yields can be more readily attributed to differences in these state policies. Holmes (1998) utilizes a similar identification strategy by comparing bordering counties in states with different right-to-work laws, and shows that counties in states with a right-to-work law are associated with higher manufacturing activity. We identify twelve state pairs in which one state is more proactive when dealing with distressed municipalities than a neighboring state. We find that secondary yields in the border counties of the more proactive states are 6.1 basis points lower than the neighboring border counties, while offering yields are 6.8 basis points lower. This supports our argument that the lower borrowing costs for municipalities in Proactive states are driven by their distress-related policies, and not by other unobserved geographical characteristics or local economic conditions.

The post-default yields from the secondary market can be used to infer the expected recovery rates for defaulted bonds, which is useful for examining the extent to which Proactive state policies provide ex-post creditor protections for their distressed municipalities. The mean implied recovery rate in our sample of defaulted bonds is 70.5%; this is comparable to the mean recovery rate of 65.0% reported in Moody's (2012) for the years 1970-2011. When we separate the recovery rates by state type, we find that the mean recovery rate is 79.1% in Proactive states, while it is only 67.0% in Chapter 9 states, for a statistically significant difference of 12.1 percentage points. For conduit bonds, there is no difference in recovery rates. These results imply that the stronger creditor protections provided by Proactive states lead to higher recovery rates ex-post.

The previously reported differences in municipal borrowing costs between Chapter 9 and Proactive states ignore the state-contingent nature of these yield differences. Creditor protections are particularly important during economic downturns, due to the increased probability of municipal default. When we condition the yield differences on local economic conditions, we find that they become even more pronounced when local economic conditions worsen. Specifically, during these times, yields on municipal bonds in Chapter 9 states are 10.9 basis points higher than those in Proactive states. When state economic conditions are strong, however, there is no significant yield difference between these state types.

A common concern in municipal bond markets is the contagion effect, in which a default event in one municipal bond causes investors to change their risk perceptions of other municipal bonds in that state, leading to higher yields for those bonds. Risk perceptions change because information is often limited for individual municipalities due to minimal disclosure requirements and infrequent trading, and a default event provides new information about local economic conditions (Kidwell and

Trzcinka (1982)). However, we suspect that risk perceptions of municipal bonds in Proactive states following a default would remain largely unchanged because of the implicit insurance provided by the state.[1] There is no implicit insurance in Chapter 9 states, however, implying that a municipal bond default is more likely to affect risk perceptions about other bonds located in that state, leading to a contagion effect.

We examine whether a contagion effect exists in Chapter 9 and Proactive states and, if so, for what duration. First, within each state, we calculate the total par value of defaulted bonds in the previous quarter as a percentage of the total par value of municipal bonds outstanding. We then examine how this relates to other municipal bond yields in that state. In Chapter 9 states, we find that a 0.27 percentage point increase in the percentage of defaulted bonds by par value in the previous quarter (which represents the mean increase given that a default occurred in that state-quarter) leads to a 2.8 basis point increase in yields for other municipal bonds in that state. This contagion effect remains positive and significant for one year. However, there is no significant contagion effect in Proactive states at any horizon. Kidwell and Trzcinka (1982) and Kidwell and Trzcinka (1983) show that there was no significant long-term contagion effect on municipal bond yields following the New York City fiscal crisis in 1975. Our results are consistent with these findings as New York is classified as a Proactive state based on the programs they implemented during the New York City fiscal crisis.

After establishing the empirical regularities of municipal borrowing costs under different state policies for distressed municipalities, we examine whether states indeed engage in economic actions that are consistent with these policies. U.S. Census data suggest that Proactive states play an active role in assisting their municipalities, especially in times of distress. When state economic conditions are strong, the state-to-local intergovernmental revenue transfer as a percentage of total local government revenue is 1.5 percentage points higher in Proactive states compared to Chapter 9 states. However, when economic conditions are weak, this difference increases to 4.5 percentage

[1]For example, during the New York City financial crisis of 1975, the governor stepped in to provide aid to the city, citing concerns that without this aid, borrowing costs would increase in surrounding municipalities.

points. This further suggests that Proactive states play an active role in providing assistance to their municipalities, particularly when economic conditions are weak.

Finally, we provide suggestive evidence that the risk-sharing mechanism in Proactive states also generates a moral hazard problem. Using the local debt level as a proxy for the severity of this problem, we find that total local debt as a fraction of total local revenue is 7.5 percentage points higher in Proactive states than Chapter 9 states. This suggests that the downside protection provided by the state induces local municipalities to take on more risk in the form of higher levels of debt. In addition, this result rules out the possibility that yields are higher in Chapter 9 states because the local governments have higher leverage, as it is actually the Proactive states that have higher levels of debt.

To the best of our knowledge, our study is the first to examine municipal defaults at this level of detail, and to quantify municipal borrowing costs under different regimes of state government creditor protections. Furthermore, this is the first study to examine the effect of the default of municipal bond yields, which is fundamentally important for understanding how default risk affects municipal bond yields ex-post. Recent literature emphasizes the importance of default risk for municipal bond yields. Wang, Wu, and Zhang (2008) and Ang, Bhansali, and Xing (2014) examine the default risk, liquidity risk, and tax components of municipal bond yield spreads, and both studies find that all three components are priced. Schwert (2015) suggests that default risk is the most important driver of municipal bond yield spreads at the state and local levels, and that there is substantial cross-sectional variation in these spreads. We show that this cross-sectional variation can be partially explained by state policies for distressed local municipalities, which affects creditor protections and local credit risk. Ang and Longstaff (2013) find that state-specific sovereign credit risk plays a much more important role than systemic sovereign credit risk in explaining U.S. state credit default swap (CDS) spreads. Even in California, where the proportion of systemic sovereign credit risk is the highest among all states, more than 60% of the CDS spread comes from state-specific credit risk (see Table 5 in Ang and Longstaff (2013)). Our research expands on this by examining cross-state variation in state-specific credit risk resulting from state policies for financially distressed municipalities.

Additional research shows that events associated with a higher likelihood of distress lead to higher municipal bond yields. Capeci (1994) examines a sample of New Jersey municipal bonds and shows that an increase in the amount borrowed by the municipality is associated with an increase in yields on subsequent issuances. Cestau (2016) examines U.S. gubernatorial elections and finds that electing a Republican governor reduces CDS spreads in that state, which is associated with a lower probability of default. Novy-Marx and Rauh (2012) causally establish that pension losses during the 2008 financial crisis led to higher municipal bond yields within that state, as public pension promises are typically senior to state-issued municipal bonds due to constitutional guarantees or statutory laws that protect these promises. These papers emphasize that default risk is an important driver of cross-sectional variation in municipal bond yield spreads, and we provide evidence that protection of credit rights alleviates the effect of default risk on spreads.

The importance of distress-related state policies is also stressed in the law and public economics literature. Spiotto (2014) emphasizes that Chapter 9 debt adjustments should be a last resort after all alternatives for remedying local fiscal distress have been exhausted. Frost (2014) proposes that states authorize Chapter 9 bankruptcy on a conditional basis, stating that the increased use of Chapter 9 could have a negative impact on municipal economics, which can extend beyond the individual distressed municipality. Finally, Pew Charitable Trusts (2013) reviews state intervention programs for distressed municipalities and recommends a proactive, rather than reactive, approach for dealing with municipalities exhibiting signs of distress.

The rest of this paper is organized as follows. Section 2 outlines the methodology for classifying each state as Proactive, Chapter 9, or neither. Section 3 describes the data used in this paper, and the filters that we apply to the data. Section 4 presents summary statistics related to municipal bond defaults. Section 5 examines local municipal bond yields conditional on the type of state (Proactive, Chapter 9, Neither) that issued the bond. Section 6 examines potential contagion effects around municipal bond defaults. Section 7 examines the potential costs of being a Proactive state. Finally, Section 8 concludes.

2 State Policies for Distressed Municipalities

States have different mechanisms in place to deal with financially distressed municipalities. In this section, we categorize states into three mutually exclusive groups according to their policies for dealing with local distress. The three groups are Chapter 9 states, Proactive states, and Neither states. While the differences in these mechanisms are clearly important, the academic literature has not yet recognized them. Therefore, we will first spend some time discussing these mechanisms.

Chapter 9 States

When a municipality is financially distressed and unable to meet its debt obligations, it may file for bankruptcy in a federal court under Chapter 9. State policies regarding Chapter 9 access can be classified into one of three types: blanket authorization, de-authorization, and conditional authorization (Frost (2014)). We denote the first group of states as Chapter 9 states, as those are the states that have the most lenient authorization policies.

Chapter 9 states allow financially distressed municipalities to file under Chapter 9 without further restriction. In contrast, de-authorization states prohibit access to Chapter 9, while conditional authorization states grant access to Chapter 9 only under certain conditions. In our sample period of 1999 to 2010, there are 13 Chapter 9 states: Alabama, Arkansas, Arizona, California, Idaho, Minnesota, Missouri, Montana, Nebraska, Oklahoma, South Carolina, Texas, and Washington (Spiotto, Acker, and Appleby (2012)). For further details about municipal bankruptcy authorizations, see Appendix A.[2] These states have statutes in place that affirm unconditional Chapter 9 authorization for any qualifying governmental unit. For example, one South Carolina statute reads "...all appropriate powers are hereby conferred upon any county, municipal corporation, township, school

[2]This information was compiled from Spiotto, Acker, and Appleby (2012) and the Pew Charitable Trusts (2013).

district, drainage district or other taxing or governmental unit ... to institute any appropriate action and in any other respect to proceed under ... any existing act of the Congress of the United States ... relating to bankruptcy ... ” (S.C. CODE ANN. §6-1-10).

In these states, the policy of unconditional Chapter 9 authorization represents a relatively decentralized approach to local financial problems. Chapter 9 states typically do not have laws allowing states to intervene in municipal finances. By specifying unconditional authorization in their statutes, these states expressly leave it up to local governments to fix local financial problems.

Because Chapter 9 functions advantageously to debtors, the decentralized approach of blanket Chapter 9 authorization can be viewed unfavorably by bondholders. Specifically, once a municipality files for Chapter 9 bankruptcy protection, creditors cannot enforce any collection efforts on the debtor. Moreover, only the municipality has the right to submit debt adjustment plans to the court, and the creditors can only approve or disapprove the plans submitted by the municipality. Therefore, the creditors’ negotiation powers are much weaker under Chapter 9. The court’s powers are also much more limited under Chapter 9. For example, the court cannot change the plan submitted by the municipality, nor can it instruct an order that interferes with local governmental matters, such as an increase in local taxes (Kimhi (2008)).

Proactive States

The second group of states we consider is Proactive states. Some states have statutes allowing them to provide assistance to a municipality and intervene in its finances in the event of local financial distress. This assistance can include emergency loan provisions, revenue transfers, and technical support. In addition, the state will typically appoint a person or board that assesses the problem and makes recommendations to address the problem. Depending on the state, the appointee may even have the authority to control municipal finances (Pew Charitable Trusts (2013)). For example, when Pittsburgh was facing serious financial problems as a result of decade-long budget deficits in 2003, it entered the state’s Municipalities Financial Recovery Program, also known as Act 47

(City of Pittsburgh (2012)). The state appointed a coordinator who, after consulting with the city's creditors, came up with a multi-year financial recovery plan that was adopted by the city council in 2004. The state also charged the Intergovernmental Cooperation Authority (ICA), a state agency, with overseeing the city's finances to ensure that the city meets its financial obligations and improves spending practices. Later in 2004, the state approved tax revisions led by the ICA and based on the Act 47 recovery plan. As a result of the intervention, Pittsburgh achieved positive operating balances in 2005.

