

**THE IMPACT OF DODD-FRANK ON
CREDIT RATINGS AND BOND YIELDS:
THE MUNICIPAL SECURITIES' CASE**

by

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Abstract

We empirically test the reputation and disciplining hypotheses on the potential impact of Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 (Dodd-Frank) on Standard & Poor's (S&P) state government credit ratings and bond yields. Our empirical findings indicate that S&P ratings after Dodd-Frank are higher and more stable, as evidenced by fewer total rating changes. We find fewer overall negative rating actions, fewer rating downgrades, and more rating upgrades. We also find that after Dodd-Frank bond yields are lower and that Dodd-Frank impacted bond yields through credit ratings. The impact of Dodd-Frank on bond yield is significant across all rating classes. Our findings are consistent with the disciplining hypothesis, and we find no support for the reputation hypothesis.

1. INTRODUCTION

Following the tumultuous events of the financial crisis and economic recession from the summer of 2007 through 2009, the Dodd-Frank Wall Street Reform and Consumer Protection Act was signed by President Barack Obama on July 21, 2010. Dodd-Frank represents perhaps the most sweeping set of financial market reforms since the Securities Act of 1933 and the Securities Exchange Act of 1934. Unlike the Securities Acts, however, Dodd-Frank comprehensively expands federal regulatory oversight of credit rating agencies (CRAs). Dodd-Frank is expressly intended to increase the accountability and transparency of credit rating agencies (CRAs) to society in general and within financial markets in particular. Indeed, an entire section of Dodd-Frank, Subtitle C of Title IX, imposes direct regulations on CRAs.

Subtitle C of Title IX of Dodd-Frank is entitled the “Improvements to the Regulation of Credit Ratings,” which sets up a comprehensive federal framework for regulating CRAs (Dodd-Frank Act, Title IX, §931-§939). One of its mandates is that rating agencies produce “Universal Ratings Symbols” that are consistent across all types of securities and money market instruments. In order to meet the Universal Rating Symbols requirement, the SEC requires CRAs to review their credit rating systems, methodologies, and to make adjustments as necessary to maintain consistency. Dodd-Frank also increases the SEC’s power to impose penalties on credit rating agencies for material misstatements and fraud, and lowers the liability shield protections CRAs had long enjoyed, thereby increasing their liability exposure for issuing inaccurate ratings.¹

¹ See Dimitrov et al. (2015) for a listing of the CRA provisions in Dodd-Frank and their implementation status as of April 2014.

Previous studies looking at the effect of increasing legal and regulatory penalties on credit ratings quality have generally found that regulation can have two conflicting results, which we develop as hypotheses and test in this paper (Dimitrov, 2015; Behr, 2014; Becker and Milbourn, 2010; Cheng and Neamtiu, 2009). On one hand, there is the hypothesis that regulation may have a disciplining effect. CRAs will try to avoid the regulatory and legal sanctions associated with assigning inaccurate ratings by improving their rating methodology; therefore, increasing the accuracy of their credit ratings. To reduce the inaccuracy of their ratings, and thus reduce their regulatory and legal exposure, CRAs will perform more due diligence, improve their methodology, and increase their surveillance operations. These changes should result in better, meaning more accurate and informative, ratings.

On the other hand, there is the reputation effect hypothesis. According to the reputation hypothesis the increase in potential legal and regulatory penalties from new regulations should provide CRAs incentives to issue ratings that are lower than the entity's credit fundamentals, thereby lowering the quality of ratings. The reason is that CRAs may expect to be penalized from litigation and regulatory actions for optimistically biased ratings but not for pessimistically biased ratings (Goel and Thakor, 2011). In other words, the risk of being penalized is higher for issuing a rating that subsequently gets downgraded than for issuing a lower rating that subsequently gets upgraded. As a result, rating accuracy will suffer.

This study adds to the finance literature by analyzing the impact of Dodd-Frank on credit ratings in the municipal securities market. It is important to study ratings in the municipal market because the impact of federal regulation may be different on the municipal market than other credit sectors. We hypothesize that in the municipal securities market, the disciplining effect of Dodd-Frank may be greater than the reputation effect. We hypothesize that Dodd-Frank will

change ratings in the municipal market, since it demands more transparency about the methodologies rating agencies use to determine ratings, imposes new SEC penalties for non-compliance, and reduces CRA liability protections. We also document that parts of Dodd-Frank were written specifically to have an impact on municipal ratings. Therefore, it is likely that Dodd-Frank may cause CRAs to make fundamental changes to their rating methodology resulting in a structural change in municipal ratings.

Using a comprehensive sample of state government general obligation (GO) bond credit ratings from 2004-2014, covering pre- and post-Dodd-Frank periods, we find results that provide support for the disciplining hypothesis. First, we find that credit ratings are higher after Dodd-Frank. The probability that a state GO bond will be rated higher after Dodd-Frank is 2.7 times greater than before Dodd-Frank. Second, we find that after Dodd-Frank S&P issued fewer overall negative rating actions, fewer rating downgrades, and more rating upgrades. We also find lower bond yields and a reduced yield spread for newly upgraded bonds after Dodd-Frank. Overall, we find no evidence that S&P ratings became less accurate after Dodd-Frank.

We perform several robustness checks. First, to test that we have adequately controlled for changes in the economy over our sample period and our results cannot be attributed to rating changes through the cycle, we use different specifications of macroeconomic activity and unemployment. Our results remain unchanged using different macroeconomic and unemployment specifications. Second, we expand our sample to include states with no GO bond rating, but which were assigned an Issuer Credit Rating (ICR) by S&P. When doing so, we still find that the probability of a state getting a higher credit rating is higher after Dodd-Frank. Next, we test for the level of rating agency competition. Becker and Milbourn (2011) and Bar-Isaac and Shapiro (2010) argue that competition most likely weakens incentives for providing quality

in the ratings industry. To test our results for the level of market competition, we include only states with three credit ratings from S&P, Moody's and Fitch. Our analysis using states with three credit ratings upholds our prior results. We find that the probability of states getting a higher credit rating is greater after Dodd-Frank for states with high Fitch market share (a proxy for greater CRA market competition).

Our findings are consistent with the disciplining hypothesis. They are also different than Dimitrov et al.'s (2015) findings regarding market sectors with high Fitch market share. They find no significant effect on credit ratings after the passage of Dodd-Frank in corporate sectors with a high Fitch market share, where we find that in a market where Fitch has traditionally had a very high market share, Dodd-Frank resulted in higher ratings and fewer downgrades.

We also test how the evolution of Dodd-Frank affected ratings. Dodd-Frank was signed in July 2010, but the process of federal lawmaking leading up to Dodd-Frank began in 2008. We run models with alternative post-Dodd-Frank periods. Our results indicate the impact on credit ratings continued to grow as federal actions associated with Dodd-Frank intensified and grew closer to Dodd-Frank becoming law.

We find consistent results supporting the disciplining hypothesis and no support for the reputational hypothesis. We believe our findings indicate that Dodd-Frank may have different results across different fixed income markets. Dimitrov et al. (2015) intimate the potential differential impact of Dodd-Frank on credit ratings across markets by noting that their findings may not apply to the structured securities market. We find that the municipal securities market may be another sector where the Dimitrov et al. (2015) reputational effect results may not hold. The municipal market is a lower risk sector of the fixed income markets, and state government GO bonds are among the lowest risk sub-sectors in the municipal market. Moreover, state

government bond issues traditionally obtain three credit ratings, making ratings' shopping, and the higher ratings that may result from issuers shopping for the highest rating(s), less likely. Our results, coupled with Dimitrov et. al.'s (2015) corporate market findings and assertions regarding the mortgage-backed securities market, indicate that the reputational effect may apply only to medium risk markets, not low or high risk markets.

The rest of our paper precedes in the following manner: Section 2 reviews the development and purposes of Dodd-Frank. Section 3 describes the theoretical underpinnings of the legislation, and also explains in more detail the theories of reputational and disciplining effects. Section 4 defines the variables used in our analysis, explains why they were chosen, summarizes our empirical results, and details our robustness checks. Section 5 presents our bond yield analysis. Finally, Section 6 presents our conclusions.

2. BACKGROUND: DODD-FRANK WALL STREET REFORM AND CONSUMER PROTECTION ACT

Dodd-Frank fundamentally changes the regulation of credit rating agencies in such a way that we would expect to see effects on how CRAs assign ratings to securities. Subtitle C of Title IX of Dodd-Frank establishes a comprehensive legislative framework for regulating CRAs. Prior to Dodd-Frank the internal procedures of credit rating agencies or the performance of the ratings themselves were not regulated by the SEC. The year 2010, however, was not the first major federal effort to regulate the industry. The first major law directly regulating the credit rating industry was the "Credit Rating Agency Reform Act of 2006 (CRARA)," which gave the SEC limited authority over the industry. The 2006 Act legislated the creation of "Nationally Recognized Statistical Rating Organizations (NRSROs)," and asked rating agencies to apply to

the SEC for registration as an NRSRO.² Going forward, only those CRAs registered as NRSROs would have their ratings recognized by banks, insurers, mutual funds, and other financial institutions regulated by the SEC.

The CRARA of 2006 was soon followed by the Municipal Bonds Fairness Act of 2008 (HR 6308), sponsored by United States Congressional Representative Barney Frank.³ The bill was drafted to “ensure uniform and accurate credit rating of municipal bonds and provide for a review of the municipal bond insurance industry” (Municipal Bonds Fairness Act of 2008). The bill was first introduced on June 19, 2008 in the U.S. House of Representatives and was last before the House on September 9, 2008. The sections of the bill on rating clarity and consistency (§101((p)(1)(A)(B)(C)⁴) and performance measures ((§101 ((p)(4)(A)(B)⁵) became part of the Dodd-Frank Act. The bill was introduced out of the concern that municipal financial intermediaries, especially municipal financial advisors and CRAs, were not serving the sector adequately due to growing conflicts of interests and “pay to play” practices (Haines, 2008).

Dodd-Frank builds upon the 2006 Credit Rating Agency Reform Act and the proposed

² The term NRSRO was first used by the SEC in 1975 on new internal SEC rules for establishing bank and broker-dealer capital requirements (17 C.F.R. 240.15c3-1.). At that time, however, there was no legal definition or specific standards for establishing an NRSRO agency. The definition of an NRSRO, and the specific legal standards of what constituted an NRSRO organization did not occur until the Credit Rating Agency Reform Act of 2006 (Pub. L. 109-291, 120 Stat. 1327, enacted September 29, 2006).

³ Municipal Bond Fairness Act, September 9, 2008 (<http://www.govtrack.us/congress/billtext.xpd?bill=h110-6308>).

⁴ “(p) Ratings Clarity and Consistency.--“(1)the Commission shall require each nationally recognized statistical rating organization that is registered under this section to establish, maintain, and enforce written policies and procedures reasonably designed—“(A) to establish and maintain credit ratings with respect to securities and money market instruments designed to assess the risk that investors in securities and money market instruments may not receive payment in accordance with the terms of issuance of such securities and instruments; “(B) to define clearly any rating symbol used by that organization; and “(C) to apply such rating symbol in a consistent manner for all types of securities and money market instruments.

⁵ “(4) Review. --“(A) Performance measures.--The Commission shall, by rule, establish performance measures that the Commission shall consider when deciding whether to initiate a review concerning whether a nationally recognized statistical rating organization has failed to adhere to such organization's stated procedures and methodologies for issuing ratings on securities or money market instruments. “(B) Consideration of evidence.--Performance measures the Commission may consider in initiating a review of an organization's ratings in each of the categories described in clauses (i) through (v) of section 3(a)(62)(B) during an appropriate interval (as determined by the Commission) include the transition and default rates of its in (*sic*) discrete asset classes.”

