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Three Essays on Corporate Bonds Issuance and Trading

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THREE ESSAYS ON CORPORATE BONDS ISSUANCE AND TRADING

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ABSTRACT

We explore the bond "clustering" phenomenon, using a sample of bond issuances in 2000-2015. Bond "clustering" is when the number of bonds issued that year exceeds three standard deviations above the mean number of issues for the firm over the sample period. We examine why firms opt for multiple issuances instead of a large one: exhaustion of debt capacity, refunding existing debt, timing favorable market conditions, managing working capital or financing profitable investment opportunities. Results indicate that firms do not cluster due to simply refinancing outstanding debt, but in order to manage their liquidity position and short-tern cash needs, to take advantage of the low interest rates, and to finance profitable investment.

We examine if the firms' corporate governance impacts new issues covenants. We find weak evidence of firms with corporate governance mechanisms that protect bondholders from excessive shareholder/manager risk-taking issuing bonds with fewer restrictive covenants (restrictive covenants indicate strong "bondholder governance" as defined by Cremers, Nair, and Wei (2007)), though they do not accrue benefits sufficient enough to lower yields on new issues.

Using the financial crisis and the subsequent tightening of regulatory oversight over CRA industry, we investigate the changing influence of credit ratings updates and credit watch procedure on market reactions to credit downgrades pre- and post- the 2008 financial crisis, and the July, 2010 Dodd-Frank Act. Market reactions to credit ratings downgrades and to downgrade credit watch initiation become less pronounced in the post-crisis post Dodd-Frank environment.

LIST OF ABBREVIATIONS AND SYMBOLS

CEO	Chief Executive Officer
CFO	Chief Financial Officer
CG	Corporate Governance
CRA	Credit Rating Agency
CUSIP	Committee on Uniform Security Identification Procedures
CW	Credit Watch
DF	Dodd-Frank Wall Street Reform and Consumer Protection Act
ESG	Environmental, Social, and Governance
FE	Fixed Effects
FINRA	Financial Industry Regulatory Authority
NOWC	Net Operating Working Capital
NRSRO	Nationally Recognized Statistical Rating Organization
OLS	Ordinary Least Squares
SEC	Securities and Exchange Commission
SDC	Securities Data Company
SIFMA	Securities Industry and Financial Markets Association
TRACE	Trade Reporting and Compliance Engine

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PART 1

CORPORATE BOND ISSUE CLUSTERING

INTRODUCTION

Firms raise a significant proportion of new capital from the debt markets. Securities Industry and Financial Markets Association (SIFMA) statistics show that total issuances of debt far exceed equity offerings. Between 2001 and 2015 over $3 trillion was issued in corporate equity through initial and secondary offers, while over $14 trillion was issued in corporate debt. The total value of the corporate bond market increased by approximately $3.6 trillion in the last decade due to new issues, while the growth in value of the equity market is mostly attributable to capital gains.

Interestingly, new bonds are often issued in clusters, a pattern not seen in the equity market. While prior literature extensively addresses bond issuance determinants, bond issuance patterns remain unstudied. Bond clustering is a period of high issuance activity, which results from firms offering an abnormal number of bond issues in a year as opposed to one large issue [1]. This paper examines bond clustering, and the reasons why some firms cluster bond issuances.

Clustering is counterintuitive, presumably increasing the cost of debt financing for firms due to increased issuance costs. Clustering goes against fundamental research on determinants of corporate yields, starting with seminal work of Fisher (1959), who determines that "marketability"

[1] We define cluster of bonds in any year with three standard deviations above the mean annual number of issues for the firm over the sample period.

(in modern terms, liquidity) of the bond is an important part of the risk premium[2] and depends significantly on both the amount issued and outstanding.

Although our definition of bond clustering is that of a firm specific issuance pattern, market wide periods of abnormal numbers of issuances without corresponding abnormal dollar volume (i.e. predominantly clustered issuances) are documented in SIFMA's annual "Issuance in the US Bond Markets" reports, possibly pointing towards firms timing their bond issuances to favorable economic conditions.[3]

<Insert Figure 1>

This is the first paper to find that bigger, more profitable firms with larger amounts of debt outstanding tend to cluster their bond issuances, using the sample of 2,814 firms that issued debt between January 1, 2001 and December 31, 2015. We also find that increased clustered issuance activity is exhibited when firms need funds to finance large investments, manage their liquidity, as well as take advantage of favorable low interest rate conditions.

Clustered issues are riskier, and potentially costlier for the firms, making the study of clustered issuance an important topic in corporate bond literature. There are several theories that

[2] Bhagat and Frost (1986) also find significant economies of scale in issuance costs, such that firms tend to avoid small issues. More recent research supports these conclusions. Collin-Dufresne, Goldstein, and Martin (2001) find that while default risk explains about a quarter of the variation in credit spreads, monthly credit spread changes are principally driven by local supply/demand shocks in the markets exacerbated by relatively low availability of issues inventory. Longstaff, Mithal, and Neis (2005) also find evidence of a significant non-default component in corporate spreads strongly related to measures of bond-specific illiquidity such as the bid–ask spread and the outstanding principal amount.

[3] For example, SIFMA reports that about $795 billion in corporate debt was issued in the US annually in 2001-2004 with an average of 1,009 firms issuing an average of 5,861 total issues per year during the period. For comparison, $1,036 billion in debt was issued annually in 2005-2007 by on average 917 firms in 3,951 issuances, i.e. an average firm issued fewer offerings with greater amount outstanding at issuance. Post-crisis 2009-2010 saw the average annual issuance of $1,012 billion of debt in an average 6,077 annual issuances by about 1,166 firms. For comparison, in 2012-2015 $1.5 trillion was issued annually by 1,129 firms in an average of 3,751 issuances, i.e. the average issue size has gone up more than twofold. Clustering of issuances became a phenomenon in 2001-2004 and 2009-2010 time periods. See figure 1 for the graphic representation of the data.

may explain why some firms cluster debt issues: transitory debt adjustments, market timing, and liquidity considerations. DeAngelo, DeAngelo, and Whited (2011) propose that firms issue transitory debt for funding investments, and thus deviate from their permanent target leverage. They estimate a dynamic tradeoff model of capital structure where leverage reflects the sequence of investment outlays, i.e. when a profitable investment opportunity arises, firms issue significant amounts of debt, which may result in clustered issuances. Another implication of the transitory debt hypothesis, consistent with the clustered issuance pattern, is that issuance inactivity immediately follows clustered issuance years observed in the sample data. These inactivity periods allow firms to adjust debt to target levels to allow for accumulation of debt capacity to facilitate another investment in the future.

Another theory tied to clustering of bonds is market timing. In their seminal survey of chief financial executives, Graham and Harvey (2001) discover that market timing is a primary consideration for the firms, and that CFOs are concerned about financial flexibility and current credit ratings when issuing debt. Furthermore, Baker and Wurgler (2002) arrive at the conclusion that capital structure is the cumulative outcome of past attempts to time the capital markets. When market conditions are favorable to debt issuance (i.e. interest rates drop) firms may choose to issue more debt of various categories in clusters, making market timing important in explaining the pattern.

Lastly, liquidity considerations may explain clustered issuances. Huang and Ritter (2016) find that the immediate need for cash is the main reason for debt issuance and a large proportion of debt issuers would have run out of cash if they had not issued debt. Increases in net operating working capital, need to cover the due portion of long term debt or notes, and overall cash

deprivation may result in firms issuing debt in clusters as they use up their available debt capacity to manage immediate liquidity concerns.

We find that firms cluster issuances for the purposes of financing large projects or taking advantage of interest rates movements to satisfy corporate cash needs. This finding is consistent with the transitory debt hypothesis in conjunction with liquidity and market timing considerations as supplementing theories in explaining firm-level issuance variation.

Furthermore, this paper determines specific characteristics that differentiate bonds issued in clusters from regular issuances. The analysis examines market quality of bond clusters: do these bonds display greater liquidity, higher overall and institutional trading activity or distinctively higher capital gains in the year following issuance? Using a sample of 70,836 bond issuances (both clustered and non-clustered) by 6,927 individual firms over the period of 2001–2015, we find that bonds issued in clusters have higher carrying costs (BBB or below rating), are more likely to have a floating coupon rate, be privately placed and be a pure discount issue, indicating a higher overall riskiness of clustered issues.

The remainder of the paper is organized as follows. Section 2 develops testable hypotheses about reasons firms cluster debt issuances, types of debt issued in clusters, and trading activity implications for clustered bonds. Section 3 describes the data. Section 4 provides empirical results, and Section 5 offers concluding remarks.

Related Literature and Hypotheses Development

Bond issuance clustering could be a capital structure decision or working capital and corporate liquidity management choice. Under the capital structure umbrella, we address the development of a dynamic tradeoff framework culminating in the transitory debt hypothesis and market timing hypothesis. We separately develop a set of testable implications for the working capital and cash liquidity choice.

The dynamic tradeoff theory departs from the static tradeoff theory, which assumes that firms maintain target capital structure by constantly adjusting to stay at target level. In general, the dynamic tradeoff theory postulates that it may be suboptimal for firms to continuously adjust leverage due to costs associated with adjustment. Fischer, Heinkel, and Zechner (1989) model dynamic capital structure as a choice in the presence of recapitalization costs. They show that the optimal dynamic recapitalization policy is a function of firm-specific characteristics. Even small recapitalization costs lead to wide swings in a firm's debt ratio over time, as call premia and issue discount costs mitigate the agency problem of early recapitalization.

Under the dynamic tradeoff theory firms weigh the benefit of being at their target leverage versus the cost to adjust to their target leverage. Firms make adjustments only if their leverage is out of the optimal range, thus leverage deviates from target levels until readjustment is reasonable (Fischer, Heinkel, and Zechner, 1989). Using a dynamic duration model of firms' financing decisions, Leary and Roberts (2005) confirm that the main motivation behind actual leverage adjustments for firms is rebalancing their leverage to stay within an optimal range. Ovtchinnikov (2010) shows additional evidence in support of dynamic tradeoff theory on a sample of firms in

deregulated industries. In his sample, firms above their target leverage issue significantly more equity, and firms with prior leverage increases adjust their leverage down following deregulation.

Dynamic tradeoff hypothesis predicts that periods of issuance inactivity follow events that cause departure from target leverage, because the benefit of adjustment is temporarily outweighed by the cost of it, resulting in the clustered issuances pattern observed in the data.[4]

Hypothesis 1: Clustering of debt issuances exists, i.e. periods of high issuance activity are followed by periods of financing inactivity, induced by the presence of adjustment costs and representing passive restoration of the exhausted debt capacity.

A recent extension of the traditional dynamic tradeoff theory, the transitory debt hypothesis provides an additional explanation for debt clustering. The transitory debt hypothesis of DeAngelo, DeAngelo, and Whited (2011) aims to explain existing empirical inconsistencies in static models (such as Myers and Majluf (1984) and Myers (1984)), and follows the dynamic capital structure models of Leary and Roberts (2005), Ovtchinnikov (2010), and others. For example, Strebulaev (2007) shows that if firms are allowed to increase debt in the future, they will opt for lower leverage initially, preserving debt capacity, resulting in average leverage higher than the leverage measured at refinancing points. The transitory debt hypothesis postulates that the opportunity costs of issuance (similar to that in Strebulaev (2007)) are also an important consideration.

In DeAngelo, DeAngelo, and Whited's model leverage decisions (transitory debt issuance) reflect the sequence of investments outlays, allowing firms to deliberately deviate from permanent leverage targets by issuing transitory debt to fund investment. They find that the transitory debt

[4] Myers (1984) postulates that if the costs of adjustments outweigh the benefits, firms will wait to recapitalize, resulting in "extended excursions away from their targets".

theory explains debt issuances/repayments and overall industry leverage better than existing tradeoff models, and also accounts for leverage changes accompanying investment spikes that occur in their sample.

The transitory debt hypothesis postulates that when a firm borrows, the opportunity cost of its consequent future inability to borrow must be taken into account. Therefore, adjustment toward the target is also related to the nature of the firm's investment opportunities, and happens when the investment needs are small, thus allowing the firm to free up finite debt capacity for future use. The target capital structure produced by the transitory debt hypothesis is more conservative than that obtained through traditional tradeoff models, because the cost of borrowing today includes the value lost when a firm fails to preserve the option to borrow later at comparable terms.

While the theory does not explicitly predict debt clusters, it shows that firms incorporate opportunity costs of future borrowing into their financing decisions, so clustering can occur not only due to depleting firm's debt capacity, but also because firms may choose to preserve some debt capacity in particular instruments and at different levels of capital costs. DeAngelo, DeAngelo, and Whited (2011) show that a firm returns to its target leverage range once shocks to its investment policy are absorbed by transitory debt, restoring the option to borrow later.

The transitory debt hypothesis also suggests firms making large investments, such as merger and acquisition activity, utilize large bond issuances that devour the acquirer's debt capacity, so it is possible that the acquirer issues multiple bond issues with an array of credit ratings producing bond issuance clusters. Billett, King, and Mauer (2004) examine the wealth effects of mergers and acquisitions on bondholders in the 1980s and 1990s. They find acquirers' bondholders' returns are negative, supporting the idea that the firm's debt capacity is depleting.

Thus, if the deviations from target capital structure are due to financing large projects, such as mergers and acquisitions, then transitory debt may explain clustered issuances patterns for some firms.

Hypothesis 2: Clustered bond issuances occur to support large investment opportunities that result in depletion of debt capacity (such as a merger or acquisition).

If bonds are issued in clusters due to firms attempting to recuperate depleting debt capacity, then the features of the bonds may be different from those issued normally. They will likely be riskier due to issuers' increasing probability of financial distress and, therefore, will attract a special category of investors, more sophisticated institutional market participants, who are willing to carry additional hazard of privately placed issues. The prevalence of Rule 144A bonds is expected, as are higher coupon rates, lower bond ratings or absence thereof. Additionally, the issue amount is of utmost importance. Beim (1992) finds that liquidity is positively priced in debt markets, such that newer bonds are more liquid and trading at lower yields. Chen, Lesmond, and Wei (2007) find that liquidity is priced into corporate yield spreads, i.e. better liquidity leads to cheaper possible financing opportunities.

Hypothesis 2.1: Bonds within a cluster are issued in smaller dollar amounts and with higher yields, are more likely to be non-investment grade, unrated, or privately placed.

An alternative view of capital structure that has been gaining traction in recent decades is that firms time the market when issuing securities. Graham and Harvey's (2001) survey of CFOs reports that market timing is a primary concern of corporate executives in their financing decisions. CFOs report that firms are concerned about financial flexibility and credit ratings when issuing debt, and earnings per share dilution and recent stock price appreciation when issuing equity.

Market timing considerations have primarily been addressed in relation to equity issuance and the speed of adjustment to target leverage, and the results are inconclusive to date.

Using the market-to-book ratio to measure market timing opportunities, Baker and Wurgler (2002) find that high market valuations reduce leverage in the short run, and historically high market valuations are associated with lower leverage in the cross section. Baker and Wurgler also show that low (high) leverage firms raised equity funds when their valuations were high (low). They find that fluctuations in market valuations have large effects on capital structure persisting over a decade, and conclude that capital structure is the cumulative outcome of past attempts to time the equity market. Welch (2004) also finds that equity price changes have a long-lasting effect on corporate capital structures. He concludes that stock returns are the primary determinant of capital structure changes and that corporate motives for net issuing are unclear.

Additional evidence of market timing affecting capital structure is presented by Korajczyk and Levy (2003). They find that financially unconstrained firms time their issue choice to coincide with periods of favorable macroeconomic conditions, while constrained firms do not. Korajczyk and Levy (2003) find evidence that supports an argument that firms consider distance from target leverage and difference in marginal costs of issuance during issuance decision-making stage. Their results indicate that market timing may not have significant influence on the issuance patterns of financially constrained firms, but unconstrained firms time their issues to periods of relative favorable pricing of assets.

Hypothesis 3: Bond issuance clustering occurs during years of low market valuations when firms lack the opportunity to issue equity "cheaply".

Hypothesis 3.1: Bond issuance clustering occurs during the years of low market valuations when firms lack the opportunity to issue equity "cheaply". The effect is most pronounced in financially unconstrained firms.

Faulkender (2005) finds strong evidence of market timing in bond issuances, which depends on the shape of the yield curve. As the yield curve steepens, firms are more likely to have floating debt to reduce short-term interest payments. Consistent with higher interest rate volatility during economic downturns, firms are more likely to raise debt with fixed coupons as the yield curve flattens, and as the expectation of a recession increases. The author stipulates that reducing short-term interest expense during times when fixed and floating rates are very different allows firms to report higher quarterly earnings.

Hypothesis 4: Bond issuance clustering occurs during years of decreasing interest rates, and when the yield curve flattens, allowing firms to favorably time macroeconomic conditions.

Hypothesis 4.1: Bonds issued in a cluster tend to have fixed rather than floating coupons.

Interestingly, the interconnection between the parts of the "capital structure puzzle" allows for alternative interpretations of market timing considerations. Hovakimian (2006) reinterprets Baker and Wurgler (2002) results, claiming that historical weighted average market-to-book ratios are related to target leverage because they contain information about growth opportunities not captured by current market-to-book ratios and not due to past equity market timing. This result shows that even the presence of market timing evidence can be interpreted as the evidence of transitory debt issuance in order to support profitable investment, as opposed to the true managerial effort to take advantage of the market. The author finds no evidence of significant equity market timing for debt issues and debt reductions.

An altogether unrelated, although not mutually exclusive, explanation for bond issuance clustering exists. It is possible that clustering may occur due to a firm's cash demands. DeAngelo, DeAngelo, and Stulz (2010) show that, without Seasoned Equity Offer (SEO) proceeds, 62.6% of issuers in their sample would run out of cash (81.1% would have subnormal cash balances) the year after the SEO. This results shows that the near-term cash need is a primary motive for SEOs, with market-timing opportunities and lifecycle stage exerting only secondary influences. Concerning debt issuance, Huang and Ritter (2016) find that 86 cents of each dollar of debt financing is spent immediately. They argue that liquidity considerations and the immediate need for cash is the main reason for debt issuance. In their sample, 76.1% of net debt issuers would have run out of cash by the end of the issuing year without the debt issue, and spend almost all of the proceeds immediately. After controlling for market timing, precautionary savings, and corporate lifecycle motives, they also find that, to a lesser extent, cash need prompts companies to issue equity, as shown in DeAngelo, DeAngelo, and Stulz (2010).

Hypothesis 5: Bond issuance clustering occurs in response to corporate cash needs in order to finance short-term liquidity.

Data and Univariate Results

Bond issuance data is obtained from Securities Data Company (SDC) and augmented by Financial Industry Regulatory Authority's (FINRA's) Trade Reporting and Compliance Engine (TRACE) dataset, as well as CUSIP issuance data. The issuance sample covers the period from January 1, 2001 to December 31, 2016. A total of 70,836 issuances are obtained. Of the 70,836

bond issuances collected, 30,841 are bonds in clustered issuances (average of 362 bonds in a clustered year per firm) versus 39,995 bonds issued in a regular year (average 172 issuances per firm). An issue is identified as clustered every year the number of distinct offers of long-term debt instruments by the firm is in excess of three standard deviations of the average annual number of issuances over the entire period the firm is present in the sample.

TRACE provides limited information on bond characteristics, and some of the information is incomplete as bonds were gradually phased into reporting compliance. Therefore, SDC is the primary source of issuance data, including bond features, coupon rate, maturity, call and sinking fund provisions. However, occasionally TRACE provides additional issuance information not presented in the SDC database. Compustat data is needed to investigate characteristics of firms that cluster issuances, constraining the sample to 2,814 firms. All accounting variables are scaled by total assets in descriptive statistics and regression analyses as indicated.

Table 1.1 provides descriptive statistics for all firms in the sample. All accounting information reported by percent is scaled by *Total Assets* and represents data in common-size approach.[5] Table 1.1 contrasts statistics for firms that cluster issuances at least once (2,516 firms) against firms that are not classified as clusterers (298 firms) over the sample period. A bond cluster is any fiscal year during which the number of bonds issued is three standard deviations above the mean number of issuances for the firm over the sample period. An average clustering firm is bigger ($26.94 billion in Total Assets versus $12.38 billion for non-clusterer), has a greater amount of debt outstanding and a larger portion of long term debt due in the next fiscal year ($557.60 million versus $329.00 million for non-clusterer or 3.23% versus 2.56% respectively). Hence, clustering

[5] Scaled variables are *Long Term Debt, Long Term Debt due in one/two years, Increase in Short Term Investments, Increase in Cash and Equivalents, Increase in NOWC*. Dollar amounts are not presented in the current version of the paper and are available in a table form upon request.

may occur naturally as the result of refunding operations. Clustering firms are slightly older (by about two years), which may be indicative of the fact that sooner or later most firms will resort to clustering their bond issuances. On average, clustering firms also carry larger cash reserves in the form of short-term investments ($1.7 billion versus $579.6 million for non-clusterers), and experience greater increases in *Cash* (by154.6%), *Short-Term Investments* (by 29.16%), and *Net Operating Working Capital* (*NOWC*) (by 5.27%).