Some states have more systematic and aggressive programs than other states. Out of the twenty-two states that have some form of state program, we identify eight states whose municipal distress-related programs are stronger from the point of view of bondholders. We examine statutes on states' policies regarding distressed municipalities, and we consider a state to be "Proactive" if debt default triggers state intervention and if the state appointee has the authority to restructure municipal finances (Pew Charitable Trusts (2013) and Spiotto, Acker, and Appleby (2012)). The states classified as Proactive are Maine, Michigan, Nevada, New Jersey, New York, North Carolina, Ohio, and Pennsylvania. Table 1 summarizes the procedure for identifying the Proactive states. Because our sample period ends in 2010, changes in state programs after 2010 are not reflected in this table. For example, Rhode Island adopted a strong intervention program in June 2010 but is not identified as a Proactive state in our sample. For convenience, Appendix A provides a table of statutes related to state policies about distressed municipalities.[3]

Proactive state policies represent a relatively centralized approach to local financial distress. Therefore, restructuring processes via state programs reflect not only the concerns of the local government but also of the state. In particular, one common motivation for state intervention is to preserve the creditworthiness of the overall state (Pew Charitable Trusts (2013)). As such, bondholders are likely to be better protected under these proactive programs than under Chapter

[3]Interestingly, Proactive states also tend to monitor local finances effectively. Kloha (2005) reports that of the fifteen states that use indicators to monitor local financial conditions, only eight have indicators that are effective in detecting local distress. These eight states are Maryland, Nevada, New Hampshire, New Jersey, New York, North Carolina, Ohio, and Pennsylvania. Six of these states are considered Proactive.

9. For example, when Harrisburg was on the verge of missing its $3.3 million in bond payments in 2010, Pennsylvania provided the city with state aid to avoid default (McNichol (2010)).

It is worth noting that the programs in Proactive states do not directly prevent defaults and bankruptcies. For example, Michigan, New Jersey, New York, North Carolina, Ohio, and Pennsylvania authorize Chapter 9 as a last resort if the state appointee determines that bankruptcy is unavoidable. As such, past intervention episodes indicate how much loss the state is willing to force on bondholders to resolve local insolvency.

Neither States

The third group consists of twenty-nine states that are neither Chapter 9 nor Proactive states. We call these states "Neither states." This group does not have explicit state policies regarding local financial distress. We should also note that Neither states are not a homogenous group, in that some of these states are closer to being Proactive states, while others are closer to being Chapter 9 states. Massachusetts and Connecticut, for example, are Neither states that are closer to being Proactive states; these two states handle local distress cases on an ad-hoc basis and adopt policies similar to the nearby Proactive state of New York, even if they do not have official statutes in place for their local distress cases. Louisiana, on the other hand, is a Neither state that allows for Chapter 9 filings on a conditional basis, but it has no laws or statutes in place for assisting municipalities in times of distress, implying that it is closer to being a Chapter 9 state.

Geography of the State Policies

For convenience, Figure 1 provides a map of the United States that indicates the Chapter 9, Proactive, and Neither states. Interestingly, Proactive states tend to be clustered in the northeast, which tends to be more Democratic, while Chapter 9 states are mostly clustered in the southern and western states, which tend to be more Republican. California and Washington are exceptions to the general observation that Chapter 9 states are Republican; we suspect this is because these are frontier states, in which the municipalities were established before these states achieved statehood and have a history of operating more independently from the state government. U.S. territories, including Puerto Rico, are excluded from our analysis, as Chapter 9 bankruptcy protection is not available to U.S. territories.[4]

3 Data

We study yields around municipal bond default events utilizing several data sources. Information on municipal bond transaction-level prices and yields is provided by the Municipal Securities Rule-making Board (MSRB), which is a self-regulatory organization that writes rules regulating broker-dealers and banks in the U.S. municipal securities market. The data consist of all broker-dealer municipal bond trades for the period 1999 to 2010. Each observation includes the bond price, yield, par value traded, and whether the trade was a customer purchase from a broker-dealer, customer sale to a broker-dealer, or an interdealer trade.

A number of papers make use of credit default swap (CDS) data to study sovereign risk at the country and state levels (Ang and Longstaff (2013), Cestau (2016), Longstaff, Pan, Pedersen, and Singleton (2011)). The main advantage of CDS data is that CDSes have better liquidity than municipal bonds, and therefore fewer measurement errors. On the other hand, not every state or local government has a well-populated, long time series of CDS spreads. For this reason, we choose to use bond yield spreads instead of CDS spreads. We also make use of offering yield spreads in our main tests, which do not have illiquidity problems due to thinly traded secondary markets.

Our second source of data is the Mergent Municipal Bond Securities Database. This database is used to identify the attributes of each bond contained in the MSRB database. Specifically, for each

[4]Puerto Rico is currently experiencing a municipal debt crisis due to excessive issuance of municipal bonds. These bonds were popular among municipal bond investors because of their triple tax-exempt status (federal, state, and local). Congress is currently debating whether to extend Chapter 9 bankruptcy protection to U.S. territories. The Chair of the Federal Reserve, Janet Yellen, made it clear in June 2016 that the Federal Reserve would not rescue Puerto Rico if it is unable to pay its bills (Gandel (2016)). Related to this, Ang and Longstaff (2013) suggest that there is no guarantee that the Federal government will bail a state out if the state defaults.

bond, the Mergent database provides its issue series, state of issuance, issuance date, maturity date, coupon rate, bond size, and sector, as well as bond ratings from Moody's and Standard & Poor's (if the bond is rated). It also provides information about whether the bond is general obligation, insured, callable, and puttable.

We also collect municipal bond default information from the Bloomberg Default Event Calendar for the period 1999 to 2010. Bloomberg uses the reports to bondholders that originate directly from the trustee of the bondholders, who in turn receives a message from either the issuer or the guarantor of the issuer. Default events include both technical and monetary defaults. This includes missing a bond payment (interest or principal), withdrawal from the reserve fund, bondholder meetings to discuss (or reschedule) a scheduled payment that cannot be made, and other covenant violations (such as the debt service ratio falling below a required minimum threshold). Altogether, there are 2,063 municipal bonds originating from 679 issues that experienced at least one default event in our sample period. This information is merged with the MSRB and Mergent databases.[5]

We study municipal bond yields around default events at the monthly level. The MSRB database consists of intraday municipal bond transactions. To convert this database to a monthly frequency, we calculate the average yield of all customer buy transactions within each bond-month, weighted by the par value traded.

If a municipal bond is contained in the MSRB database but not the Mergent database, it is excluded. We also exclude municipal bonds with fewer than ten transactions, a maturity of more than one hundred years, a variable coupon rate, or bonds that are subject to federal taxes. We only include bonds that are issued in U.S. states, and not those issued in U.S. territories, as state-issued bonds are more likely to be subject to Proactive or Chapter 9 policies. To mitigate the effect of outliers, we exclude any transactions from the MSRB database that have non-positive yields or yields greater than 50 percentage points. We also exclude state-issued general obligation bonds

[5]It is important to point out that default events do not necessarily progress to municipal bankruptcy events. While we have several thousands of default events during our sample period, there were fewer than 150 cases of municipal bankruptcies, according to Public Access to Court Electronic Records (PACER).

from our main analysis, as state policies generally apply to municipal bonds issued at the local level. After applying these filters and aggregating trades into bond-month observations, we are left with a final sample of 5,307,584 bond-month observations.

4 Summary Statistics

Panel A of Table 2 contains summary statistics for the municipal bonds in our sample. There are 416,631 bonds that did not experience a default event (about 99.5% of all municipal bonds); we call these non-default bonds. Within these non-default bonds, there are 25,554 issues. The average par value of a municipal bond is $6.69 million, with an average maturity of 13.82 years. The average issue size is $100 million, while the median issue size is $33.54 million. The average offering yield of these bonds is 4.49%. About 10% of these bonds are considered "conduit" bonds, which are bonds sold by the local government on behalf of a non-governmental third party, where the funds generated by the third party are used to repay the bond. Practitioners often call conduit bonds "corporate munis," as they have characteristics that are similar to corporate bonds. Conduit bonds are excluded from our analyses, with the exception of Sections 5.2-5.4, where we use them for falsification tests. Sixty-one percent of non-default bonds are insured. Eighty percent of these bonds are classified as investment grade and the remaining 20% are unrated. Forty-two percent of these bonds are general obligation, meaning they are backed by the full faith and credit of the issuing municipality. Finally, 62% of these bonds are callable, meaning the municipality has the right to repurchase the bonds it issued at a pre-specified price, starting on a pre-specified date.

For comparison purposes, Panel A also reports summary statistics for municipal bonds that experienced at least one default event, which we call default bonds. Altogether, there are 2,063 default bonds, which comprise approximately 0.5% of all municipal bonds in our sample. The number of default events is consistent with what the Federal Reserve Bank of New York (FRBNY) reports, but significantly greater than what both Standard & Poor's (S&P) and Moody's report.

The difference arises because rating agencies only focus on rated bonds.[6] In our sample, the total par value of defaulted but unrated issues represents 60.8% of the par value of all defaulted issues. Another reason for this difference is that we focus on defaults at the issuance level while Moody's and S&P report default information at the issuer level, which may contain multiple issuances.

Within our sample of defaulted bonds, there are 679 issues. The average par value of these bonds is $9.82 million, which is about 47% higher than the average par value for non-default municipal bonds ($6.69 million). Furthermore, the average issue size of default bonds is $52.82 million, which is close to 50% less than the average issue size of non-default bonds ($100 million). This is likely because these bonds have a higher tendency to be unrated (69%, versus 20% for non-default bonds), which implies that it is more difficult to attract many investors on a per-bond basis. Default bonds also have a longer average time to maturity (18.98 years) and have a higher tendency to be callable (78%).

A higher percentage of default bonds are conduit (59%), meaning that conduit bonds default more often. This is unsurprising, as conduit bonds are backed by cash flows from a non-governmental third party entity, and not by cash flows from a municipality with a typically reliable tax base. Twenty-seven percent of default bonds are insured, 22% are investment grade, and 4% are general obligation. All of these numbers reflect the increased riskiness of these bonds, even before a default occurs. Reflecting this, the average offering yield of default bonds is 6.08%, which is 1.59 percentage points higher than the average offering yield of non-default bonds (4.49%). In our tests later in the paper, we make sure to control for these bond characteristics.[7]

[6] For instance, Moody's reports that its rated municipal bonds defaulted only 71 times from 1970 to 2011. Similarly, S&P indicates that its rated municipal bonds defaulted only 47 times from 1986 to 2011. See "The Untold Story of Municipal Bond Defaults" by Appleson, Parsons, and Haughwout, available from libertystreeteconomics.newyorkfed.org/2012/08/the-untold-story-of-municipal-bond-defaults.html.

[7] Out of the 2,063 bonds that experienced a default event, 1,958 (94.9%) traded after default. In the year following a default, on average, a bond trades 3.4 times, 8.0 times, and 3.7 times in Chapter 9, Neither, and Proactive states, respectively. While the average number of trades in Neither states seems much higher, the medians are much more comparable, suggesting that the relatively high average in Neither states is driven by outliers. Regarding the post-default trading horizon, on average, the first trade for a defaulted bond occurs 5.7 months, 6.6 months, and 5.6 months after default in Chapter 9, Neither, and Proactive states, respectively. Overall, we do not observe significant differences in post-default trading frequencies or trading horizons across state types.

We also break down non-default and default municipal bonds into nine sectors: Education, Healthcare, Housing, Improvement/Development, Public Service, Recreation, Transportation, Water/Sewer, and Other. Panel B of Table 2 reports statistics related to the sector. For non-default bonds, the three most frequently observed sectors are Education (31.8%), Improvement/Development (30.3%), and Water/Sewer (14.3%). In contrast, for default bonds, the most frequently observed sectors are Improvement/Development (25.5%), Healthcare (19.8%), and Housing (18.7%).

Why are defaults more prevalent in these latter three categories? It is likely because bonds from these categories tend to be more speculative investments, backed by cash flows that have greater uncertainty. Improvement/Development bonds are typically used to develop residential and commercial zones in that municipality, and the cash flows are backed by tax revenues from the residents and businesses that are expected to occupy those zones. Housing bonds are typically used to develop housing projects in lower-income areas, and these cash flows are subject to local economic conditions, highly variable revenues and costs, and potential mismanagement. Similarly, healthcare bonds are used to develop local hospitals and assisted living facilities, which are also subject to the same uncertainties.