Municipal Bond Fairness Act to transform the regulatory relationship between the SEC and CRAs from clerical registration to ongoing federal oversight of rating agency governance policies, internal operations, procedures and methodologies, and ratings performance. It intentionally cuts into the intellectual heart of the rating agency industry – the rating symbol itself. Section 938(a) of Subtitle C requires rating agencies to produce “Universal Ratings Symbols.” The section states:

The (Securities and Exchange) Commission shall require, by rule, each nationally recognized statistical rating organization to establish, maintain, and enforce written policies and procedures that— (1) assess the probability that an issuer of a security or money market instrument will default, fail to make timely payments, or otherwise not make payments to investors in accordance with the terms of the security or money market instrument; (2) clearly define and disclose the meaning of any symbol used by the nationally recognized statistical rating organization to denote a credit rating; and (3) apply any symbol described in paragraph (2) in a manner that is consistent for all types of securities and money market instruments for which the symbol is used.⁶

Section 938(a) fundamentally reforms how rating agencies may determine municipal credit ratings and may lead to major changes in municipal ratings. First, rating agencies have to now assess the default risk of each issuer. Not that rating agencies didn’t determine in some general sense the likelihood of an issuer defaulting on its debt prior to Dodd-Frank, but it must now do so for every sector, and report it in a way that enables the direct, public comparison of issuers default risk across sectors. Second, CRAs are now required to define and disclose the meaning of credit rating symbols. This requirement might require a CRA to clarify its rating category and sub-category structure and modify its methodologies for assigning ratings in particular categories. Third, CRAs are now required to apply rating symbols in a manner that is consistent across all sectors. So, a AAA municipal rating should be equivalent to a AAA corporate rating,

⁶ In addition, 938(b) reads that “nothing in this section shall prohibit a nationally recognized statistical rating organization from using distinct sets of symbols to denote credit ratings for different types of securities or money market instruments.”

and both should be equivalent to a AAA sovereign rating.

During the immediate aftermath of the financial crisis it became increasingly clear to CRAs that they were unlikely to avoid new federal regulations. The U.S. Treasury released the President's financial market regulatory blueprint on June 17, 2009, entitled *Financial Regulatory Reform, A New Foundation: Rebuilding Financial Supervision*. A section of the report called on the SEC to:

...continue its efforts to strengthen the regulation of credit rating agencies, including measures to require that firms have robust policies and procedures that manage and disclose conflicts of interest, differentiate between structured and other products, and otherwise promote the integrity of the ratings process.

The Treasury report along with the Municipal Bond Fairness Act became working documents for the legislative activities that resulted in Dodd-Frank. As the financial reform legislation worked its way through the U.S. House and Senate, at each step of the process, federal regulatory oversight tightened on CRAs with more detailed statutes reaching down into their internal operations.⁷ For the credit rating agencies, there was no turning back the tide of federal regulation once the Treasury report was released. Appendix A provides a timeline of selected Congressional and Executive actions leading up to Dodd-Frank. It shows the progressively restrictive regulatory structure proposed by Congress and the Obama Administration for CRAs.

3. THEORETICAL FRAMEWORK FOR ANALYZING THE EMPIRICAL IMPACT OF DODD-FRANK

This section develops our two basic test hypotheses, the reputation hypothesis and the

⁷ After the Municipal Bond Fairness Act of 2008, eight Congressional bills were proposed each designed to expand federal oversight of CRAs. Several elements of the bills were later incorporated into the 2010 Dodd Frank Act (see Appendix A for more details).

disciplining hypothesis. These hypotheses have been used in recent studies (Ambrose, LaCour and Sanders, 2005; Bai, 2010; Becker and Milbourn, 2008; Behr et al., 2014; Cheng and Neamtiu, 2009; Covitz and Harrison, 2003; Dimitrov et al., 2015; Goel and Thakor, 2011; Hunt, 2009; Partnoy, 2006; Wang, 2011) to test the effect of major federal regulatory changes on credit ratings, the latest being Dodd-Frank.

3.1 Reputation Hypothesis

Questions have been raised by researchers on whether government intervention is needed in the CRA industry, and if so, how much and how will it affect the quality of ratings. According to the reputational view, industries where the suppliers rely on their reputational capital for future income, such as the credit ratings industry, should provide higher quality services to protect the value of their reputations, which acts to protect the interests of investors, and the general public at large. The reputational capital view has been used to justify industry self-regulation and argue against government regulation (Shapiro, 1983). Schwarcz (2002) argues that if the reputational capital view holds regulations are unnecessary “because their profitability is directly tied to reputation... [that] [a]dditional regulation of rating agencies thus would impose unnecessary costs and thereby diminish efficiency”. However, because ratings predict future default events, which are infrequent and can be far off in the future, feedback about the accuracy of ratings is slow and imprecise (Becker and Milbourn, 2011). Since investors might not be able to adequately account for the declines in marginal quality, government intervention may be required (Lynch, 2008).

The reputation hypothesis (Dimitrov et al., 2015; Becker and Milbourn, 2011) proposes that following the implementation of new regulations CRAs will tend to understate ratings to

protect their reputation. The reason is penalties for inaccurate ratings are usually imposed on optimistically biased ratings, and not on pessimistically biased ratings (Goel and Thakor, 2011). In other words, the risk of being penalized and losing reputation will be higher for issuing a higher rating on a bond that subsequently defaults, than for issuing a lower rating on a bond that maintains or increases credit quality. This asymmetric penalty causes regulation to have an adverse effect on the credit rating industry. To avoid penalties imposed by the new regulation, credit rating agencies might lower their ratings beyond a level justified by an issuer's fundamentals (Morris, 2001), thus reducing rating accuracy.

Dimitrov et al. (2015) analyze the impact of the increase in regulatory penalties and legal exposure under Dodd-Frank in the corporate market and find no evidence that ratings become more accurate and informative after Dodd-Frank. Instead, they find that CRAs issued lower ratings, give more false warnings, and issue downgrades that are less informative after Dodd-Frank. These empirical results are consistent with the reputation hypothesis and support the proposition that under increased regulation CRAs may intentionally issue pessimistic ratings, which can have a negative effect on rating accuracy. Likewise, Becker and Milbourn (2011) have results consistent with these same conclusions when they find that increased competition from Fitch caused ratings to decline.

3.2 Disciplining Hypothesis

In contrast to the reputation hypothesis, the disciplining hypothesis argues that CRAs will try to avoid the regulatory and legal sanctions associated with assigning inaccurate ratings by improving their rating methodology and therefore increasing the accuracy of their credit ratings after regulation (Dimitrov et al., 2015; Goel and Thakor, 2011). To reduce the inaccuracy of their

ratings and to reduce their regulatory and legal exposure, CRAs will perform more due diligence, improve their methodology, and improve their surveillance operations. These changes should result in better, meaning more accurate and informative, ratings.

We hypothesize that in the municipal sector CRAs are not likely to respond to Dodd-Frank in a way that is consistent with the reputation hypothesis. First, the default rate for municipal securities is very low. Studies have found that state and local government default rates are much lower than corporate default rates for similarly rated debt (Washburn, 2002). A Moody's study covering tax-exempt long-term bond issuers with Moody's credit ratings between the years 1970 and 2000 finds that municipal defaults are much less common and recoveries in the event of default are much higher than in the corporate market (Washburn, 2002). With this low default rate, the worst case scenario of a default of an investment-grade rated bond is much less a concern in the municipal market than the corporate market.

Second, before Dodd-Frank, CRAs had been widely criticized for underrating the municipal sector. Several state officials publically argued in U.S. Congressional hearings and in lawsuits that municipal debt was unfairly rated lower than corporate debt, since corporate debt had higher default rates and lower recovery rates upon default than municipal debt with the same credit rating (Municipal Bond Turmoil, 2008). This downward bias of ratings for the municipal sector has been widely known, with CRAs facing lawsuits from several state governments.⁸ Between 2008 and 2013, 16 state governments and the District of Columbia sued Fitch, Moody's and S&P (Viswanatha and Lacapra, 2013).

Based on the series of state governments suing CRAs, we argue that before Dodd-Frank,

⁸ On July 30, 2008 the state of Connecticut was the first to sue seeking to hold credit rating agencies accountable for allegedly obscuring the true credit quality of state of Connecticut bonds and as result, causing them to pay higher interest costs. On October 14, 2011 they settled with the rating agencies for a \$900,000 credit on future rating services.

CRAAs were facing reputational risk regarding the inaccuracy of ratings in the municipal sector. Indeed, sections of Dodd-Frank on rating clarity and consistency are taken directly from the Municipal Bonds Fairness Act bill (HR 6308), sponsored by Representative Frank, which was explicitly intended to “ensure uniform and accurate credit rating of municipal bonds” (Municipal Bond Fairness Act of 2008).

Another reason for the likely differential impact of Dodd-Frank regulation across municipal and corporate ratings is because the municipal bond market is not subject to the same level of primary and secondary market financial disclosure regulation as the corporate bond market. Historically, the Securities Act of 1933 and the Securities Exchange Act of 1934 provided broad exemptions for municipal securities, not subjecting municipal securities to the disclosure regulation provisions of the Acts, except for the antifraud provisions.

In 1975 Congress passed the Securities Acts Amendments of 1975, which created a “limited regulatory scheme” for the federal regulation of municipal securities. The 1975 amendments gave the SEC broad regulatory and enforcement authority over broker-dealers and banks transacting in municipal securities, and it created the Municipal Securities Rulemaking Board, subject to SEC oversight, to make rules regulating the municipal securities activities of broker-dealers and banks. The 1975 amendments, however, did not impose any new requirements, disclosure or otherwise, on municipal issuers. Indeed, the 1975 amendments expressly prohibited the SEC or MSRB from imposing any direct or indirect disclosure requirements on municipal issuers (see Exchange Act 15B(b), 15B(d)(1) and 15(B(d)(2)).⁹

However, a series of federal disclosure regulation improvements was established in 1989

⁹ The amendments exempting municipal issuers from disclosure requirements are commonly referred to as the Tower Amendments referring to the remarks of Senator John Tower during senate debate of the Act. (See 94th Congress, 1st Session, 121 Congressional Record 10727 (1975)).

with Exchange Act Rule 15c-2-12. The rule required underwriters to certify that they reviewed the “near final” official statement in municipal securities offerings. The rule was amended in 1994 to improve the flow of continuing disclosure information over the life of a security (SEC, 2000). The 1994 amendments prohibited bond dealers from purchasing or selling bonds in a primary offering if the issuer did not pledge in writing to provide a nationally recognized municipal securities information repository (NRMSIR) with annual financial information and timely notices of material events. The amendments also prohibited dealers from recommending the purchase of a bond to investors if the dealer does not have a system in place that informs dealers of significant events regarding the security.¹⁰

Despite the changes in the municipal securities disclosure regulation system mentioned above, the system is far from complete. Municipal securities still do not have to register with the SEC. Additionally, while most larger municipal issuers follow GASB-based accounting and reporting standards, there are no federal regulations requiring municipal issuers to follow GASB-based accounting standards, and not all municipal issuers follow such standards. Also, studies have consistently found that financial reporting by municipal governments is frequently delayed, untimely and incomplete (see GAO, 2012; Robbins and Simonsen, 2010; SEC, 2012). Moreover, while the quality and quantity of information reported in comprehensive annual financial statements (CAFRs) have substantially improved since GASB Statement No. 34 imposed a more comprehensive model of financial reporting, quarterly or monthly financial reports is still not required.

The gaping holes in the patchwork system of municipal disclosure give CRAs a greater

¹⁰ In 2008, the MSRB established the Electronic Municipal Market Access system (EMMA) as a single centralized disclosure repository under SEC Rule 15c2-12 (SEC, 2008).

role in providing and certifying information to investors than in the corporate market. In the municipal market, they not only certify to the interpretation of publically available information, but they may also reduce the uncertainty associated with a lack of complete and timely disclosure.