Further, table 1.2 separates clusterers' annual observations into years of clustered and non-clustered issuance to see any inherent differences in accounting information conditional upon issuance patterns. In years of clustered issuances, firms experience increases in *NOWC* of about $90 million (2.1%) as compared to a modest increase of $5 million (0.29%) in a regular year. Firms have smaller amounts of long term debt outstanding ($3.9 billion versus $4.7 billion, leverage ratio of 30.84% versus 25.49%) and due in the next fiscal period ($616.6 million versus $837.1 million, or 3.07% versus 2.81% scaled by *Total Assets*), which may point to greater available debt capacity and away from refunding operations as a possible explanation. Proceeds of debt issuances are reported as cash and equivalents on the balance sheet ($224 million or 1.5% increase in cash than in non-clustered year) and extra cash is converted into short-term investments ($207 million or 0.5% increase compared to a regular year).

Table 1.3 provides specific observations on the characteristics of bonds classified as issued in clusters versus regular issuances. Clustered bond issuances are on average over $450,000 less in total par value, with slightly longer maturities, and have a 0.84% higher coupon (more likely to be high-yield) than non-clustered issuances. However, these bonds are more likely to be zero coupon (the seeming contradiction is due to the fact that zero coupon bonds are identified by a dummy variable, and the average coupon rate is only measured for coupon-bearing bonds), and

callable, but less likely to be a senior bond or have a floating coupon, further indicating prevalence of high-yield issues in clusters, which provides support for hypothesis 4.1, indicating that bonds issued in a cluster tend to have fixed rather than floating coupons

Data presented in the first three tables of this paper provides support to hypothesis 1: clustered issuances exist and, in fact, differ from regular issuances. The preliminary findings in table 1.3 are also consistent with Faulkender's (2005) results on timing of short-term interest savings and in support of hypothesis 3. Consistent with higher cost of interest rate volatility during economic downturns, firms are more likely to raise debt with fixed coupons as the yield curve flattens, and as the expectation of a recession increases. Clustered bond issuance in the sample is most prevalent during 2010 – 2014, where the yield curve is the flat. Floating coupons are less prevalent in clustered issuances, preliminarily supporting hypothesis 4.1.

Clustered bonds are more likely to be privately placed, which falls in line with higher coupon and greater proportion of high-yield bonds in the category, as the Rule 144A bond market is reserved for sophisticated institutional investors, who are expected to be able to carry out due diligence in-house and who do not rely on information provided by the firm. According to hypothesis 2 clustered bond issuances indicate depletion of debt capacity. The results in table 1.3 indicate that the bonds within a cluster are issued in smaller dollar amounts and with higher yields, are more likely to be non-investment grade or unrated, as well as privately placed, providing full support for hypothesis 2.1.

Since discussion of liquidity implications for clustered issuances is one of the possible extensions of the results presented in this paper, it is interesting to observe that some liquidity determinants are characteristics of clustered bonds. Petrasek (2012) shows positive liquidity

implications for multimarket traded bonds. Listing and trading bonds on an exchange provides additional benefits of a wider investor base. Clustered bonds are less likely to be listed on NYSE, but out of 422 globally listed and traded bonds in the sample, 186 were issued in a cluster, i.e. about 5.991% of the clustered bonds were listed versus 3.88% of non-clustered bonds.

Multivariate Results

Table 1.4 provides estimates of multivariate regressions on differences between firms with and without clustered issuances. We examine the impact of the firms' history of clustering behavior on their market valuation, capital structure, and investments using the following:

$$DepVariable_{i,t} = \beta_1 TA_{i,t} + \beta_2 LTDdue_{i,t+1} + \beta_3 LTDdue_{i,t+2} + \beta_4 LTD_{i,t} + \beta_5 Revenue_{i,t} + \beta_6 STinvestment_{i,t} + \beta_7 CapEx_{i,t} + \beta_8 NI_{i,t} + \beta_9 Clusterer_i + \beta_{10} Industry_i + \beta_{11} Fiscal\ Year_t + \varepsilon_{i,t}$$

The results of our regression analyses show that firm that cluster debt issues are larger in market value terms (column [1], *Market Value*), carry a greater amount of debt (column [2], *Long Term Debt*), produce more revenue (column [3], *Revenue*), with positive coefficients on the main variable of interest, *Firm-clusterer*. We find no significant evidence that firm-clusterers invest more in fixed assets, compared to firms that do not cluster their issuances, (column [4], *CapEx*). However, results in column [5] (dependent variable – *Acquisition*) show that firms that cluster debt issues acquire more or produce larger acquisition cash flows than firms that do not (indicator variable *Firm-clusterer* is positive and significant). This result provides additional indirect support

for the transitory debt hypothesis of DeAngelo, DeAngelo and Whited postulated in hypothesis 2. Additionally, as is later revealed in table 1.7, when firms that cluster debt issues acquire, this extraordinary event forces them to exhaust their debt capacity to support a profitable undertaking as predicted by the transitory debt hypothesis.

Table 1.5 provides evidence on cash increases after debt issuance and subsequent decreases in the year following clustered issuances, showing that clustered issuances are different from ordinary issuances and are therefore important to study:

$$DepVariable_{i,t} = \beta_1 TA_{i,t} + \beta_2 LTDdue_{i,t+1} + \beta_3 LTDdue_{i,t+2} + \beta_4 LTD_{i,t} + \beta_5 CapEx_{i,t} + \beta_6 Revenue_{i,t} + \beta_7 NI_{i,t} + \beta_8 \#issuances_{i,t} + \beta_9 Cluster_{i,t\ or\ t-1} + \beta_{10} Firm_i + \beta_{11} Fiscal\ Year_t + \varepsilon_{i,t}$$

Results in Panel A show that cash increases by $456 million in the year of clustered issuance [1] and is spent over the fiscal period as next year cash decreases significantly by $302 million as presented in column [1] of Panel B. Similar results is observed in short-term investments, which absorb excess cash in the year of issuances [2]. Panel A (increase of $336.9 million), and are converted into cash and spent the following year, see column [2] of Panel B (decrease of $247.82 million). While not all cash is spent immediately, it is important to note that clustered issuances rarely follow each other, as clustered issuance potentially represents consumption of the available debt capacity. It is important to uncover how raised capital is spent and why the firms moved to expend the valuable opportunity to issue debt later.

Table 1.6 presents preliminary results of debt issuance cash proceeds usage:

$$DepVariable_{i,t} = \beta_1 TA_{i,t} + \beta_2 LTDdue_{i,t+1} + \beta_3 LTDdue_{i,t+2} + \beta_4 LTD_{i,t} +$$
$$\beta_5 Revenue_{i,t} + \beta_6 NI_{i,t} + \beta_7 \#issuances_{i,t} + \beta_8 Cluster_{i,t} + \beta_9 Firm_i +$$
$$\beta_{10} Fiscal\ Year_t + \varepsilon_{i,t}$$

According to DeAngelo, DeAngelo, and Whited (2001), the exhaustion of debt capacity occurs due to the presence of lucrative investment opportunities that require a large investment. The transitory debt hypothesis postulates that debt is issued to fund profitable investment opportunities, and regressions in columns [1] and [2] aim to address investment. Investment avenues may take the form of large capital expenditures for expansion, mergers and acquisition activity, or large investment into research and development. While firms do not seem to increase their capital expenditures in years of clustered issuance, they use proceeds to acquire other firms (including minority interest). Acquisitions (column [2]) are significantly and positively related to clustered debt issuance. Value of acquisition assets is separated from capital expenditures (*CapEx*).

The increase in NOWC observed in table 1.5, Panel A, column [3] is primarily driven by changes in cash balances explored above. Also, results in Panel B of table 1.5 indicate that firms manage their working capital/liquidity through cash from clustered debt. The results in table 1.6 show that in the year of clustered issuance firms significantly decrease their trade payables [3] (by $759 million) without significant changes in other categories of payables (unreported results). This result indicates additional support for hypothesis 5, and show that firms use cash raised from clustered debt to manage their short-term liquidity.

While results reported in table 1.3 provides support for the transitory debt hypothesis and liquidity considerations in issuing clustered debt, further investigation of market timing (hypotheses 3 and 4) is required. The greatest number of clustered bonds is issued during and

immediately post-crisis, in years 2008-2014.[6] The first wave of crisis-related clustered issuances coincides with dramatic reduction in the Federal Funds Rate over the second half of calendar year 2007, which resulted in significantly lowered yields on corporate bonds and a flattened yield curve, providing firms with a great market timing opportunity.

Table 1.7 presents the results of modelling the probability of a clustered issuance year with a probit regression incorporating all the variables with power to explain clustering gathered from preliminary analysis:

$$Cluster_{i,t} = \beta_1 Age_{i,t} + \beta_2 TA_{i,t} + \beta_3 LTDdue_{i,t+1} + \beta_4 LTDdue_{i,t+2} + \beta_5 LTD_{i,t} + \beta_6 NI_{i,t} + \beta_7 CapEx_{i,t} + \beta_8 Acquisitions_{i,t} + \varepsilon_{i,t} \quad [1]$$

The coefficients on *Age* and *Long-Term Debt* are positive, indicating that the initial conclusions that firms clustering their issues are slightly older and more leveraged hold. Clustering of issuances is also not likely a simple outcome of refunding operations, since the coefficient on *Long-Term Debt due in One Year* is insignificant, and the coefficient on *Long-Term Debt due in Two Years* is significant and negative, meaning that impeding maturity of a portion of the outstanding long-term debt does not increase the probability of a clustered issuance.

More importantly, it is evident that firms resort to issuing clustered debt due to an imminent profitable investment opportunity. The coefficient on *Acquisition* is positive. The transitory debt hypothesis (hypothesis 2) finds additional support in the fact that regular project financing through *Capital Expenditures* does not have any predictive power over the occurrence of clustered issuance.

[6] SIFMA Research Department, 2016, US Corporate Bond Issuance Report

Column [2] in table 1.7 sheds lights on liquidity considerations that influence clustered bond issuances:

$$Cluster_{i,t} = \beta_1 Age_{i,t} + \beta_2 TA_{i,t} + \beta_3 LTDdue_{i,t+1} + \beta_4 LTDdue_{i,t+2} + \beta_5 LTD_{i,t} + \beta_6 NI_{i,t} + \beta_7 \Delta NOWC_{i,t} + \beta_8 \Delta Cash_{i,t} + \beta_9 \Delta ST\ investment_{i,t} + \beta_{10} Trade\ Receivables_{i,t} + \beta_{11} Trade\ Payables_{i,t} + \varepsilon_{i,t} \quad [2]$$

Firms issue clustered debt to manage their liquidity positions and short-tern cash needs (hypothesis 5), but extending trade credit is not related to clustered issuance (*Trade Receivables* coefficient is insignificant). Trade related *Accounts Payable* (positive effect on the probability of clustered issuance) may indicate that excessive payables prompt firms to issue clustered debt in a cash crunch. Change in NOWC is mostly attributable to changes in cash balances and short-term investments. These results provide partial support for hypothesis 5, but additional investigation of cash use following clustered issuance is warranted as suggested by univariate results in table 1.3.

Column [3] aims to test hypothesis 4 related to market timing, and explicitly examines the effects of economy-wide interest rate environment on bond issuance clustering:

$$Cluster_{i,t} = \beta_1 Age_{i,t} + \beta_2 TA_{i,t} + \beta_3 LTDdue_{i,t+1} + \beta_4 LTDdue_{i,t+2} + \beta_5 LTD_{i,t} + \beta_6 NI_{i,t} + \beta_7 Interest\ Rates\ increase_t + \beta_8 Interest\ Rates\ decline_t + \varepsilon_{i,t} \quad [3]$$

We find no decisive support for market timing considerations playing a major role in firms' decisions to issue multiple bonds in a short time. Firms are less likely to issue clustered debt in the years of Federal Funds decrease or increase relative to no change years (*Interest Rates Decline/ Increase* variables is negative). These results indicate lack of support for hypothesis 4, firms do

not issue more clustered bonds in years of downward interest rate change. In the current sample, years of no change in the interest rate environment coincide with the latest economic recession. According to SIFMA Issuance Report, firms are very active in issuing corporate debt in 2010-2014. During that time, the slope of the yield curve is fairly steep in anticipation of future interest rates increases, which may prompt companies to issue more debt throughout the slow economic recovery period. In our sample, 2010-2014 are the years in which clustered issuance is most likely, possibly supporting Faulkender (2005) conclusions about managerial market timing. The first significant increase in interest rates occurs in 2015 and there is not yet enough data to draw conclusions about the post-recession period. Further investigation is warranted.

Column [4] combines all the explanatory variables presented in the previous models and shows that large investments and short-term liquidity considerations push firms to issue clustered debt.

Conclusion

This paper examines the bond issuance pattern of "clustering". If the number of bonds issued by a firm in a fiscal year is three standard deviations above the firm's mean number of bond issues, we deem that year a bond issuance cluster year. This measure allows for identifying years of extraordinary circumstances, forcing firms to opt for multiple issuances instead of a single one, which indicates potential exhaustion of their debt capacity. Bonds issued in clusters display a great degree of heterogeneity in their features, and a large proportion of clustered bonds is non-rated or rated below BBB, further suggesting firms' depleted capacity of issuing low interest debt.

Further analysis reveals that clustered issuances coincide with years of merger and acquisition activity, an outcome predicted by the transitory debt hypothesis of DeAngelo, DeAngelo, and Whited (2001). Firms also use proceeds of clustered issuances to manage their liquidity positions, extending greater trade credit to their customers, and lowering the balance of their trade payables. These results are in direct agreement with Huang and Ritter's (2016) findings that immediate cash needs are the primary motive for debt issuances. In their sample, a two standard deviation increase in free cash flow-to-assets, on average, decreases the likelihood of a net debt issue in that year by 53.6%.

Our estimations of probit regressions suggest that firms issue clustered debt in order to finance profitable investment opportunities as predicted in DeAngelo, DeAngelo, Whited (2001). Additionally, firms use clustered issuances to provide cash for immediate operations and due to market timing considerations. The most fruitful years for clustered bond issuances are during the economic recovery period of 2010-2014.

Overall, studying clustered bond issuances is warranted by the exclusive containment of this phenomenon to bond markets. Issuance patterns of this nature are not exhibited in equities. The plethora of debt instruments available for financing provides for additional interest in studying bond clusters. Bond clusters tend to consist of smaller issues, which contain a greater degree of heterogeneity and complexity in their features, more likely to be privately placed, carry a non-investment grade denomination and, consequently, have a higher coupon. Clustering is not explained simply by the process of refunding outstanding debt, and serves a purpose to management. Clustering allows greater liquidity in operating working capital of the firm, cheaper financing in anticipation of interest rate increases, and provides an opportunity for the firms to take

advantage of profitable investment (merger and acquisition activity) as their debt capacity is depleted.

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Table 1.1
Sample statistics for all firms in the sample

The table presents differences in means of various accounting and investor related metrics between the firms exhibiting clustering behavior during the sample vs. non-clusterers. All accounting measures (designated as %) are scaled by total assets (Compustat item # 6 – AT)

	# Observations		Difference in means		
Firm level (all firms)	Clusterer	Non-Clusterer	Clusterer	Non-Clusterer	Difference
Size (Total Assets) ($, mln)	2,491	283	26,944.40	12,384.30	14,560.1***
Market Capitalization ($, mln)	2,029	221	79,047.10	46,135.20	32,912.1***
Long-Term Debt (%)	2,491	292	27.37	29.59	-2.22*
Long-Term Debt Due in One Year (%)	2,459	278	3.23	2.56	-0.68*
Long-Term Debt Due in Two Years (%)	2,135	250	2.73	2.42	0.32
Average # Bonds Per Year	2,516	298	3.92	2.16	1.76***
Age (yrs)	1,204	167	9.04	7.25	1.79***
Ordinary Dividends ($, mln)	1,436	158	1.07	0.97	0.103
Short-Term Investments ($, mln)	2,484	281	1,791.3	579.60	1,211.7***
Increase in Short-Term Investments (%)	2,107	237	35.22	6.06	29.16**
Increase in Cash and Equivalents (%)	2,391	271	161.20	6.64	154.6*
Increase in NOWC (%)	1,888	237	2.23	-3.04	5.27**
Total observations	2,516	298			

Table 1.2

Sample statistics for firms that clustered issuances during the sample period

The table presents differences in means of various accounting metrics between clustered years (>3σ of average number of bond issuances by the firm) vs. years of average issuance. The table only contains data on the firms that exhibited clustered issuance behavior at least once during the sample period. All accounting measures are scaled by total assets.

	# Observations		Difference in means		
Firm-year level (clusterer firms)	Clustered year	Non-Clustered year	Clustered	Non-Clustered	Difference
Average # Bonds Per Year	3,186	28,126	5.14	1.71	3.41***
Long-Term Debt Total (%)	4,499	25,899	30.84	25.49	5.35***
Long-Term Debt Due in One Year (%)	4,213	24,318	3.07	2.81	0.26
Long-Term Debt Due in Two Years (%)	3,296	18,617	2.11	2.68	-0.57***
Capital Expenditures (%)	4,126	23,817	5.43	5.45	-0.02
NOWC (%)	3,324	17,347	2.10	0.29	1.81*
Change in Cash and Equivalents (%)	4,382	22,965	1.48	-0.032	1.51***
Change in Short-Term Investments (%)	4,362	22,827	0.446	-0.044	0.49***
Total Revenue (%)	4,499	25,888	67.71	70.48	-2.77**
Interest Expense (%)	4,431	25,258	328.40	422.30	-93.90**
Net Income (%)	4,232	24,557	430.70	521.10	-90.35**
Total Volume Traded, Equity (mln)	3,662	19,638	4787.764	5,300.20	-512.434**
Average Stock Price ($)	3,662	19,638	37.16	37.61	0.45
Total Dividends Paid, per share ($)	2,213	11,769	1.09	1.04	0.05*
Total observations	4,458	26,754			

Table 1.3

Sample statistics for all bonds in the sample (of firm clusterers and non-clusterers)

The table presents differences in various bond features, complexity and callability between bonds issued in clusters vs. bonds of average issuance. The table contains data on all firms that issued bonds during the sample period.

Panel A. All Bonds

	# Observations		Difference in means		
	Clustered Issuance	Non-Clustered Issuance	Clustered	Non-Clustered	Difference
Issuance Amount ($, mln)	4,479	7,166	1,707.3	2,164.00	-456.74**
Coupon Rate	24,743	35,267	5.08%	4.24%	0.84%***
Fixed coupon (vs. floating)	27,962	36,729	0.718	0.7283	-0.0103***
Zero coupon (vs. non-zero)	24,743	35,267	0.179	0.1382	0.0408***
Callable	20,971	32,061	0.5042	0.4853	0.0189***
Senior (vs. subordinated)	20,826	31,909	0.3577	0.3622	-0.0044
High-yield (vs. Investment Grade)	30,841	39,995	0.7257	0.5338	0.1919***
Listed on NYSE (vs. all the rest)	30,841	39,995	0.096	0.1462	-0.0502***
Listed Globally (vs. NYSE-listed only)	3,145	6,080	0.0591	0.0388	0.0203***
Rule 144A	30,841	39,995	0.1934	0.1274	0.066***
Maturity at issuance (in years)	22,430	32,582	10.7412	10.215	0.5261***
# bonds issued by the firm in a year	30,841	39,995	362.3	172	190.7***

Table 1.3 – *continued*

Panel B. All Bonds. Difference-in-medians

	# Observations		Difference-in-medians			
	Clustered Issuance	Non-Clustered Issuance	Clustered	Non-Clustered	Pearson χ^2	p-value
Issuance Amount ($ mln)	4,479	7,166	400	500.00	154.5274	<0.0001
Coupon Rate	24,743	35,267	5.13%	4.06%	844.9282	<0.0001
Fixed coupon (vs. floating)	27,962	36,729	1	1	.	.
Zero coupon (vs. non-zero)	24,743	35,267	0	0	185.0365	<0.0001
Callable	20,971	32,061	1	0	18.0343	<0.0001
Senior (vs. subordinated)	20,826	31,909	0	0	1.0532	0.305
High-yield (vs. Investment Grade)	30,841	39,995	1	1	.	.
Listed on NYSE (vs. all the rest)	30,841	39,995	0	0	401.9556	<0.0001
Listed Globally (vs. NYSE-listed only)	3,145	6,080	0	0	0.0498	0.823
Rule 144A	30,841	39,995	0	0	574.5963	<0.0001
Maturity at issuance (in years)	22,430	32,582	8	8	2.4365	0.119
# bonds issued by the firm in a year	30,841	39,995	15	29	183.8223	<0.0001

Table 1.3 – *continued*

Panel C. Bonds issued within clusters only. Difference-in-means

	# Observations		Difference in means		
	Below Median Offer Amount	Above Median Offer Amount	Below Median Offer Amount	Above Median Offer Amount	Difference
Issuance Amount ($ mln)	2,392	2,087	207.59	3,426.16	-3,218.57***
Coupon Rate	2,392	2,087	5.4246	4.5050	0.9195***
Fixed coupon (vs. floating)	2,392	2,087	0.8976	0.9374	-0.0398***
Zero coupon (vs. non-zero)	2,392	2,087	0.0326	0.0551	-0.0226***
Callable	2,392	2,087	0.8507	0.8136	0.0371***
Senior (vs. subordinated)	2,392	2,087	0.6971	0.5963	0.1009***
High-yield (vs. Investment Grade)	2,392	2,087	0.6798	0.4485	0.2313***
Listed on NYSE (vs. all the rest)	2,392	2,087	0.0033	0.0120	-0.0086***
Listed Globally (vs. NYSE-listed only)	2,392	2,087	0.0105	0.0292	-0.0188***
Rule 144A	2,392	2,087	0.3637	0.3934	-0.0297**
Maturity at issuance (in years)	2,392	2,087	11.5523	10.2631	1.2892***
# bonds issued by the firm in a year	2,392	2,087	10.9661	42.8769	-31.9107***

Table 1.3 – *continued*

Panel D. All bonds. Annualized Issuance Data. Difference-in-means

	# Observations		Difference in means		
	Clustered	Non-Clustered	Clustered	Non-Clustered	Difference
Issuance Amount ($ mln)	8,178	8,965	734.30	849.35	-115.05**
Coupon Rate	8,178	8,965	6.40	5.60	0.80***
Fixed coupon (vs. floating)	8,178	8,965	0.87	0.92	-0.05***
Zero coupon (vs. non-zero)	8,178	8,965	0.07	0.05	0.02***
Callable	8,178	8,965	0.69	0.73	-0.04***
Senior (vs. subordinated)	8,178	8,965	0.67	0.62	0.06***
High-yield (vs. Investment Grade)	8,178	8,965	0.77	0.59	0.18***
Listed on NYSE (vs. all the rest)	8,178	8,965	0.03	0.06	-0.03***
Listed Globally (vs. NYSE-listed only)	8,178	8,965	0.01	0.01	0.00
Rule 144A	8,178	8,965	0.32	0.21	0.11***
Maturity at issuance (in years)	8,178	8,965	14.29	12.15	2.15***
# bonds issued by the firm in a year	8,178	8,965	4.63	6.70	-2.07***

Table 1.4

We use OLS to examine the impact of firms' history of clustering behavior (Panel A: *Firm-Clusterer Indicator* = 1, if there is a record of firm clustering its issuances over the sample period, and 0 otherwise; Panel B: *Cluster Indicator*=1, if bonds are issued in cluster during the fiscal year) on their performance, capital structure and investment. All accounting variables are scaled by total assets. Robust t-statistics reported in parentheses are obtained from standard errors clustered by the industry (first 2 digits of the appropriate SIC code) and year, ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Panel A. All Firms.