Figure 2 provides information about aggregate municipal defaults over time. The upper panel plots the annual number of municipal defaults and the lower panel plots the annual total par value of municipal defaults. Both panels cover the years 1999 to 2010 for non-conduit and conduit municipal bonds separately. According to these panels, default activity seems to be higher in the early and late 2000s, both of which were periods of economic contraction in the U.S. In addition, we find for most years that the number of conduit defaults exceeds the number of non-conduit defaults, reflecting the relative riskiness of these bonds. The panels together also seem to suggest that the defaults in the first half of the sample period are on average of smaller size. In unreported results, we find that the top five states by the mean par value of defaulted bonds as a percentage of the total amount outstanding are LA, AL, MT, GA, and CT. It is possible that this partially reflects the fact that these states are smaller in size and thus have lower total par amounts of municipal bonds outstanding. If we rank the states by the number of quarters in which as least one default has occurred, we have CA, TX, FL, AL, and MO. Given the frequency with which distressed municipalities in CA tend to make the news, we are unsurprised that it is ranked the highest by this metric.

A potential selection bias concern is that municipal bond attributes will differ by state type. To address this concern, we report municipal bond summary statistics by state type in Panel A of Table 3. For the most part, the differences in municipal bond attributes between Chapter 9 and Proactive states are minimal. Both states have a similar proportion of investment grade, unrated, and insured bonds, and the mean bond par value and maturity are also similar. The main differences are that Proactive states tend to have more bonds per issue, higher issuance sizes, and a slightly higher proportion of general obligation bonds (51% in Proactive states versus 40% in Chapter 9 states). Based on these results, it is unlikely that different bond types will be self-selected into different state types in equilibrium in a way that significantly affects our analysis.[8]

The main purpose of our paper is to examine municipal bond yield spread changes around default events, and how these changes differ depending on whether the bond is located in a Proactive state, Chapter 9 state, or neither. Panel A of Table 4 contains information about the number of municipal bond defaults within each of these three state types. We separate municipal bonds into two categories: non-conduit and conduit. Non-conduit bonds are backed by their respective municipalities, which are more likely to have the option to declare Chapter 9 bankruptcy and be subject to state intervention policies. On the other hand, conduit bonds are backed by non-governmental third parties, which do not have the option to declare Chapter 9 bankruptcy and are unlikely to be subject to state intervention policies. Within Chapter 9 states, there are 443 non-conduit default events, while for Proactive states, there are 123 default events. On a default-per-state basis, this implies there are about 34 non-conduit default events per state for Chapter 9 states (443 default events divided by 13 states) and 15 default events per state for Proactive

[8]Panel B of Table 3 reports distributional statistics for state-level variables. These variables will be important for tests later in the paper (starting in Section 6), and we will refer back to this panel later.

states (123 default events divided by 8 states). Panel B of Table 4 reports the average fraction of bonds that experienced a default event within each state type. In Chapter 9 states, 0.38% of bonds experienced a default event, while in Proactive states, only 0.16% of bonds experienced a default event. On a per-state basis, these numbers imply that defaults are less likely to occur in Proactive states, which makes sense, given that Proactive states have laws designed to allow them to intervene and assist a municipality when it is exhibiting signs of distress.

5 Municipal Bond Yields and State Policies

We first examine how a default event affects the yields of local municipal bonds, and condition this event on whether these bonds were issued in a Chapter 9 or Proactive state. The independent variable of interest is $Default$, which is an indicator variable that equals one if the bond previously experienced a default event and equals zero otherwise. The dependent variable we use throughout our analyses is the yield spread (y), which is defined as the difference between the municipal bond yield and the yield on an equivalent risk-free bond.[9] We obtain U.S. treasury yields from the Federal Reserve Board website. Specifically, the Federal Reserve Board provides daily parameters with which to calculate the entire U.S. treasury yield curve, where the functional form for the curve, based on Nelson and Siegel (1987) and Svensson (1994), is as follows:

$$TYield(D) = \beta_0 + \beta_1 \left(\frac{1 - e^{-D/\tau_1}}{D/\tau_1} \right) + \beta_2 \left(\frac{1 - e^{-D/\tau_1}}{D/\tau_1} - e^{-D/\tau_1} \right) + \beta_3 \left(\frac{1 - e^{-D/\tau_2}}{D/\tau_2} - e^{-D/\tau_2} \right). \quad (1)$$

In this equation, $TYield(D)$ is the yield on a treasury bond with duration D and $(\beta_0, \beta_1, \beta_2, \beta_3, \tau_1, \tau_2)$ is the daily set of parameters provided by the Federal Reserve Board. For more details about the functional form and daily parameters, see Gürkaynak, Sack, and Wright (2007).

In addition to default indicators and state type indicators, we also control for bond charac-

[9] We calculate the yield on an equivalent risk-free bond in year-month t as follows. First, we calculate the sum of the present value of future cash flows from the municipal bond using the U.S. Treasury yield curve to discount the cash flows. This gives the price of the equivalent risk-free bond; we then use this price to calculate the yield-to-maturity of this bond. This is similar to the yield spread calculation in Longstaff, Mithal, and Neis (2005).

teristics and state economic conditions. Specifically, we include ratings controls by assigning an indicator variable to each possible rating assigned by Moody's (we use the S&P rating when the Moody's rating is not available). If all of the ratings indicator variables equal zero for a specific bond, then that bond is unrated. We also include controls for time to maturity (TTM), inverse time to maturity (Inverse TTM), and whether the bond is insured, general obligation, callable, and puttable. For callable and puttable bonds, yields are dependent on how much time is remaining until the first exercise date, so we also interact the callable and puttable indicator variables with time-to-first-exercise and its inverse (these variables equal zero if the transaction date is after the first exercise date). We also include an indicator variable for whether the municipal bond is pre-refunded, in which case the bond is secured by high-credit-quality investments (typically U.S. Treasuries). Similar control variables are employed in Butler, Fauver, and Mortal (2009) and Bergstresser, Cohen, and Shenai (2011). Based on Schultz (2013), who examines the market segmentation of municipal bond markets, we control for states that tax in-state and out-of-state municipal bonds equally (Equal Tax). We also include (log) bond size as a proxy for liquidity, as in Bergstresser, Cohen, and Shenai (2011); Longstaff (2011) emphasizes that the liquidity premium is an important component of municipal bond prices, and suggests that the municipal bond puzzle (in which yield-implied marginal tax rates are much lower than the statutory rates) is likely due to the liquidity premium. Finally, we include the three-month growth in the state coincident index (Coincident Index) from the Federal Reserve Bank of Philadelphia, which is designed to capture economic conditions in that state. The state coincident index encompasses payroll employment, hours worked in manufacturing, unemployment, and wage and salary disbursements in that state.

5.1 Baseline Results

To determine how default events affect municipal bond yields, we estimate the following regression, which is similar to specifications found in Butler, Fauver, and Mortal (2009) and Novy-Marx and

Rauh (2012):

$$\begin{aligned} y_{it} \quad = \quad & \beta_0 + \beta_1 \cdot Default_{it} + \beta_2 \cdot (Default_{it} \times Ch.9_i) + \beta_3 \cdot Ch.9_i + \\ & \beta_4 \cdot (Default_{it} \times Proactive_i) + \beta_5 \cdot Proactive_i + \\ & \gamma' Y_{it} + \delta_t + \varepsilon_{it}. \end{aligned} \tag{2}$$

This regression utilizes all bond-month yields in our sample period, with a small number having defaulted. In this specification, i denotes the municipal bond, t denotes the year-month, and δ_t denotes year-month fixed effects. We also double-cluster standard errors by issue and year-month. β_2 and β_4 are intended to capture the incremental effect a municipal bond default has on the yield if the bond was issued in, respectively, a Chapter 9 or a Proactive state. β_3 and β_5 are used to capture ex-ante effects on the yield that are due to being located in one of these state types.

The results are reported in Table 5. According to the first column, a default event increases the secondary municipal bond yield by 5.6 percentage points, unconditioned on the state type. In the second column, we condition on state type. We find that, following a default event in a Chapter 9 state, the secondary municipal bond yield increases by 6.5 percentage points, implying that investors expect higher losses due to the relative ease of declaring Chapter 9 bankruptcy for a municipality in that state. In a Proactive state, however, a default event only increases the yield by 3.9 percentage points, which represents a statistically significant difference of about 2.6 percentage points between those two state types. Finally, if the bond is insured, the yield increases by 1.0 percentage points following a default event.

Our results also indicate that investors ex-ante prefer municipal bonds issued in Proactive states to those issued in Chapter 9 states, all else being equal. According to the second regression column, secondary municipal bond yields in Chapter 9 states are 7.1 basis points higher than those in Proactive states. To put this in context, according to the second column of Table 5, the spread between Ba1-rated and Aaa-rated municipal bonds in our sample is 47.1 basis points. Municipal bond yields in Chapter 9 states are 7.1 basis points higher than those in Proactive states, which represents approximately 15.1% of this default spread. Therefore, our results indicate that investors require economically significant yield compensation when purchasing a municipal bond in a state in which the borrower can unconditionally file for Chapter 9 bankruptcy.

The control variable coefficients are as expected. Yields for general obligation bonds are lower because they are backed by the full faith and credit of the issuing municipality; shortfalls can be covered, for example, by raising local taxes. Bonds with a longer time to maturity have higher yields because they are subject to a higher interest rate risk and inflation risk. Yields are 11.0 basis points lower for bonds that have insurance, indicating that bonds that issuers choose to insure benefit from having insurance (for related results about municipal bond insurance, see Nanda and Singh (2004) and Wilkoff (2013)). Bonds in Equal Tax states have higher yields, which is consistent with Schultz (2013). Larger-sized bonds have lower yields, as these bonds are likely to be more liquid. In unreported results, we find that bonds with higher ratings have lower yields, and that callable bonds have higher yields, particularly when there is a longer time until the right to first exercise, to compensate for the valuable option embedded in the bond for the seller. Similarly, puttable bonds, which give the holder the right to sell his bond back to the issuer before the maturity date, have lower yields because of valuable option embedded in the bond for the buyer.[10] Finally, we include the past three-month growth in the state coincident index and find that when it is one percentage point higher (lower), municipal bonds in that state have yields that are 3.6 basis points lower (higher).

We have established that the yield reaction following default in Proactive states is much lower compared to the reaction in Chapter 9 states. However, it is possible that this reflects a longer delay between the onset of financial distress and the actual default event in Proactive states. One way to address this possibility is to set the default event indicator variable equal to one starting one

[10]The relationship between the bond's yield and its embedded options is complex and depends non-linearly on time to first exercise and other bond characteristics. Therefore, we retest the above regression model by conditioning on bonds without embedded call or put options. Our main results remain robust to this alternative specification.

year before the actual default event, so that distress-related information prior to the default event is taken into account. When we retest the regression model above using this alternative default event indicator variable, we find (in unreported results) that the yield reaction is 2.2 percentage points higher in Chapter 9 states than in Proactive states, compared to the 2.5 percentage point difference from the baseline regression in the second regression column of Table 5. However, this 0.3 percentage point difference is not significant at any conventional significance level, indicating that the difference in post-default yield reactions between Proactive and Chapter 9 states is not due to a systematic delay in the onset of default events in the Proactive states.

Many over-the-counter traded fixed income securities are illiquid, which makes precise measurement of their performance surrounding event windows challenging (Bessembinder, Kahle, Maxwell, and Xu (2009)). This is also the case for the municipal bonds (Harris and Piwowar (2006)). Therefore, to address this concern directly, we also examine the effects of Chapter 9 and Proactive state policies on municipal bond offering yields, as opposed to the secondary market yields. To do so, we test the same specification above, except that y_{it} is now defined as the difference between the offering yield for bond i in issuance month t and the yield on an equivalent risk-free bond. (We also exclude the Default indicator as an independent variable, since these bonds are newly-issued.)