Dodd-Frank may also have a different impact on municipal ratings than corporate ratings due to differences in its secondary market. The secondary municipal market is considered an opaque market, dominated by individual retail investors (Green et al., 2007a, b and 2010; Harris and Piwowar, 2006; Edwards et al., 2007). Such individual investors in the municipal market are likely more reliant on ratings than markets dominated by institutional investors, like the corporate market. Individual investors tend to be uninformed and may lack the necessary skills to gather information and perform sophisticated analysis (Akerlof, 1970; Jaffee and Russell, 1976; Stiglitz, 1985). As a result, individual investors tend to rely more heavily on third-party information, particularly information from CRAs. In the municipal market, uninformed individual investors are subject to a different secondary market pricing structure than more informed institutionally-based investors (Green et al., 2007a, b). Credit ratings allow uninformed investors to quickly assess the comparable risk properties of securities to make an investment decision, and thus municipal investors are much more reliant on information from CRAs.

All of the empirical studies mentioned so far on the relationship between new regulations and ratings were conducted on corporate securities, leaving questions on how regulation has affected municipal securities unaddressed and unanswered. We address this issue directly, and test how the Dodd-Frank Wall Street Reform and Consumer Protection Act (2010), the latest major federal financial market regulatory reform, has directly affected CRAs and municipal ratings.

4. CREDIT RATING EMPIRICAL ANALYSIS - SAMPLE SELECTION, VARIABLE MEASUREMENT AND SUMMARY STATISTICS

Dodd-Frank increases litigation and regulatory risk for credit rating agencies. Although Goel and Thakor (2011) think of regulation as a “two-edged” sword for the industry, we propose that in the municipal market the disciplining effect may dominate the reputation effect. Based on the disciplining hypothesis, we expect municipal credit ratings to be higher after Dodd-Frank for two primary reasons. First, we expect the disciplining effect from Dodd-Frank will cause CRAs to fix the downward bias on municipal credit ratings. Both Moody’s and Fitch publically acknowledge that many of their municipal ratings had a downward bias relative to corporate bonds with the same or greater level of default risk (Municipal Bond Turmoil 2008). Therefore, it is reasonable to assume that S&P ratings may have at one point in time exhibited a similar bias. Second, as a response to greater regulatory scrutiny and litigation risk post-Dodd Frank, rating agencies may adjust their methodologies in a way that results in greater rating stability.

To test our hypotheses we use an ordered probit credit rating decision model for S&P’s ratings issued for the years 2004-2014. Fitch and Moody’s publically recalibrated their credit ratings in 2010; therefore, it will be difficult to separate the changes in Fitch and Moody’s ratings that were caused by recalibration versus changes in rating methodology in response to Dodd-Frank. S&P, on the other hand, claims that they did not recalibrate municipal ratings. S&P states they began incrementally implementing a universal rating scale with new issue ratings prior to Dodd-Frank (S&P, 2010). Therefore, S&P rating changes following Dodd-Frank cannot be attributed to a sector-wide rating recalibration. We conduct hypothesis tests that analyze changes to S&P’s rating methodology from 2004-2014 for a panel of state government data for states that sell general obligation (GO) bonds.

We focus our sample on state governments for several reasons. First, in 2008 sixteen state governments sued the rating agencies claiming that their GO bonds were underrated, thereby exposing CRAs to substantial litigation risk leading up to and after the passage of Dodd-Frank. Second, states with a GO bond rating sell general obligation debt backed by the full, faith and credit of the state. The GO credit rating indicates the state's credit position relative to all other states, and is a good indicator of a state government's credit risk. States that do not sell GO bonds, sell only revenue bonds that are not backed by the full, faith and credit of the state and the bond issue may be rated substantially based on the issue-specific project and legal provisions. Third, we separate state and local issuers to eliminate potential ratings' shopping since most state governments receive three credit ratings. Fourth, S&P publishes a state ratings' methodology manual that shows their rating methodology for state governments is different than all other rating sectors, including local issuers (S&P, 2011b).

4.1 Variable Measurement

Data, data sources and descriptive statistics for our variables are in tables 1 and 2. Several studies have been conducted over the years identifying variables associated with state government credit ratings. Our dependent variable is the state credit rating issued by S&P at the end of year $_{t+1}$. We transform alphanumeric ratings into five numeric general and sub-categories scaled from highest to lowest (AAA=1; AA+=2; AA=3; AA-=4, A+ and below¹¹=5). Table 3 summarizes the distribution of credit ratings across five rating categories for the 418 observations from the 38 states with GO ratings from 2004 to 2014. Our test variable is the AFTER DODD-FRANK (DF) dummy variable which is a 0/1 variable for periods before and after Dodd-Frank. The before

¹¹ Because of the relatively small number of ratings in A sub-categories, we assign the same category for all ratings in A categories.

Dodd-Frank period incorporates the end-of-year rating for years 2004 to 2009 while the after Dodd-Frank period incorporates the end of year rating for years 2010 to 2014.

TABLE 1: DATA AND DATA SOURCES

VARIABLE	DESCRIPTION	SOURCE
<i>Dependent Variables</i>		
S&P	Standard and Poor’s State Credit Ratings (AAA=1, AA+=2, AA=3, AA-=4, and A=5)	History Of U.S. State Ratings (published September 2015)
<i>Independent Variables</i>		
BUDGET	General fund balance (reported in millions)	Various state CAFR reports
DEBT	Long-term full faith and credit debt outstanding per capita	Various state CAFR reports
REVENUE	Own-source general revenue per capita	U.S. Census Bureau data
POP	Statewide population (reported in millions)	“
UNEMP	Statewide unemployment rate (reported as a %)	U.S. Bureau of Labor Statistics
TPGFP	Total Primary Government Financial Position (Unrestricted Assets _{TPG} /Expenses _{TPG})	Various state CAFR reports
TAXRATIO	Total Primary Government Revenue Measure (General Revenues _{TPG} /Operating Revenues _{TPG})	“
USECHG	User charges as a percent of total program revenues for business type activities (Use Charges _{BTA} /Program Revenues _{BTA})	“
PROGEXP	Measure of business type activity self-sustainability (Program Revenues _{BTA} /Expenses _{BTA})	“

BTATPG	Measure of total primary government expenses financed from BTA revenues (Program Revenues _{BTA} /Expenses _{TPG})	“
AFTER DODD-FRANK (DF)	Dummy variable indicator =1 if the credit rating is assigned from 2010 until 2014 (end of year), otherwise =0 (2004-2009).	“

TABLE 2: DESCRIPTIVE STATISTICS

This table reports descriptive statistics for key variables. The sample consists of S&P’s end of year rating for the thirty-eight state governments that issued General Obligation bonds continuously from 2004 until 2014.

VARIABLES	OBS.	MEAN	SD	MIN	MAX
S&P	418	2.514354	1.108517	1	5
BUDGET	418	1050.128	3688.249	-22961.29	22623.4
REVENUE	418	3683.914	1704.779	1878.667	20352.97
POP	418	6.470674	6.766195	0.617858	38.43139
UNEMP	418	6.516986	2.171976	2	13.7
DEBT	418	932.2335	958.7906	14.2421	4914.817
TPGFP	418	-0.040429	0.3670491	-0.958283	2.535335
TAXRATIO	418	0.4847738	0.0967233	-0.715857	0.7100293
USECHG	418	0.787151	0.1936484	0.0614088	1
PROGEXP	418	1.030181	0.2412661	0.3586425	1.805743
BTATPG	418	0.1284884	0.0667081	0.0124505	0.3770348

TABLE 3: S&P RATING DISTRIBUTION 2004-2014

This table reports S&P’s end of year ratings for thirty-eight states that issue General Obligation bonds continuously from 2004 until 2014. The Before Dodd-Frank period has end of year ratings for years 2004 until 2009 while the After Dodd-Frank period has end of year ratings for years 2010 until 2014.

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
AAA	9	9	9	9	9	9	9	8	8	9	9
AA+	5	4	6	7	8	9	9	11	11	10	10
AA	14	17	15	16	17	16	16	15	15	15	15
AA-	8	6	6	4	2	2	2	2	2	2	1
A+	1	0	1	1	2	1	1	1	1	1	1
A	1	2	1	1	0	1	1	1	1	1	1
A-	0	0	0	0	0	0	0	0	0	0	1

Our core model includes control variables found to be statistically significant in state government credit rating models, including revenues, debt, population, and other variables for the economic and financial condition of the states (Liu and Thakor, 1984; Lowry, 2001; Johnson et al., 2012; Chen et. al., 2016). We expect to find these explanatory variables significantly associated with state government credit ratings. Fiscal condition is considered a key financial indicator in determining a governments' credit rating. A commonly used fiscal measure is the debt level (DEBT), which should be directly related to the bond issuer's ability to pay off obligations in full when due. Some studies have found that municipalities' per capita debt outstanding is associated with credit ratings (e.g. Liu and Thakor, 1984; Johnson and Kriz, 2005). As expected, these studies found higher debt levels associated with lower credit ratings. We measure the debt position of the state government using the long-term full-faith and credit debt outstanding of the state government per capita (DEBT). States with higher levels of debt per capita should have lower GO credit ratings.

Revenue is also an important fiscal factor associated with credit ratings. We capture the issuer's revenue generating capacity using two revenue measures. First, we measure the level of own-source general revenue per capita (REVENUE) (Liu and Thakor, 1984; Johnson and Kriz, 2002; Johnson and Kriz, 2005; Johnson et al., 2012). This variable measures the relative tax burden since most own-source revenue is derived from taxes. Higher revenues per capita are associated with lower credit ratings. The reason is that states with a higher revenue burden may have less flexibility in increasing revenues in the future. We also use another revenue variable TAXRATIO, which is measured by dividing General Revenue with Operating Revenue.¹²

¹² Unless otherwise indicated, our financial ratios are calculated from the government-wide financial statements which cover the total primary government. It represents the most comprehensive set of government financial statements prepared on the full accrual basis.

General revenue is revenue generated for annual operations from general revenue sources (particularly taxes). Operating revenue consists of not only general revenues, but also charges for services and operating grants and contributions (not including capital grants and contributions). A higher TAXRATIO means the state has a greater ability to generate revenues from general sources. We expect a higher TAXRATIO to be associated with higher credit ratings.

Budget condition is measured using the general fund balance according to audited financial statements in CAFRS (BUDGET). All else equal, a state running a budget deficit is of higher credit risk and should have a lower credit rating than a state running a budget surplus. Therefore, we expect to find a positive relationship between BUDGET and credit rating. The variable used to control the economy is unemployment level (UNEMP) (Johnson and Kriz, 2005; Johnson and Kriz, 2002; Capeci, 1991; Liu and Thakor, 1984). We expect that a lower unemployment rate is associated with lower credit risk (higher credit rating) because of the states' greater ability to service its long-term debt. We use population (POP) to control for population size.

Several CAFR-based financial ratios have been found to be important in explaining credit ratings (Johnson et. al., 2012). The financial position ratio (TPGFP) is calculated by dividing Unrestricted Assets with Expenses. Unrestricted assets measure the level of accumulated resources over expenses. By dividing unrestricted assets by expenses, we measure the adequacy of accumulated net assets to cover current expenses. We expect higher levels of TPGFP to be associated with higher credit ratings.

Three financial ratios are related with government's business-type activities and measure the government's ability to fund services from other than general revenues. These ratios are USECHG, PROGEXP, and BTATPG. USECHG is measured by dividing User Charges by

Program Revenues. This ratio compares the revenues from charges for services with total program revenues for business type-activities. A higher USECHG means a greater ability to generate revenues from user charges to maintain business-type activities, which indicates a higher level of self-sufficiency and should be associated with a higher credit rating.