	(1) Market	(2) Long-Term	(3) Revenue	(4) CapEx	(5) Acquisition
Total Assets	0.0919	0.0476***	0.0746***	-0.00100	0.00206
	(0.85)	(4.25)	(3.17)	(-0.41)	(1.37)
Long-Term Debt Due in One Year	-0.938***	0.384	-0.622**	-0.0611*	-0.0943***
	(-3.81)	(1.43)	(-2.48)	(-1.66)	(-3.50)
Long-Term Debt Due in Two Years	-0.474	3.054***	0.248	-0.0246	0.0826
	(-0.39)	(11.45)	(0.35)	(-0.34)	(1.44)
Long-Term Debt Total	-0.00833		0.125	0.0622***	0.0317***
	(-0.03)		(0.88)	(3.16)	(2.89)
Total Revenue	0.451***	0.0125		0.0495***	0.00226
	(3.71)	(0.92)		(5.23)	(0.88)
Short-Term Investments	0.442	-0.0388	-0.153*	-0.0212*	-0.0278***
	(0.66)	(-0.85)	(-1.87)	(-1.77)	(-3.83)
Capital Expenditures	3.571***	0.665***	5.285***		-0.0426
	(2.98)	(3.24)	(6.96)		(-1.49)
Net Income	4.015**	-0.141*	1.834***	0.0702**	0.0506***
	(2.52)	(-1.67)	(3.01)	(2.19)	(3.26)
Firm-Clusterer Indicator	846.5*	107.7*	616.6**	52.99	27.04*
	(1.96)	(1.96)	(1.98)	(0.81)	(1.72)
Industry and Time FE	Yes	Yes	Yes	Yes	Yes
N	16,654	23,287	23,287	23,287	19,383
adj. R^2	0.655	0.883	0.579	0.526	0.115

Table 1.4 – *continued*

Panel B. Firm-Clusterers only.

	(1) Market Value	(2) Long-Term Debt	(3) Revenue	(4) CapEx	(5) Acquisition
Total Assets	0.0862	0.0476***	0.0707***	-0.000922	0.00204
	(0.83)	(4.21)	(3.03)	(-0.38)	(1.35)
Long-Term Debt Due in One Year	-1.029***	0.384	-0.600**	-0.0596	-0.0966***
	(-3.66)	(1.41)	(-2.39)	(-1.61)	(-3.50)
Long-Term Debt Due in Two Years	-0.534	3.053***	0.310	-0.0216	0.0830
	(-0.45)	(11.39)	(0.41)	(-0.30)	(1.43)
Long-Term Debt Total	0.0396		0.117	0.0593***	0.0332***
	(0.13)		(0.81)	(2.98)	(2.83)
Total Revenue	0.360***	0.0120		0.0489***	0.00101
	(2.62)	(0.85)		(5.03)	(0.37)
Short-Term Investments	0.396	-0.0389	-0.144*	-0.0203*	-0.0282***
	(0.65)	(-0.85)	(-1.79)	(-1.75)	(-3.87)
Capital Expenditures	3.391***	0.644***	5.170***		-0.0372
	(2.67)	(2.98)	(7.01)		(-1.25)
Net Income	5.553**	-0.128	2.158***	0.0779**	0.0571**
	(2.53)	(-1.33)	(3.22)	(2.05)	(2.46)
Cluster Indicator	341.8	37.28	269.9*	-23.48	102.7***
	(0.92)	(0.52)	(1.66)	(-1.02)	(4.24)
Industry and Time FE	Yes	Yes	Yes	Yes	Yes
N	15,054	21,050	21,050	21,050	17,581
adj. R^2	0.694	0.884	0.591	0.526	0.103

Table 1.5

We use OLS to examine the impact of firms' concurrent (Panel A) or prior (Panel B) clustering behavior (C*luster* (or *Last Year Cluster*) = 1, if this or last year displayed a clustered issuance, and 0 otherwise) on their cash flow and investment in short-term working capital. All accounting variables are scaled by total assets. Robust t-statistics reported in parentheses are obtained from standard errors clustered by individual firm and year, ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Panel A

	(1) Δ Cash and	(2) Δ Short-Term	(3) ΔNOWC
Size (Total Assets)	-0.0238*** (-6.58)	-0.0258*** (-7.67)	0.0086*** (3.39)
Long-Term Debt Due in One Year	-0.3851*** (-8.38)	-0.2457*** (-5.65)	0.0591*** (2.59)
Long-Term Debt Due in Two Years	0.4324*** (4.94)	0.4638*** (5.59)	-0.1687*** (-6.31)
Long-Term Debt Total	-0.1426*** (-6.75)	-0.2088*** (-10.48)	-0.0098 (-1.54)
Capital Expenditures			-0.0683*** (-4.1)
Total Revenue	0.0447*** (4.14)	0.0567*** (5.47)	-0.011*** (-5.18)
Net Income	0.1172*** (3.39)	0.1090*** (3.33)	0.0447*** (7.43)
# Bonds Issued in Current Year	-47.066*** (-9.43)	-49.314*** (-10.47)	-4.306 (-1.44)
Cluster	456.01*** (166.238)	336.946** (2.13)	106.644*** (3.88)
Stock and Time FE	Yes	Yes	Yes
N	2,114	2,108	1,865
N	19,891	19,546	17,376
adj. R^2	0.1273	0.1224	0.0842

Table 1.5 – *continued*

Panel B

	(1) Δ Cash and Equivalents	(2) Δ Short-Term Investments	(3) ΔNOWC
Size (Total Assets)	-0.0103***	-0.0042*	0.0070***
	(-3.7)	(1.7)	(2.8)
Long-Term Debt Due in One Year	-0.1695***	-0.0483	0.0610***
	(-3.81)	(-1.16)	(2.73)
Long-Term Debt Due in Two Years	0.1591*	0.2958***	-0.1619***
	(1.85)	(3.67)	(-6.21)
Long-Term Debt Total	-0.1824***	-0.2234***	-0.107*
	(-8.6)	(-11.29)	(-1.73)
Capital Expenditures			-0.0683***
			(-4.16)
Total Revenue	0.0216**	0.0405***	-0.0102***
	(2.00)	(3.95)	(-4.86)
Net Income	0.1518***	0.1395***	0.0431***
	(4.38)	(4.30)	(7.26)
# Bonds Issued in Current Year	-50.739***	-62.0414***	-0.6929
	(-9.99)	(-13.07)	(-0.26)
Last Year Cluster	-301.905**	-247.8238*	-45.0634**
	(-1.97)	(-1.72)	(-1.96)
Stock and Time FE	Yes	Yes	Yes
N	19,891	19,546	17,376
adj. R^2	0.1174	0.1303	0.0849

Table 1.6

We use OLS to examine the impact of firms' clustering behavior (Cluster = 1, if current year displayed a clustered issuance, and 0 otherwise) on their fixed capital expenditures, acquisitions, and trade credit management. All accounting variables are scaled by total assets. Robust t-statistics reported in parentheses are obtained from standard errors clustered by individual firm and year, ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

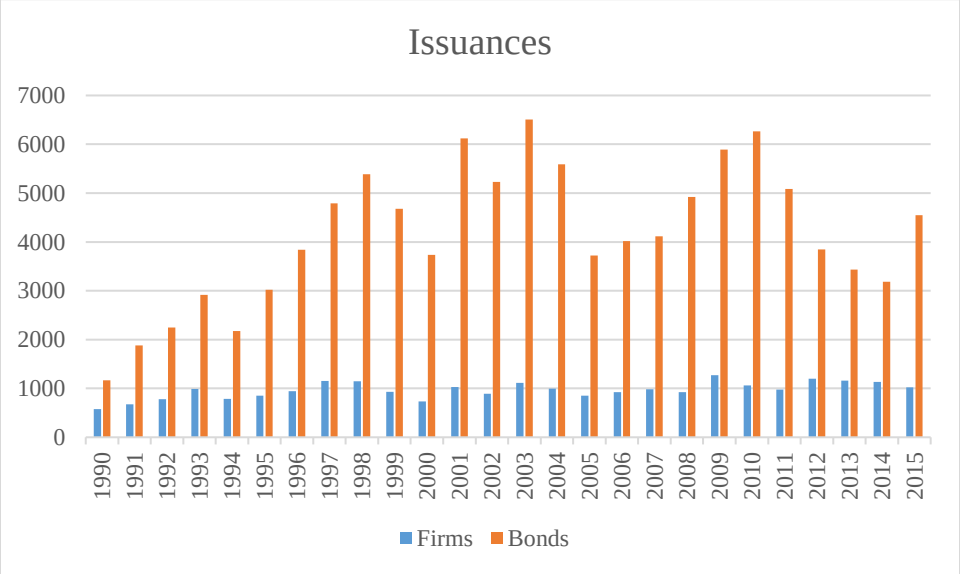
	(1) CapEx	(2) Acquisitions	(3) AP-trade	(4) AR-trade
Size (Total Assets)	0.0015	0.0015	0.196**	0.0758
	(0.09)	(0.90)	(2.03)	(1.26)
Long-Term Debt Due in One Year	-0.0535**	-0.0711*	-1.075	-0.488
	(-2.54)	(-1.77)	(-1.59)	(-1.34)
Long-Term Debt Due in Two Years	-0.0672**	0.0694	1.863***	2.485***
	(-2.15)	(1.39)	(2.94)	(3.90)
Long-Term Debt Total	0.0419***	0.00590	-0.226	0.192
	(2.95)	(0.46)	(-1.19)	(1.53)
Total Revenue	0.0501***	0.00985***	-0.0971	-0.0321
	(5.12)	(2.58)	(-1.24)	(-0.68)
Net Income	-1.928	-0.697	292.6***	-98.74*
	(-1.02)	(-0.52)	(4.54)	(-1.78)
# Bonds Issued in Current Year	0.0170	0.0161*	-0.0736	-0.0243
	(1.08)	(1.73)	(-0.56)	(-0.29)
Cluster	2.847	103.1***	-758.9***	342.5
	(0.23)	(3.76)	(-2.84)	(1.50)
Stock and Time FE	Yes	Yes	Yes	Yes
N	18,699	17,793	18,455	17,925
adj. R^2	0.258	0.331	0.385	0.332

Table 1.7

We use a probit regression to examine the impact of the firm's short-term liquidity and trade credit management, long-term debt reissuance, and market timing on the probability of firm resorting to a clustered issuance (dependent variable is C*luster* = 1, if a year displayed a clustered issuance, and 0 otherwise). All accounting variables are scaled by total assets. Wald Chi statistics are reported in parentheses, ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

	(1)	(2)	(3)	(4)
Age	0.0087***	0.0083**	0.0016	0.0055**
	(16.30)	(11.88)	(0.64)	(4.68)
Size (Total Assets)	-0.0000	-0.0000	-0.0000	-0.0000**
	(0.009)	(1.47)	(0.01)	(4.84)
Long-Term Debt Due in One Year	0.1348	0.4337	0.2787	0.4644
	(0.27)	(2.48)	(2.07)	(2.57)
Long-Term Debt Due in Two Years	-1.8568***	-1.5728***	-1.9871***	-1.5495***
	(28.34)	(20.71)	(37.32)	(19.68)
Long-Term Debt Total	0.7853***	0.9465***	0.7353***	0.9232***
	(135.20)	(166.47)	(141.19)	(152.01)
Net Income	0.0872	-0.0608	0.0475	-0.0605
	(1.34)	(0.47)	(0.58)	(0.45)
Capital Expenditures	-0.0002			0.0000
	(1.78)			(0.09)
Acquisitions	0.0043**			0.0136***
	(5.89)			(18.26)
ΔNOWC		0.426***		0.4259***
		(36.25)		(35.14)
ΔCash		0.5882***		0.6254***
		(30.25)		(33.04)
ΔShort-Term Investments		0.6791***		0.5557**
		(10.11)		(6.39)
Trade Receivables		-0.0001		0.0000
		(1.086)		(0.01)
Trade Payables		0.0004**		0.00045**
		(5.89)		(5.65)
Interest Rates Decline			-0.419***	-0.3017***
			(111.34)	(41.30)
Interest Rates Increase			-0.1643***	-0.1957***
			(19.20)	(16.28)
N	8,205	7,018	9,770	6,692
Pseudo R^2	0.024	0.033	0.033	0.045

FIGURE 1.1. BOND ISSUANCE PATTERN 1990-2015



Pattern of bond issuances over the sample period. The sample includes observations on 108,302 issuances by 9,235 individual firms over the period of 1990-2015.

PART 2

CORPORATE GOVERNANCE AND BOND TRADING

INTRODUCTION

Corporate governance aims to encourage management to work in shareholders' best interests. This is attempted by a system of internal mechanisms such as strong boards, audit, blockholdings, etc., as well as external governance like government regulations or takeovers.

Since managers are supposed to work in shareholders' best interests, there exists an inherent conflict between bondholders and managers/shareholders, which is not addressed by most traditional corporate governance mechanisms. Cremers, Nair, and Wei (2007) introduce the concept of "bondholder governance" exercised through restrictive bond covenants[7], especially those related to takeover defenses. The authors illustrate the idea first put forth in Jensen and Meckling (1976) that corporate bond covenants reduce the cost of debt by protecting bondholders and mitigating potential conflicts between shareholders and bondholders.

While restrictive covenants may protect bondholders, they are usually not involved in covenants' determination *ex ante,* and unlike shareholders, cannot exert direct influence on management through traditional corporate governance vehicles (i.e., bondholders cannot vote). As

[7] For a discussion of restrictive covenants that we analyze, please refer to Appendix B

a matter of fact, the ability of bondholders to mitigate the agency problems *ex post* may be limited. Therefore, we investigate if governance influences the choice of debt covenants.

Monitoring by regulators, banks, trade unions and blockholders is another broad governance channel, as well as supplementary monitoring through informed trading by shareholders, which compliments traditional corporate governance framework.[8] Zhang and Zhou (2018) find that firms with greater institutional blockholding tend to use more covenants in their bond offerings, especially in presence of active or short-term blockholders. The authors suggest that covenants are employed ex ante to mitigate incentive conflicts between shareholders and bondholders. Large informed shareholders can also "vote with their feet". [9] For example, Admati and Pfleiderer (2009) show that large shareholders' trading helps reduce agency costs and align managerial decisions with shareholders' interests through the credible threat of exit on the basis of private information.

There is evidence of prolific informed trading in bond markets, indicating the possibility of bondholders' trading as a substitute for governance. Han and Zhou (2013) show that the impact of adverse selection due to information asymmetry in the corporate bond trading is higher in larger trade sizes, i.e. bond traders do not break orders to minimize price impact, unlike stock traders. This result is consistent with Edwards, Harris, and Piwowar (2007), who find that in bond markets dominated by institutional-sized trades (>$100,000) transaction costs decrease significantly with

[8] Ferreira and Laux (2007) show that firms with weaker governance (fewer antitakeover provisions) exhibit more private information flow resulting in more informative stock prices through encouraging collection of and trading on private information (through higher level of institutional trading). Edmans (2009) and Edmans and Manso (2011) find that informed trading results in better incorporation of fundamentals into prices, which pressures management to select value enhancing projects.

[9] Bharath, Jayaraman, and Nagar (2013) show that even the threat of an informed block holder selling is sufficient to discipline management, reinforcing the importance of informed trading by large shareholders to the executives. McCahery, Sautner, and Starks's (2016) survey of institutional investors documents widespread behind-the-scenes intervention and governance-motivated exit as complementary mechanisms, with intervention occurring prior to potential exit.

trade size. Kedia and Zhou (2014) document the prevalence of informed trading in corporate bonds before takeover announcements, including the affinity of bond dealers affiliated with merger and acquisition advisors to sell bonds that accrue negative returns. [10] This mechanism is surprisingly similar to shareholders "voting with their feet". In this paper we also investigate if governance influences the amount of institutional trading (by sophisticated investors) in bonds.

We expect that institutional trading serves as an alternative to strong bondholder protection (i.e. restrictive covenants). Hence we expect bonds that contain less restrictive covenants in their indentures to have relatively higher institutional trading volume, i.e. to exhibit signs of informed trading.

Bond yields, ratings, and liquidity are related to corporate governance.[11] Bhojraj and Sengupta (2003) report that firms with stronger outside control of the board and greater institutional ownership (both indicating strong shareholder interest protection) enjoy lower bond yields and higher ratings on new bond issues due to lower default risk, information asymmetry between the firm and the lenders, agency costs, and better monitoring of managerial performance. However, they find that concentration of institutional ownership has an adverse effect on yields and ratings, the conclusion that has been further explored by Zhang and Zhou (2018), who postulate that blockholding aggravates bondholder concerns of agency conflict due to strengthened shareholder control. In order to mitigate this conflict, corporate bond issuers with more concentrated institutional shareholding use more covenants.

[10] Wei and Zhou (2016) also find informed trading in bond markets prior to earnings announcements that contain earnings surprises, with the link most prominently displayed prior to negative news and in high-yield bonds.
[11] Chung, Elder, and Kim (2010) find that firms with better corporate governance have narrower spreads, better liquidity, and lower probability of informed trading in equity markets.

Klock, Mansi, and Maxwell (2005) find, contrary to Bhojraj and Sengupta (2003), that stronger shareholder rights protection increases the cost of debt financing. The results also suggest that antitakeover governance provisions, although not beneficial to stockholders, are viewed favorably in the bond market, potentially due to alleviating the agency conflict between shareholders and bondholders.[12] Supporting this conclusion, Cremers, Nair, and Wei (2007) show that the impact of shareholder control on credit risk varies depending on the firm's takeover vulnerability. In the presence of large institutional block holders, bond yields are higher if the firm is exposed to takeovers (i.e. exhibits weak managerial protection) and vice versa. But the authors also find that change of control risk covenants reduce the credit risk associated with strong shareholder governance. These conclusions align with the agency costs model of Jensen and Meckling (1976), which shows that stronger shareholder control (better alignment of management to shareholders) results in asset substitution concerns for bondholders, which potentially may be mitigated by strong debt covenants.

Ashbaugh-Skaifea, Collins, and LaFond (2006) try to take a more comprehensive approach to corporate governance and investigate if firms with strong corporate governance benefit from higher credit ratings. They find that credit ratings are negatively related to the number of blockholders and CEO power, and positively related to weaker shareholder rights (associated with takeover defenses), as well as board independence, board stock ownership, and board expertise.

[12] Kim and McConnell (1977), Asquith and Kim (1982), Eger (1983), Dennis and McConnell (1986), and Maquieira, Megginson, and Nail (1998) all find insignificant excess returns to target bondholders. Walker (1994) finds that abnormal returns earned to nonconvertible bondholders after corporate takeovers are inversely related to issuer default risk. High quality bonds earn negative abnormal returns, and vice versa. Billett, King, and Mauer (2004) find that only non-investment grade target bonds earn positive announcement period returns, especially when the target's rating is below the acquirer's, due to the broadly documented co-insurance effect.

Overall, better governance translates into significant debt cost savings, due to the difference between investment and non-investment grade bond yields.

King and Wen (2011) examine the effects of corporate governance on an integrated basis although from a different viewpoint, as consisting of shareholder governance in the form of antitakeover provisions and bondholder governance in debt covenants.[13] While this approach may not be fully comprehensive, it attempts to investigate the combined effects of the governance structure onto the multi-sided agency conflict between bondholders, shareholders, and management. We proceed with the similar line of analysis by incorporating a comprehensive governance index representing strength the shareholders' rights protection, board strength and independence, remuneration, audit and managerial entrenchment, as well as an index of debt covenants protecting the bondholders' interests.

Overall, the results of this paper contribute to the understanding of the effects of governance mechanisms on bondholders.