Column (3) of Table 5 reports the results of this regression. We find that offering yields in Chapter 9 states are 1.3 basis points higher than those in Proactive states. These results also indicate that the Chapter 9 and Proactive coefficients are positive and significant, suggesting that the Neither states have the lowest ex-ante offering yields. It is important to re-emphasize here that Neither states exist on a spectrum, in that some of these states are closer to being Proactive states, while others are closer to being Chapter 9 states. As mentioned earlier, Massachusetts and Connecticut are examples of Neither states that are closer to being Proactive states, as they handle local distress cases on an ad-hoc basis and adopt policies similar to the nearby Proactive state of New York, even if those states do not have official statutes in place for these local distress cases. In addition, there was only one Chapter 9 filing in Virginia, and that case was dismissed, suggesting that this state is closer to being Proactive than Chapter 9. If we run the same offering yield regression with Massachusetts, Connecticut, and Virginia included as Proactive states (for this test only), we find (in unreported results) that the yield difference between Chapter 9 and Proactive states is 3.0 basis points and significant at the one-percent level. Furthermore, the coefficient on the Proactive state indicator variable is negative and significant, while the coefficient on the Chapter 9 state indicator variable is positive and significant. This is similar to the results of our secondary yield regressions.

5.2 Identification Strategy 1: A Falsification Exercise

In general, it is difficult to confidently distinguish the effects of state policies on distressed municipalities from the effects of state characteristics that have nothing to do with state policies, particularly because of the large geographic dispersion between many of these states. Ideally, we would like to have states that are randomly treated into Chapter 9 versus Proactive state types. Unfortunately, during our sample period from 1999 to 2010, we do not have such events. Moreover, as shown by Rossi and Yun (2015), state-level adoption of municipal bankruptcy laws itself is not random. Therefore, we adopt alternative identification strategies.

Our first identification strategy exploits the setting in which some municipal bonds are not affected by state policies for distressed municipalities. In particular, as a falsification exercise, we test the same specification as before, but for conduit municipal bonds only. These bonds, which are sometimes referred to as "corporate munis," are sold by the local government on behalf of a non-governmental third party, and the funds generated by the third party are used to repay the bond. These bonds have similar cash flow streams to comparable revenue-based municipal bonds, including the tax deductibility for interest payments.[11] The main difference is that the cash flows

[11] Typically, in the event of a conduit municipal default, the government is not held responsible. For example, K-Mart, a massive retail franchise, built approximately 96 stores in various locations and funded these with conduit bonds issued by the local governments on their behalf. These bonds would be backed by revenues generated by those stores. When K-Mart filed for bankruptcy protection in 2002, it defaulted on many of these bonds. The local governments were not responsible for these defaults, although they might have indirectly suffered negative consequences from being associated with the defaults.

from conduit municipal bonds are backed by non-governmental third parties who do not have access to the Chapter 9 bankruptcy procedure and are not subject to proactive assistance from the state. Therefore, unlike regular municipal bonds, there should be no difference between conduit municipal bond yields in Proactive and Chapter 9 states.

The results are reported in the last two columns of Table 5. The first of these two columns indicates that if a conduit bond experiences a default event, and we do not condition on state type, then its yield spread increases by 3.9 percentage points. The last column conditions on state type and provides evidence that there is no significant incremental effect following a default if the conduit bond is located in a Chapter 9 or Proactive state, which makes sense given that conduit bonds cannot file for Chapter 9 bankruptcy protection, and given the high likelihood that state intervention policies do not affect yields ex-post. Ex-ante, there is also no difference in yields for Chapter 9 states versus Proactive states. Therefore, we find that conduit bonds issued in any state do not have significantly different yields, unlike regular municipal bonds, which do have higher yields in Chapter 9 states.

5.3 Identification Strategy 2: Geographic Proximity

Holmes (1998) confronts a similar identification challenge when he studies "right-to-work" laws and economic activity. His identification strategy is to compare bordering counties in states with different laws. Inspired by Holmes (1998), to further strengthen our identification, we first examine yield differences between counties on the border of North Carolina and South Carolina. North Carolina is a Proactive state and South Carolina is a Chapter 9 state. According to Holmes (1998), these states have similar right-to-work laws. Furthermore, the total populations of the border counties are similar. Because of the close geographic proximity of these counties, any differences in yields between counties north and south of this border can be more readily attributed to the differences in their state's policies regarding distressed municipalities. Figure 3 provides a map of North and South Carolina counties, with the border counties highlighted in orange (South Carolina) and blue (North Carolina).

We test a regression model similar to the one used before, except that we only include municipal bonds from these border counties.[12] The results for secondary market yields and offering yields are reported in columns (1) and (2), respectively, of Table 6. The evidence indicates that secondary market yields in the North Carolina border counties are 10.7 basis points lower than the yields in the South Carolina border counties. Similarly, offering yields in the North Carolina border counties are 8.3 basis points lower.

It is possible that these yield differences are being driven by other differences specific to the North Carolina-South Carolina border. Therefore, to further strengthen our identification, we include eleven more state pairs: Oregon-Washington, Wisconsin-Minnesota, Illinois-Missouri, Michigan-Indiana, Ohio-Indiana, Pennsylvania-Maryland, North Carolina-Virginia, Georgia-South Carolina, New York-Vermont, New York-Massachusetts, and New York-Connecticut. The first state in each pair is considered more proactive than the second state in the pair, in that either the first state is a Proactive state and the second state is not, or the first state is a Neither state and the second state is a Chapter 9 state.

We utilize a pooled regression with control variables similar to the ones used before, along with state-pair fixed effects, to test whether yields are significantly lower in the more proactive states. Columns (3) and (4) of Table 6 report the results for secondary market yields and offering yields, respectively. We find that, on average, secondary market yields are 6.1 basis points lower in the more proactive states, while offering yields are 6.8 basis points lower. This indicates that a systematic yield difference exists across many state pairs.[13]

Finally, we examine conduit bond yields across these twelve state pairs. As discussed in the previous subsection, there should be no significant difference in border county yields for conduit

[12]To control for potential differences in county characteristics, we also include the following county-level control variables: annual population growth, annual log of per capita income, annual house price growth, quarterly real wage growth, quarterly growth in the number of business establishments, and monthly employment growth.

[13]Cestau (2016) provides evidence that state-level municipal default risk is lower when the governor is Republican; our results remain robust if we control for Republican governorship within each state.

bonds because these bonds are not subject to Proactive state policies and do not have access to Chapter 9 bankruptcy. Column (5) of Table 6 reports the results for conduit bond yields on the secondary market, and we find that there is no significant difference in conduit bond yields for the border counties. This falsification test further strengthens our finding that Proactive state policies are associated with lower municipal bond yields.

5.4 Recovery Rates

The post-default yields from the secondary market can be used to infer the expected recovery rates for defaulted bonds. This is useful for examining the extent to which Proactive state policies provide ex-post support for their distressed municipalities. We calculate the market-implied recovery rate as follows. First, for each defaulted bond, we obtain its last transaction price in the post-default period; we use the last transaction price because it is likely to contain the most information about the ultimate recovery rate of the bond. Following this, we use the U.S. Treasury yield curve to calculate the present value of the future payments from this bond on its last transaction date; this present value calculation represents the price of a risk-free bond with an equivalent coupon payment structure and time to maturity. Then, we divide the last transaction price of the defaulted bond by this risk-free price to obtain the market-implied expected recovery rate.

Summary statistics for the market-implied recovery rates of defaulted bonds are reported in Table 7. According to Panel A, the mean implied recovery rate in our sample of defaulted non-conduit bonds for all states is 70.5%; this is similar to the mean recovery rate of 65.0% reported in Moody's (2012) for the years 1970 to 2011.[14] Separating by state type, we find that the recovery rate for defaulted non-conduit bonds in Proactive states is 79.1%, while it is only 67.0% for defaulted bonds in Chapter 9 states, a difference of 12.1 percentage points. To test whether this difference is statistically significant, we run a pooled regression containing all defaulted bonds, using the recovery rate as the dependent variable and the Proactive and Chapter 9 indicators as the key

[14] Defaulted municipal bonds typically have higher recovery rates than defaulted corporate bonds. Moody's (2012) reports that the mean recovery rate for corporate senior unsecured bonds is 49.0% for the years 1987 to 2010.

independent variables.[15] In unreported results, we find that the difference between recovery rates in Proactive states and Chapter 9 states is positive and statistically significant (p-value=0.014).

Conduit bonds are not subject to Proactive states' policies and do not have access to Chapter 9 bankruptcy. Thus, mean recovery rates for defaulted conduit bonds in Proactive states and Chapter 9 states should not be significantly different. According to Panel B of Table 7, the mean recovery rate for defaulted conduit bonds in Proactive states is 67.3%, while it is 66.3% for defaulted bonds in Chapter 9 states, a difference of 1.0 percentage points; using a similar regression test, we find that this difference is statistically insignificant (p-value=0.603). This test further suggests that recovery rates are positively affected by ex-post Proactive state support. Finally, Panel C reports the mean difference between non-conduit and conduit bond recovery rates within each state type. We find that the difference between non-conduit and conduit bond recovery rates in Proactive states is positive (11.8 percentage points) and statistically significant at the five percent level, while in Chapter 9 states, the difference is not significantly different from zero. One interpretation of this result is that Proactive state policies have a significant effect on post-default recovery rates. Our methodology for classifying Proactive states is largely based on the support that these states provide to their municipalities following signs of financial distress, and our evidence of higher recovery rates in Proactive states is consistent with this classification.

5.5 Time-series Variation in Differences in Yields Spreads

Gandhi and Lustig (2015) provide evidence showing that the expected return difference between small and large banks widens as the probability of financial disaster increases. This is because the government guarantees granted to stockholders of "too-big-to-fail" banks essentially represent put options that are closer to being "in-the-money" when economic conditions are weak. Municipal bonds in Proactive states can similarly be thought of as having put options that become more

[15] To account for the possibility that recovery rates may be related to bond characteristics and general economic conditions, we control for year fixed effects, duration, and whether the bond is insured, callable, and rated. Because the recovery rate is bound between zero and one, we also apply a logit transformation to this variable for the regression test.

valuable as local economic conditions worsen, as Proactive state governments are more likely to provide assistance to their distressed municipalities. In contrast, Chapter 9 states provide none of these tail risk subsidies during weak economic times, instead allowing unconditional access to the Chapter 9 bankruptcy procedure. Therefore, much like the expected return gap between small and large banks in Gandhi and Lustig (2015), we expect the yield gap between Proactive and Chapter 9 states to be wider when economic conditions worsen.

To address this conjecture, we regress secondary municipal bond yields on the following interaction terms: $Coincident\ Index \times Ch.9$ and $Coincident\ Index \times Proactive$ (along with the control variables from before). If yields vary more with local economic conditions in Chapter 9 states, then we should see a negative and significant coefficient on the former interaction term. For context, summary statistics for coincident index growth are provided in Panel B of Table 3.

The results are reported in Table 8. The first column shows that a one standard deviation decrease in coincident index growth (0.94%) is associated with a 1.2 basis point increase in municipal bond yields in Proactive states. However, if the municipal bond was issued in a Chapter 9 state, then a one percentage point decrease in coincident index growth is associated with a 9.0 basis point increase in municipal bond yields in that state.

In fact, this increased sensitivity to economic conditions in Chapter 9 states primarily manifests in "bad times," which we define as an indicator variable that equals one if the coincident index growth is less than its median (0.38 percentage points), and zero otherwise. Similarly, "good times" is an indicator variable that equals one if the coincident index growth is greater than or equal to 0.38 percentage points, and zero otherwise. According to the second column in Table 8, yields are 10.9 basis points higher in bad times in Chapter 9 states compared to Proactive states, but are not significantly different in good times. This evidence indicates that the yield difference between municipal bonds in Proactive states and Chapter 9 states is wider when economic conditions are weak, reflecting the tail risk subsidies provided by Proactive states to their local municipal bonds during these times.