PROGEXP is calculated by dividing Program Revenues by Expenses, which measures the ability of government business-type activities (BTA) to cover their expenses. PROGEXP can also be viewed as a measure of operating self-sufficiency, and therefore should be positively related to higher credit ratings. BTATPG is a measure of the amount of total primary government expenses financed from BTA revenues. This ratio measures the adequacy of BTA funds to pay total government expenses. A higher ratio implies more non-tax resources from self-sustaining activities are available to cover basic total primary government (TPG) services. Therefore, we expect BTATPG to be positively related to credit rating.

4.2 Empirical Tests

4.2.a Credit rating levels before and after Dodd-Frank

In this section we examine whether or not S&P's credit rating levels changed after the passage of Dodd-Frank. We estimate the Dodd-Frank effect holding constant economic conditions and other important variables. Model 1 in Table 4 provides estimates from an ordered probit, pooled across years. Since there is potential correlation between regression errors for individual states, we clustered the standard errors by states. Our variable of interest is the AFTER-DF dummy variable that shows the change in ratings probability pre- and post- Dodd-Frank (holding economic and financial variables constant).

We find that credit ratings are significantly higher after Dodd-Frank when controlling for

economic and financial variables. The coefficient on the AFTER-DF dummy variable is -.9938 which indicates that the probability a state GO bond will be rated higher after Dodd-Frank is 2.7 times greater than before Dodd-Frank. This result is consistent with our proposed relationship based on the disciplining hypothesis that the increase in litigation and regulatory risk will cause S&P to increase ratings. Next, in Model 2 we estimate the base model with interactive variables multiplying AFTER-DF by independent variables to determine if the S&P ratings' model changed after Dodd-Frank. Our results indicate that S&P's model exhibited both change and stability. Most of the interactive variables remain unchanged. A Chi-Square test of the variables collectively, however, indicates that the interactive Dodd-Frank model is statistically different from the base Dodd-Frank model.

TABLE 4: RATING LEVELS BEFORE AND AFTER DODD-FRANK

This table shows ordered probit results for numerical rating codes for all end of year credit ratings for the thirty-eight state governments that issued General Obligation (GO) bonds continuously from 2004 until 2014. The dependent variable is the numerical rating for a GO bond assigned by S&P, ranging from 1 to 5 (AAA, AA+, AA, AA-, A and below). AFTER-DF (DODD-FRANK) is a dummy variable with a value of one for ratings assigned in and after 2010, and zero for ratings assigned in 2004 - 2009. Model 2 incorporates interaction variables between the independent variables and the AFTER-DF (DODD-FRANK) dummy variable. The incremental chi-square contrast test addresses the value of including the interaction variables in model 2 (compared to model 1 with no interaction variables). The independent variables are defined in Table 1. Standard errors are clustered by state. ***, **, * represent statistical significance beyond the 1st, 5th, and 10th percentile levels, respectively.

VARIABLES	MODEL 1		MODEL 2	
	ESTIMATE	STANDARD ERROR	ESTIMATE	STANDARD ERROR
BUDGET	-0.0001598	0.0000592***	-0.0002517	0.0000987**
REVENUE	0.0003023	0.0001128***	0.0004618	0.0001563***
POP	0.0024059	0.0311156	0.0450973	0.0315165
UNEMP	0.168038	0.0858801**	0.030731	0.1574881
DEBT	-0.0000456	0.0001912	0.0003101	0.0002665

TPGFP	-1.442537	0.8289515*	-0.9641729	1.152675
TAXRATIO	-3.844371	2.380812	-14.13952	3.763415***
USECHG	1.369681	0.8184929*	1.913821	1.23141
PROGEXP	-0.4447795	0.578578	-0.4344467	0.7335546
BTATPG	-3.400393	2.362571	-7.021339	2.953582**
AFTER-DF (DODD-FRANK)	-0.9938177	0.2850041***	-6.394209	1.72579***
BUDGET*AFTER-DF			0.0001189	0.000079
REVENUE*AFTER-DF			-0.0001065	0.000184
POP*AFTER-DF			-0.0699913	0.0293119**
UNEMP*AFTER-DF			0.1589801	0.1233727
DEBT*AFTER-DF			-0.0006001	0.0001575***
TPFGP*AFTER-DF			-1.248312	0.8772441
TAXRATIO*AFTER-DF			12.1482	3.166383***
USECHG*AFTER-DF			-0.3106766	0.916239
PROGEXP*AFTER-DF			-0.5730163	0.6595456
BTATPG*AFTER-DF			3.166913	2.420486
<i>U2</i>	-0.9847291	1.682868	-6.047062	2.566479**
<i>U3</i>	-0.2405907	1.69377***	-5.224196	2.560164***
<i>U4</i>	1.243017	1.672718***	-3.590796	2.495771***
<i>U5</i>	2.052537	1.741741***	-2.67283	2.597148***
NUMBER OF OBS.		418		418
MCKELVEY & ZAVOINA'S R²		47.60%		55.20%
CORRECTLY PREDICTED RATINGS (COUNT R²)		48.80%		51.20%
CORRECTLY PREDICTED – AAA		27.55%		37.75%
CORRECTLY PREDICTED – AA+		0.00%		0.00%
CORRECTLY PREDICTED – AA		42.35%		57.65%
CORRECTLY PREDICTED – AA-		0.00%		0.00%
CORRECTLY PREDICTED – A		43.50%		34.80%
INCREMENTAL CHI-SQUARE CONTRAST TEST (CHI2(10))			39.51 ***	

The interaction variables (DEBT*AFTER-DF and POP*AFTER-DF) are statistically significant, indicating that there were changes in S&P's rating model after Dodd-Frank. The most significant change is the TAXRATIO variable. Our TAXRATIO coefficient is negative and statistically significant. The negative sign implies governments that generate most of their operating revenue from general revenue sources tend to have higher credit ratings. The interaction between TAXRATIO and AFTER-DF variable is positive, resulting in the net effect of -1.17514¹³. This indicates that although generating more operating revenue from general revenue sources is associated with higher credit ratings, the odds of getting a higher rating is lower after Dodd-Frank. This is an important change because typically the TAXRATIO, and related revenue variables, have been some of the most consistently significant variables in credit rating studies. The results of our main specifications indicate that S&P increased states' credit ratings and changed its credit rating model in response to increased litigation and regulatory risk, but without a major public announcement.

4.2.b Rating Outlooks

We continue the analysis by including rating outlooks as distinct credit rating categories (see Table 5). We do this because several research studies have shown the importance of outlooks as rating signals, above and beyond the rating itself (Altman and Rijken, 2007; Alsakka and ap Gwilym, 2012; Hill and Faff, 2010). For example, a AA rating with a positive outlook is considered to be of lower risk than a AA rating with a stable outlook, which is considered of lower risk than a AA rating with a negative outlook. We find that our results are virtually the

¹³ The TAXRATIO coefficient is -12.75826 and the TAXRATIO*AFTER-DF coefficient is 11.58312. Therefore, after Dodd-Frank the net effect of TAXRATIO will be $-12.75826 + (11.58312*1)$.

same when we include outlook notches into our rating variable, as shown in Table 6. Holding economic and financial variables constant, S&P ratings are higher after Dodd-Frank, even when accounting for rating outlooks. We find that the probability a state GO bond will be rated higher (or assigned a stable or positive outlook) after Dodd-Frank is 2.76 times greater than before Dodd-Frank.

TABLE 5: CREDIT RATING AND OUTLOOK CLASSIFICATION

This table presents the numerical codes associated with the alphanumeric ratings and outlooks assigned by S&P.

Rating Categories	Description
1	AAA Stable
2	AAA Negative
3	AA+ Positive
4	AA+ Stable
5	AA+ Negative
6	AA Positive
7	AA Stable
8	AA Negative
9	AA- Positive
10	AA- Stable
11	AA- Negative
12	A and below

TABLE 6: RATING AND OUTLOOK LEVELS BEFORE AND AFTER DODD-FRANK

This table shows ordered probit results for numerical rating codes for all end of year credit ratings and outlooks for the thirty-eight state governments that issued General Obligation (GO) bonds continuously from 2004 until 2014. The dependent variable is the numerical rating for a GO bond assigned by S&P, ranging from 1 to 12 (the rating classification is defined in Table 5). AFTER-DF is a dummy variable with a value of one for ratings assigned in and after 2010, and zero for ratings assigned in 2004 - 2009. Model 2 incorporates interaction variables between the independent variables and the AFTER-DF dummy variable. The incremental chi-square contrast test addresses the value of including the interaction variables in model 2 (compared to model 1 with no interaction variables). The independent variables are defined in Table 1. Standard errors are clustered by state. ***, **, * represent statistical significance beyond the 1st, 5th, and 10th percentile levels, respectively.

VARIABLES	MODEL 1		MODEL 2	
	ESTIMATE	STANDARD ERROR	ESTIMATE	STANDARD ERROR
BUDGET	-0.0001513	0.0000582***	-0.0002444	0.0000948***
REVENUE	0.0002917	0.0001129**	0.0004465	0.0001548***
POP	0.002342	0.0305629	0.0452082	0.030466
UNEMP	0.1865232	0.0837594**	0.0635456	0.1542901
DEBT	-0.0000478	0.0001882	0.0003049	0.0002655
TPGFP	-1.424976	0.8315467*	-0.9251247	1.13549
TAXRATIO	-3.824786	2.363534	-13.69421	3.733008***
USECHG	1.546977	0.7968144*	2.052684	1.215364*
PROGEXP	-0.459833	0.5677199	-0.4078085	0.7202197
BTATPG	-3.288882	2.325126	-6.77768	2.917786**
AFTER-DF	-1.015817	0.2828304***	-5.884709	1.77008***
BUDGET*AFTER-DF			0.0001226	0.0000758
REVENUE*AFTER-DF			-0.0001168	0.0001874
POP*AFTER-DF			-0.0700966	0.0295338**
UNEMP*AFTER-DF			0.1349828	0.1252941
DEBT*AFTER-DF			-0.0005956	0.0001704***
TPFGP*AFTER-DF			-1.291391	0.8934064
TAXRATIO*AFTER-DF			11.58785	3.177223***
USECHG*AFTER-DF			-0.2204111	0.90401
PROGEXP*AFTER-DF			-0.7042019	0.6584478
BTATPG*AFTER-DF			3.142348	2.397567
<i>U2</i>	-0.7776511	1.646579	-5.535281	2.530683**

<i>U3</i>	-0.7579217	1.643822	-5.513266	2.529713
<i>U4</i>	-0.7193282	1.642455	-5.470522	2.528852
<i>U5</i>	-0.0362372	1.655678***	-4.718047	2.523764***
<i>U6</i>	-0.014046	1.656114	-4.693546	2.523085
<i>U7</i>	0.0153209	1.65607*	-4.661041	2.522621
<i>U8</i>	1.369005	1.638583***	-3.183753	2.466757***
<i>U9</i>	1.475395	1.644284**	-3.071627	2.469543**
<i>U10</i>	1.547778	1.644996**	-2.994373	2.473221**
<i>U11</i>	2.200661	1.701259***	-2.255129	2.556748***
<i>U12</i>	2.276983	1.710312	-2.161327	2.574946
NUMBER OF OBS.				
		418		418
MCKELVEY & ZAVOINA'S R₂				
		47.30%		55.00%
CORRECTLY PREDICTED RATINGS (COUNT R₂)				
		45.90%		50.70%
INCREMENTAL CHI-SQUARE CONTRAST TEST (CHI₂(10))			42.31 ***	

4.2.c Rating Actions

Our next analysis involves the number and composition of S&P rating actions. Table 7 shows the average annual S&P rating actions for our sample of 38 states during 2004 – 2014. As can be seen in Table 7, annual S&P actions decreased from 2009 to 2010 and increased from 2010 to 2011. There were zero positive actions in 2010. Using the explanatory variables from the previous model, which control for economic and financial conditions, we test whether the number and composition of rating agency actions changed after Dodd-Frank.