Hypothesis Development

Jensen and Meckling (1976) show the theoretical connection between corporate governance and restrictive covenants postulating that covenants reduce the cost of debt by

[13] King and Wen (2011) find that strong bondholder protection results in more low-risk investments (capital expenditures) and diminishes high-risk investments (R&D expenditures), and weak shareholder governance (entrenched managers) leads to more R&D expenditures. They also show that financing and investment covenants exhibit especially strong binding power to deter risky investments that would disproportionately benefit the shareholders.

protecting bondholders and mitigating potential conflicts between shareholders and bondholders. Cremers, Nair, and Wei (2007) explicitly test this hypothesis and state that shareholder interests protected by the strong shareholder rights provisions diverge from bondholder interests without bond covenants. Corporate governance, however, is not defined by the shareholder rights protection alone. And while strong shareholder rights protection aggravates asset substitution concerns for bondholders, many other aspects of corporate governance framework aim to mitigate them. Using the governance portion of Bloomberg ESG (environmental, social, and governance) rank[14] to account for the strength of the traditional internal corporate governance mechanisms, such as compensation, audit, board diversity and independence, managerial entrenchment and shareholder rights, allows us to test if high quality comprehensive corporate governance leads to a greater degree of financial flexibility, i.e. less restrictive covenants in the new bond issues.

H1: Firms with high corporate governance rank issue bonds with less restrictive covenants.

The governance portion of Bloomberg ESG index does not cover such important alternative or supplementary governance vehicles as monitoring by blockholders or informed trading in stock or bond markets. Boehmer and Kelley (2009) find that stocks with greater institutional ownership are priced more efficiently due to institutional trading activity. Bond market trading is dominated by institutions,[15] and there exists ample evidence on informed trading in bond markets, which validates the investigation of corporate governance impact onto informed (institutional) trading in bond market.

[14] For more information on Bloomberg ESG rating construction, please refer to Appendix A.
[15] Edwards, Harris and Piwowar (2007) report that about 60% of all trades are in institutional-sized transactions (>$100,000) even after excluding the entire Rule 144A market, where trading is restricted to large institutions.

Furthermore, Kedia and Zhou (2014) find evidence of informed trading in bond markets in the course of mergers and acquisitions. They document, during the pre-announcement period, price run-up in target bonds that gain value and price decline in bonds that end up losing value. Wei and Zhou (2016) find informed trading in corporate bond markets around earnings announcements, especially evident in high-yield bonds during negative earnings surprises. Results are even stronger for institutional trades, tying informed trading to institutions yet again, and providing additional rationale for examining corporate governance influence on institutional bond trading. If institutional trading acts as an additional monitoring and disciplinary avenue in bond market due to poor corporate governance, then:

H2: Firms with high corporate governance rank experience relatively less institutional trading in their bonds.

Strong shareholder rights provisions may be detrimental to bondholders due to asset substitution concerns, resulting in higher bond yields in the presence of large and concentrated institutional stockholders. To alleviate these concerns credit risk reducing (restrictive) covenants may be introduced or institutional bondholders may participate in higher levels of informed trading. If restrictive covenants influence the proportion of institutional trading, then:

H3: Bonds issued with more restrictive covenants experience less institutional trading.

Corporate governance mechanisms influence not only information-based trading, but also market liquidity. For example, results in Chung, Elder, and Kim (2010) suggest that adopting governance standards that mitigate informational asymmetries may help alleviate informed trading

and improve stock market liquidity[16]. Liquidity is of utmost importance in the US bond markets, which warranties the investigation of impact of corporate governance and restrictive covenants.

The importance of bond liquidity to firms' outcomes is highlighted in the work of Whited (1992). She finds that problems of asymmetric information in debt markets affect financially unhealthy firms' ability to obtain outside financing and their investment expenditures over time. Therefore, it is of utmost importance for the firms, especially constrained and/or distressed firms, to ensure more bonds liquidity. Not only does bond liquidity reduce costs of further financing, but it also ensures a greater subscription to subsequent new issues.

Only limited evidence of corporate governance impact on bond market liquidity exists. Lee and Cho (2016) suggest that corporate governance[17] is a determinant of bond liquidity in Korean markets[18], as it lowers transaction costs by improving transparency and reducing information asymmetry, but no such conclusion has been drawn about the fundamentally different US bond market (e.g. corporate bonds in Korea are mostly traded in the primary market transactions). One of the biggest drawbacks of this study is the sample period of 2003 to 2007, when the Korean bond market is still dominated by treasury and agency debt.

H4: Firms with high corporate governance rank experience more active trading overall in the bond market.

[16] They find that firms with better corporate governance have narrower spreads, higher market quality index, smaller price impact of trades, and lower probability of information-based trading.
[17] Lee and Cho's index of corporate governance quality includes information on the level of shareholders' rights protection, functions of the board of directors, sufficiency of disclosure, presence of a responsible audit committee, and distribution of management loss.
[18] For more information on Korean bond markets, please refer to Korea Economic Institute whitepaper at http://www.keia.org/sites/default/files/publications/kei_koreas_economy_choi.pdf

Klock, Mansi, and Maxwell (2005) show that strong management rights (strongest antitakeover provisions) lower the cost of debt financing by reducing the probability of extreme shareholder activism in the form of takeover, which is usually detrimental to bondholders. Furthermore, Cremer, Nair, and Wei (2007) show that shareholder and bondholder interests diverge unless binding and restrictive covenants are written into bond indentures. Risk covenants reduce the credit risk associated with strong shareholder governance, protecting bondholders. Therefore, restrictive covenants may produce additional benefits even in presence of strong corporate governance mechanisms.

H5: Bonds issued with more restrictive covenants are traded more frequently.

Chen, Lesmond, and Wei (2007) find that liquidity is priced in corporate bond yield spreads so that more illiquid bonds earn higher yield spreads, and an improvement in liquidity causes a significant reduction in yield spreads. Hence, if strong corporate governance improves liquidity in the outstanding bonds, it decreases the costs of debt financing in the long run, and then:

H6: Firms with high corporate governance rank issue bonds that have lower yields at issuance.

Previous studies show that firm size, leverage, debt maturity, and corporate liquidity and solvency concerns are important determinants of bond covenants (Malitz, 1986; Nash et al., 2003; Billett et al., 2007; Cook et al., 2014). Controlling for these factors, as well as the strength of corporate governance, if more restrictive covenants offer additional liquidity and yield benefits to the newly issued bonds, then:

H7: Bonds issued with more restrictive covenants have lower yields at issuance.

Strong shareholder protection is detrimental to bondholders, but many other corporate governance avenues are favorable to them as well. Bhojraj and Sengupta (2003) provide evidence that stronger outside control of the board and greater (but not concentrated) institutional ownership lead to higher bond ratings and lower bond yields, mostly due to decreasing information asymmetry and mitigating agency costs, as well as monitoring of managerial efficiency. Ashbaugh-Skaifea, Collins, and LaFond (2006) confirm that firms with strong corporate governance (strong, independent and experienced boards) benefit from higher credit ratings.

H8: Firms with high corporate governance rank issue bonds that have better credit ratings.

If restrictive covenants act in compliment to strong corporate governance, then controlling for the corporate governance ranking:

H9: Bonds issued with more restrictive covenants have better credit ratings at issuance.

Data and Methodology

In this paper we use the governance portion of Bloomberg ESG (environmental, social, and governance) rating (further referred to as CG rank) to account for the strength of the traditional internal corporate governance mechanisms such as compensation, audit, board diversity and independence, shareholder rights and managerial entrenchment metrics. The index does not cover alternative or supplementary governance vehicles such as monitoring by blockholders or informed trading in stock market. Bloomberg evaluates companies annually collecting public governance data through companies' websites, annual reports, as well as through direct contact. The rating

addresses such governance issues as board independence, diversity and undue busyness, remuneration, strength of audit, shareholder rights, and managerial entrenchment. [19] The governance portion of the Bloomberg ESG data covers 37 governance indicators including, but not limited to cumulative voting, executive compensation, unequal voting rights shares, takeover defenses, staggered boards, and independent directors within the seven aforementioned broader categories. Bloomberg ESG rating also penalizes companies for missing data, prizing the high level of public disclosure over opacity.

We also construct a simple composite measure of covenant restrictiveness due to the categorical nature of the covenants presence or absence. We count the number of restrictive covenants imposed on the debt issue to obtain an ordinal composite variable. The data on restrictive covenants comes from Bloomberg.[20]

The data on bond trading comes from TRACE (Trade Reporting and Compliance Engine) distributed by the Financial Industry Regulatory Authority. We dismiss all non-corporate debt, debt of any foreign financial entities, as well as any debt in TRACE that Bloomberg does not collect data on.

Issuer level quarterly and annual accounting data is from Compustat.

The data sample only covers TRACE eligible US corporate bonds issued in 2014 through 2017, and we collect various data on complexity features, restrictive covenants, and trading of about 16,000 bonds issued over this period of time by about 1,000 US publicly traded firms.

[19] Refer to Appendix A for full details on factors covered by the governance portion of Bloomberg ESG rating, as well as its compilation.
[20] Refer to Appendix B for full list and generally accepted legal definitions an/or examples of covenants covered in Bloomberg database.

We only examine the trading in newly issued bonds during the first calendar year post-issuance, due to the fact that the trading activity in bonds thins out significantly only after the very first month post-issuance and by the twelfth month the turnover is negligible[21]. Most firms also consistently issue debt, and top bond (the bond with most trading during the day, as defined in Edward, Harris and Piwowar (2007)) is usually the newest in the company's string of debt securities. For the analysis we also exclude rule 144A issuances, as they have been previously shown to be very different from issuances to the open market[22].

Table 2.1 presents sample descriptive statistics. Panel A describes an average firm in the sample, which, at $45.6 million in market capitalization is fairly large, and offers new bonds about 12 times a year. The average leverage of the firm in the sample is just over 33% of total assets, with about 6% of total debt due next year. An average firm is solvent and liquid with an average current and quick ratio of 1.58 and 1.24 respectively, and with access to cash and short-term investments in the amount of 10.92% of its total assets. Most importantly, an average firm in the sample has a corporate governance rank of 75.6 (that rank is calculated per firm within an industry peers group). The information in panel B describes an average bond. Issued with maturity of about 12.5 years, a coupon at issuance of about 2% and in the amount of right under $208 million, an average bond is non-convertible and non-callable, and is rated BBB. This average bond in the sample is very representative of the overall bond market new issues as described by various SIFMA reports.[23] An average bond in the sample is issued with about 6 restrictive covenants, however the covenant data is not available for every issue that data was collected on. While the

[21] See, for example, the report to the SEC Fixed Income Advisory Committee at https://www.sec.gov/spotlight/fixed-income-advisory-committee/blackrock-next-generation-bond-market-fimsa-011118.pdf
[22] Livingston, Zhou (2002); Zhu, Cai (2014)
[23] See, for example, US Corporate Bond Issuance Report at https://www.sifma.org/resources/archive/research/statistics/

manual check of many such issues provided that no restrictive covenants were written into bonds' indentures, we do not include these bonds into final analysis.

Results

Preliminary results are available in table 2.2 and presented in the univariate Pearson correlation matrix. The most important result in panel A is that company's *CG rank* is inversely related to the average number of covenants on the firm's newly issued bonds (*Restrictive Covenants*), indicating that restrictive covenants may be employed to tackle poor governance concerns of investors. Companies with higher *CG rank* are larger in size (*Market Capitalization*) and more likely pay dividends (*Dividend Payer*), have higher credit ratings (*Credit Rating*) and offer more debt (*Annual Offering*). Size is strongly related to other variables of interest in the same direction as the *CG rank*, which makes size effect extremely important in regression analysis, as has been shown in Billet, King, and Mauer (2007), and Cook, Fu, ad Tang (2014).

Panel B shows that in a univariate setting, the increase in number of *Restrictive Covenants* of each individual bond is positively correlated with *Yield at Issuance* and negatively correlated with issue's C*redit Rating* (positively correlated with *Credit Watch*), thus contradicting hypotheses 7 and 9. On bond level *Issuer CG Rank* remains negatively correlated with *Restrictive Covenants*, and indicated better credit quality (positively correlated with *Credit Rating*, and negatively correlated with *Credit Watch*) and associated lower *Yield at Issuance*.

Hypothesis 1 is formally tested in table 2.3. We test whether firms with higher corporate governance rank issue bonds with less restrictive covenants:

$$DepVariable_{i,t} = \beta_1 Restrictive\ Covenants_{i,t} + \beta_2 Credit\ Rating_{i,t} + \beta_3 Market\ Capitalization_{i,t} + \beta_4 Solvency_{i,t} + \beta_5 Profitability_{i,t} + \beta_6 Internal\ Liquidity_{i,t} + \beta_7 LTD\ due_{i,t+1} + \beta_8 Return\ of\ Cash\ to\ Shareholders_{i,t} + \beta_9 Leverage_i + \beta_{10} Industry_i + \varepsilon_{i,t}$$

To start off, we determine whether higher CG ranked firm issue more debt, as univariate results in tables 2.1 and 2.2 suggested. Regressions 1, 2, and 3 are firm-level regressions with one annual observation per firm, if the firm reported issuance in the given year and had at least some restrictive covenants data available. The variable of interest, *Issuer CG Rank*, remains statistically insignificant in influencing either of three debt volume determining dependent variables (*Number of Bonds Issued*, *Average Offering Amount*, and *Total Offering Amount* annually in regressions 1, 2, and 3 respectively) in presence of firm-level controls and industry fixed effects, indicating that the size effect (*Market Capitalization* is positive) might be the driver behind the univariate results. Larger firms tend to have higher CG rank and better credit ratings.

We then investigate if *CG Rank* influences restrictive covenants averaged at firm level (regression 4) and for individual bonds (regression 5). While both *Average Restrictive Covenants* (firm-level variable), and *Individual Restrictive Covenants* (bond level variable) are negatively related to Size (*Market Capitalization*) and *Credit Rating* determinants, there exists weaker evidence (coefficients significant at 10% level) of negative relation between good corporate governance and more restrictive covenants. In other words, the marginal effect perseveres even

conditional on all the important determinants of bond covenants as defined in Nash et al. (2003), Billett et al. (2007), and Cook et al. (2014), in support of hypothesis 1.

Table 2.4 presents results of formally testing hypothesis 2 using the following regression:

$$DepVariable_{i,t} = \beta_1 CG\ Rank_{\ i} + \beta_2 Number\ of\ Bonds\ Traded_{i,t} + \beta_3 Number\ of\ Trades_{i,t} + \beta_4 Average\ Days\ since\ Issue_{i,t} + \beta_5 Credit\ Rating_i + \beta_6 Market\ Capitalization_{\ i} + \beta_7 Solvency_i + \beta_8 Profitability_i + \beta_9 Internal\ Liquidity_i + \beta_{10} LTD\ due\ next\ year_i + \beta_{11} Return\ of\ Cash\ to\ Shareholders_i + \beta_{12} Leverage_i + \beta_{12} Industry_i + \varepsilon_{i,t}$$

We average trading data for all of the bonds of a given firm daily to obtain 92,081 daily observations on institutional trading in bonds of each firm. Trading data on bonds is collected only over the first year after issuance, as bond trading thins out considerably even after the first month post issue. This conclusion predicates the strong negative relation between *Average Days Since Issuance* across all measures of institutional trading activity in regressions 1 through 4. Across all specifications companies with higher *CG Rank* have less institutional trading in their bonds (*CG Rank* coefficient is negative in regressions 1, 2, and 4 where the dependent variables are *Number of Institutional Trades*, *% Institutional Trades*, and *% Institutional Trading Volume* respectively), providing strong support for hypothesis 2.

Turning to individual bond-day level data not aggregated at firm level, we test if bonds issued with more restrictive covenants experience less institutional trading controlling for issuing firm's *CG Rank*, using the following regression:

$$DepVariable_{i,t} = \beta_1 CG\ Rank_i + \beta_2 Restrictive\ Covenants_{i,t} +$$
$$\beta_3 Trading\ Activity_{i,t} + \beta_4 Credit\ Rating_i + \beta_5 Callable_i + \beta_6 Convertible_i +$$
$$\beta_7 Days\ since\ Issue_{i,t} + \beta_8 Firm - Level\ Controls_i + \beta_9 Industry_i + \varepsilon_{i,t}$$

Table 2.5 presents the results of the regression above, and consistent with table 2.4 testing hypothesis 3, we use *Number of Institutional Trades*, *% Institutional Trades*, *Institutional Trading Volume*, and *% Institutional Trading Volume* as dependent variables in regressions 1 through 4 respectively. In presence of *Issuer CG Rank* (negative and significant across all specifications) *Restrictive Covenants* provide additional reduction in *Number of Institutional Trades* and *Institutional Trading Volume*, but this reduction may be driven by the overall reduction in trading, as indicated by positive coefficients on *Retail Number of Trades* and *Retail Trading Volume* in regressions 1 and 3 respectively. With this in mind, using proportional measures of trading activity as dependent variables allows us to observe in regressions 2 and 4 that *% Institutional Trades* and *% Institutional Trading Volume* increase with increasing number of restrictive covenants.

Bonds issued with restrictive covenants are traded less actively (by both institutions and retail investors), however, institutions participate relatively more actively in trading of bonds with restrictive covenants controlling for overall reduction in trading, which leads us to find no support for hypothesis 3. An additional result of interest is that across all specifications, institutional trading activity is greater for convertible bonds (positive coefficient on *Convertible* in all regressions 1 through 4), which comprise less than 0.5% of the sample bonds.

To further explore trading activity in bonds issued with restrictive covenants, dependent on CG rank, table 2.6 presents results on testing hypotheses 4 and 5 using the following regressions:

Panel A: $DepVariable_{i,t} = \beta_1 CG\ Rank_i + \beta_2 Trading\ Activity_{i,t} +$

$\beta_4 Average\ Days\ since\ Issue_{i,t} + \beta_5 Credit\ Rating_i + \beta_6 Market\ Capitalization_i +$

$\beta_7 Solvency_i + \beta_8 Profitability_i + \beta_9 Internal\ Liquidity_i + \beta_{10} LTD\ due\ next\ year_i +$

$\beta_{11} Return\ of\ Cash\ to\ Shareholders_i + \beta_{12} Leverage_i + \beta_{12} Industry_i + \varepsilon_{i,t}$

Panel B: $DepVariable_{i,t} = \beta_1 CG\ Rank_i + \beta_2 Restrictive\ Covenants_{i,t} +$

$\beta_3 Yield\ at\ Issue_i + \beta_4 Credit\ Rating_i + \beta_5 Callable_i + \beta_6 Convertible_i +$

$\beta_7 Days\ since\ Issue_{i,t} + \beta_8 Firm - Level\ Controls_i + \beta_9 Industry_i + \varepsilon_{i,t}$

Panel A uses daily aggregated at the firm level data on bond trading. Results in panel A indicates that while *Average* and *Total Number of Trades* increase, *Average* and *Total Trading Volume* do not change significantly in response to better *CG Rank* of the firm, consistent with findings in table 2.4 that institutions trade less in bonds of firms with better *CG Rank*. *Average* and *Total Number of Trades* as well as *Total Trading Volume* (dependent variables in regressions 1, 2, and 4 respectively) decline with increasing *Credit Rating*, while *Average Trading Volume* is not significantly related to *Credit Rating*, consistent with results in table 2.4, where *Institutional Trading Volume* in regression 3 increases with better credit rating, overpowering the negative relation between *Credit Rating* and trading activity variables present in regressions 1,2, and 4 of table 2.6.

Panel B employs bond trading data aggregated daily per each bond. Bond market trading volume is driven by institutional traders, and therefore the results in panel B are closely related to results reported in table 2.5. The number of trades is not significantly related to either *CG rank* or individual bond's *Restrictive Covenants*, as in the sample on average 50% of trades are retail-sized. *Total Trading Volume* declines in both *CG rank* and *Restrictive Covenants* consistent with all

regression specifications in table 2.5, due to institutional trading volume representing 90% of total trading volume of an average bond in the sample.

Table 2.7 present the results of test for hypotheses 6 and 7 using the following regressions:

(1): $$Average\ Yield\ at\ Issuance_{i,t} = \beta_1 CG\ Rank_{i,t} + \beta_2 Credit\ Rating_{i,t} + \beta_4 Average\ Issue\ Volume_{i,t} + \beta_5 Average\ Offer\ Price_{i,t} + \beta_6 Market\ Capitalization_{i,t} + \beta_7 Solvency_{i,t} + \beta_8 Profitability_{i,t} + \beta_9 Internal\ Liquidity_{i,t} + \beta_{10} LTD\ due\ next\ year_{i,t} + \beta_{11} Return\ of\ Cash\ to\ Shareholders_{i,t} + \beta_{12} Leverage_{i,t} + \beta_{12} Industry_i + \varepsilon_{i,t}$$

(2): $$Yield\ at\ Issuance_{i,t} = \beta_1 CG\ Rank_i + \beta_2 Restrictive\ Covenants_{i,t} + \beta_3 Credit\ Rating_i + \beta_4 Issue\ Volume_i + \beta_5 Time\ to\ Maturity_i + \beta_6 Callable_i + \beta_7 Convertible_{i,} + \beta_8 Firm - Level\ Controls_i + \beta_9 Industry_i + \varepsilon_{i,t}$$

Results in table 2.7 fail to support either hypotheses 6 or 7. *CG Rank* is insignificant at determining *Average Yield at Issuance,* and *Restrictive Covenants* variable is insignificant in presence of *Issuer CG Rank* and bond-level determinants of yield. *Firm* and *Bond Credit Rating* however are both significantly negatively related to the at-issuance yield (a step up in *Firm Credit Rating* produces a reduction of 0.25% in *Average Yield at Issuance*, and an incremental increase in Bond Credit Rating reduces the given bonds *Yield at Issuance* of 0.23%). Results in table 2.2 indicate that *Restrictive Covenants* is strongly negatively correlated with *Credit Rating*. In this light, it is important to investigate if *Restrictive Covenants* become substantially more important at median credit rating (BBB) and at marginally investment grade credit rating (BBB-).