6 Contagion Effects

A major concern in municipal bond markets is the "contagion effect," in which a default event in one municipality is correlated with yield increases for bonds in other municipalities. This is a standard statistical definition often seen in the corporate bankruptcy literature (for example, Lang and Stulz (1992) and Jorion and Zhang (2007)). The literature attributes the contagion effect to a number of causes such as counterparty default risk, updating of beliefs, and correlation risk. For municipal bonds, while all of these factors may play a role, we think that the updating of beliefs is particularly relevant. In particular, investors may change their risk perceptions of other municipalities within a state following a default in the same state, leading to higher yields for those municipalities. Risk perceptions change because information is often limited for individual municipalities due to minimal disclosure requirements and infrequent trading, and a default event provides new information about local economic conditions (Kidwell and Trzcinka (1982)). While a default event in a Proactive state will lead to a change in the risk perceptions regarding the fundamentals of the local economy, the Proactive state's measures mitigate creditors' concerns that these weak fundamentals will affect their repayments from other municipalities in that state.

Several high profile cases of municipal distress suggest that state policy can be influenced by contagion concerns. Harrisburg, PA was financially distressed in 2010, and the state advanced $4 million in loans so that Harrisburg could avoid default. Then-Governor Edward Rendell cited contagion concerns, stating that missing a bond payment "would devastate not only the city, but the school district, the county, and central Pennsylvania" (Singer (2010)). During the New York City fiscal crisis of 1975, the governor stepped in to provide aid to the city, citing concerns that without this aid, borrowing costs would increase in surrounding municipalities. Yields in New Jersey municipalities increased in 2014 after Governor Chris Christie appointed Kevyn Orr as the emergency manager of Atlantic City, which was in economic distress and had $344 million in municipal debt outstanding. Previously, Orr was appointed as emergency manager of Detroit; under his management, the city filed for Chapter 9 bankruptcy. According to Moody's, under the settlement agreement in the bankruptcy, municipal bondholders recovered 25% of what they were owed. Moody's downgraded Atlantic City debt to "Caa1" in 2014, citing the appointment of Orr, and this in turn adversely affected yields in New Jersey's 565 municipalities. Orr's appointment suggested that New Jersey had become more open to Chapter 9 bankruptcy filings.

The purpose of this section is to examine whether a contagion effect exists in municipal markets and, if it does, to determine: (1) the duration of the contagion effect, and (2) whether it is more pronounced in Chapter 9 or Proactive states.

To examine potential contagion effects, we first calculate the total par value of defaulted bonds within each state-quarter, and divide this by the total par value of all bonds within that state-quarter. We denote this variable as $PCTDEF_{q-k}$ (percentage default), where $q-k$ denotes the lagged quarter relative to the yield in month t. Bonds that have previously defaulted are excluded from this analysis. Then, for bonds within each state type (Chapter 9, Proactive, Neither), we run the following regression using secondary municipal bond yields as the dependent variable:

$$y_{it} = \beta_0 + \sum_{k=1}^{4} \beta_k \cdot PCTDEF_{i,q-k} + \gamma' Y_{it} + \delta_t + \varepsilon_{it}, \tag{3}$$

where all other variables are defined as before. To provide context, summary statistics for $PCTDEF$ (conditional on at least one default having occurred in that state-quarter) are provided in Panel B of Table 3.

The regression results are reported in Table 9. For each state type, we run the regression using only the $PCTDEF$ from the previous quarter, and then again for the previous four quarters. We do find evidence of a contagion effect in Chapter 9 states, but not in Proactive states. Specifically, in Chapter 9 states, we find that a 0.27 percentage point increase in $PCTDEF$ in the previous quarter (the mean $PCTDEF$ given that at least one default occurred in that state-quarter) is associated with a 2.8 basis point increase in yields for other bonds in that state. As shown in column (2), this effect persists for one year. Neither states have a similar, but milder, contagion effect. Proactive states, in contrast, do not experience any contagion effect at any lag, with the exception of a negatively significant coefficient at the third lag (although we still find that the four coefficients are jointly insignificant from zero). Therefore, our evidence indicates that contagion is significant in Chapter 9 states, but not in Proactive states.

Together, the results in Tables 8 and 9 demonstrate robustness from reverse causality. The evidence in Table 8 shows that municipal bond yields in Proactive states are less sensitive to the state's economic conditions. However, it is possible that local exposure to statewide risk is driving the decision for that state to become Proactive. If this is true, then we would expect to see more contagion in Proactive states following a default. However, Table 9 shows that there is no contagion in Proactive states. This implies that being a Proactive state is not endogenously determined by local exposure to statewide risk.

Our contagion finding is consistent with Kidwell and Trzcinka (1982), who examine potential contagion effects in the New York municipal bond market following the fiscal crisis in New York City in 1975. They show that there were no significant increases in yields in New York municipal bonds following this crisis. At best, they find that if there was an effect, it was small and of short duration. Our result that Proactive states do not experience a significant contagion effect corroborates this finding, as New York is classified as a Proactive state based on the programs it implemented during the New York fiscal crisis.

7 The Cost of Being a Proactive State

Proactive states implement measures to protect the creditworthiness of the state when its local municipalities are exhibiting signs of distress. As a result, local municipal bonds in these states have lower yields, both in the secondary market and at issuance, than those in Chapter 9 states. In addition, municipal bond yields in Proactive states are less sensitive to economic conditions and are not susceptible to contagion, unlike those in Chapter 9 states. However, these benefits come at a cost. When a municipality in a Proactive state is distressed, the state government can provide emergency loans (at a zero or low interest rate), grants, credit guarantees, and professional and technical assistance. Distress-related policies in Proactive states are reflective of their overall willingness to aid their municipalities, particularly in bad times. Therefore, we expect that state-to-local transfers in Proactive states will be greater than those in Chapter 9 states, and will be even greater when the state's economic conditions are poor.

To test this, we calculate state-to-local intergovernmental transfers as a percentage of total local government revenue for each state-year ($Transfer_{it}$) for the fiscal years 1999 to 2010 (excluding 2001 and 2003, when state-level census data were not available). Then, we examine how these transfers vary with state economic conditions in Proactive and Chapter 9 states. Specifically, we run the following regression:

$$\begin{aligned} Transfer_{it} &= \beta_0 + \beta_1 \cdot Proactive_i + \beta_2 \cdot Proactive_i \times \Delta GSP_{it} + \\ &\quad \beta_3 \cdot Ch.9_i + \beta_4 \cdot Ch.9_i \times \Delta GSP_{it} + \beta_5 \cdot \Delta GSP_{it} + \\ &\quad \gamma' Z_{it} + \delta_t + \varepsilon_{it}, \end{aligned} \tag{4}$$

where ΔGSP is the annual log growth of real state GDP per capita. Z is a vector of control variables that includes federal-to-local intergovernmental transfers as a percentage of total local government revenue, the maximum state income tax rate, the percentage of the state population that is over the age of sixty-five, the percentage of the state population that lives in urban areas, the log of state income per capita, the annual log growth of the state house price index, and indicator variables for each possible rating assigned by S&P to a state. These control variables are similar to the ones used by Matsusaka (2000) and Butler, Fauver, and Mortal (2009). Summary statistics for the key variables used in this regression, $Transfer$ and ΔGSP, are provided in Panel B of Table 3.

The results are reported in Table 10. As shown in column (2), the proportion of total local government revenue that comes from the state government in Proactive states is 3.4 percentage points higher than it is in Chapter 9 states. In addition, the transfers in Proactive states are more countercyclical than in Chapter 9 states, as indicated by the significantly negative coefficient term on the interaction between state GDP growth and the Proactive state indicator variable. Specifically, when ΔGSP is one standard deviation lower (2.7%), $Transfer$ increases by $(-0.646) \times (-0.027) =$ 1.7 percentage points in Proactive states relative to Chapter 9 states.

In column (3) of Table 10, we show that intergovernmental revenue transfers in Proactive states are more countercyclical than transfers in Chapter 9 states because revenue transfers in Proactive states are particularly large when economic conditions are weak. In this regression, "bad times" ("good times") is defined as an indicator variable that equals one if the state's GDP growth is less than (greater than or equal to) 1.4 percentage points, which represents the median state GDP growth across the sample, and zero otherwise. We find that revenue transfers in Proactive states are 4.5 percentage points higher than transfers in Chapter 9 states during bad times and 1.5 percentage points higher during good times, for a difference of 3.0 percentage points. Economically, this is a sizable difference, representing approximately 9.7% of the mean state revenue transfer reported in Panel B of Table 3. This suggests that Proactive state governments play a more active role in assisting their municipalities in times of distress, especially compared to Chapter 9 states.[16]

The implicit insurance provided by state governments in Proactive states potentially generates a moral hazard problem (Persson and Tabellini (1996)), in that it discourages fiscal discipline in local governments because of the downside protection provided by the state. To deter local officials from exploiting this downside protection ex-ante, proactive state policies give the state government the authority to control local finances in times of distress, although this is likely to be ineffective because of the short-term incentives of local politicians.

Using U.S. Census data, we calculate the ratio of total local debt outstanding to total local government revenue for each state-year ($Localdebt_{it}$) for the fiscal years 1999 to 2010 (again excluding 2001 and 2003, for which state-level census data were not available). If there is a moral hazard problem in Proactive states, then we expect this variable to be higher in these states than in Chap-

[16] In unreported results, we find (weak) evidence that secondary and offering yields for state-issued general obligation bonds are slightly higher in Proactive states than in Chapter 9 states. This likely reflects the transfer of credit risk from local municipal governments to state governments in Proactive states.

ter 9 states. We test the same regression model we used before, except that we use *Localdebt* as the dependent variable. For context, Panel B of Table 3 provides summary statistics for *Localdebt*.

The regression results are reported in the fourth column of Table 10. Consistent with our hypothesis, we find that *Localdebt* in Proactive states is 7.5 percentage points higher than in Chapter 9 states, indicating that local governments in Proactive states take on higher levels of debt. However, we also find that the coefficients on Proactive and Chapter 9 are both positive and significant (13.5% and 6.0%, respectively), suggesting that Neither states have the lowest local debt levels relative to their local revenues. It is possible that a moral hazard problem also exists in Chapter 9 states, in that easier access to the Chapter 9 bankruptcy procedure encourages a higher degree of careless debt issuances. Nonetheless, our evidence suggests that the moral hazard problem for local debt is more severe if implicit insurance for this debt is provided via a state intervention program. This also rules out the possibility that yields are higher in Chapter 9 states because the local governments have higher leverage, as this evidence indicates that it is actually Proactive states that have the highest levels of debt.

8 Conclusion

We provide new evidence that state policies for distressed municipalities matter for local borrowing costs. Proactive states have programs that allow the state to restructure the local finances of a distressed municipality and provide emergency loans and revenue transfers, while Chapter 9 states unconditionally allow their distressed municipalities to file for Chapter 9 bankruptcy. This state policy difference leads to increased risk sharing between the state and local governments and stronger creditor protections in Proactive states.

We find that the yield changes of local municipal bonds following default events are lower in Proactive states. Specifically, in Proactive states, municipal bond yield spreads increase by 3.9 percentage points, while in Chapter 9 states, they increase by 6.5 percentage points. The difference in state policies also affects local municipal bond yields in general; average yields in Chapter 9 states are 7.1 basis points higher than yields in Proactive states. That is, investors anticipate that if a bond were to default, the issuer could follow through with bankruptcy in a Chapter 9 state. In Proactive states, however, investors anticipate that there is a higher likelihood that the state will step in when a municipality is exhibiting signs of financial distress, and thus are willing to pay a higher price for bonds with this implicit state insurance.