Table 8 shows the results of our analysis. We first test for a change in total actions, including rating changes, outlook and watch changes, shown in Panel A. We find that after Dodd-Frank, overall actions issued by S&P decreased by 17.27%. This result is significant at the .05 level. Similarly, total negative actions decreased by approximately 11.6% after Dodd-Frank, which is statistically significant at the .10 level. In Panel B we isolate rating changes (rating upgrades or downgrades). We find that after Dodd-Frank S&P issued fewer rating changes. Regarding the composition of rating changes, our results also show that after Dodd-Frank rating downgrades decreased by 9.51%, while rating upgrades increased by 8.29%. Both results are significant at the .05 level.¹⁴

In summary, after controlling for financial and economic conditions, S&P issued fewer total rating actions, fewer negative rating actions, fewer rating downgrades, and more rating upgrades after Dodd-Frank.¹⁵ Our results provide evidence of greater rating stability after Dodd-Frank and are consistent with the disciplining hypothesis. In contrast, more negative rating

¹⁴ We also analyzed the number of outlook actions, but did not find any significant results.

¹⁵ Our results contrast with Behr, et. al. (December 2014) who find that in the post-SEC NRSRO certification period (end of July 1975- December 1978), corporate rating downgrades increased. They note, however, that their results are most robust for bonds around the non-investment to investment grade threshold (i.e., rated Baa). Most state government bonds are rated in the AA-AAA range.

actions and downgrades would indicate a rating agency hedging against the potential loss in reputational capital from future downgrades not expected by the market. Moreover, the expectation under the reputational capital hypothesis is for rating agencies to produce fewer upgrades, not more, as we find. Finally, using the traditional measure of lower rating accuracy - more rating changes - we find no evidence that S&P ratings became less accurate after Dodd-Frank.

TABLE 7: AVERAGE S&P RATING ACTIONS BY YEAR

This table shows average S&P actions for the thirty-eight states that issued General Obligation bonds continuously from 2004 until 2014. Average actions are calculated as the total actions divided by the number of states in the sample.

Year	Average Total Action	Average Total Negative Action	Average Total Positive Action	Average Total Rating Action	Average Total Rating Downgrade	Average Total Outlook Action	Average Total Negative Outlook Action
2004	0.2105263	0.0789474	0.1315789	0.1052632	0.0789474	0.0789474	0
2005	0.4210526	0.1842105	0.2368421	0.2105263	0.1052632	0.1315789	0
2006	0.1315789	0.0263158	0.1052632	0.0789474	0	0.0526316	0.0263158
2007	0.2894737	0.0789474	0.2105263	0.1315789	0.0263158	0.1578947	0.0526316
2008	0.2368421	0.0789474	0.1578947	0.1315789	0	0	0
2009	0.2894737	0.2368421	0.0526316	0.1315789	0.0789474	0.1315789	0.1315789
2010	0.0789474	0.0789474	0	0.0263158	0.0263158	0.0263158	0.0263158
2011	0.3421053	0.0789474	0.2631579	0.1578947	0.0789474	0.1578947	0
2012	0.2105263	0.0789474	0.1315789	0.0526316	0.0263158	0.1578947	0.0526316
2013	0.1578947	0.0526316	0.1052632	0.0526316	0.0263158	0.1052632	0.0263158
2014	0.3947368	0.2631579	0.1315789	0.1315789	0.0789474	0.1842105	0.1315789

TABLE 8: RATING AGENCY'S ACTIONS BEFORE AND AFTER DODD-FRANK

This table shows ordinary least squares regression results for all S&P actions before and after Dodd-Frank. The sample includes thirty-eight state governments that issued General Obligation (GO) bonds continuously from 2004 until 2014. Panel A shows the total rating actions including changes in credit ratings, outlooks and credit watches. Panel B shows total rating changes, upgrades and downgrades. AFTER-DF is a dummy variable with a value of one for S&P actions issued after 2010, and zero for actions issued before 2010. The sample excludes actions in 2010 since Dodd-Frank was in effect in the middle of 2010. While we have within-year outlook, credit watch, and rating change data, we have only annual data for our independent variables, so 2010 cannot be estimated as before/after Dodd-Frank across all variables in our model. The independent variables are defined in Table 1. Standard errors are clustered by state. ***, **, * represent statistical significance beyond the 1st, 5th, and 10th percentile levels, respectively.

PANEL A: Total Actions

VARIABLES	Total Rating Actions		Total Negative Actions		Total Positive Actions	
	ESTIMATE	STANDARD ERROR	ESTIMATE	STANDARD ERROR	ESTIMATE	STANDARD ERROR
BUDGET	-0.0000236	0.000012**	0.0000101	0.0000083	-0.0000337	0.00000817***
REVENUE	0.0000855	0.0000365**	0.0000518	0.0000256**	0.0000337	0.0000232
POP	0.0218524	0.0072466***	0.0063254	0.0065279	0.015527	0.0040721***
UNEMP	0.033251	0.0234233	0.0416091	0.0177961**	-0.0083581	0.0146179
DEBT	9.96E-07	0.0000435	-5.59E-05	0.0000337*	5.69E-05	0.0000258**
TPGFP	-0.2311935	0.2192012	-0.4215887	0.1915508**	0.1903952	0.0950516**
TAXRATIO	-1.036562	0.5412098*	0.2214455	0.3395128	-1.258007	0.4293243***
USECHG	0.1972498	0.1676802	0.1527418	0.1197883	0.044508	0.1144837
PROGEXP	0.1417662	0.1236377	0.0703826	0.0808059	0.0713836	0.0865202
BTATPG	-0.9263624	0.4518797**	-0.3551124	0.2973822	-0.57125	0.3531176
AFTER DF	-0.1688257	0.0866587*	-0.1149218	0.0682923*	-0.0539038	0.0551994
Constant	0.0110591	0.3641475	-0.5636622	0.2484123**	0.5747213	0.2730924**
NUMBER OF OBS.	380		380		380	
R-SQUARED	17.89%		11.07%		17.53%	

PANEL B: Rating Changes

VARIABLES	Total Rating Changes		Total Rating Downgrades		Total Rating Upgrades	
	ESTIMATE	STANDARD ERROR	ESTIMATE	STANDARD ERROR	ESTIMATE	STANDARD ERROR
BUDGET	-0.000012	0.0000085	0.0000014	0.0000052	0.0000003	0.0000041
REVENUE	0.000048	0.0000247*	0.0000281	0.0000169*	-0.0000178	0.0000109
POP	0.0052433	0.0034597	-0.0017702	0.00221	0.0012823	0.0021296
UNEMP	0.0182568	0.014255	0.0334768	0.0115978***	-0.0299845	0.0106332***
DEBT	-1.31E-05	0.0000287	-4.06E-05	0.0000219*	2.86E-05	0.000014**
TPGFP	-0.1386822	0.1524831	-0.2551836	0.1317232*	0.168339	0.0787353**
TAXRATIO	-0.1998467	0.353666	0.3704592	0.2112304*	-0.2960559	0.1928194
USECHG	-0.0840356	0.1056278	-0.0390263	0.0823482	0.0252672	0.080402
PROGEXP	0.1294372	0.0809649	0.0525568	0.0457966	-0.0342931	0.040568
BTATPG	-0.3882422	0.2827802	-0.1930626	0.1540853	0.1464801	0.1410284
AFTER DF	-0.1380654	0.052777***	-0.0956881	0.0394727**	0.0835215	0.0346056**
Constant	-0.0525428	0.2334324	-0.3685656	0.1592735**	1.289001	0.1306553***
NUMBER OF OBS.	380		380		380	
R-SQUARED	7.35%		9.85%		8.53%	

4.3 Several Robustness Tests

4.3.a Business Cycle effects

For a robustness check we test for changes in ratings over the economic cycle using different specifications of unemployment (UNEMP). We do this to substantiate our claim that our results adequately control for changes in the economy over our sample period, so changes in ratings cannot be attributed to rating changes through the cycle. Using both the squared value and lagged value of unemployment levels, our results are unchanged.¹⁶

4.3.b Number of States

Our next analysis includes states with no GO ratings, but which were assigned an Issuer Credit Rating (ICR) by S&P. These states were previously excluded from our base model. This analysis includes 47 states; all states, except for Nebraska, South Dakota and Idaho, which do not have S&P credit ratings over our entire study period. Similar to our previous findings, after including states with an ICR the probability of a state getting a higher credit rating is higher after Dodd-Frank.

4.3.c Competition

Becker and Milbourn (2011) and Bar-Isaac and Shapiro (2010) argue that competition most likely weakens incentives for providing quality in the ratings industry. Dimitrov et al. (2015) uses Becker and Milbourn to (2011) to argue that CRA reputational concerns are higher in credit sectors with greater competition. They operationalize low CRA market competition in

¹⁶ We also used State GDP as an alternative economic variable specification. This additional analysis produced a consistent result. The probability of getting a higher credit rating is higher after Dodd-Frank, controlling for changes in State GDP.

terms of low Fitch market share. The state government credit sector presents a case where competition from Fitch is virtually always high. In our sample 36 (of 38) states received three credit ratings. To test our results for the level of market competition, we include only states with three credit ratings (S&P, Moody's and Fitch). Our analysis using the data for 36 states with three credit ratings generates results consistent with prior results.

We find that the probability of states getting a higher credit rating is higher after Dodd-Frank for states with high Fitch market share. In contrast, Dimitrov et al. (2015) find no significant effect on credit ratings after the passage of Dodd-Frank in corporate sectors with high Fitch market share. In low Fitch market share corporate sectors they find lower credit ratings after Dodd-Frank. They argue this is because rating agencies "lower their ratings after Dodd-Frank when their reputation is more valuable" (Dimitrov et al., 2015: 512).

The reputation argument is that Moody's and S&P are more protective of their reputations in a sector with low Fitch market share because of the costs of losing their reputation. In a high Fitch market share sector, the *ex ante* cost of losing their reputation is lower, and therefore, there is no need for Moody's or S&P to issue lower ratings. In a credit sector where their reputation is less valuable, rating agencies have no incentive to produce overly pessimistic ratings in response to increased regulation. Dimitrov et al. (2015) find no significant results in high Fitch market share corporate sectors, where we find that in a market where Fitch has traditionally had very high market share, Dodd-Frank resulted in higher ratings and fewer downgrades.

4.4 Evolution of Dodd-Frank

Dodd-Frank did not become law quickly. Rather, Dodd-Frank represents the culmination

of the long and winding process of federal law making in the United States of America.

Appendix A provides a timeline of significant executive and legislative actions leading up to Dodd-Frank. The primary impetus occurred in September 2008 with the introduction of the Municipal Bond Fairness Act in the U.S. House of Representatives by Barney Frank. Legislative activities continued throughout 2009 with a series of legislative hearings, including testimony by rating agency executives. Several amendments and drafts of alternative bills worked their way through the legislative pipeline, all intended to increase federal regulatory oversight of financial markets in general, and accountability and transparency of CRAs in particular.