Panel A of table 2.8 presents the difference-in-means analysis for the average number of restrictive covenants a firm issues their new bonds with, and the number of individual bond

restrictive covenants in a new issue, between firms (bonds) with credit rating equal to median BBB (including all BBB group ratings: BBB+, BBB, and BBB-) versus all other rating categories. Mean of the average number of restrictive covenants that that BBB rated firms issue their new debt with is 8.21 versus 7.43 for firm in any other category rated firm. The difference of about 0.77 extra restrictive covenants on average for a BBB rated firm is statistically significant. Bonds issued with BBB category rating are issued with about 0.85 extra restrictive covenants as well (6.97 versus 6.12 for bonds within other ratings categories), and the difference is statistically significant.

Panel B of table 2.8 presents the difference-in-means analysis for the average number of restrictive covenants a firm issues their new bonds with, and the number of restrictive covenants in a new bond between firms (bonds) with credit rating is equal to marginally investment grade rating of BBB- versus all other rating categories. Not all of the individual bond issuances are rated, which limits our number of observations for bond level difference-in-means comparison to 3,888 bond issuances. The results in panel B indicate that for firms and bonds within the lowest investment grade BBB- rating category, the difference in the mean number of restrictive covenants is even more distinct. Firms rated BBB- on average issue bonds with 0.87 more restrictive covenants, and bonds issued with a marginally investment grade rating have on average 1.39 more restrictive covenants written into their indentures. This result indicated that restrictive covenants are extremely important for marginal credit ratings supporting hypotheses 8 and 9.

The full results of testing hypotheses 8 and 9 are presented in table 2.9 in the form of the following regression:

$$Credit\ Rating_{i,t} = \beta_1 CG\ Rank_i + \beta_2 Time\ to\ Maturity_{i,t} + \beta_4 Issue\ Volume_{i,} + \beta_5 Restrictive\ Covenants_i + \beta_6 Market\ Capitalization_{\ i} + \beta_7 Solvency_i +$$

$$\beta_8 Profitability_i + \beta_9 Internal\ Liquidity_i + \beta_{10} LTD\ due\ next\ year_i +$$

$$\beta_{11} Return\ of\ Cash\ to\ Shareholders_i + \beta_{12} Leverage_i + \beta_{12} Industry_i + \varepsilon_{i,t}$$

Results presented in table 2.9 do not support hypotheses 8. In presence of firm-level proxies for firm size, solvency, profitability, operating working capital liquidity, leverage and return of cash to shareholders (regressions 1 and 2), as well as bond level quality proxies (regression 2), *CG Rank* is insignificant both on the firm and bond level, despite the strong positive correlation presented in table 2.2. All in all, effects of *CG Rank* on *Credit Rating* may be indirect, through a relation with other traditional determinants of *Credit Rating*. Regression 2 indicates that, contradictory to hypothesis 9, *Restrictive Covenants* variable is negatively related to bond *Credit Rating*. Bonds issued with more restrictive covenants tend to have lower credit ratings. This may mean that restrictive covenants are widely used to alleviate credit concern of the investor. Combining this conclusion with the result of difference-in-means analysis presented in table 2.8, we investigate the effect of *Restrictive Covenants* on the likelihood of a bond being *BBB* (including BBB+, BBB, and BBB- subcategories) or specifically *BBB*- rated, as well as the likelihood of bond placed on *Credit Watch* over the sample period, using the following regression:

$$Probability\ of\ Credit\ Rating\ Event_{i,t} = \beta_1 CG\ Rank_i +$$

$$\beta_2 Restrictive\ Covenants_{i,t} + \beta_3 Amount\ Issued_i + \beta_4 Time\ to\ Maturity_{i,t} +$$

$$\beta_5 Callable_i + \beta_6 Firm - Level\ Controls_i + \beta_7 Industry_{i,t} + \varepsilon_{i,t}$$

Table 2.10 provides evidence of restrictive covenants use to grip to the lowest investment grade rating. The likelihood of being rated within one of the *BBB* rating categories increases with *Issuer CG Rank*, however when it comes to the marginally investment grade bonds, rated *BBB*-, *Issuer CG Rank* is rendered insignificant, however *Restrictive Covenants* increase increases the

likelihood of a bond holding on to the BBB- rating. Consistent with results in table 2.8, restrictive covenants are used as the last resort measure to issue cheaper and more widely traded debt by remaining within the investment grade range. Regression 3 provides an additional piece of evidence against hypothesis 8. Higher *Issuer CG Rank* increases the likelihood of *Credit Watch*, potentially due to exacerbated asset substitution concerns described in Jensen and Meckling (1976). At the same time, and also in line Jensen and Meckling (1976), regression 3 results show that increase in number of *Restrictive Covenants* decreases the likelihood of *Credit Watch* rendering additional support to hypothesis 9.

Conclusion

Restrictive covenants and high quality corporate governance are not perfect substitutes, but rather restrictive convents are supplemental. Using the governance portion of Bloomberg Environmental, Social, and Governance rating to account for the strength of the traditional internal corporate governance mechanisms and a simple composite measure of covenant restrictiveness, We establish that firms with high CG rank issue bonds with less restrictive covenants, but this relation is not always clear in bond market trading setting.

While firms with high CG rank unequivocally experience less institutional trading in their bonds across all specifications, bonds issued with more restrictive covenants actually experience proportionally more institutional trading, when controlling for the overall trading activity.

Neither corporate governance, nor restrictive covenants provide additional benefits of reducing at-issuance yields, which are strongly determined by the bond credit ratings. This renders

the analysis of corporate governance and restrictive covenants effects on credit ratings extremely important.

Hypothesis 8 associated with the role of corporate governance in determining the quality of firm's credit does not find support in our analysis, variable of interest, *CG Rank*, is insignificant across all specification used to test hypothesis 8.

However, we conclude that restrictive covenants are likely introduced to alleviate asset substitution concerns described in Jensen and Meckling (1976), as firms that issue bonds with more restrictive covenants, are less likely to be put on credit watch, and more likely to keep investment grade credit rating, controlling for the quality of governance. Also, bonds issued with more restrictive covenants (controlling for issuing company governance rank) have lower credit ratings at issuance.

We believe that the results of this paper contribute to better understanding of the effects of governance mechanisms on bondholders.

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Table 2.1
Sample statistics for firms in the sample and bonds issued by them

The table presents average accounting, credit rating, and debt issuance metrics for firms in the sample, as well as average characteristics of the bonds issued by these firms.

Panel A. Firms in sample				
Firm level (all firms)	N	Mean	Median	Standard Deviation
CG Rank	1,116	75.60	76.58	6.53
Average Number of Restrictive Covenants	747	7.78	8.00	2.34
Market Capitalization ($, mln)	1,116	45,676.19	21,822.63	71,536.38
Debt-to-Assets Ratio	1,116	33.21%	31.92%	18.69%
Liabilities-to-Assets Ratio	1,116	48.55%	66.56%	20.03%
Long-Term Debt Due in One Year (% Total Debt)	1,116	6.12%	4.04%	7.87%
Cash and Short-Term Investments to Assets Ratio	1,116	10.92%	6.43%	12.66%
Return on Assets	1,116	4.35%	4.23%	7.06%
Current Ratio	1,116	1.57	1.34	1.01
Quick Ratio	1,116	1.24	1.02	0.94
Stock Repurchase (=1, if repurchase happens)	1,116	0.75	1	0.43
Dividend Payer (=1, if dividend is payed)	1,116	0.87	1	0.33
# Bonds Issued Per Year	1,116	11.86	1	98.33
Annual Offering Amount ($, mln)	1,116	3,611.75	1,498.42	6,118.14
Panel B. Bonds in sample				
Bond level (all non-144A issuances)	N	Mean	Median	Standard Deviation
Number of Restrictive Covenants	6,314	6.38	6.00	1.80
Amount Issued ($, mln)	13,237	207.64	15.55	544.20
Offering Price (% of par)	13,237	109.32	100	112.81
Time to Maturity	13,237	12.50	4	13.03
Callable	13,237	0.37	0	0.48
Yield at issuance	8,419	1.99%	1.50%	2.37%
Credit Rating (S&P)	3,888	BBB	BBB	2.15

Table 2.2
Pearson correlation matrix

The table presents correlations between various firm level and bond issuance level variables of interest.

Panel A. Firms in sample

	1	2	3	4	5	6	7	8	9	10	11
1. CG Rank	1										
(p-value)											
2. Restrictive Covenants	-0.163	1									
(p-value)	(<.0001)										
3. Market Capitalization	0.150	-0.290	1								
(p-value)	(<.0001)	(<.0001)									
4. Debt-to-Assets Ratio	-0.035	0.287	-0.078	1							
(p-value)	(.255)	(<.0001)	(.009)								
5. Return on Assets	-0.034	0.092	0.081	0.052	1						
(p-value)	(.259)	(.012)	(.007)	(.084)							
6. Current Ratio	-0.008	0.131	-0.006	-0.094	0.936	1					
(p-value)	(.813)	(.012)	(.863)	(.005)	(<.0001)						
7. Quick Ratio	0.024	0.084	0.039	-0.044	0.025	0.936	1				
(p-value)	(.483)	(.046)	(.248)	(.201)	(.448)	(<.0001)					
8. Stock Repurchase	0.035	-0.056	0.090	-0.131	0.117	0.079	0.072	1			
(p-value)	(.254)	(.127)	(.003)	(<.0001)	(<.0001)	(.019)	(.033)				
9. Dividend Payer	0.129	-0.248	0.55	-0.093	0.003	-0.001	-0.022	0.029	1		
(p-value)	(<.0001)	(<.0001)	(.069)	(.002)	(.915)	(.984)	(.510)	(.341)			
10. # Bonds Issued	0.055	-0.124	0.237	-0.008	-0.049	-0.074	-0.037	0.050	0.039	1	
(p-value)	(.066)	(.0007)	(<.0001)	(.786)	(.105)	(.028)	(.285)	(.096)	(.191)		
11. Annual Offering	0.126	-0.238	0.636	-0.025	-0.045	0.065	0.122	0.061	0.058	0.039	1
(p-value)	(.0005)	(<.0001)	(<.0001)	(.507)	(.221)	(.117)	(.004)	(.098)	(.115)	(.191)	
12. Credit Rating	0.179	-0.434	0.480	-0.375	0.191	0.031	0.051	0.176	0.290	0.023	0.173
(p-value)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(.459)	(.230)	(<.0001)	(<.0001)	(.528)	(<.0001)

Table 2.2 – *continued*

Panel B. Bonds in sample

	1	2	3	4	5	6	7	8	9
1. Issuer CG Rank	1								
(p-value)									
2. Restrictive Covenants	-0.193	1							
(p-value)	(<.0001)								
3. Credit Rating	0.201	-0.353	1						
(p-value)	(<.0001)	(<.0001)							
4. Credit Watch	-0.057	0.055	-0.006	1					
(p-value)	(<.0001)	(<.0001)	(.694)						
5. Amount Issued	-0.138	0.155	0.111	0.153	1				
(p-value)	(<.0001)	(<.0001)	(<.0001)	(<.0001)					
6.Yield at Issuance	-0.163	0.211	-0.435	0.068	0.282	1			
(p-value)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)				
7. Time to Maturity	-0.035	-0.107	-0.129	0.050	0.116	0.126	1		
(p-value)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)			
8. Offering Price	0.094	-0.006	-0.029	-0.017	-0.070	-0.002	0.080	1	
(p-value)	(<.0001)	(.663)	(.088)	(.056)	(<.0001)	(.853)	(.089)		
9. Callable	-0.111	0.138	-0.169	0.067	0.185	0.510	0.079	-0.010	1
(p-value)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(.276)	

Table 2.3

We use OLS to examine the impact of firm's CG Rank on the number of bond issuances, mean and total dollar amount of debt offerings, as well as average number of restrictive covenants the firm chooses to issue its debt with. We also investigate the issuer CG Rank effect on individual bond restrictive covenants, controlling for firm-specific factors. T-statistics reported in parentheses are obtained from standard errors clustered by the industry (Bloomberg BICS level 1). ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

	(1)	(2)	(3)	(4)	(5)
	Number of Bonds Issued	Average Offering Amount	Total Offering Amount	Average Restrictive Covenants	Individual Restrictive Covenants
Issuer CG Rank	-0.0931	-1.665	19.642	-0.0286*	-0.547*
	(-1.63)	(-0.48)	(0.59)	(-1.79)	(-1.92)
Credit Rating	0.166	-21.842*	-205.897*	-0.268***	-0.376***
	(0.86)	(-1.87)	(-1.83)	(-4.95)	(-12.87)
Market Capitalization	22.1***	2.336***	39.252***	-5.44***	-2.56***
	(4.76)	(8.33)	(14.53)	(-4.20)	(-5.01)
Current Ratio	-1.635	-66.964	-1145.41*	0.464	0.339*
	(-1.52)	(-1.03)	(-1.83)	(1.55)	(1.73)
Quick Ratio	2.665**	163.711**	2,258.03***	-0.419	-0.223
	(2.04)	(2.07)	(2.97)	(-1.15)	(-1.02)
Return on Assets	-6.810	-230.73	-1,903.82	0.160	-0.114
	(-1.37)	(-0.77)	(-0.66)	(0.12)	(-0.10)
Cash and ST Investments to Assets Ratio	-7.560	-49.132	-5,264.97**	-0.345	-1.085*
	(-1.83)	(-0.20)	(-2.18)	(-0.30)	(-1.85)
LTD due Next Year	21.17***	-866.66***	2,417.37	-1.849	-4.793***
	(3.96)	(-2.68)	(0.78)	(-1.24)	(-6.06)
Stock Repurchase	-2.512***	-74.551	-513.611	0.291	0.907***
	(-2.80)	(-1.38)	(-0.98)	(1.16)	(6.43)
Dividend Payer	2.130**	-14.735	1,377.32**	-0.0608	-0.604***
	(2.09)	(-0.24)	(2.32)	(-0.21)	(-3.39)
Debt-to-Assets Ratio	2.186	66.347	-289.774	0.777	-0.524
	(0.72)	(0.36)	(-0.16)	(0.91)	(-1.09)
Liabilities-to-Assets	1.421	215.162	1,042.21	-0.589	-0.219
	(0.49)	(1.24)	(0.62)	(-0.73)	(-0.51)
Callable					0.430***
					(3.48)
Amount Issued					-0.038
					(-0.44)
Yield at Issuance					0.096*
					(1.95)
Industry FE	YES	YES	YES	YES	YES

Clustered SE	YES	YES	YES	YES	YES
N	2,001	2,001	2,001	2,001	3,888
adj. R^2	0.178	0.351	0.507	0.340	0.423

Table 2.4

We use OLS to examine the impact of firm's CG Rank on the number and proportion of institutional trades and the total and proportional dollar volume of trades over $100,000 (defined, following Edwards, Harris, and Piwowar (2007), as institutional). T-statistics reported in parentheses are obtained from standard errors clustered by the industry (Bloomberg BICS level 1). ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

	(1)	(2)	(3)	(4)
	Number of Institutional Trades	% Institutional Trades	Institutional Trading Volume	% Institutional Trading Volume
CG Rank	-0.0294***	-0.0029***	-0.020	-0.0011**
	(-3.58)	(-2.91)	(-1.36)	(-2.47)
Number of Firms' Bonds Traded	-0.0053	-0.0021	0.021	-0.0004
	(-0.26)	(-0.86)	(1.03)	(-0.53)
Number of Trades	0.247***	-0.0102***	0.265***	-0.0034***
	(8.26)	(-9.92)	(5.57)	(-8.03)
Average Days Since Issuance	-0.0021***	-0.0001***	-0.0042***	-0.0001***
	(-23.08)	(-9.01)	(-31.57)	(-5.26)
Credit Rating	-0.0193	0.0045	0.199***	0.002
	(-0.67)	(1.03)	(3.89)	(1.05)
Market Capitalization	1.55	-0.179	0.202	-5.36
	(1.35)	(-1.13)	(0.11)	(-0.10)
Current Ratio	-0.478**	-0.0133	-0.345	-0.008
	(-2.85)	(-0.59)	(-1.40)	(-1.05)
Quick Ratio	0.616***	0.0144	0.578*	0.0109
	(3.19)	(0.67)	(1.80)	(1.33)
Return on Assets	-0.108	0.0679	1.589	0.0444
	(-0.10)	(0.54)	(0.91)	(0.78)
Cash and ST Investments to Assets Ratio	-0.782***	-0.133	-1.210*	-0.0340
	(-3.40)	(-1.42)	(-1.86)	(-1.60)
LTD due Next Year	0.325	0.249**	-0.775	0.0309
	(0.73)	(2.40)	(-0.92)	(1.42)
Stock Repurchase	-0.149	-0.00786	-0.281	-0.0084
	(-0.77)	(-0.45)	(-1.34)	(-1.25)
Dividend Payer	-0.275*	0.00625	0.173	-0.0118*
	(-1.88)	(0.29)	(1.03)	(-1.92)
Debt-to-Assets Ratio	0.296	0.0974**	0.496	0.0203
	(0.67)	(2.35)	(1.23)	(1.32)
Liabilities-to-Assets	-0.312***	-0.0675**	-1.067**	-0.0255***
	(-3.26)	(-2.35)	(-2.54)	(-3.38)
Industry FE	YES	YES	YES	YES
Clustered SE	YES	YES	YES	YES
N	92,081	92,081	92,081	92,081
adj. R^2	0.3815	0.377	0.245	0.149

Table 2.5

We use OLS to examine the impact of individual bonds' restrictive covenants on the daily number and proportion of institutional trades and the daily total and proportional dollar volume of institutional trades, controlling for issuing firms' CG Rank, size, solvency, and leverage. T-statistics reported in parentheses are obtained from standard errors clustered by industry (Bloomberg BICS level 1), ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

	(1)	(2)	(3)	(4)
	Number of Institutional Trades	% Institutional Trades	Institutional Trading Volume	% Institutional Trading Volume
Issuer CG Rank	-0.0343***	-0.00307***	-0.039*	-0.0015***
	(-2.75)	(-3.24)	(-1.87)	(-4.62)
Restrictive Covenants	-0.102***	0.007**	-0.1566**	0.0019*
	(-2.15)	(1.97)	(-2.63)	(1.74)
Credit Rating	-0.195***	0.0113**	-0.0119	0.00521**
	(-6.29)	(2.22)	(-0.28)	(2.00)
Callable	0.361**	-0.0092	1.041***	0.00614
	(4.67)	(-0.32)	(7.98)	(0.87)
Convertible	1.906***	0.198***	3.2584***	0.115***
	(7.22)	(4.34)	(7.09)	(5.57)
Days Since Issuance	-0.002***	-0.0002***	-0.0045***	-0.0001***
	(-11.69)	(-10.67)	(-8.75)	(-7.70)
Retail Number of Trades	0.038*			
	(1.92)			
Retail Trading Volume			4.087***	
			(34.48)	
Issuer Market Capitalization	3.32***	-0.242**	2.972*	-0.0447
	(3.58)	(-2.13)	(2.80)	(-1.26)
Issuer Current Ratio	-0.131	-0.0100	-0.0463	-0.00355
	(-0.63)	(-0.43)	(-0.14)	(-0.42)
Issuer Return on Assets	-1.264*	0.120	-0.452	0.0255
	(-1.90)	(1.01)	(-0.44)	(0.71)
Issuer Cash and ST Investments	1.605***	-0.258***	1.145***	-0.0554*
to Assets Ratio	(3.95)	(-3.09)	(2.59)	(-1.74)
Issuer LTD due Next Year	-2.343	0.282**	-3.008	0.0638*
	(-1.40)	(2.00)	(-1.62)	(1.69)
Stock Repurchase	0.234	-0.0391	-0.0654	-0.0111**
	(0.71)	(-1.40)	(-0.14)	(-2.27)
Dividend Payer	-0.126	-0.000508	0.2407	-0.00789**
	(-0.91)	(-0.03)	(0.73)	(-2.36)
Issuer Debt-to-Assets Ratio	0.678	0.131*	0.9181	0.0527***
	(0.71)	(1.71)	(0.75)	(3.48)
Issuer Liabilities-to-Assets Ratio	0.325	-0.0542*	0.0975	-0.0195**

	(0.71)	(-1.65)	(0.11)	(-2.17)
Industry FE	YES	YES	YES	YES
Clustered SE	YES	YES	YES	YES
N	349,788	349,788	349,788	349,788
adj. R^2	0.206	0.194	0.358	0.053

Table 2.6

We use OLS to examine the impact of firm's CG Rank on the total and average number and dollar volume of trades of bonds of a firm, and the impact of individual bonds' restrictive covenants on the daily number total dollar volume of trades, controlling for issuing firms' CG Rank, size, solvency, and leverage. T-statistics reported in parentheses are obtained from standard errors clustered by industry (Bloomberg BICS level 1), ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Panel A. Daily Firm Observations