Additional results emphasize the advantages that local municipalities have in Proactive states that those in Chapter 9 states do not. Municipal bond yields in Chapter 9 states are more sensitive to state economic conditions, especially when economic conditions are weak. During these times, the yields on local municipal bonds in Chapter 9 states are 10.9 basis points higher than those in Proactive states. We also find evidence of a contagion effect in Chapter 9 states, but not in Proactive states. Specifically, a 0.27 percentage point increase in the percentage of defaulted bonds (by par value) within a Chapter 9 state leads to a 2.8 basis point increase in the yields of other municipal bonds within that state. This contagion effect lasts about one year.

The advantages that accrue to local municipalities in Proactive states come at a cost to their states, however. U.S. Census data suggest that Proactive states play an active role in assisting their municipalities in times of distress. We find that state government transfers are always higher in Proactive states compared to other states, and are even higher when state economic conditions are weak. Using local government debt levels, we also provide evidence of a moral hazard problem in Proactive states because of the downside protection provided by the state.

Our results imply that the institutional details of how state governments respond to local defaults lead to an additional source of heterogeneity in default risk premia across U.S. states. For example, while the default risk premia in distressed municipalities such as Stockton, CA and Atlantic City, NJ, are likely to be high, they are also likely to differ because of the policy differences between the municipalities' states. State governments play an important role in determining the default risk, and thus the borrowing costs, for local governments.

Appendix A

The following table summarizes statutes in each state related to Chapter 9 authorization and intervention policies for distressed municipalities. Empty cells in the "Bankruptcy Authorization" or "Intervention Statute" columns indicate that no statute exists for that category. Empty cells in the "Intervention Strength" column indicate no explicit intervention statutes.

State	Bankruptcy Authorization	Intervention Statute	Intervention Strength
Alabama	Blanket		
Alaska			
Arizona	Blanket		
Arkansas	Blanket		
California	Blanket		
Colorado	Limited to Special Districts		
Connecticut	Conditional	The state deals with fiscal distress in an ad hoc manner. See LCO 4532 (Waterbury); SA 92-5 (West Haven); SA 88-80, 89-23, 89-47, 90-31, 91-40 (Bridgeport); and SA 93-4 (Jewett City).	Weak
Delaware			
Florida	Conditional	See F.S.A. 163.05, 163.055, and 218.50-218.504	Weak
Georgia	Prohibited		
Hawaii			
Idaho	Blanket	IDAHO CODE ANN. 43-2101 et seq.	Weak
Illinois	Limited to Illinois Power Agency	See 65 ILCS 5/8-12-1 through 65 ILCS 5/8-12-24 (Financially Distressed City Law) and 50 ILCS 320/1 through 50 ILCS 320/14 (Local Government Financial Planning and Supervision Act)	Weak
Indiana		See IC 6-1.1-20.3-1 through 6-1.1-20.3-13 (Distressed Unit Appeal Board)	Weak
Iowa	No Statute with Exceptions		
Kansas			
Kentucky	Conditional	See KY. REV. STAT. ANN. 66.320	Weak

State	Bankruptcy Authorization	Intervention Statute	Intervention Strength
Louisiana	Conditional		
Maine		See 30-A M.R.S.A. 6101-6113 (Municipal Finance Board)	Strong
Maryland			
Massachusetts		The state deals with fiscal distress in an ad hoc manner. See MA Session Laws: Chapter 58 of the Acts of 2010 and Chapter 169 of the Acts of 2004.	Weak
Michigan	Conditional	See M.C.L.A. 141.1541 et al. (Local Financial Stability and Choice Act). Act 436 of 2012 took effect on March 28, 2013	Strong
Minnesota	Blanket		
Mississippi			
Missouri	Blanket		
Montana	Blanket, Except Counties		
Nebraska	Blanket		
Nevada		See N.R.S. 354.655 through 354.725	Strong
New Hampshire		See N.H. Rev. Stat. 13:1 through 13:7	Weak
New Jersey	Conditional	See Special Municipal Aid Act N.J.S.A. 52:27D-118.24 to 118.31; Local Government Supervision Act N.J.S.A. 52:27BB- 1 et seq.; Municipal Finance Commission R.S. 52:27-1 to R.S. 52:27-66; Municipal Rehabilitation and Economic Recovery Act N.J.S.A. 52:27BBB-1 et seq., and 18A:7A et seq.	Strong
New Mexico		See N.M.S.A. 1978, 12-6-1 through 12-6-14 (Audit Act), N.M.S.A. 1978, 6-1-1 through 6-1-13, 10-5-2, and 10-5-8.	Weak
New York	Conditional	The state deals with fiscal distress in an ad hoc manner. New legislation is passed for each municipality.	Strong

State	Bankruptcy Authorization	Intervention Statute	Intervention Strength
North Carolina	Conditional	See N.C.G.S.A. 159-1 through 159-180; N.C.G.S.A. 63A; and 159D.	Strong
North Dakota			
Ohio	Conditional	See Ohio's R.C. 118, 133.34, and 3735.49.	Strong
Oklahoma	Blanket		
Oregon	Limited to Irrigation and Drainage Districts	See O.R.S. 203.095-100 and 287A.630.	Weak
Pennsylvania	Conditional	See PA ST 53 P.S. 11701.101-712 (Municipalities Financial Recovery Act and Intergovernmental Cooperation Authority Act)	Strong
Rhode Island	Conditional	See RI GEN LAWS 45-9-1 through 45-9-14, enacted in June 2010	None during the sample period
South Carolina	Blanket		
South Dakota			
Tennessee		See T.C.A. 9-13-201 to 212 (Emergency Financial Aid to Local Government Law of 1995), T.C.A. 9-13-301 to 302 (Financially Distressed Municipalities, Counties, Utility Districts and Education Agencies Act of 1993), and T.C.A. 9-21-403 (Local Government Public Obligations Act).	Weak
Texas	Blanket	See T.C.A., Local Government Code 101.006.	Weak
Utah			
Vermont			
Virginia			
Washington	Blanket		
West Virginia			
Wisconsin			
Wyoming			

Appendix B

The following table summarizes important dependent variables and control variables used in our tests. Data source information is also included.

Panel A: Bond-Level Variables

Variable	Definition
Yield Spread (y)	The percentage yield spread between a municipal bond and a coupon-equivalent risk-free bond. *Source for municipal bond yields: MSRB. Source for the U.S. Treasury yield curve: the Federal Reserve Board.*
Default	An indicator variable that equals one if a bond previously experienced a default event and zero otherwise. *Source for municipal default events: the Bloomberg Default Event Calendar.*
Conduit	An indicator variable that equals one if a bond is a conduit bond and zero otherwise. A municipal bond is a conduit bond if the ultimate borrower of the bond is different from the issuer. *Source for ultimate borrowers and issuers of municipal bonds: Bloomberg.*
Recovery Rate	The ratio of the last transaction price of a defaulted bond to the price of an equivalent risk-free bond.

Panel B: County-Level Variables

Variable	Definition
Population Growth	Annual log growth of a county's population. *Source: BEA.*
Log(Per Capita Income)	Annual log real income per capita of a county in 2009 dollars. *Source: BEA.*
Real Wage Growth	Quarterly log growth of a county's total real wages. *Source: BLS QCEW Database.*
Establishment Growth	Quarterly log growth of the number of a county's business establishments. *Source: BLS QCEW Database.*
Employment Growth	Monthly log growth of county employment. *Source: BLS QCEW Database.*

Panel C: State-Level Variables

Variable	Definition
PCTDEF	The total par value of bonds that defaulted in each state-quarter as a percentage of the total par value of all traded bonds in that state-quarter.
State Revenue Transfer	Annual total dollars transferred from the state to its municipalities as a share of total municipality revenue in that state. *Source: Census State & Local Government Finance.*
Local Govt Debt	Annual total municipality debt of a state as a share of total municipality revenue in that state. *Source: Census State & Local Government Finance.*
Coincident Index	The quarterly log growth of a state's coincident index (in percent). *Source: FRED.*
Delta GSP	Annual log growth of real state GDP per capita (in percent). *Source: BEA.*
Fed Revenue Transfer	Annual total dollars transferred from the federal government to the municipalities of a state as a share of the total municipality revenue in that state. *Source: Census State & Local Government Finance.*
State Tax Rate	Annual maximum state income tax rate (in percent). *Source: NBER TAXSIM.*
% Population > 65	The percentage of the population for a state-year that is older than 65 years of age. *Source: Census Population Estimates.*
Log(Per Capita Income)	Annual log real income per capita of a state in 2009 dollars. *Source: BEA.*
% Urban Population	The urban percentage of the population for a state-year. Inter-decennial values were calculated by linear interpolation. *Source: Decennial Census.*
House Price Growth	Quarterly log growth of the state real house price index (in percent). *Source: FRED.*

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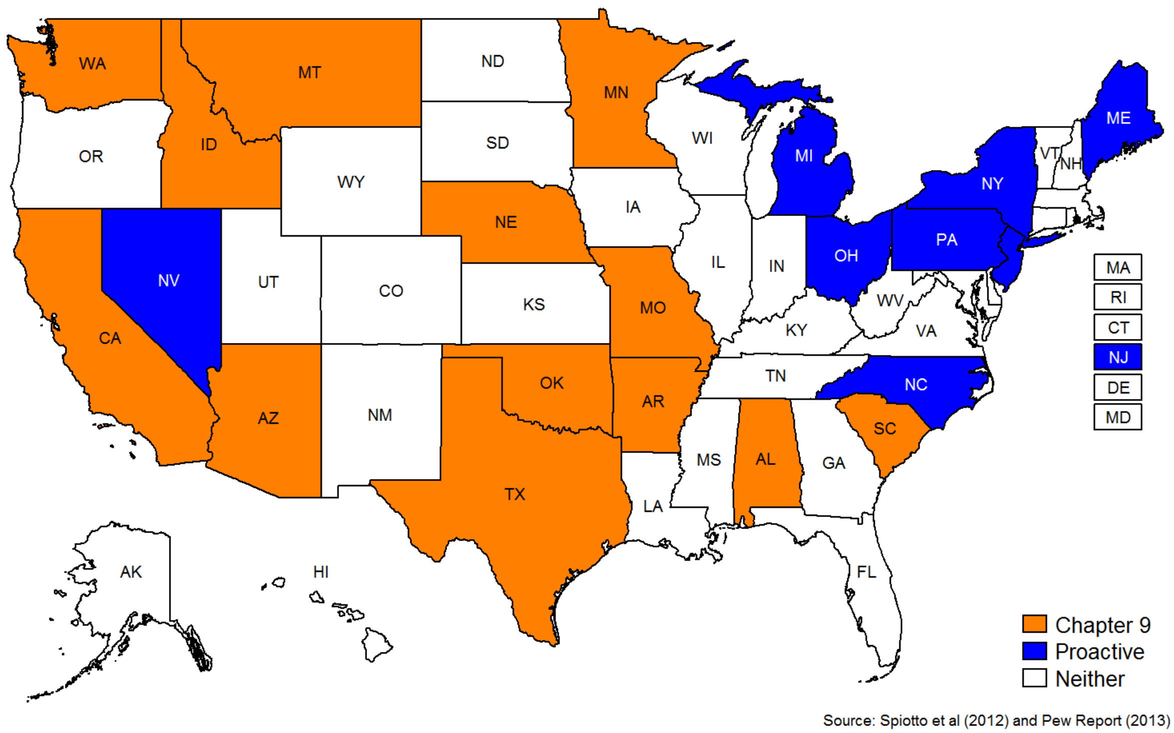

Figure 1: **Map of United States with State Type.** This map of the United States indicates state type: Proactive (blue), Chapter 9 (red), or Neither (white).