Of particular importance was the U.S. Treasury Report released in June 2009, *Financial Regulatory Reform, A New Foundation: Rebuilding Financial Supervision*. The report laid out President Obama's perspective on financial regulatory reform following the financial crisis, which included the comprehensive reform of CRAs. On July 23, 2009 H.R. 3310 was introduced in the House of Representatives with the explicit purpose "to reform the financial regulatory system of the United States..." On October 21, 2009, the "Accountability and Transparency in Rating Agencies Act" (H.R. 3890) was introduced. It contained a sweeping overhaul and tightening of the federal regulation of CRAs. The Dodd-Frank bill, H.R. 4173, was introduced in the House on December 2, 2009, passed on December 11, 2009 and was sent to the Senate. On May 10, 2010, the bill passed the Senate and was signed into law by President Obama on July 21, 2010.¹⁷

Since the public process of creating Dodd-Frank began in 2008, in this section we conduct a sensitivity analysis to see if our results change using alternative specifications of the

¹⁷ See *Dodd-Frank Wall Street Reform and Consumer Protection Act: A Brief Legislative History with Links, Reports and Summaries*. Public Law 111-203, July 21, 2010, 124 Stat. 1325 (H.R. 4173) Law Librarians' Society of Washington, D.C. <http://www.lisdc.org/dodd-frank-legislative-history>. Downloaded on June 2, 2016.

pre- and post-Dodd-Frank periods. Our base model used end of year 2010 ratings as the base year. We now run models with 2008, 2009 and 2011 as alternative post-Dodd-Frank periods. Our results for model's 1 and 2 are shown in Table 10.¹⁸ In model 1 our results show significant results for all years. For 2008, 2009 and 2010 years the AFTER-DF coefficient is statistically significant at the .01 level. The AFTER-DF coefficient for 2009 is larger than 2008, and the coefficient for 2010 is larger than 2009, indicating that the impact on S&P from the federal actions associated with Dodd-Frank continued to grow the closer it came to becoming law. Also in model 1, the AFTER-DF coefficient for 2011 is significant at the .10 level. Overall for model 1, the 2010 year has the largest coefficients, and the highest McKelvey & Zavoina R² and Count R² prediction accuracy. In model 2, the AFTER-DF coefficient is significant in years 2008, 2009, 2010, but not 2011. The McKelvey & Zavoina R² is highest for 2010, but the Count R² is highest for 2009. Overall, from these results we conclude that 2010 provides the most accurate Dodd-Frank start date.

¹⁸ While we ran the full models, to conserve space we only show summary statistics and test variable coefficients and significance levels.

Table 10: Rating levels for alternative start dates of the post-Dodd-Frank period.

This table shows ordered probit results for numerical rating codes for all end of year credit ratings, conditional on the starting date of the Dodd-Frank period (the time period when the activities leading up to Dodd-Frank are assumed to start influencing S&P rating decisions). The sample includes the thirty-eight state governments that issued General Obligation (GO) bonds continuously from 2004 until 2014. Panel A shows the result for the model without interaction variables and Panel B shows the result for the model with interaction variables. Both Panel A and Panel B correspond to the regression specifications for Model 1 and Model 2 in Table 4, with the coefficients on the control variables omitted for brevity. The dependent variable is the numerical rating for a GO bond assigned by S&P, ranging from 1 to 5 (AAA, AA+, AA, AA-, A and below). AFTER-DF is a dummy variable with a value of one for ratings assigned in and after 2010, and zero for ratings assigned in 2004 - 2009. Standard errors are clustered by state. ***, **, * represent statistical significance beyond the 1st, 5th, and 10th percentile levels, respectively.

Panel A: Model without Interaction Variables

	Start of Dodd-Frank Effect			
	2008	2009	2010	2011
COEFFICIENT AFTER-DF VARIABLE	-0.5911752***	-0.8323926***	-0.9938177***	-0.3970033*
MCKELVEY & ZAVOINA'S R ²	44.50%	46.50%	47.60%	43.10%
CORRECTLY PREDICTED RATINGS (COUNT R ²)	48.30%	47.80%	48.80%	48.30%

Panel B: Model with Interaction Variables

	Start of Dodd-Frank Effect			
	2008	2009	2010	2011
COEFFICIENT AFTER-DF VARIABLE	-6.297367***	-6.743144***	-6.394209***	-2.013632
MCKELVEY & ZAVOINA'S R ²	51.40%	54.50%	55.20%	47.50%
CORRECTLY PREDICTED RATINGS (COUNT R ²)	50.50%	52.20%	51.20%	47.80%

5. DODD-FRANK IMPACT ON BOND YIELDS

In this section we continue to test the disciplining versus reputational hypotheses by analyzing bond yields before and after Dodd-Frank. We examine how investors react to changes in credit ratings after the passage of Dodd-Frank. If the market views that Dodd-Frank improves the credibility of credit rating agency information, we expect the market will react positively to higher ratings and bond yields will be lower. To test this hypothesis, we use yields on state government general obligation bonds issued in years 2004-2015 in the primary municipal market. The period covers both years before and after Dodd-Frank. The total bonds used for the analysis is 22,785 individual bonds.¹⁹ The model we use to test this hypothesis is as follows:

$$YIELD_{it} = \beta_0 + \beta_1 RATING_{it} + \beta_2 AFTER - DF + \beta_3 RATING_{it} \times AFTER - DF + CONTROLS + \varepsilon \quad (1)$$

RATING represents the credit ratings assigned by S&P. We transform alphanumeric ratings into seven numeric general and sub-categories scaled from highest to lowest (AAA=1; AA+=2; AA=3; AA-=4, A+=5; A=6; A-=7).²⁰ Higher numbers associated with higher credit risk, and thus should also be associated with higher yields. *AFTER-DF* represents the periods after Dodd-Frank. Our findings in Section 4 show that after Dodd-Frank ratings are higher and rating actions are more positive. Therefore, we expect bond yields will be lower in the periods after Dodd-Frank and *AFTER-DF* will have a negative sign.

¹⁹ We started with 24,575 serial bonds that are issued during the years 2004-2015. We dropped 1600 bonds that do not have rating information, 121 bonds that have no yield information, and 69 bonds that are missing bond or market characteristics.

²⁰ We have a sufficient number of bonds in the single A rating category to use three single A rating sub-categories. Our model represents all credit risk levels for the bonds in our sample (we do not have a bond with a rating lower than A-).

Next, we test the impact of Dodd-Frank on bond yields across rating levels. The interaction between rating level and *AFTER-DF* estimates the changes in yield differences across rating classes after Dodd-Frank. Consistent with the disciplining hypothesis, we expect that after Dodd-Frank the market will have more confidence in the information provided by the ratings issued by credit rating agencies. Credit ratings may be viewed as being more informative, with market participants better able to separate bonds based on their default risk. We, therefore, expect after Dodd-Frank, the yield differences across rating classes will be wider. However, if the market reacts consistent with the reputational hypothesis, we expect to find the opposite. The market will not view rating information as more informative, resulting in no significant change in bond yield differences across rating classes.

In our model we control for serial bond and bond issue characteristics, and market conditions at the time of a new bond issuance. We also control for any annual changes that can influence interest rates using year fixed effects, and control for issuer characteristics that are constant over time using issuer fixed effects. The model is estimated using robust standard errors.

Next, we specifically test whether the market reacts differently to new rating information after Dodd-Frank. If the market views that Dodd-Frank improves the credibility of rating agency information, we expect the market will react sooner to new rating information. We test this hypothesis using the rating upgrades in the periods before and after Dodd-Frank.²¹ The analytical model used to test this proposition is:

²¹ We did not test rating downgrades because only about 1 percent of the new bond issues in this study are issued by state governments that experienced a rating downgrade at least 30 days prior to new bond issuance.

$$\begin{aligned}
YIELD_i(t) = & \beta_0 + \beta_1 RATING_{it} + \beta_2 UPGRADE_{it} + \beta_3 UPGRADE_{it} \times RATING_{it} \\
& + \beta_4 UPGRADE_{it} \times RATING_{it} \times AFTER - DF + \beta_5 AFTER - DF \\
& + \beta_6 UPGRADE_{it} \times AFTER - DF + \beta_7 RATING_{it} \times AFTER - DF \\
& + CONTROLS \\
& + \varepsilon
\end{aligned} \tag{2}$$

As discussed earlier, the coefficient for *RATING* indicates the bond yield differences across rating classes. *UPGRADE* indicates that the issuer received a rating upgrade just prior to the new bond issuance.²² The coefficient for the interaction between *RATING* and *UPGRADE* tests for the spread in bond yield differences for bonds with a newly-upgraded rating and bonds with an established rating. If this variable is negative, the bond yield differences are smaller for bonds from issuers that are recently upgraded. Our variable of interest is the interaction between *UPGRADE*, *RATING*, and *AFTER-DF*. Based on the disciplining hypothesis, we expect that after Dodd-Frank, the market reacts sooner to the new rating information, thus reducing the spread in bond yield differences between bonds with a newly-upgraded rating and bonds with an established rating. Similar to model (1), we use year fixed effects to control for any annual changes that can influence interest rates and state fixed effects to control for state characteristics that are constant over time. The model is estimated with robust standard errors.

5.1 Regression Results

Variable descriptions, data and data sources are shown in Table 11. Table 12 provides the descriptive statistics for all variables. The regression results for the model estimating Dodd-

²² In our main specification, we use a 30-days upgrade period to reduce the possibility that other new information enters the market and affects bond yields. We then perform additional analysis using a 60-days upgrade period.

Frank's impact on bond yields are shown in Table 13. As expected, lower ratings are associated higher yields. Every increase in the level of risk is associated with a 10.5 basis points increase in yield. The *AFTER-DF* variable is negative and significant (-3.59), which indicates that yields on bonds issued after Dodd-Frank are lower than bonds issued before Dodd-Frank, holding rating (and other bond, issue and market characteristics) constant. The interaction between rating level and the after-Dodd-Frank period (*RATING*AFTER-DF*), is positive and significant. Before Dodd-Frank, each increase in risk is associated with a 10.5 basis points higher bond yield. After Dodd-Frank, each increase in risk is associated with a 13.9 basis points higher bond yield. These results indicate that after Dodd-Frank the market uses credit rating information to further separate bonds based on their default risk.

Table 11
Variables, Data and Sources - Yield Regression

VARIABLE NAME	DESCRIPTION	SOURCE
<i>Dependent Variables</i>		
YIELD	Initial offering yield (%)	IPREO
<i>Independent Variables</i>		
RATING	Rating at issuance (AAA=1, AA+=2, AA=3, AA-=4, A+=5, A=6, A-=7)	IPREO
AFTER-DF	Dummy variable indicator if the bond is issued after Dodd-Frank	Author's compilation
UPGRADE	Dummy variable indicator if the bond rating was upgraded recently	Author's compilation
Scale Coupon	Bond coupon rate (%)	IPREO

General Purpose	Dummy variable indicator if the bond is a general purpose bond (yes=1;no=0)	IPREO
Tax Exempt	Dummy variable indicator if the bond interest is not subject to federal tax (yes=1;no=0)	IPREO
Competitive	Dummy variable indicator if the bond is sold in competitive offering (yes=1;no=0)	IPREO
Bank Qualified	Dummy variable indicator if the bond's interest is bank qualified (yes=1;no=0)	IPREO
Unlimited GO	Dummy variable indicator if the bond's source of repayment is unlimited (yes=1;no=0)	IPREO
Callable	Dummy variable indicator if the bond is callable (yes=1;no=0)	IPREO
Refunding	Dummy variable indicator if the bond is a refunding bond (yes=1;no=0)	IPREO
Issue Size	Log of bond par value	IPREO
Maturity	Difference between bond's dated date and maturity date (in days)	IPREO
Insured	Dummy variable indicator if the bond is insured (yes=1;no=0)	IPREO
Market Index	Market Yield, Bond Buyer 20 index	Bond Buyer
Market Volatility	Standard deviation of the 8-week moving average of Bond Buyer 20 index	Bond Buyer
Visible Supply	The amount of municipal bonds to be offered by dealers over the next 30 days	Bond Buyer

Table 12: Descriptive Statistics for Yield Regressions

This table reports descriptive statistics for key variables. The sample consists of rated new general obligation bonds issued by thirty-eight state governments from 2004 until 2015.