	(1)	(2)	(3)	(4)
	Average Number of Trades	Total Number of Trades	Average Trading Volume	Total Trading Volume
CG Rank	0.0562**	0.674***	0.0033	0.140
	(2.00)	(2.87)	(0.29)	(1.45)
Number of Firms' Bonds Traded	0.120*	8.546***	0.0428***	3.434***
	(1.80)	(3.89)	(4.31)	(4.74)
Average Days Since Issuance	-0.0000551	-0.00342	-0.0037***	-0.0167***
	(-0.06)	(-0.77)	(-9.81)	(-6.97)
Credit Rating	-0.633***	-4.552***	-0.066	-0.962**
	(-4.45)	(-3.41)	(-1.42)	(-1.99)
Market Capitalization	12.8*	19.2***	5.185***	81.99***
	(1.86)	(3.83)	(3.77)	(6.83)
Current Ratio	1.005	2.038	0.126	0.021
	(1.21)	(0.76)	(0.52)	(0.01)
Quick Ratio	-1.921	-0.854	-0.213	0.815
	(-1.47)	(-0.18)	(-0.64)	(0.40)
Return on Assets	-5.439	-3.413	0.151	5.706
	(-1.24)	(-0.13)	(0.12)	(0.43)
Cash and ST Investments to Assets Ratio	6.357	-7.631	1.077	-3.038
	(1.16)	(-0.23)	(0.59)	(-0.21)
LTD due Next Year	-10.33**	-26.89	-3.248*	-17.446
	(-2.40)	(-0.75)	(-1.88)	(-1.31)
Stock Repurchase	0.886	10.31*	-0.047	2.124
	(1.23)	(1.68)	(-0.19)	(0.90)
Dividend Payer	0.933	8.762	0.071	4.097
	(1.01)	(1.27)	(0.31)	(1.36)
Debt-to-Assets Ratio	0.126	-4.520	0.599	4.529
	(0.08)	(-0.29)	(1.13)	(0.66)
Liabilities-to-Assets Ratio	0.168	-3.644	-0.664	-5.643
	(0.17)	(-0.37)	(-1.40)	(-0.95)
Industry FE	YES	YES	YES	YES
Clustered SE	YES	YES	YES	YES
N	103,874	103,874	103,874	103,874
adj. R^2	0.095	0.595	0.067	0.4217

Table 2.6 – *continued*

Panel B. Daily Bond Observations		
	(1)	(2)
	Total Number of Trades	Total Trading Volume
Issuer CG Rank	0.00686	-0.02*
	(0.21)	(-1.92)
Restrictive Covenants	-0.387	-0.152**
	(-1.46)	(-2.14)
Yield at Issuance	-0.248	0.521***
	(-0.67)	(16.70)
Credit Rating	-0.764***	0.04
	(-4.75)	(0.84)
Callable	1.527***	0.419**
	(5.43)	(2.53)
Convertible	-2.930***	4.495***
	(-2.60)	(11.17)
Days Since Issuance	0.000335	-0.004***
	(0.66)	(-8.68)
Issuer Market Capitalization	9.63**	3.018***
	(2.07)	(2.74)
Issuer Current Ratio	0.282	0.02
	(0.36)	(0.06)
Issuer Quick Ratio	-0.758	0.092
	(-0.84)	(0.21)
Issuer Return on Assets	-7.432**	-0.687
	(-1.98)	(-0.95)
Issuer Cash and ST Investments to Assets Ratio	7.301***	1.508***
	(2.99)	(3.17)
Issuer LTD due Next Year	-12.19*	-3.861***
	(-1.85)	(-2.60)
Stock Repurchase	1.302	0.259
	(1.53)	(0.74)
Dividend Payer	-0.276	0.255
	(-0.46)	(0.95)
Issuer Debt-to-Assets Ratio	-1.459	1.239
	(-0.74)	(1.17)
Issuer Liabilities-to-Assets	1.845	-0.098
	(0.99)	(-0.13)
Industry FE	YES	YES
Clustered SE	YES	YES
N	478,587	478,587
adj. R^2	0.039	0.063

Table 2.7

We use OLS to examine the impact of firm's CG Rank average yields of its newly issued bonds, and the impact of individual bonds' restrictive covenants on at-issuance yield, controlling for issuing firms' CG Rank, size, solvency, and leverage. T-statistics reported in parentheses are obtained from standard errors clustered by industry (Bloomberg BICS level 1), ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

	(1)		(2)
	Average Yield at Issuance		Yield at Issuance
CG Rank	0.0116	Issuer CG Rank	0.0118
	(0.91)		(1.35)
Average Restrictive Covenants		Restrictive Covenants	0.0178
			(0.67)
Firm Credit Rating	-0.247***	Bond Credit Rating	-0.232***
	(-8.38)		(-7.30)
Average Issue Volume	0.0002**	Issue Volume	0.226***
	(2.19)		(5.89)
Average Offering Price	0.00534***	Offering Price	0.100
	(12.38)		(1.58)
Average Time to Maturity	0.0067**	Time to Maturity	0.0681***
	(2.16)		(12.90)
		Callable	0.393***
			(4.30)
		Convertible	-2.218***
			(-5.53)
Market Capitalization	0.273	Issuer Market Capitalization	0.214
	(0.41)		(0.49)
Current Ratio	0.271*	Issuer Current Ratio	-0.155
	(1.72)		(-0.92)
Quick Ratio	-0.191	Issuer Quick Ratio	0.127
	(-1.45)		(0.71)
Return on Assets	-1.576***	Issuer Return on Assets	-1.327**
	(-3.70)		(-1.97)
Cash and ST Investments to Assets Ratio	-0.00792	Issuer Cash and ST to Assets Ratio	-0.0661
	(-0.01)		(-0.33)
LTD due Next Year	-0.0228	Issuer LTD due Next Year	-0.467
	(-0.04)		(-0.87)
Stock Repurchase	0.173	Stock Repurchase	0.179**
	(1.13)		(2.55)
Dividend Payer	-0.106	Dividend Payer	-0.321**
	(-1.05)		(-2.06)
Debt-to-Assets Ratio	-0.0388	Issuer Debt-to-Assets Ratio	-0.157
	(-0.08)		(-0.54)
Liabilities-to-Assets Ratio	0.586	Issuer Liabilities-to- Assets	0.386

Ratio	(1.22)		Ratio	(1.60)
Industry FE	YES	Industry, Year FE		YES
Clustered SE	YES	Clustered SE		YES
N	1,116	N		3,338
adj. R^2	0.429	adj. R^2		0.655

Table 2.8

We use difference-in-means analysis to examine the impact of firm and bond credit ratings on firm average and individual bonds number of restrictive covenants. T-statistics reported in parentheses are obtained from standard errors clustered by industry (Bloomberg BICS level 1), ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Panel A

	N	Average Restrictive Covenants	N	Restrictive Covenants
BBB	512	8.21	1,171	6.97
All Other Ratings	604	7.44	2,717	6.12
Difference-in-Means	1,116	0.77***	3,888	0.85***
		(4.5)		(17.5)
Standard Deviation		2.31		1.76

Panel B

	N	Average Restrictive Covenants	N	Restrictive Covenants
BBB-	106	8.58	1,689	7.71
All Other Ratings	1,010	7.71	3,719	6.32
Difference-in-Means	1,116	0.87***	3,888	1.39***
		(2.78)		(12.7)
Standard Deviation		2.33		1.78

Table 2.9

We use OLS to examine the impact of firm's CG Rank on its average bond credit rating, as well as the impact of individual bonds' restrictive covenants on their credit ratings, controlling for issuing firms' CG Rank, size, solvency, and leverage. T-statistics reported in parentheses are obtained from standard errors clustered by industry (Bloomberg BICS level 1), ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

	(1)	(2)
	Average Credit Rating	Bond Credit Rating
CG Rank	0.0197	0.0084
	(1.44)	(0.48)
Restrictive Covenants		-0.245***
		(-5.61)
Average Issue Volume	-0.99	0.993
	(-1.35)	(0.06)
Average Time to Maturity	0.002	0.016***
	(0.61)	(3.22)
Offering Price		-0.310***
		(-3.37)
Callable		-0.368***
		(-3.39)
Convertible		-2.041***
		(-3.1)
Market Capitalization	1.478***	0.812***
	(4.44)	(5.93)
Current Ratio	-0.519	-0.537
	(-1.0)	(-0.88)
Return on Assets	6.508***	5.815***
	(2.60)	(3.50)
Cash and ST Investments	1.507	3.068*
to Assets Ratio	(1.49)	(1.89)
LTD due Next Year	3.434***	4.346*
	(2.81)	(3.09)
Stock Repurchase	0.818***	1.119***
	(2.79)	(4.49)
Dividend Payer	0.953***	1.175***
	(4.62)	(4.54)
Debt-to-Assets Ratio	-5.464***	-3.205***
	(-5.39)	(-3.76)
Liabilities-to-Assets Ratio	1.397	0.312
	(1.30)	(0.42)
Industry FE	YES	YES
Clustered SE	YES	YES
N	1,116	3,888
adj. R^2	0.693	0.633

Table 2.10

We use probit to examine the impact of issuing firm's CG Rank and bond's restrictive covenants on likelihood of bonds being rated in median BBB broad category (including BBB+, BBB, and BBB- subcategories), marginal investment grade BBB- category, and likelihood of being placed on credit watch during the sample period, controlling for issuing firms' CG Rank, size, solvency, and leverage. T-statistics reported in parentheses are obtained from standard errors clustered by industry (Bloomberg BICS level 1), ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

	(1)	(2)	(3)
	BBB	BBB-	Credit Watch
Issuer CG Rank	0.0246**	-0.0061	0.0575***
	(2.02)	(0.13)	(3.24)
Restrictive Covenants	0.0686**	0.1404***	-0.0823***
	(2.29)	(-8.94)	(-2.76)
Issue Volume	-7.94	-3.04	16.7
	(-0.44)	(-0.18)	(1.24)
Time to Maturity	0.0013**	0.0014**	-0.00472
	(2.46)	(2.18)	(-0.59)
Offering Price	-0.00258**	-0.0019**	-0.0008
	(-2.37)	(-2.05)	(-0.11)
Callable	-1.1598***	-0.0427	-0.0663
	(-3.24)	(-0.32)	(-0.41)
Issuer Market Capitalization	-9.40***	-2.42**	-2.36***
	(-3.65)	(-2.69)	(-3.08)
Issuer Current Ratio	-0.319	-0.273	-0.172
	(-0.65)	(-0.58)	(-0.69)
Issuer Quick Ratio	0.415	0.193	-0.537
	(0.77)	(0.34)	(-1.70)
Issuer Return on Assets	1.236	-3.192*	2.043
	(0.54)	(-1.78)	(1.23)
Issuer Cash and ST	-1.170**	0.0405	-0.588
to Assets Ratio	(-2.67)	(0.02)	(-0.49)
Issuer LTD due Next Year	0.553	-2.417**	-2.813**
	(0.41)	(-2.55)	(-2.25)
Stock Repurchase	-0.772***	0.122	0.0511
	(-3.57)	(0.41)	(0.28)
Dividend Payer	0.202	-0.307*	-0.466**
	(0.46)	(-1.84)	(-2.32)
Issuer Debt-to-Assets Ratio	-0.363	2.961**	0.930
	(-0.41)	(2.09)	(1.33)
Issuer Liabilities-to-Assets	-0.0716	-2.808**	-2.409***
Ratio	(-0.09)	(-2.14)	(-3.40)
N	3,888	3,888	3,888
Pseudo R^2	0.259	0.268	0.169

PART 3

BOND MARKET REACTION TO CREDIT RATINGS CHANGES, CREDIT WATCH IN POST- FINANCIAL CRISIS, POST CRA REGULATORY OVERHAUL

INTRODUCTION

We investigate bond market reactions in response to credit ratings changes in post-crisis and post- Dodd-Frank environment. The onset of the 2008 financial crisis, commonly time-stamped as September, 2008[24] creates the cutoff for our pre-crisis sample period. While the official end date of the 2008 financial crisis is not quite as clear, because the "Great Recession" immediately followed and continued into 2012, we set the end of calendar year 2008 as our crisis cutoff date. The regulatory change, which we use to split our sample into pre- and post- regulatory environment change in CRA industry, is the Dodd-Frank Wall Street Reform and Consumer Protection Act (further referred to as Dodd-Frank or DF), effective July 21, 2010. We collect an additional data sample after recession end to verify the robustness of our results.[25]The recession period includes our post-crisis, pre- regulatory change, and post- regulatory change samples.

Credit ratings are important to firms, investors and regulatory agencies as ratings provide

[24] The 2008 financial crisis was precipitated by rising residential mortgage delinquency rates starting in August 2006, "housing bubble" burst, followed by Subprime Mortgage Crisis, with delinquency rate remaining on the rise throughout the 2008 financial crisis, peaking in the first quarter of 2010, but extending past 2008-2012 "Great Recession". Further information is available from Board of Governors of the Federal Reserve System at https://fred.stlouisfed.org/series/DRSFRMACBS

[25] Please, refer to Figure 1 for a visual representation of the sample timeline

certification for borrowers and "coordinate" investors' beliefs. In recent years, the failure of the CRAs to adequately evaluate risk in the wake of the subprime mortgage crisis has emphasized the paramount importance of credit ratings to the economy and has led to increased regulatory oversight. For example, the 2010 Dodd-Frank Act requires the Securities and Exchange Commission (SEC) to issue an annual examination report on credit agencies.[26] The recent 2016 examination report demonstrates increased compliance as nationally recognized statistical rating organizations (NRSROs) respond to the comprehensive credit rating reforms adopted by the SEC.[27] The SEC report concludes that credit ratings in the post-crisis era are more accurate.

Contrary to SEC findings, research suggests that CRAs effectiveness has, in fact, declined post-crisis. For example, using the entry of Fitch Ratings in the CRA market as a structural break, Becker and Milbourn (2011) discover that upon entrance of Fitch into the CRA industry, S&P and Moody's provide lower quality ratings, and that the ability of ratings to predict default has deteriorated. They conclude that the reputational mechanism underlying the provision of quality ratings is impaired.[28] Baghai, Servaes, and Tamayo (2014) find that CRAs became more conservative from 1985 to 2009. This increased ratings conservatism caused firms to issue less debt, reduce leverage, and hold more cash, which results in lower growth. Additional empirical evidence indicates that CRAs became even more protective of their reputation following the passage of Dodd-Frank.

Dimitrov, Palia, and Tang (2015) find that following the passage of the Dodd-Frank Act, CRAs issue lower ratings, give more false warnings, and issue less informative downgrades. Given

[26] There exists an additional SEC annual report mandated by the 2006 Credit Rating Agency Reform Act.
[27] "…NRSROs are redoubling their focus on policy and procedure adherence to achieve enhanced transparency, quality, and integrity,"– Thomas J. Butler, Director of the SEC's Office of Credit Ratings.
[28] Future economic rents motivate current (unobserved) quality of ratings. If increasing competition from Fitch reduced expected future rents for the incumbents, the incentives for quality provision were consequently reduced.

this structural break in CRA activity that came with increased regulatory oversight in the post financial crisis. The reexamination of traditional conclusions about rating changes is warranted. As credit downgrades during a meltdown are anticipated, and CRAs conservatism increases, it is reasonable to assume that downgrades in the bond markets are no longer informative.

Regulatory environment change acts as an additional natural experiment to measure differences in market reactions to credit changes, because during the 2008 financial crisis, in a noisy informational environment, individual downgrade announcements may be less informative due to the overall financial system instability. With increased CRAs transparency under regulatory oversight, and increased rating conservatism documented in the literature, more downgrades should be anticipated by the market and therefore considered less informative. This provides motivation for reexamining bond market reactions to changes in credit ratings in a post- regulatory change environment. We argue that changes in CRA industry result in muted bond market reactions to credit downgrades.

On the other hand, prior research provides additional evidence of CRA ratings relevance in the crisis environment. Shivakumar, Urcan, Vasvari, and Zhang (2011) document that the relevance of managerial forecasts to credit markets is particularly strong during periods of high uncertainty, especially for firms with poor credit ratings or those announcing bad news. This suggest that institutional investors condition their investment decisions on the ratings more so during the financial crisis. Driss, Massoud, and Roberts (2016) also show that credit agencies and ratings remain relevant post crisis by providing certification for corporate borrowers through the credit watch procedure. Firms with confirmed ratings invest more capital and experience an increase in long-term debt financing. While we postulate that credit downgrades and credit watches become less informative, these results can lead to rejection hypotheses put forth in this analysis.

The purpose of this paper is twofold. First, we investigate if investors react less intensively to downward credit updates post-crisis due to lesser informativeness of ratings or due to anticipated future credit upgrades, and if market reactions to credit watches are muted after the 2008 financial crisis. We also investigate if increased conservatism due to regulatory oversight in CRAs results in lesser informativeness of ratings for bond market investors, causing lighter reactions to credit downgrades and credit watch indications after the 2010 Dodd-Frank Act. As downgrades during credit meltdowns are anticipated, and CRAs conservatism increases during credit meltdowns, it is reasonable to assume insignificant bond market reactions to downgrades and credit watches during and after a crisis.

Hypotheses development

Traditionally, CRAs are considered sophisticated processers of information and their ratings deliver valuable information to the market. Hand, Holthausen, and Leftwich (1992) study the price impact of firms being added to S&P's "Credit Watch List" and document virtually no bond or stock price impact to downgrades or upgrades preceded by a credit watch, showing that changes in credit quality are anticipated by the market. However, when they further partition the credit watch additions into "expected" or "unexpected", both bond and stock prices react negatively to an indicated downgrade in the "unexpected" subsample.

Goh and Ederington (1993) also argue that a negative reaction should not be expected for all downgrades, as some are related to equity value increasing announcements (such as additional debt issuance). They examine the reaction of common stock returns to bond rating changes and

find that only downgrades conveying new information about deteriorating financial prospects evoke negative price reaction. Additionally, Dichev and Piotroski (2001) find negative abnormal returns in the year following downgrades. These negative returns are further exacerbated at subsequent earnings announcements, which confirm negative information conveyed by the initial downgrade. Hence, unexpected credit downgrades or those conveying new negative information to the markets tend to bring significant price reactions.

Interestingly, Dimitrov, Palia, and Tang (2015) show that, after the passage of the Dodd-Frank Act, CRAs give more false warnings, issue downgrades that are less informative, and give lower ratings overall. They attribute these changes to the fact that only excessive optimism is penalized, due to the important role that highly rated investment grade securities play in insurance and banking industries. They conclude that the Dodd-Frank Act does not discipline CRAs to provide more accurate and informative credit ratings. As downgrades during the credit meltdown are anticipated, and CRAs conservatism increases, it is reasonable to assume insignificant price reactions to downgrades in the bond markets during and after a crisis.

Hypothesis 1: If post-crisis credit downgrades are either less informative and/or expected, less intensive market reaction to downgrades will be observed in the bond market compared to pre-crisis period.

Hypothesis 1a: If post- regulatory changes credit downgrades are either less informative and/or expected, less intensive market reaction to downgrades will be observed in the bond market compared to pre-regulatory changes period.

The credit watch procedure may ease the conflict between rating stability and timely accuracy required from CRAs, allowing CRAs to postpone actual rating decision, while still

providing cautionary information to investors. When changes in rating are triggered, agencies adjust their ratings only partially, due to serial dependency of agency-rating migrations, potentially explaining historically observed rating conservatism.

Boot, Milbourn, and Schmeits (2006) provide a rationale for credit ratings as a "focal point" for firms and their investors by providing a coordinating mechanism for investors' beliefs. Credit ratings play an economically meaningful role due to their monitoring function (credit watch procedure) and their information certification role in delivering accurate and timely information for institutional investors' decisions. Boot, Milbourn, and Schmeits's model provides several empirical predictions regarding expected price impacts of rating changes. They postulate a firm put on credit watch should experience a large negative price change if the credit watch results in a downgrade, but only a moderate negative change, followed by a moderate positive change, if the credit watch is resolved in successful recovery.

Bannier and Hirsch (2010) empirically extend some of the implications of Boot, Milbourn, and Schmeits (2006). They find that CRAs and lower rated firms develop an "implicit contract" forcing such firms to refrain from increasing their riskiness. Intensive monitoring and threat of downgrade throughout the watch procedure allow CRAs to influence low-rated firms' risk choices. On the other hand, companies with high creditworthiness enjoy improved delivery of information through credit watch procedures. Watch listing is a CRAs' response to investors' need for accurate and stable rating information, which fulfils the CRA's information-certification role. Overall, after the review procedure was introduced by Moody's in 1991, direct rating downgrades lead to stronger market reactions than in prior periods. Since Bannier and Hirsch's sample ends in 2004 there is no test of how the financial crisis impacted the efficiency of CRAs' downgrade watch.

Hypothesis 2: If the credit watch procedure is less informative post-crisis, firms placed on a credit watch list will experience less intensive market reaction to the credit watch initiation and subsequent credit rating downgrades.

Hypothesis 2a: If the credit watch procedure is less informative post- regulatory changes, firms placed on a credit watch list will experience less intensive market reaction to a credit watch initiation and subsequent credit rating downgrades.

Data and Methodology

In this paper, we use bond trading data from TRACE (Trade Reporting and Compliance Engine) distributed by the Financial Industry Regulatory Authority. We exclude all non-corporate debt, debt of any foreign financial entities, as well as any debt in TRACE on which Bloomberg does not collect data. We also exclude rule 144A issuances from the analysis, as they have been previously shown to be different from issuances to the open market[29].

Credit ratings and credit watch data is hand-collected from Bloomberg, along with associated event dates. We collect about 160 credit change events, as well as 46 credit watch placements of S&P500 firms. We then encode the credit rating events to be represented by dummy variables depending on type of the credit event, for 30 days following the announcement.