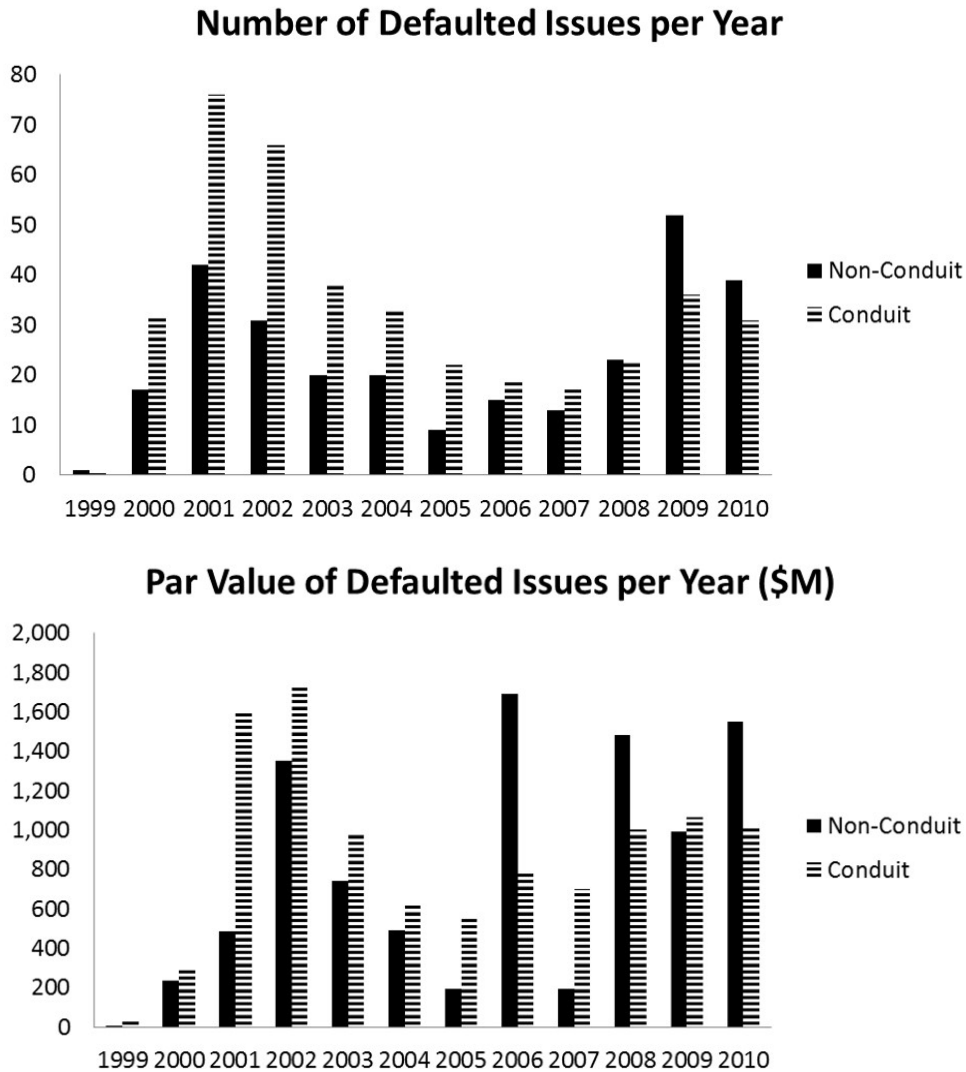

Figure 2: **Municipal Defaults per Year.** The top panel reports the number of non-conduit and conduit defaulted municipal bond issues per year. The bottom panel reports the total par value (in millions of dollars) of non-conduit and conduit municipal bond issues per year.

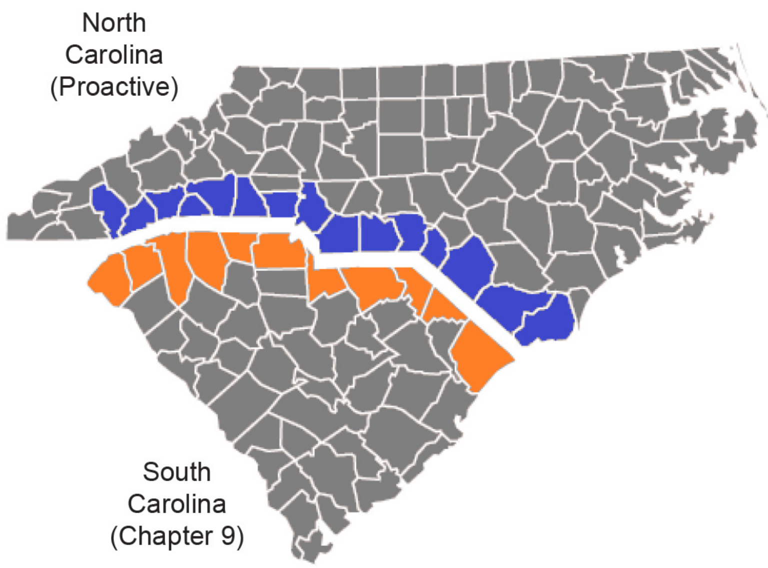

Figure 3: **County Map of North Carolina and South Carolina.** North Carolina is a Proactive state and South Carolina is a Chapter 9 state. The counties highlighted blue are those from North Carolina that border South Carolina. The counties highlighted orange are those from South Carolina that border North Carolina.

Table 1: Conditions for Proactive State Classification. The second column indicates whether a state has statutes in place such that a state program is triggered by a local government's debt default. The next three columns indicate whether the state can restructure the debt contracts, labor contracts, and taxes and fees of its distressed local governments under the state program. A state is defined as a Proactive state if a state program is triggered by debt default, and if the state can restructure the debt contracts, labor contracts, or taxes and fees. Eight states are classified as Proactive states. The states missing from this table are those that do not satisfy any of these four conditions.

		State can restructure:			
	Default Triggers Program	Debt Contracts	Labor Contracts	Taxes and Fees	Proactive?
CT	0	1	1	1	
DC	1	0	0	0	
FL	1	0	0	0	
ID	1	0	0	0	
IL	0	1	1	1	
IN	0	0	1	0	
KY	0	1	0	0	
ME	1	1	0	1	Yes
MA	0	1	0	1	
MI	1	1	1	0	Yes
NV	1	1	1	1	Yes
NJ	1	1	0	1	Yes
NY	1	1	1	0	Yes
NC	1	1	0	1	Yes
OH	1	1	0	0	Yes
OR	0	1	0	0	
PA	1	1	1	1	Yes
RI	0	1	0	1	
TN	0	1	0	1	

Table 2: Municipal Bond Attributes. The first column of Panel A reports summary statistics for municipal bonds that have never experienced a default event; the second column reports statistics for those that have experienced at least one default event. Panel B reports the breakdown of municipal bonds by sector.

Panel A: Bond Sample Statistics		
	Non-Defaulted	**Defaulted**
N(bonds)	416,631	2,063
N(issues)	25,554	679
Avg. Bond Par Value ($M)	6.69	9.82
Avg. Issue Par Value ($M)	100.01	52.82
Issue Par Value - 25th pctl ($M)	15.5	8.16
Issue Par Value - 50th pctl ($M)	33.54	17.87
Issue Par Value - 75th pctl ($M)	90.88	40.79
Avg. Bond Maturity (years)	13.82	18.98
Avg. Bond Offering Yield (%)	4.49	6.08
Conduit (%)	10	59
Insured (%)	61	27
Inv. Grade (%)	80	22
Non-Inv. Grade (%)	0	9
Unrated (%)	20	69
Gen. Obligation (%)	42	4
Callable (%)	62	78
Puttable (%)	0	1

Panel B: Sector Breakdown (%)		
	Non-Defaulted	**Defaulted**
Education	31.8	8.2
Healthcare	6.4	19.8
Housing	2.5	18.7
Improvement/Development	30.3	25.5
Public Service	4.2	1.3
Recreation	2.5	3.9
Transportation	5.4	3.5
Water-Sewer	14.3	6.3
Others	2.6	12.9

Table 3: Summary Statistics by State Type. Panel A reports summary statistics for municipal bonds by the following state types: Chapter 9, Proactive, and Neither. Panel B reports distributional statistics for the state-level variables that are used for tests later in the paper (starting with Section 6).

Panel A: Bond Summary Statistics by State Type

	Chapter 9	Proactive	Neither	All
N(bonds)	143364	124691	150639	418694
N(issues)	10064	6317	9568	25948
Avg. Bond Par Value ($M)	7.06	7.05	6.09	6.71
Avg. Issue Par Value ($M)	103.52	120.11	79.39	99.78
Issue Par Value - 25th pctl ($M)	15.13	15.1	16.1	15.49
Issue Par Value - 50th pctl ($M)	31.61	33.39	35	33.45
Issue Par Value - 75th pctl ($M)	80	109.1	88.61	90.31
Avg. Bond Maturity (years)	14.5	13.51	13.51	13.85
Avg. Bond Offering Yield (%)	4.55	4.47	4.47	4.5
Conduit (%)	8	12	12	11
Insured (%)	61	64	59	61
Inv. Grade (%)	79	81	79	79
Non-Inv. Grade (%)	0	1	0	0
Unrated (%)	21	19	21	20
Gen. Obligation (%)	40	51	37	42
Callable (%)	66	60	59	62

Panel B: Additional Summary Statistics

	Mean	P25	Median	P75	St. Dev.
Percent Defaulted (%)	0.270	0.013	0.042	0.147	0.868
Three-Month Coinc. Index Growth (%)	0.194	-0.197	0.382	0.780	0.942
Annual GSP Growth (%)	1.032	-0.607	1.379	2.867	2.745
State Revenue Transfer	0.315	0.273	0.311	0.351	0.080
Local Government Debt	0.897	0.662	0.838	1.089	0.331

Table 4: Default Statistics by State Type. Panel A reports the number and total par value of non-conduit and conduit defaulted bonds within three state types: Chapter 9, Proactive, and Neither. Panel B reports the number of non-conduit (conduit) defaulted bonds as a percentage of all non-conduit (conduit) bonds traded in the secondary market within that state type, and the total par value of all non-conduit (conduit) defaulted bonds as a percentage of the total par value of all non-conduit (conduit) bonds trading in the secondary market within that state type. Chapter 9 states are those that allow for unconditional Chapter 9 bankruptcy authorization. Proactive states are those that have proactive measures in place for municipalities that show signs of distress. Neither states are the remaining states. Bonds are also separated into non-conduit and conduit.

		N(Defaulted Bonds)		Off. Amt. Defaulted ($M)	
Panel A		Non-conduit	Conduit	Non-conduit	Conduit
Chapter 9	AL, AR, AZ, CA, ID, MN, MO, MT, NE, OK, SC, TX, WA	443	415	3167.69	3121.39
Proactive	ME, MI, NC, NJ, NV, NY, OH, PA	123	250	2158.82	2548.65
Neither	All other states	275	557	4100.26	4790.63
All		841	1222	9426.76	10460.67

		Defaulted Bonds (%)		Off. Amt. Defaulted (%)	
Panel B		Non-conduit	Conduit	Non-conduit	Conduit
Chapter 9	AL, AR, AZ, CA, ID, MN, MO, MT, NE, OK, SC, TX, WA	0.379%	3.491%	0.728%	2.747%
Proactive	ME, MI, NC, NJ, NV, NY, OH, PA	0.164%	1.778%	0.310%	4.568%
Neither	All other states	0.173%	2.727%	0.430%	2.569%
All		0.225%	2.774%	0.488%	2.935%