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
YIELD	22,785	2.978	1.292	0.0600	7.931
AFTER-DF	22,785	0.476	0.499	0	1
RATING	22,785	5.417	1.336	1	7
UPGRADE (30 Days)	22,785	0.0186	0.135	0	1
UPGRADE (60 Days)	22,785	0.0226	0.149	0	1
Scale Coupon	22,785	4.256	1.021	0.140	7.950
Refunding	22,785	0.350	0.477	0	1
Insured	22,785	0.0965	0.295	0	1
General Purpose	22,785	0.676	0.468	0	1
Tax Exempt	22,785	0.881	0.324	0	1
Competitive	22,785	0.585	0.493	0	1
Bank Qualified	22,785	0	0	0	0
Unlimited GO	22,785	0.856	0.351	0	1
Callable	22,785	0.276	0.447	0	1
Issue Size	22,785	15.48	1.584	8.517	21.82
Maturity	22,785	3,618	2,247	30	14,893
Market Index	22,785	4.287	0.417	3.270	6.010
Market Volatility	22,785	0.102	0.0632	0.0243	0.503
Visible Supply	22,785	9,935,000	3,406,000	1,397,000	20,500,000

Table 13: Bond Yields before and after Dodd-Frank

This table shows OLS regression for municipal bond yields for new GO bonds issued by state governments in 2004-2015. The dependent variable is bond yield. RATING is the S&P rating for the bond at the time of new issuance, ranging from 1 (highest) to 7 (lowest). After Dodd-Frank (AFTER-DF) is a dummy variable with a value of one for ratings assigned after July 2010, and zero for ratings assigned before 2010. All variables are defined in Table 11. The model includes state and year fixed effects, and robust standard errors. ***, **, * represent significance beyond the 1st, 5th, and 10th percentile levels, respectively.

VARIABLES	YIELD
RATING	0.105*** (0.00824)
AFTER-DF	-0.359* (0.0283)
RATING*AFTER-DF	0.0342*** (0.00609)
Scale Coupon	0.218*** (0.00463)
General Purpose	-0.0272*** (0.00963)
Tax Exempt	-0.967*** (0.0131)
Competitive	-0.0746*** (0.00926)
Unlimited GO	-0.0799*** (0.0121)
Insured	-0.195*** (0.0142)
Callable	-0.00146 (0.00924)
Refunding	-0.0421*** (0.00776)
Issue Size	-0.0622*** (0.00304)
Maturity	0.000346*** (0.00000263)
Market Index	0.520***

	(0.0141)
Market Volatility	0.167**
	(0.0691)
Visible Supply	0.000000000466
	(0.0000000012)
Constant	1.327***
	(0.0982)
Observations	22,785
R-squared	0.859
Issuer FE	YES
Year FE	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

As shown in Table 14, we conduct another analysis by grouping bonds into general rating categories or classes: AAA, AA, and A.²³ In each of the rating class regressions, the *AFTER-DF* variable is negative and significant, which shows that after Dodd-Frank bond yields are lower and the impact of Dodd-Frank on bond yield is significant across all rating classes.²⁴ Additionally, we ran a separate model using only non-rated bonds to test our results. As shown in Table 15, we did not find any significant difference in bond yields before and after Dodd-Frank for non-rated bonds. This result indicates Dodd-Frank impacted bond yields through credit ratings.

²³ The lowest rating for all bond issues in our sample is A-, thus we do not need to conduct a separate analysis for rating classes that are lower than A.

²⁴ To make sure our results are not affected by Moody's rating recalibration in 2010, we run separate models using only bonds that are issued by nonrecalibrated states. Our results are consistent.

Table 14: Municipal Bond Yield before and after Dodd-Frank by Rating Classes

This table shows OLS regressions for municipal bond yields for new GO bonds issued by state governments in 2004-2015 based on three rating classes (AAA, AA, and A). The dependent variable is the municipal bond yield. AFTER-DF is a dummy variable with a value of one for ratings assigned after July 2010, and zero for ratings assigned before 2010. The independent variables are defined in Table 11. The model includes state and year fixed effect, and robust standard errors. ***, **, * represent significance beyond the 1st, 5th, and 10th percentile levels, respectively.

VARIABLES	(1) AAA	(2) AA	(3) A
AFTER-DF	-0.222*** (0.0502)	-0.156*** (0.0305)	-0.460*** (0.165)
Scale Coupon	0.141*** (0.00783)	0.216*** (0.00428)	0.363*** (0.0155)
General Purpose	0.0206 (0.0234)	-0.0164 (0.0109)	0.133* (0.0707)
Tax Exempt	-1.124*** (0.0265)	-0.876*** (0.0123)	-1.113*** (0.0586)
Competitive	0.0733*** (0.0245)	-0.0851*** (0.0106)	-0.0687* (0.0391)
Unlimited GO	-0.0859*** (0.0309)	0.00546 (0.0139)	-0.142*** (0.0409)
Insured	-0.366*** (0.0580)	-0.205*** (0.0150)	-0.124*** (0.0452)
Callable	0.0749*** (0.0174)	-0.0200* (0.0105)	0.0119 (0.0307)
Refunding	0.0297* (0.0169)	-0.0484*** (0.00907)	0.0484 (0.0335)
Issue Size	-0.0423*** (0.00620)	-0.0692*** (0.00331)	-0.114*** (0.0101)
Maturity	0.000363*** (0.00000368)	0.000349*** (0.00000211)	0.000293*** (0.00000575)
Market Index	0.514*** (0.0276)	0.530*** (0.0156)	0.788*** (0.0655)
Market Volatility	0.0215 (0.120)	0.0136 (0.0829)	1.315*** (0.314)
Visible Supply	0.0000000143*** (0.00000000237)	0 (0.00000000135)	0.0000000179*** (0.00000000487)

Constant	0.763*** (0.171)	0.795*** (0.126)	-0.184 (0.375)
Observations	4,915	15,906	1,964
R-squared	0.882	0.866	0.848
Issuer (State) FE	YES	YES	YES
Year FE	YES	YES	YES

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

Table 15: Municipal Bond Yields before and after Dodd-Frank for Non-Rated Bonds

This table shows OLS regression for municipal bond yield for new non-rated GO bonds issued by state governments in 2004-2015. The dependent variable is the municipal bond yield. AFTER-DF is a dummy variable with a value of one for ratings assigned after July 2010, and zero for ratings assigned before 2010. The independent variables are defined in Table 11, and are the same variables shown in Table 14. Here we show only the result for the test variable. The results of the full model are available from the author. The model includes state and year fixed effects, and robust standard errors. ***, **, * represent significance beyond the 1st, 5th, and 10th percentile levels, respectively.

VARIABLES	YIELD
AFTER-DF	0.299 (0.212)
Observations	1,600
R-squared	0.881

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

Our next analysis involves the impact of recent rating upgrades on bond yields. We identified whether a bond issuer received a rating upgrade before the new bond issuance. We identified the periods before bond issuance as 30 days and 60 days prior to new bond issuance.

The results of this analysis are shown in Table 16 and we provide a numerical example to interpret the regression coefficients in Table 17.

From Table 16, our *RATING* variable is positive and significant, which indicates every decrease in rating class is associated with a 10.9 bps increase in bond yield, or in other words, the yield spread across rating is 10.9 bps. The interaction between *RATING* and *UPGRADE* is negative and significant, which means the yield spread across rating will be higher if one of the ratings is a newly upgraded rating. For example, as shown table 17 section A.1, the yield difference between AAA and AA bonds is 10.9 bps. However, if the AAA bond is a newly upgraded bond, as shown in table 17 section A.2, the yield spread between AAA and AA bonds is 18.57 bps. Thus, the yield spread for newly upgraded bonds (compared with other rating level) is 7.67 bps greater compared to the yield spread for bonds with an established rating.

Our variable of interest, the interaction between *RATING*, *UPGRADE*, and *AFTER-DF*, addresses whether Dodd-Frank reduces the differences in yield spread between recently upgraded bonds and bonds with an established rating. As shown in Table 16, we find that the interaction between *RATING*, *UPGRADE*, and *AFTER-DF* is positive and significant, which indicates that the difference in yield spread is smaller after Dodd-Frank. From the illustration in Table 17 section B.1, after Dodd-Frank, the yield spread across ratings is 13.97 bps, which means every decrease in rating class is associated with a 13.97 bps higher yield. For bonds that have a newly upgraded rating after Dodd-Frank, the yield spread across rating decreases to 11.99 bps (see section B.2 in Table 17). Overall, the difference in yield spread (across rating level) for newly upgraded bonds and bonds with an established rating is now -1.98 bps, lower than the before-Dodd-Frank difference of 7.67 bps.

Our results for the 60-days period are also consistent. Although a yield spread between newly upgraded bonds and bonds with established rating still exists, the magnitude decreases after Dodd-Frank. These results support our general proposition that after Dodd-Frank the market adjusted their expectations for newly upgraded bonds. After Dodd-Frank, rating upgrades are viewed more positively with the market reacting to the new information by reducing the yield spread difference between newly upgraded bonds and bonds with an established rating.

Table 16: Municipal Bond Yields before and after Dodd-Frank for Newly Upgraded Issuers

This table shows OLS regressions for municipal bond yields for new GO bonds issued by state governments in 2004-2015. The dependent variable is the municipal bond yield. Rating is S&P's rating for the bond issuer at the time of new bond issuance, ranging from 1 (highest) to 7 (lowest). AFTER-DF is a dummy variable with a value of one for ratings assigned after July 2010, and zero for ratings assigned before July 2010. RATING UPGRADED is a dummy variable with a value of one for new bonds issued by an issuer that had a recent rating upgrade, and zero otherwise. The other independent variables are defined in Table 11. The model includes state and year fixed effect, and robust standard errors. ***, **, * represent significance beyond the 1st, 5th, and 10th percentile levels, respectively. We show only the results for the test variables. The results for the full model are available from the author.

VARIABLES	(1) UPGRADED_30DAYS	(2) UPGRADED_60DAYS
Rating	0.109*** (0.00835)	0.109*** (0.00834)
Rating*RATING UPGRADED	-0.0767*** (0.0193)	-0.0770*** (0.0193)
Rating*RATING UPGRADED*AFTER-DF	0.0965*** (0.0363)	0.0456* (0.0270)
AFTER-DF	-0.351*** (0.0284)	-0.353*** (0.0284)
Rating*AFTER-DF	0.0307*** (0.00621)	0.0312*** (0.00624)
RATING UPGRADED	0.253*** (0.0586)	0.254*** (0.0586)
RATING UPGRADED*AFTER DODD-FRANK	-0.230*	-0.0900

	(0.127)	(0.0958)
Observations	22,785	22,785
R-squared	0.859	0.859

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 17
Illustration for the impact of Dodd-Frank on Yield Spread between
Newly Upgraded and Established Rating

This table provides an illustration of bond yield differences for bonds that are upgraded within the last 30 days and bonds with an established rating. Panel A shows the yield difference before Dodd-Frank and Panel B shows the yield difference after Dodd-Frank. Section A.1 shows the yield difference between bonds with a AAA and AA rating. Section A.2 shows the yield difference between the new AAA bonds and AA bonds. Section B.1 shows the yield difference between bonds with AAA rating and AA rating. Section B.2 shows the yield difference between the newly rated AAA bonds and AA bonds.