[29] Livingston and Zhou (2002); Zhu and Cai (2014)

Firm level quarterly accounting data is collected from Compustat to control for individual size, leverage, profitability, liquidity and solvency, which influence both firm-related credit rating events and bond market activity.

The data spans January 2007 to July 2016 (we omit the period of July, 2011 to January 2015), in an attempt to access the dynamic change in bond market investors' reactions to credit ratings events[30]. The onset of the 2008 financial crisis is commonly time-stamped September, 2008. (federal government takeover of Freddie Mac and Fannie Mae, followed a week later by Lehman Brothers bankruptcy filings),[31] creates the cutoff for our Pre-Crisis sample period. While the official end date of the 2008 financial crisis is not quite as clear cut, because of the "Great Recession" that immediately followed and continued into 2012, we accept the end of calendar year 2008 as crisis cutoff date. The recession period includes our Post-Crisis, Pre- Dodd-Frank, and Post- Dodd-Frank subsamples.

The main regulatory change, which we use to split our sample into pre- and post- regulatory environment change in CRA industry, is the Dodd-Frank Wall Street Reform and Consumer Protection Act, effective July 21, 2010. We collect additional data after the end of the recession for a robustness analysis on an additional post-crisis, post- regulatory change sample of bond trades and issuances in 2015 and first two quarters of 2016 to create event 6 quarter time intervals for all our sample periods except "Crisis".

Table 3.1 presents descriptive statistics on average bond trading activity, bond yields and

[30] Please, refer to Figure 1 for a visual representation of the sample timeline

[31] The 2008 financial crisis was precipitated by the rising residential mortgages delinquency rate starting in August 2006, "housing bubble" burst, followed by Subprime Mortgage Crisis, with delinquency rate remaining on the rise throughout the 2008 financial crisis, peaking in the first quarter of 2010, but extending past 2008-2012 "Great Recession". Further information is available from Board of Governors of the Federal Reserve System at https://fred.stlouisfed.org/series/DRSFRMACBS

bond prices for firms in the sample and during Pre-Crisis, Crisis, Post-Crisis and Pre- Dodd-Frank, Post-Crisis and Post- Dodd-Frank, as well as Robustness sub-samples. *Total Daily Volume* is at the lowest in the earliest and latest parts of the sample, 57.49 million in Pre-Crisis and 62.06 million in the Robustness subsample, while *Average Daily Volume* (averaged across all bonds of the firm before calculating the mean) and *Average Daily Volume Per Bond* (averaged across individual bonds of the firm before calculating the mean) has remained fairly stable over time at about 2.5 million and approximately 0.4 million respectively. All trading activity variables peak in Post-Crisis and Pre-Dodd-Frank subsamples, which correspond to the period between January 2009 and July 2010 following the American Recovery and Reinvestment Act of February 17, 2009.

Next, conduct a univariate difference-in-means analysis, multivariate fixed and random effects regressions, and marginal effects regressions using standard methodology.

Results

Preliminary results are available in table 3.2, which present univariate differences-in-means of bond trading activity between subsamples. We calculate means of average bond trading activity variables, bond yields and bond prices across the firms in the sample and compare each against the full sample. The results of our comparison indicate that each subsample is systematically different from the rest. Panel A shows the comparison of the Pre-Crisis period to the rest of the sample. It confirms the observation from table 3.1 with a high degree of statistical significance, *Total Daily Volume* is lower by 7.84 million in the pre-crisis part of the sample. The majority of the trading activity variables are lower in the Pre-Crisis subsample, which is

representative of a strong time trend in the bond trading activity data.

Panel B describes the crisis sample, and consequently provides the biggest difference in *Average Credit Rating* over all samples recorded of two full levels down from an average BBB to just above BB+ cutoff. Results in panels C, D, and E cover Post-Crisis & Pre- Regulatory Change, Post-Crisis & Post- Regulatory Change, Robustness subsamples respectively, and continue to support the univariate results in table 3.1. The *Total Number of Trades* peaks in the crisis and immediately following and then decline, however the effects of this trading activity are unequal between the two subsamples. In panel B (Crisis) the trades take place at a lower *Average Price % Par* the rest of the sample (13.51% of par less), indicating capital losses for investors if they sell their bond holdings during the credit meltdown. In panel C, during Post-Crisis & Pre- Regulatory Change time period, which includes *inter alia* the American Recovery and Reinvestment Act and the large stimulus package associated with it, the losses decline (*Average Price % Par* lower by 3.08) and turn into gains in Post Dodd-Frank era in panel D (*Average Price % Par* higher than the rest of the sample by 3.31).

Panel A of table 3.3 presents the general results on changes in trading activity of bond investors, and trade yields and bond prices of firms affected by the credit rating events, and is presented as the following regression:

$$DepVariable_{i,t} = \beta_1 Downgrade_{i,t} + \beta_2 Upgrade_{i,t} + \beta_3 Firm - Level\ Controls_{i,t} + \beta_4 Sub\ Period_n + \beta_5 Firm_i + \varepsilon_{i,t}$$

In Panel A, variable of interest *Credit Downgrade* is positive in specifications (1), (2), and (4) indicating increases in *Total Daily Volume*, *Average Daily Volume*, and *Total Number of Trades* in the 30 days following the downgrade. *Credit Downgrade* is negative in specification (8),

additionally signifying that investors accrue capital losses of about 1.601% of par (or $16.01 dollars per bond for a normal $1,000 par security) due to increasing credit risk, and potential for new debt offerings from the firm with higher at-issuance yields. While *Credit Upgrade* is not a variable of interest in our analysis, upgrades do not produce significant price reactions, but generally increase trading activity (specifications (1), (2), (3) and (4)).

Panel B of table 3.3 presents additional regression results on changes in the trading activity level of bond investors in response to the credit rating events conditional on a preceding credit watch, and is presented as the following regression:

$$DepVariable_{i,t} = \beta_1 Downgrade_{i,t} + \beta_2 Downgrade_{i,t}|Preeceding\ Credit\ Watch + \beta_3 Upgrade_{i,t} + \beta_4 Upgrade_{i,t}|Preeceding\ Credit\ Watch + \beta_5 Firm - Level\ Controls_{i,t} + \beta_6 Sub\ Period_n + \beta_7 Firm_i + \varepsilon_{i,t}$$

In Panel B, the interaction term *Credit Downgrade after CW* remains insignificant across all specifications, indicating that the downgrade following the credit watch is less unexpected, as Hand, Holthausen, and Leftwich (1992) show.

The level of significance on the variable of interest *Credit Downgrade* declines across all specifications in presence of the interaction term, as compared to non-conditional results in panel A, while the magnitude of the coefficient increases across all specifications with statistically significant *Credit Downgrade* coefficients ((1), (2), and (4)). These results indicate that while the downgrade following the credit watch is less unexpected, the additional attention concentrated on the firm under the watch causes greater investor trading activity.

Coefficients on sample sub period indicators *Pre-Crisis* and *Crisis* reaffirm the univariate difference-in-means results in table 3.2 that the trading activity is lower at the earlier part of the

sample. No additional inferences refuting or supporting hypotheses 1a and 1b can be made without further analysis.

Table 3.4 presents the main results of testing hypothesis 1 using the following marginal effects regression:

$$DepVariable_{i,t} = \beta_1 Downgrade_{i,t} + \beta_2 Downgrade_{i,t} | Sub\ Period_n + \beta_3 Upgrade_{i,t} + \beta_4 Upgrade_{i,t} | Sub\ Period_n + \beta_5 Firm - Level\ Controls_{i,t} + \beta_6 Sub\ Period_n + \beta_7 Firm_i + \varepsilon_{i,t}$$

While not all marginal effects were tested due to the lack of nonzero conditional observations *Downgrade in Crisis* and *Downgrade Post-Crisis & Post DF* are negative in specifications (1) and (2), and *Downgrade in Crisis* is negative in specifications (3), (4), and (5), indicating significant declines in trading activity on credit downgrades in those periods. These results provide some evidence to refute hypotheses 1a and 1b, as downgrades in post-crisis and post Dodd-Frank environment produce large reductions in daily trading volume ($32.96 million in total (1), or $2.989 million on average (2)) as compared to the robustness sub period. We fail to directly test hypothesis 1a due to the lack of nonzero conditional observations in Post-Crisis & Pre Dodd-Frank sub period sample, however the coefficient on *No Change Rating Update Post-Crisis & Pre-DF* (rating updates without changes are usually due to a completion of credit watch without a rating change or due to reaffirming of a stale rating) is significant in specifications (2). (3), (4), (5), and (8), reaffirming the inconclusive results of testing hypothesis 1a. Coefficients on *Upgrade Post-Crisis & Post DF* and *No Change Rating Update Post-Crisis & Post-DF* are not significant in all 9 regression specifications providing additional support to hypothesis 1b.

Table 3.5 presents the general results on changes in trading activity of bond investors, and

trade yields and bond prices of the affected firms in response to a credit watch initiation, and is presented as the following regression:

$$DepVariable_{i,t} = \beta_1 Downgrade\ CW_{i,t} + \beta_2 CW_{i,t}|Resulting\ in\ Downgrade + \beta_3 Upgrade_{i,t} + \beta_4 CW_{i,t}|Resulting\ in\ Upgrade + \beta_5 Firm - Level\ Controls_{i,t} + \beta_6 Sub\ Period_n + \beta_7 Firm_i + \varepsilon_{i,t}$$

In table 3.5, coefficients on main variables of interest *Downgrade CW* and *CW Resulting in Downgrade* are not significantly different from zero in any specification. On the other hand, the successful resolution of the watch is important to the bond markets. Coefficients on *Upgrade CW* are positive in specifications (2) and (3), indicating an *Average Daily Volume* increase of about $0.423 million following credit watch for upgrade initiation, and *Average Daily Volume per Bond* increase of about $0.103 million. *Upgrade CW* is negative and significant in specifications (6) and (7) (*Average Yield* and *Average Bond Trade Yield* respective dependent variables) indicating reduction in future at-issuance coupons for the firm due to credit risk reduction, and the associated price drop. *CW Resulting in Upgrade* is negative in specifications (3) and (8) indicating a decline in *Average Daily Volume Per Bond* at credit watch announcement in anticipation of its resolution. *Average Bond Trade Yield* coefficient on *CW Resulting in Upgrade* is, similar to *Upgrade CW,* negative.

Coefficients on sample sub period indicators *Pre-Crisis* and *Crisis* are in line with those reported in table 3.3, indicating that the trading activity is lower at the earlier part of the sample.

Table 3.6 presents the main results of testing hypothesis 2 using the following marginal effects regression:

$$DepVariable_{i,t} = \beta_1 Downgrade\ CW_{i,t} + \beta_2 Downgrade\ CW_{i,t}|Sub\ Period_n + \beta_3 Upgrade\ CW_{i,t} + \beta_4 Upgrade\ CW_{i,t}|Sub\ Period_n + \beta_5 Firm - Level\ Controls_{i,t} + \beta_6 Sub\ Period_n + \beta_7 Firm_i + \varepsilon_{i,t}$$

In table 3.6 the interaction terms on credit watch and sub period sample indicators serve as variables of interest. *Downgrade CW Pre-Crisis* and *Downgrade CW in Crisis* both negatively influence *Average Daily Volume* (2) by $1.417 million and $2.217 million respectively. *Downgrade CW Post-Crisis & Post DF* is negative, though marginally significant in specification (2) as well. All in all, *Average Daily Volume* declines on the downgrade credit watch announcement, but the importance of the relation declines in later sub period samples. *Downgrade CW in Crisis* coefficient is also significant specifications (4), (5), and (8), indicating declines in trading activity, however no other sub period sample interaction variables are providing support hypothesis 2. *Total Number of Trades* (4) in all bonds of a firm put on downgrade credit watch declines by about 60 trades daily. Later in the sample the same relation does not hold. The coefficient on *Downgrade CW Post-Crisis & Post* DF is not significant at conventional levels, providing support for both hypotheses 2a and 2b. *Average Number of Trades* (5) in an average bond of a firm put on downgrade credit watch declines by about 6 trades daily in the 30 days following the event in *Crisis* sub period sample. The coefficient on *Downgrade CW Post-Crisis & Post* DF is yet again not significant, providing support for both hypotheses 2a and 2b of the decline in importance of credit watch procedures in post-crisis and post-regulatory change environment.

Conclusion

Using the financial crisis and the subsequent tightening of regulatory oversight over Credit Rating Agency (CRA) industry, we investigate the changing influence of credit ratings updates and credit watch procedure on market reactions to credit downgrades pre- and post- the 2008 financial crisis, and the July, 2010 Dodd-Frank Wall Street Reform and Consumer Protection Act.

The results of analysis provide evidence to refute hypothesis 1a and 1b postulating lack of informativeness of credit downgrades in post-crisis and post Dodd-Frank environment respectively, as the downgrade events produce large reduction in daily trading volume ($32.96 million in total trade volume, and $2.989 million on average) as compared to the robustness subsample. Additionally, post Dodd-Frank, reaction to credit upgrades and rating updates resulting in no changes (e.g. successful downgrade credit watch resolution, i.e. avoiding downgrade) are insignificant across all 9 regression specifications providing additional support to hypothesis 1b.

We test hypothesis 1a, postulating lack of informativeness of credit downgrades, only on post-crisis post Dodd-Frank sub period sample, and not on post-crisis but pre Dodd-Frank, due to the lack of conditional observations in an isolated post-crisis and Pre Dodd-Frank sub period sample, however the effect of rating updates without changes in that period is significant across five different specifications testing for trading activity, producing the inconclusive results of testing hypothesis 1a.

Both hypotheses 2a and 2b postulating the decline in importance of credit watch procedures in post-crisis and post-regulatory change environment find support in analysis results. Only the early sub period sample interaction variables have significant coefficients indicating the effect on

trading activity at an earlier parts of the sample. There exists, earlier on, a relation between credit watch procedure initiation and market activity, as it declines on the downgrade credit watch announcement, but the importance of the relation declines in later sub period samples.

Overall results suggest that market reactions to credit ratings downgrades and downgrade credit watch initiation become less pronounced in later sub period samples in post-crisis and especially post Dodd-Frank environment. This dull reaction of bond markets can condition firms for and in part explain the higher level of debt issuance observed post crisis, corresponding to our Post-Crisis & Post Dodd-Frank sub period sample.

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Table 3.1
Sample statistics for bond trading activity for firms in the sample

The table presents average bond trading activity, bond yields and bond prices for firms in the sample, as well as firm characteristics. Presented are means, standard deviation in parentheses.

Panel A. Trading Activity

	(1) Full Sample	(2) Pre-Crisis	(3) Crisis	(4) Post-Crisis & Pre Dodd-Frank	(5) Post-Crisis & Post Dodd-Frank	(6) Robustness
Total Daily Volume	64.85	57.49	67.96	81.02	69.26	62.06
	(123.5)	(96.81)	(141.8)	(148.6)	(132.5)	(118.5)
Average Daily Volume	2.54	2.60	2.43	2.93	2.70	2.45
	(4.240)	(3.431)	(3.284)	(4.138)	(6.778)	(3.748)
Average Daily Volume Per Bond	0.38	0.49	0.34	0.37	0.34	0.38
	(0.457)	(0.626)	(0.463)	(0.455)	(0.433)	(0.442)
Total Number of Trades	242.60	191.77	315.33	368.82	292.78	215.21
	(476.7)	(316.6)	(626.8)	(719.8)	(557.4)	(408.2)
Average Number of Trades	8.44	6.52	9.64	11.51	9.51	7.89
	(11.29)	(6.559)	(9.950)	(13.86)	(14.23)	(10.52)
Average Yield	3.05	-2.43	10.63	5.83	2.82	2.80
	(178.7)	(707.6)	(74.75)	(6.299)	(17.95)	(10.84)
Average Bond Trade Yield	-0.09	-0.23	-0.25	-0.10	-0.01	-0.08
	(7.047)	(8.358)	(1.474)	(1.659)	(9.835)	(6.993)
Average Price, % of Par	104.61	99.60	91.53	101.86	107.52	105.59
	(8.488)	(6.452)	(13.51)	(11.85)	(7.002)	(7.008)
Average Period Return, %	-7.75	-2.15	-1.70	-1.30	-0.97	-13.64
	(20.60)	(7.597)	(5.870)	(4.657)	(3.849)	(26.81)
N	84,403	5,167	2,676	8,966	10,078	57,266

Table 3.1 – *continued*

Panel B. Firm Characteristics

	(1) Full Sample	(2) Pre-Crisis	(3) Crisis	(4) Post-Crisis Pre Dodd-Frank	(5) Post-Crisis Post Dodd-Frank	(6) Robustness
Market Capitalization, $ millions	81,998.44 (124941.6)	87,126.78 (123085.6)	59,060.41 (92911.0)	56,833.46 (77633.3)	62,334.05 (84953.4)	90,573.65 (137516.3)
Current Ratio	1.71 (1.391)	1.35 (0.584)	1.41 (0.682)	1.64 (0.937)	1.79 (1.241)	1.75 (1.536)
Quick Ratio	1.36 (1.418)	0.95 (0.399)	1.00 (0.450)	1.28 (0.865)	1.45 (1.223)	1.42 (1.590)
Return on Assets	0.01 (0.0170)	0.01 (0.0138)	0.01 (0.0206)	0.01 (0.0140)	0.02 (0.0160)	0.01 (0.0177)
Liabilities-to-Assets Ratio	0.68 (0.178)	0.70 (0.166)	0.70 (0.169)	0.68 (0.174)	0.65 (0.175)	0.68 (0.180)
Cash and STIs to Assets Ratio	0.14 (0.143)	0.08 (0.0795)	0.09 (0.0816)	0.13 (0.126)	0.15 (0.144)	0.15 (0.150)
M&A Indicator	0.58 (0.493)	0.57 (0.496)	0.64 (0.480)	0.56 (0.497)	0.61 (0.489)	0.58 (0.494)
Net Change in LTD	895.34 (8389.9)	5515.22 (12990.5)	6010.15 (14862.3)	-765.48 (5191.6)	-2308.68 (7734.0)	1070.18 (7538.5)
Dividend Indicator	0.86 (0.352)	0.81 (0.394)	0.82 (0.382)	0.76 (0.428)	0.76 (0.427)	0.90 (0.306)
LTD Issuance Indicator	0.75 (0.433)	0.81 (0.390)	0.90 (0.306)	0.78 (0.416)	0.75 (0.432)	0.73 (0.443)
LTD due Next Year (% total LTD)	0.02 (0.0398)	0.00 (0.0242)	0.00 (0.0134)	0.00 (0.0157)	0.01 (0.0292)	0.03 (0.0446)
Credit Rating	18.65 (3.500)	19.51 (3.825)	16.81 (4.360)	17.10 (6.376)	17.63 (2.759)	19.32 (2.512)
N	80,459	5,212	2,693	9,020	9,970	53,564

Table 3.2
Difference-in-means of bond trading activity for firms in the sample

The table presents the difference-in-means of average bond trading activity, bond yields and bond prices for firms in the sample compared pairwise against the full sample. Presented are means, t-statistic for difference in means is in parentheses. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Panel A. Pre-Crisis

	(1) Full sample mean	(2) All Other Periods mean	(3) Pre-Crisis mean	(4) Difference in means (2)-(3)	t-stat
Total Daily Volume	64.85	65.33	57.49	7.84***	(4.42)
Average Daily Volume	2.54	2.53	2.60	-0.07	(-1.11)
Average Daily Volume Per Bond	0.38	0.37	0.49	-0.12***	(-17.94)
Total Number of Trades	242.60	245.93	191.77	54.16***	(7.91)
Average Number of Trades	8.44	8.56	6.52	2.04***	(12.60)
Average Yield	3.05	3.42	-2.43	5.85**	(2.27)
Average Bond Trade Yield	-0.09	-0.08	-0.23	0.15	(1.41)
Average Price, % of Par	104.61	104.94	99.60	5.33***	(44.25)
Average Period Return, %	-7.75	-8.32	-2.15	-6.17***	(-20.59)
Average Credit Rating	>BBB+	>BBB	>BBB+	-0.93***	(-5.20)
N	84,403	78,986	5,167	84,153	

Panel B. Crisis

	(1) Full sample mean	(2) All Other Periods mean	(3) Crisis mean	(4) Difference in means (2)-(3)	t-stat
Total Daily Volume	64.85	64.75	67.96	-3.21	-1.32
Average Daily Volume	2.54	2.54	2.43	0.11	1.29
Average Daily Volume Per Bond	0.38	0.38	0.34	0.04***	4.06
Total Number of Trades	242.60	240.22	315.33	-75.11***	-8.02
Average Number of Trades	8.44	8.40	9.64	-1.24***	-5.59
Average Yield	3.05	2.79	10.63	-7.83**	-2.22
Average Bond Trade Yield	-0.09	-0.09	-0.25	0.16	1.17
Average Price, % of Par	104.61	105.04	91.53	13.51***	84.30
Average Period Return, %	-7.75	-8.06	-1.70	-6.36***	-15.60
Average Credit Rating	>BBB+	>BBB	>BB+	2.00***	11.97
N	84,403	81,477	2,676	84,153	