Table 5: Local Municipal Bond Yield Spreads and Default. This table shows the results of regressions of monthly municipal bond yield spreads on a default indicator variable, state type indicator variables (Chapter 9 and Proactive), and the interaction of the default and state type indicators. Rating Controls represents a set of indicator variables for each possible bond rating assigned by Moody's. Callable Controls includes callable and puttable indicator variables, whether the bond is pre-refunded, time-to-first-exercise, and its inverse. Regression columns (1) and (2) report results for secondary market municipal bond yields. Regression column (3) reports results for primary market (offering) yields. Regression columns (4) and (5) report results for conduit municipal bond yields. Standard errors are double-clustered by issue and year-month. *t*-statistics are reported below the regression coefficients. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Secondary		Offering	Conduit	
	(1)	(2)	(3)	(4)	(5)
Default	5.640***	5.258***		3.915***	3.904***
	(8.53)	(6.29)		(9.58)	(8.41)
Default × Chapter 9		1.202			-0.314
		(1.32)			(-0.45)
Chapter 9		0.0322***	0.0327***		0.0151
		(2.86)	(5.54)		(0.46)
Default × Proactive		-1.338			0.740
		(-1.19)			(0.82)
Proactive		-0.0387***	0.0198***		-0.0425
		(-4.45)	(3.54)		(-1.40)
Default × Insured	-4.416***	-4.211***		-2.939***	-3.157***
	(-6.19)	(-5.45)		(-5.41)	(-4.93)
Insured	-0.109***	-0.110***	-0.0817***	-0.548***	-0.546***
	(-10.15)	(-10.37)	(-14.07)	(-16.01)	(-15.89)
General Obligation	-0.125***	-0.118***	-0.0795***	0.214	0.208
	(-12.16)	(-12.07)	(-16.12)	(1.47)	(1.43)
Time to Maturity	0.00677***	0.00624***	0.0320***	0.0167***	0.0167***
	(3.90)	(3.55)	(33.78)	(6.80)	(6.76)
Inverse TTM	0.122***	0.122***	0.338***	0.173***	0.172***
	(11.86)	(11.84)	(3.64)	(11.92)	(11.88)
Equal Tax	0.0424***	0.0232**	0.0867***	0.222***	0.208***
	(4.58)	(2.02)	(16.22)	(5.50)	(5.04)
Coincident Index	-0.0284***	-0.0362***	-0.0314***	-0.0483**	-0.0506**
	(-4.44)	(-5.83)	(-6.21)	(-2.25)	(-2.33)
Log(Size)	-0.0277***	-0.0255***	0.00640***	-0.0673***	-0.0670***
	(-8.03)	(-7.82)	(2.76)	(-5.96)	(-5.93)

Intercept	-0.171***	-0.170***	-0.793***	0.532***	0.552***
	(-4.19)	(-4.26)	(-34.69)	(8.79)	(8.66)
Ch. 9 - Proactive		0.0709***	0.0129**		0.0576
p-value		0.000	0.0327		0.101
Def × (Ch. 9 - Pro)		2.540***			-1.054
p-value		0.005			0.280
SE Clustering	Issue-YM	Issue-YM	Issue-YM	Issue-YM	Issue-YM
Fixed Effects	YM	YM	YM	YM	YM
Rating Controls	Yes	Yes	Yes	Yes	Yes
Callable Controls	Yes	Yes	Yes	Yes	Yes
N	5,108,589	5,108,589	243,743	826,396	826,396
R-Squared	0.439	0.441	0.724	0.375	0.376

Table 6: Border County Regression. This table reports the results of regressions of municipal bond yields on bond and county characteristics using municipal bonds issued in border counties for the following state pairs: NC-SC, OR-WA, WI-MN, IL-MO, MI-IN, OH-IN, PA-MD, NC-VA, GA-SC, NY-VT, NY-MA, and NY-CT, where the first state in each pair is considered more proactive when dealing with its distressed municipalities. The first and second columns use secondary yields and offering yields, respectively, for the NC-SC border only. The following three columns use secondary yields, offering yields, and conduit secondary yields, respectively, from all twelve state pairs. All control variables are specified in the main body of the text. Standard errors are double-clustered by issue and year-month. *t*-statistics are reported below the regression coefficients. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	NC-SC Sec. (1)	NC-SC Off. (2)	All Sec. (3)	All Off. (4)	All Cond. (5)
Proactive/More Proactive	-0.107***	-0.0827**	-0.0610***	-0.0680***	-0.0239
	(-2.81)	(-2.44)	(-3.34)	(-4.55)	(-0.08)
SE Clustering	Issue-YM	Issue-YM	Issue-YM	Issue-YM	Issue-YM
Fixed Effects	YM	YM	YM	YM	YM
Rating Controls	Yes	Yes	Yes	Yes	Yes
Callable Controls	Yes	Yes	Yes	Yes	Yes
Characteristic Controls	Yes	Yes	Yes	Yes	Yes
County Controls	Yes	Yes	Yes	Yes	Yes
N	41,136	2,003	147,350	7,462	17,502
R-Squared	0.544	0.875	0.444	0.808	0.364

Table 7: Recovery Rates. This table reports summary statistics for the implied recovery rates of defaulted bonds by state type. The "Panel A Minus Panel B" row in Panel C equals the mean recovery rate in Panel A minus the mean recovery rate in Panel B. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Non-Conduit Bonds

	Proactive	Neither	Chapter 9	All
Mean	79.1%	72.8%	67.0%	70.5%
25th Percentile	73.5%	56.1%	52.2%	54.2%
Median	88.8%	77.3%	72.0%	75.7%
75th Percentile	97.5%	92.6%	85.9%	90.8%
Standard Deviation	24.5%	23.1%	23.7%	24.0%
N	104	241	411	756

Panel B: Conduit Bonds

	Proactive	Neither	Chapter 9	All
Mean	67.3%	64.2%	66.3%	65.5%
25th Percentile	44.0%	41.4%	45.1%	43.0%
Median	77.7%	71.4%	74.7%	74.1%
75th Percentile	92.4%	89.6%	89.5%	90.1%
Standard Deviation	28.2%	28.7%	27.6%	28.2%
N	229	522	389	1,140

Panel C: Difference in Means

	Proactive	Neither	Chapter 9	All
Panel A Minus Panel B	11.8%**	8.6%***	0.7%	5.0%***

Table 8: Municipal Bond Yield Spreads and State Economic Conditions. This table examines secondary municipal bond yield spreads, conditional on local economic conditions in that state, and conditional on whether the bond is located in a Chapter 9 or Proactive state. Bad Times (Good Times) is an indicator variable that equals one if Coincident Index is less than (greater than or equal to) the median Coincident Index and zero otherwise. Standard errors are double-clustered by issue and year-month. *t*-statistics are reported below the regression coefficients. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)		(2)
Coincident Index	-0.0342***	Bad Times	0.0279***
	(-4.96)		(3.14)
Coincident Index × Chapter 9	-0.0614***	Bad Times × Chapter 9	0.0569***
	(-5.85)		(3.28)
Coincident Index × Proactive	0.0211***	Bad Times × Proactive	-0.0516***
	(3.07)		(-4.66)
Chapter 9	0.0390***	Good Times × Chapter 9	-0.00872
	(3.83)		(-0.88)
Intervention	-0.0380***	Good Times × Proactive	-0.0182**
	(-4.51)		(-2.16)
Index × Ch. 9 - Index × Pro	-0.0825***	Bad × Ch. 9 - Bad × Pro	0.1085***
p-value	0.000	*p*-value	0.000
		Good × Ch. 9 - Good × Pro	0.0095
		p-value	0.420
SE Clustering	Issue-YM	SE Clustering	Issue-YM
Fixed Effects	YM	Fixed Effects	YM
Controls	Yes	Controls	Yes
N	5,108,588	N	5,108,588
R-Squared	0.409	R-Squared	0.409

Table 9: Contagion Effects. This table examines whether recent defaults affect the secondary yields of other bonds in that state. The dependent variable is the bond-month secondary yield spread. $PCTDEF_{q-k}$ is the total par value of defaulted bonds in a state as a percentage of the total par value of all bonds within that state, in quarter $q-k$. The partial F-test tests whether the four lagged coefficients for $PCTDEF_{q-k}$ are jointly significant from zero. Standard errors are double-clustered by issue and year-month. t-statistics are reported below the regression coefficients. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Chapter 9		Proactive		Neither	
	(1)	(2)	(3)	(4)	(5)	(6)
$PCTDEF_{q-1}$	0.103***	0.106***	-0.000594	-0.00146	0.0205	0.0210
	(3.70)	(3.72)	(-0.07)	(-0.17)	(1.47)	(1.50)
$PCTDEF_{q-1}$		0.0950***		-0.0110		0.0266*
		(3.37)		(-1.47)		(1.67)
$PCTDEF_{q-3}$		0.113***		-0.0239**		0.0214*
		(3.15)		(-2.48)		(1.75)
$PCTDEF_{q-4}$		0.113***		-0.0128		0.0191
		(3.98)		(-1.39)		(1.54)
Partial F-test		0.000		0.052		0.268
SE Clustering	Issue-YM	Issue-YM	Issue-YM	Issue-YM	Issue-YM	Issue-YM
Fixed Effects	YM	YM	YM	YM	YM	YM
Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	1,730,916	1,700,818	1,382,266	1,355,246	1,696,230	1,662,133
R-Squared	0.444	0.444	0.433	0.438	0.430	0.431

Table 10: State Revenue Transfers and Debt Levels. The dependent variable for the first three regressions is the annual total dollars transferred from the state to its municipalities as a fraction of the total municipality revenue. The dependent variable in the fourth regression is the level of total local debt as a fraction of the total municipality revenue. ΔGSP is the annual log growth in the gross state product per capita (in percent). Fed Revenue Transfer is the annual total dollars transferred from the federal government to a state's municipalities as a fraction of the total municipality revenue in that state. State Tax Rate is the top marginal state tax rate in percent. % Pop > 65 is the percentage of the population for that state-year that is over 65 years of age. % Urban Population is the percentage of the population located in an urban area. House Price Growth is the percentage growth in the real house price index for that state in the past year. Bad (Good) is an indicator variable that equals one if ΔGSP is less than (greater than or equal to) the median State GSP in our sample period. State Rating Controls is a set of indicator variables corresponding to each possible credit rating assigned by S&P to the state. Standard errors are clustered by year. t-statistics are reported below the regression coefficients. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	State Revenue Transfer			Local Govt Debt
	(1)	(2)	(3)	(4)
Proactive	0.0207***	0.0234***		0.135***
	(9.38)	(8.89)		(11.81)
Chapter 9	-0.00981***	-0.0105*		0.0602***
	(-4.35)	(-1.98)		(3.59)
Proactive × ΔGSP		-0.00600**		
		(-2.77)		
Chapter 9 × ΔGSP		0.000457		
		(0.15)		
ΔGSP		0.000966		
		(0.64)		
Proactive × Good			0.0136*	
			(1.93)	
Chapter 9 × Good			-0.000904	
			(-0.23)	
Proactive × Bad			0.0255***	
			(5.23)	
Chapter 9 × Bad			-0.0191*	
			(-2.21)	
Bad			-0.00266	
			(-0.33)	
Fed Revenue Transfer	-0.741***	-0.757***	-0.758***	0.475
	(-4.69)	(-5.02)	(-4.98)	(1.29)

State Tax Rate	0.00664***	0.00681***	0.00666***	-0.0203***
	(14.72)	(13.97)	(15.20)	(-9.21)
% Population > 65	-0.00319***	-0.00298***	-0.00318***	-0.0309***
	(-5.65)	(-5.48)	(-4.54)	(-10.80)
% Urban Population	-0.00198***	-0.00198***	-0.00197***	0.0114***
	(-9.73)	(-10.03)	(-9.56)	(22.83)
Log(Per Capita Income)	-0.0365*	-0.0354	-0.0373*	-0.840***
	(-1.87)	(-1.81)	(-1.94)	(-26.83)
House Price Growth	0.000507	0.000682	0.000463	-0.00216
	(0.57)	(0.76)	(0.50)	(-1.61)
Intercept	0.932***	0.911***	0.932***	9.148***
	(5.01)	(4.80)	(5.10)	(27.28)
Proactive – Ch. 9	0.0305***	0.0339***		0.0748***
p-value	0.000	0.001		0.003
(Proactive – Ch. 9) × ΔGSP		-0.646**		
p-value		0.030		
(Proactive – Ch. 9) × Bad			0.0446***	
p-value			0.000	
(Proactive – Ch. 9) × Good			0.0145*	
p-value			0.084	
(Pro. – Ch. 9) × (Bad – Good)			0.0301*	
p-value			0.067	
SE Clustering	Year	Year	Year	Year
Fixed Effects	Year	Year	Year	Year
State Rating Controls	Yes	Yes	Yes	Yes
N	500	500	500	500
R-Squared	0.228	0.230	0.228	0.276