A. YIELD DIFFERENCE BEFORE DODD-FRANK

	AAA (rating=1)	AA (rating=2)	Yield Spread Across Rating Level
<i>A.1 Post Dodd-Frank=0, Upgraded=0</i>			
Coefficient for Rating = 0.109	0.109	0.218	0.109
<i>A.2 Post Dodd-Frank=0, Upgraded=1 for AAA</i>			
Coefficients for Rating = 0.109, Rating Upgrade= -0.0767	0.0323 ^a	0.218	0.1857
Difference in Yield Spread for New Upgrade and Established Rating before Dodd-Frank			0.0767

^a(0.109+(1*-0.0767))

B. YIELD DIFFERENCE AFTER DODD-FRANK

	AAA (rating=1)	AA (rating=2)	Yield Spread Across

			Rating Level
<i>B.1 Post Dodd-Frank=1, Upgraded=0</i>			
Coefficients for Rating = 0.109, Rating*After-DF =0.0307	0.1397 ^b	0.2794 ^c	0.1397
<i>B.2 Post Dodd-Frank=1, Upgraded=1 for AAA</i>			
Coefficients for Rating = 0.109, Rating*After-DF =0.0307, Rating Upgrade=-0.0767, Rating*Upgraded*After-DF=0.0965	0.1595 ^d	0.2794	0.1199
Difference in Yield Spread for New Upgrade and Established Rating after Dodd-Frank			-0.0198

^b(1*0.109)+(1*0.0307)

^c(2*0.109)+(2*0.0307)

^d(0.109+(1*0.0307)+(1*-0.0767)+(1*0.0965))

6. CONCLUSION

We find empirical evidence consistent with a disciplining hypothesis response by CRAs to greater federal regulation. Faced with the reality of regulatory intervention in the form of Dodd-Frank, S&P raised their ratings significantly on state government GO bonds. Our results also show that after Dodd-Frank rating downgrades decreased significantly, while rating upgrades increased significantly. After Dodd-Frank, S&P issued fewer overall negative rating actions, fewer rating downgrades, and more rating upgrades. Also, using rating changes as a measure of rating accuracy, we find no evidence that S&P ratings became less accurate after Dodd-Frank. Indeed, we find evidence supporting greater accuracy after Dodd-Frank. These results are consistent with the disciplining hypothesis.

The results of our main specifications indicate that S&P increased states' credit ratings and changed its credit rating model in response to increased litigation and regulatory risk, but

without a major public announcement. This is also consistent with the notion presented by Goel and Thakor (2014) that CRAs in their role as information intermediaries between issuers and investors may feel pressure from issuers to influence ratings in their favor.

We also find that after Dodd-Frank bond yields are lower and the impact is significant across all rating classes. In addition, we find no significant difference in bond yields before and after Dodd-Frank for non-rated bonds. This result indicates Dodd-Frank did impact bond yields through credit ratings, and that after Dodd-Frank the market uses credit rating information to further separate bond yields based on their default risk.

In addition, we find that recently upgraded bonds are associated with a significantly greater reduction in yield spread after Dodd-Frank. This result supports our general proposition that the market interpreted post-Dodd-Frank rating upgrades as providing new, positive information and adjusted bond yields accordingly.

Finally, our results highlight the consequences of the gaping holes in the patchwork system of municipal disclosure. In such an incomplete and non-comprehensive disclosure system, CRAs may have a greater role in providing and certifying information to investors than in a market with complete and comprehensive disclosure requirements, such as the corporate market. Even though the municipal market in general, and state government GO bonds in particular, represent a low-risk sector of the fixed income market, CRAs not only certify to the interpretation of publically available information, but they may also reduce the uncertainty associated with a system lacking complete and timely disclosure.

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**APPENDIX A:
THE LEGAL EVOLUTION OF DODD-FRANK:
Selected Bills, Amendments, Hearings, Congressional Records, Laws and Reports (July 2008- July 2010)**

Appendix A describes significant legislative and executive branch activities directed at credit rating agencies prior to the Dodd–Frank Wall Street Reform and Consumer Protection Act being signed by President Barack Obama and becoming law on July 21, 2010. U.S. federal actions started to occur in mid-2008. By then the steepest recession since the Great Depression had already begun, with the National Bureau of Economic Research dating the recession’s start as December 2007. By March 16, 2008 Bear Stearns had folded, agreeing to a fire sale with JP Morgan in a stock swap of \$2, or less than 7 percent of what its stock was trading just days before. The sale was backed by \$1 billion from JP Morgan and \$29 billion from the New York Federal Reserve Board in loans. The government was propping up the U.S. economy at a tremendous cost. Rep. Gary Ackerman introduced one of the first bills to directly address how to correct the systematic failures of financial markets which had caused the recession. Rep. Barney Frank [D-MA] introduced the Municipal Bond Fairness Act on September 9, 2008. Then Lehman Brothers collapsed on September 15, 2008, surpassing Enron/WorldCom to become the largest bankruptcy in U.S. history. From then on, the Senate, the House of Representatives, and the White House engaged in a flurry of legislative proposals and actions, as detailed below, that culminated in the Dodd-Frank Act becoming law.

Action	Title	Sponsor	Branch	Congress	Date Introduced
Bill	H.R.6482, To direct the Securities and Exchange Commission to establish both a process by which asset-backed instruments can be deemed eligible for NRSRO ratings and an initial list of such eligible asset-backed instruments.	Rep. Gary Ackerman [D-NY-5]	House of Representatives	110th (2007-2008, 2nd Session)	July 14, 2008
Bill	H.R. 6308, Municipal Bond Fairness Act	Rep. Barney Frank [D-MA-4]	House of Representatives	110th (2007-2008, 2nd Session)	September 9, 2008
Congressional Record	Financial Crisis (154 Cong. Rec. S9446)	Sen. Johnny Isakson [R-GA]	Senate	110th (2007-2008, 2nd Session)	September 25, 2008
Hearing	Credit Rating Agencies and the Financial Crisis	Committee on Oversight and Government Reform	House of Representative	110th (2007-2008, 2nd Session)	October 22, 2008

Hearing	Financial Regulation - Where were the Watchdogs? The Financial Crisis and the Breakdown of Financial Governance, January 21, 2009	Committee on Homeland Security and Governmental Affairs	Senate	111th (2009-2010, 1st Session)	January 21, 2009
Bill	H.R. 768, Commission on Financial Crisis Accountability Act of 2009	Rep. John B. Larson [D-CT-1]	House of Representatives	111th (2009-2010, 1st Session)	January 28, 2009
Congressional Record	America's Financial Crisis (155 Cong. Rec. H764)	Mr. Akin (Speaking on behalf of minority leader, John Boehner)	House of Representatives	110th (2007-2008, 2nd Session)	January 28, 2009
Hearing	Financial Regulation - Where were the Watchdogs? Systemic Risk and the Breakdown of Financial Governance	Committee on Homeland Security and Governmental Affairs	Senate	111th (2009-2010, 1st Session)	March 4, 2009
Bill	H.R. 1445, Credit Rating Agency Transparency and Disclosure Act	Rep. Patrick T. McHenry [R-NC-10]	House of Representatives	111th (2009-2010, 1st Session)	March 11, 2009
Bill	H.R.6230, Credit Rating Transparency and Disclosure Act	Rep. Patrick T. McHenry [R-NC-10]	House of Representatives	111th (2009-2010, 1st Session)	March 12, 2009
Amendment	H.Amdt.518, Amendment sought to strike the provisions creating a new private right of action against credit rating agencies to H.R.4173 (Dodd-Frank Wall Street Reform and Consumer Protection Act)	Rep. Pete Sessions [R-TX-32]	House of Representatives	111th (2009-2010, 1st Session)	March 13, 2009
Bill	S.927, Credit Rating Agency Responsibility Act of 2009	Sen. Mark L. Pryor [D-AR]	Senate	111th (2009-2010, 1st Session)	April 29, 2009
Bill	S.1073, Rating Accountability and Transparency Enhancement (RATE) Act	Sen. Jack Reed [D-RI]	Senate	111th (2009-2010, 1st Session)	May 19, 2009
Hearing	Approaches to Improving Credit Rating Agency Regulation	Subcommittee on Capital Markets, Insurance, and Government Sponsored Enterprises, Committee on Financial Services	House of Representatives	111th (2009-2010, 1st Session)	May 19, 2009
Bill	H.R. 2549, Municipal Bond Fairness Act	Rep. Michael E. Capuano [D-MA-8]	House of Representatives	111th (2009-2010, 1st Session)	May 21, 2009
Hearing	Financial Regulation - Where were the Watchdogs? Financial Regulatory Lessons from Abroad	Committee on Homeland Security and Governmental Affairs	Senate	111th (2009-2010, 1st Session)	May 21, 2009

Report	Financial Regulatory Reform, A New Foundation: Rebuilding Financial Supervision	Pres. Barack Obama	Executive	111th (2009-2010, 1st Session)	June 17, 2009
Bill	H.R.3128, To amend the Federal Reserve Act to authorize Federal Reserve Banks to examine the methodologies used by nationally recognized statistical rating organizations in analyzing and rating asset backed securities and structured finance products.	Rep. Keith Ellison [D-MN-5]	Senate	111th (2009-2010, 1st Session)	July 8, 2009
Bill	H.R. 3214, Rating Accountability and Transparency Enhancement (RATE) Act of 2009	Rep. Thomas Rooney [R-FL-16]	House of Representatives	111th (2009-2010, 1st Session)	July 14, 2009
Hearing	First Public Meeting of the Rating Accountability and Transparency Enhancement	Financial Crisis Inquiry Commission	Joint House and Senate Committee	111th (2009-2010, 2nd Session)	September 17, 2009
Hearing	Reforming Credit Rating Agencies	Subcommittee on Capital Markets, Insurance, and Government Sponsored Enterprises, Committee on Financial Services	House of Representative	111th (2009-2010, 1st Session)	September 30, 2009
Hearing	1st Roundtable Discussion	Financial Crisis Inquiry Commission	Joint House and Senate Committee	111th (2009-2010, 2nd Session)	October 20, 2009
Bill	H.R. 3890, Accountability and Transparency in Rating Agencies Act	Rep. Paul E. Kanjorski [D-PA-11]	House of Representatives	111th (2009-2010, 1st Session)	October 21, 2009
Bill	H.R. 3996, Financial Stability Improvement Act of 2009	Rep. Barney Frank [D-MA-4]	House of Representatives	111th (2009-2010, 1st Session)	November 3, 2009
Hearing	Causes of 2008 Financial Collapse, Financial Market Participants	Financial Crisis Inquiry Commission	House & Senate	119th (2009-2010, 1st Session)	February 10, 2010
Hearing	Forum to Explore the Causes of the Financial Crisis, Day 1	Financial Crisis Inquiry Commission	Joint House and Senate Committee	111th (2009-2010, 2nd Session)	February 26, 2010
Hearing	Forum to Explore the Causes of the Financial Crisis, Day 2	Financial Crisis Inquiry Commission	Joint House and Senate Committee	111th (2009-2010, 2nd Session)	February 27, 2010
Bill	S.3217, Restoring American Financial Stability Act of 2010	Sen. Christopher J. Dodd [D-CT]	Senate	111th (2009-2010, 2nd Session)	April 15, 2010

Hearing	Wall Street and the Financial Crisis: The Role of Credit Rating Agencies	Permanent Subcommittee on Investigations of the Committee on Homeland Security and Governmental Affairs	Senate	111th (2009-2010, 2nd Session)	April 23, 2010
Amendment	S.Amdt.3774 to S.Amdt.3739, To remove statutory references to credit rating agencies. Amends S.3217 (Restoring American Financial Stability Act of 2010)	Sen. George S. LeMieux [R-FL]	Senate	111th (2009-2010, 2nd Session)	May 3, 2010
Amendment	S.Amdt.3808 to S.Amdt.3739, To instruct the Securities and Exchange Commission to establish a self-regulatory organization to assign credit rating agencies to provide initial credit ratings. Amends S.3217 (Restoring American Financial Stability Act of 2010)	Sen. Al Franken [D-MN]	Senate	111th (2009-2010, 2nd Session)	May 4, 2010
Amendment	S.Amdt.3991 to S.Amdt.3739, To instruct the Securities and Exchange Commission to establish a self-regulatory organization to assign credit rating agencies to provide initial credit ratings. Amends S.3217 (Restoring American Financial Stability Act of 2010).	Sen. Al Franken [D-MN]	Senate	111th (2009-2010, 2nd Session)	May 12, 2010
Hearing	Credibility of Credit Ratings, The Investment Decisions Made Based on Those Ratings, and the Financial Crisis	Financial Crisis Inquiry Commission	Joint House and Senate Committee	111th (2009-2010, 2nd Session)	June 2, 2010