Table 3.2 – *continued*

Panel C. Post-Crisis & Pre-Regulatory Change

	(1) Full sample	(2) All Other Periods	(3) Post-Crisis & Pre Dodd-Frank	(4) Difference in means	
	mean	mean	mean	(2)-(3)	t-stat
Total Daily Volume	64.85	62.92	81.02	-18.10***	-13.12
Average Daily Volume	2.54	2.49	2.93	-0.44***	-9.27
Average Daily Volume Per	0.38	0.38	0.37	0.01**	2.88
Total Number of Trades	242.60	227.55	368.82	-141.27***	-26.63
Average Number of Trades	8.44	8.07	11.51	-3.43***	-27.34
Average Yield	3.05	2.72	5.83	-3.11	-1.53
Average Bond Trade Yield	-0.09	-0.09	-0.10	0.01	0.06
Average Price, % of Par	104.61	104.94	101.86	3.08***	32.69
Average Period Return, %	-7.75	-8.98	-1.30	-7.68***	-32.65
Average Credit Rating	>BBB+	>BBB+	>BBB-	1.71***	10.85
N	84,403	75,187	89,66	84,153	

Panel D. Post-Crisis & Post-Regulatory Change

	(1) Full sample	(2) All Other Periods	(3) Post-crisis & Post Dodd-Frank	(4) Difference in means	
	mean	mean	mean	(2)-(3)	t-stat
Total Daily Volume	64.85	64.25	69.26	-5.01***	-3.82
Average Daily Volume	2.54	2.52	2.70	-0.18***	-4.02
Average Daily Volume Per	0.38	0.38	0.34	0.04***	8.49
Total Number of Trades	242.60	235.78	292.78	-57.00***	-11.27
Average Number of Trades	8.44	8.29	9.51	-1.21***	-10.11
Average Yield	3.05	3.08	2.82	0.26	0.13
Average Bond Trade Yield	-0.09	-0.11	-0.01	-0.11	-1.36
Average Price, % of Par	104.61	104.21	107.52	-3.31***	-37.01
Average Period Return %	-7.75	-9.24	-0.97	-8.27***	-36.93
Average Credit Rating	>BBB+	>BBB	>BBB-	1.22***	10.01
N	84,403	74,075	10,078	84,153	

Table 3.2 – *continued*

Panel E. Robustness sample

	(1) Full sample mean	(2) All Other Periods mean	(3) Robustness mean	(4) Difference in means (2)-(3)	t-stat
Total Daily Volume	64.85	70.80	62.06	8.73***	9.56
Average Daily Volume	2.54	2.73	2.45	0.28***	9.02
Average Daily Volume Per	0.38	0.38	0.38	-0.00	-0.13
Total Number of Trades	242.60	300.98	215.21	85.77***	24.42
Average Number of Trades	8.44	9.61	7.89	1.73***	20.72
Average Yield	3.05	3.57	2.80	0.77	0.57
Average Bond Trade Yield	-0.09	-0.11	-0.08	-0.02	-0.35
Average Price, % of Par	104.61	102.52	105.59	-3.07***	-49.60
Average Period Return, %	-7.75	-1.38	-13.64	12.26***	73.65
Average Credit Rating	>BBB+	>BBB	>BBB+	-1.64***	-18.14
N	84,403	26,887	57,266	84,153	

Table 3.2 – *continued*

Panel F. Pairwise Differences between all sub period samples

	(1) Pre-Crisis vs Crisis	(2) Post-Crisis &Pre Dodd-Frank vs Crisis	(3) Post-Crisis & Post Dodd-Frank vs Crisis	(4) Robustness vs Crisis	(5) Post-Crisis & Pre Dodd-Frank vs Pre-Crisis	(6) Post-Crisis & Post Dodd-Frank vs Pre-Crisis	(7) Robustness vs Pre-Crisis	(8) Post-Crisis & Post Dodd-Frank vs Post-Crisis & Pre Dodd-Frank	(9) Robustness vs Post-Crisis & Pre Dodd-Frank	(10) Robustness vs Post-Crisis & Post Dodd-Frank
Total Daily Volume	10.47***	23.53***	11.77***	4.57**	13.06***	1.30	-5.90*	-11.76***	-18.96***	-7.20***
	(3.849)	(10.20)	(5.656)	(2.691)	(4.031)	(0.444)	(-2.492)	(-5.774)	(-13.57)	(-5.522)
Average Daily Volume	-0.17*	0.33***	0.10	-0.15**	0.50***	0.26	0.01	-0.23**	-0.48***	-0.25***
	(-2.080)	(4.827)	(0.952)	(-2.844)	(5.686)	(1.947)	(0.186)	(-2.820)	(-11.16)	(-5.321)
Average Daily Volume Per Bond	-0.15***	-0.12***	-0.15***	-0.11***	0.02*	-0.00	0.04***	-0.02***	0.01**	0.04***
	(-10.63)	(-13.50)	(-16.92)	(-16.51)	(2.201)	(-0.101)	(4.046)	(-3.593)	(2.635)	(7.654)
Total Number of Trades	123.56***	177.06***	101.01***	23.44***	53.49***	-22.55	-	-76.04***	-	-77.57***
	(11.59)	(16.76)	(12.06)	(4.019)	(3.470)	(-1.810)	(-12.04)	(-8.196)	(-29.22)	(-16.55)
Average Number of Trades	3.12***	4.99***	2.98***	1.37***	1.87***	-0.14	-1.75***	-2.00***	-3.62***	-1.62***
	(16.60)	(24.33)	(14.30)	(9.169)	(6.486)	(-0.462)	(-8.437)	(-9.810)	(-28.89)	(-13.42)
Average Yield	13.06	8.26	5.25	5.23	-4.80***	-7.81***	-7.83***	-3.01***	-3.02***	-0.02
	(0.946)	(1.086)	(0.723)	(1.742)	(-5.911)	(-9.272)	(-20.56)	(-14.79)	(-25.29)	(-0.113)
Average Bond Trade Yield	-0.02	0.13	0.22	0.14	0.15***	0.25	0.17	0.09	0.01	-0.08
	(-0.151)	(1.367)	(1.363)	(1.286)	(4.217)	(1.276)	(1.221)	(0.873)	(0.196)	(-0.836)
Average Price, % of Par	-8.07***	2.25***	7.92***	5.99***	10.32***	15.99***	14.06***	5.67***	3.73***	-1.93***
	(-35.77)	(12.62)	(67.84)	(59.16)	(38.23)	(83.77)	(95.74)	(40.67)	(41.92)	(-25.53)
Average Period Return, %	0.45**	0.85***	1.18***	-11.49***	0.40***	0.73***	-11.94***	0.33***	-12.34***	-12.67***
	(2.670)	(8.220)	(12.72)	(-30.57)	(3.649)	(7.718)	(-22.97)	(5.377)	(-43.35)	(-47.24)
Average Credit Rating	-2.70***	-2.41***	-1.88***	-0.19	0.29	0.82***	2.51***	0.53*	2.22***	1.69***
	(-9.699)	(-6.797)	(-10.27)	(-1.353)	(0.816)	(4.312)	(18.20)	(2.241)	(14.48)	(18.11)
N	7,843	14,133	15,245	62,433	11,642	12,754	59,942	19,044	66,232	67,344

Table 3.3

We use OLS to examine the impact of Credit Ratings Changes onto bond market trading activity, and trade yields and bond prices of the affected firms, controlling for firm-specific factors, 2008 financial crisis fixed effects, and the signing into law on July 21, 2010 of the Dodd-Frank Wall Street Reform and Consumer Protection Act. T-statistics reported in parentheses are obtained from robust standard errors clustered by the firm. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Panel A. All ratings changes

	(1) Total Daily Volume	(2) Average Daily Volume	(3) Average Daily Volume Per Bond	(4) Total Number of Trades	(5) Average Number of Trades	(6) Average Yield	(7) Average Bond Trade Yield	(8) Average Price, % of Par	(9) Average Period Return, %
Credit Downgrade	17.85**	1.323**	0.00748	32.48**	6.411	-0.175	-0.00975	-1.601**	0.453
	(2.49)	(2.08)	(0.26)	(2.44)	(1.32)	(-0.15)	(-0.08)	(-2.27)	(0.39)
Credit Upgrade	7.802**	0.724*	-0.0186	20.61***	2.047*	0.493	-0.0915	-0.354	-0.346
	(2.64)	(1.91)	(-0.56)	(2.79)	(1.74)	(0.41)	(-0.86)	(-0.27)	(-0.20)
Market Capitalization	0.167***	-0.858***	-0.621**	0.657***	-0.0180**	0.0180	-0.160***	-0.272	0.663
	(5.66)	(-3.10)	(-2.37)	(5.26)	(-2.34)	(0.88)	(-2.87)	(-0.45)	(1.11)
Current Ratio	20.54*	0.916	0.0740	40.35	-2.687	-4.525	-0.0410	4.055	0.431
	(1.78)	(0.88)	(0.80)	(1.25)	(-0.73)	(-1.16)	(-0.29)	(1.48)	(0.12)
Quick Ratio	-11.81	-0.895	-0.114	-16.02	3.316	5.594	0.0675	-5.300*	0.717
	(-0.87)	(-0.81)	(-1.21)	(-0.42)	(0.89)	(1.41)	(0.39)	(-1.81)	(0.19)
Return on Assets	-35.69	-3.007	-0.150	-206.6	-18.17	-2.620	-0.175	37.72**	-12.95
	(-0.48)	(-0.70)	(-0.30)	(-0.65)	(-0.65)	(-0.08)	(-0.09)	(2.21)	(-0.83)
Cash and STIs to Assets Ratio	-34.93	2.350	0.592	-178.2**	-0.303	-10.13*	0.635	7.212	-2.652
	(-1.15)	(1.02)	(1.51)	(-2.10)	(-0.03)	(-1.89)	(1.21)	(0.99)	(-0.36)
M&A Indicator	-1.912	-0.0801	-0.0166	-0.534	-0.162	-2.429	-0.298	0.284	0.0135
	(-1.05)	(-0.61)	(-0.78)	(-0.17)	(-0.47)	(-1.08)	(-1.27)	(0.66)	(0.02)
Net Change in LTD	0.276***	0.514***	0.0002	0.315**	-0.128	-0.0105	-0.0211	-0.319	0.880**
	(4.01)	(4.89)	(0.88)	(2.44)	(-0.22)	(-0.91)	(-0.88)	(-1.13)	(2.46)
Dividend Indicator	2.494	0.0110	-0.148	8.092	2.315	-1.074	-0.163	-1.760	-0.804
	(0.75)	(0.04)	(-1.63)	(0.72)	(1.50)	(-0.37)	(-1.12)	(-1.57)	(-0.43)

Liabilities-to-Assets Ratio	121.3**	5.263**	0.520**	197.4***	16.12*	10.72	-1.420***	-13.09**	15.55***
	(2.35)	(2.53)	(2.63)	(4.04)	(1.88)	(1.00)	(-2.97)	(-2.69)	(3.37)
LTD Issuance Indicator	-1.507	0.613*	0.0395*	-5.654	0.590	0.0966	0.114	0.375	-1.727**
	(-0.75)	(1.73)	(1.95)	(-1.00)	(0.75)	(0.12)	(0.84)	(0.67)	(-2.40)
LTD due Next Year	49.34*	0.953	-0.269	257.6*	15.64	-10.28	0.571	-8.587	-9.541
	(1.84)	(0.57)	(-0.83)	(1.86)	(1.35)	(-0.79)	(0.41)	(-1.25)	(-0.62)
Pre-Crisis	-13.23*	0.464*	0.116**	-44.16**	-0.0927	-12.14	-0.167***	-8.749***	13.26***
	(-2.01)	(1.86)	(2.47)	(-2.10)	(-0.09)	(-0.81)	(-3.01)	(-6.15)	(10.90)
Crisis	-11.58	0.0187	-0.0820**	6.910	2.864**	4.552***	-0.205***	-15.10***	13.85***
	(-1.68)	(0.06)	(-2.68)	(0.60)	(2.19)	(3.77)	(-3.13)	(-11.93)	(11.75)
Post-Crisis, Pre Dodd-Frank	-1.074	0.448	-0.0627	26.80*	4.448**	1.795	-0.167**	-4.834***	14.46***
	(-0.39)	(1.21)	(-1.54)	(1.74)	(2.56)	(1.38)	(-2.17)	(-7.34)	(12.27)
Post-Crisis, Post Dodd-Frank	0.525	0.426	-0.0512	11.97	2.508	0.228	-0.0278	0.467	14.72***
	(0.21)	(0.83)	(-1.48)	(1.67)	(1.53)	(0.19)	(-0.21)	(0.66)	(11.73)
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Clustered SE	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	58,829	58,829	58,829	58,829	58,829	56,443	32,582	58,829	35,780
adj. R^2	0.137	0.022	0.019	0.175	0.040	0.000	0.000	0.283	0.084

Table 3.3 – *continued*

Panel B. Ratings changes after credit watch

	(1) Total Daily Volume	(2) Average Daily Volume	(3) Average Daily Volume Per Bond	(4) Total Number of Trades	(5) Average Number of Trades	(6) Average Yield	(7) Average Bond Trade Yield	(8) Average Price, % of Par	(9) Average Period Return, %
Credit Downgrade	34.21*	2.453*	0.0256	56.69*	13.23	0.460	0.160	-2.124	2.229
	(1.78)	(1.81)	(0.50)	(1.80)	(1.35)	(0.75)	(0.86)	(-1.00)	(1.29)
Credit Downgrade after CW	-32.49	-2.225	-0.0356	-47.93	-13.44	-1.262	-0.299	1.067	-3.108
	(-1.40)	(-1.43)	(-0.52)	(-1.29)	(-1.32)	(-0.66)	(-1.31)	(0.35)	(-1.52)
Credit Upgrade	4.105	0.826*	-0.0155	17.59*	2.317	0.803	-0.0381	0.347	-0.158
	(1.62)	(1.74)	(-0.50)	(1.88)	(1.51)	(0.65)	(-0.42)	(0.25)	(-0.09)
Credit Upgrade after CW	14.87*	-0.494	-0.0141	11.63	-1.497	-1.452	-0.479*	-2.953**	-1.463
	(1.72)	(-0.75)	(-0.20)	(0.79)	(-1.10)	(-0.67)	(-1.98)	(-2.20)	(-0.37)
Pre-Crisis	-13.12*	0.455*	0.116**	-44.12**	-0.131	-12.16	-0.171***	-8.778***	13.24***
	(-1.98)	(1.81)	(2.47)	(-2.10)	(-0.13)	(-0.81)	(-3.04)	(-6.15)	(10.92)
Crisis	-11.53	0.0158	-0.0821**	6.947	2.853**	4.546***	-0.206***	-15.11***	13.85***
	(-1.69)	(0.05)	(-2.68)	(0.60)	(2.23)	(3.75)	(-3.18)	(-11.92)	(11.75)
Post-Crisis, Pre Dodd-Frank	-1.080	0.440	-0.0629	26.75*	4.409**	1.787	-0.170**	-4.846***	14.44***
	(-0.39)	(1.20)	(-1.55)	(1.74)	(2.56)	(1.36)	(-2.20)	(-7.35)	(12.26)
Post-Crisis, Post Dodd-Frank	1.200	0.444	-0.0511	12.78*	2.648	0.222	-0.0293	0.400	14.73***
	(0.52)	(0.85)	(-1.44)	(1.84)	(1.54)	(0.18)	(-0.22)	(0.57)	(11.75)
Firm-Level Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Clustered SE	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	58,829	58,829	58,829	58,829	58,829	56,443	32,582	58,829	35,780
adj. R^2	0.140	0.023	0.019	0.176	0.049	-0.000	0.000	0.284	0.084

Table 3.4

We use OLS to examine the impact of Credit Ratings changes on bond market trading activity, and trade yields and bond prices of the affected firms, controlling for firm-specific factors, 2008 financial crisis fixed effects, and the signing into law on July 21, 2010 of the Dodd-Frank Wall Street Reform and Consumer Protection Act. T-statistics reported in parentheses are obtained from robust standard errors clustered by the firm. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

	(1) Total Daily Volume	(2) Average Daily Volume	(3) Average Daily Volume Per Bond	(4) Total Number of Trades	(5) Average Number of Trades	(6) Average Yield	(7) Average Bond Trade Yield	(8) Average Price, % of Par	(9) Average Period Return, %
Credit Downgrade	27.00**	2.157**	0.0293	42.79*	9.518	0.0329	0.162	-1.851	1.007
	(2.16)	(2.18)	(0.85)	(1.89)	(1.38)	(0.04)	(1.10)	(-1.29)	(0.50)
Downgrade in Crisis	-29.99***	-4.020***	-0.176***	-75.22***	-14.27**	4.923*	-0.044	-2.233	0.855
	(-3.61)	(-4.51)	(-4.70)	(-3.77)	(-2.26)	(2.02)	(-0.26)	(-1.30)	(0.43)
Downgrade Post-Crisis & Post DF	-32.96**	-2.989**	-0.0746	-37.69	-11.19	-0.695	-0.402	0.916	-1.309
	(-2.20)	(-2.20)	(-1.59)	(-1.14)	(-1.44)	(-0.27)	(-1.37)	(0.31)	(-0.60)
Credit Upgrade	6.963**	0.954*	-0.0297	18.82**	2.595	-0.859	-0.037	-0.582	-0.556
	(2.25)	(1.79)	(-0.67)	(2.18)	(1.66)	(-0.63)	(-0.36)	(-0.37)	(-0.20)
Upgrade Pre-Crisis	19.77*	-0.475	-0.111*	53.92**	-0.0338	19	-0.128	0.255	-2.507
	(1.76)	(-0.71)	(-1.88)	(2.08)	(-0.01)	(1.10)	(-0.51)	(0.13)	(-0.88)
Upgrade Post-Crisis & Post DF	-1.441	-1.115	0.0747	-4.804	-3.105	2.185	-0.122	1.047	1.12
	(-0.30)	(-1.41)	(1.09)	(-0.32)	(-1.39)	(0.79)	(-0.58)	(0.67)	(0.39)
No Change Rating Update Pre-Crisis	14.89**	0.371	0.0627	38.45*	0.22	14.06	0.0158	-0.63	0.592
	(2.69)	(1.04)	(0.52)	(1.98)	(0.13)	(0.95)	(0.12)	(-0.49)	(0.80)
No Change Rating Update in Crisis	-2.37	-0.859**	-0.0143	-35.43***	-1.391	2.07	-0.0319	-4.711*	0.0194
	(-0.32)	(-2.08)	(-0.39)	(-3.13)	(-1.08)	(0.65)	(-0.61)	(-1.92)	(0.02)
No Change Update Post-Crisis & Pre-DF	-4.292	2.312***	-0.0840**	210.1***	56.34***	1.003	0.0258	-15.41***	-1.921
	(-0.70)	(5.05)	(-2.25)	(10.03)	(42.93)	(0.47)	(0.31)	(-15.45)	(-1.59)
No Change Update Post-Crisis & Post-DF	1.378	1.106	0.0238	-18.86	0.0236	4.623	-0.0415	-0.164	0.93
	(0.25)	(1.33)	(0.32)	(-1.30)	(0.02)	(1.67)	(-0.31)	(-0.14)	(0.29)
Market Capitalization	0.169***	-0.836***	-0.621**	0.659***	-0.172**	0.177	-0.156***	-0.028	0.0666
	(5.73)	(-2.98)	(-2.35)	(5.30)	(-2.35)	(0.87)	(-2.87)	(-0.47)	(1.11)

Current Ratio	19.64	0.824	0.0735	41.11	-3.2	-4.743	-0.0514	4.398	0.373
	(1.68)	(0.77)	(0.78)	(1.25)	(-0.84)	(-1.21)	(-0.35)	(1.64)	(0.10)
Quick Ratio	-11.16	-0.842	-0.113	-17.12	3.747	5.783	0.0686	-5.651*	0.773
	(-0.81)	(-0.75)	(-1.18)	(-0.45)	(0.98)	(1.42)	(0.39)	(-1.94)	(0.20)
Return on Assets	-33.81	-2.576	-0.144	-216.7	-18.04	-0.445	-0.143	37.21**	-12.73
	(-0.44)	(-0.59)	(-0.29)	(-0.69)	(-0.66)	(-0.01)	(-0.07)	(2.22)	(-0.81)
Cash and STIs to Assets Ratio	-33.31	2.593	0.587	-175.3**	0.213	-9.901*	0.686	7.288	-2.779
	(-1.12)	(1.14)	(1.48)	(-2.12)	(0.02)	(-1.80)	(1.22)	(0.99)	(-0.37)
M&A Indicator	-2.029	-0.0885	-0.0158	-0.887	-0.172	-2.51	-0.297	0.262	0.0406
	(-1.09)	(-0.68)	(-0.76)	(-0.29)	(-0.50)	(-1.09)	(-1.24)	(0.61)	(0.07)
Net Change in LTD	0.269***	0.471***	0.0153	0.306**	-0.305	-0.113	-0.022	-0.0319	0.843**
	(4.07)	(4.34)	(0.79)	(2.35)	(-0.47)	(-0.90)	(-0.90)	(-1.13)	(2.49)
Dividend Indicator	2.372	-0.0167	-0.146	8.021	2.192	-1.058	-0.166	-1.677	-0.769
	(0.73)	(-0.07)	(-1.61)	(0.73)	(1.41)	(-0.37)	(-1.14)	(-1.50)	(-0.40)
Liabilities-to-Assets Ratio	121.2**	5.145**	0.519**	198.4***	15.70*	11.51	-1.435***	-12.96**	15.55***
	(2.36)	(2.50)	(2.63)	(4.01)	(1.88)	(1.02)	(-3.07)	(-2.66)	(3.29)
LTD Issuance Indicator	-1.734	0.582*	0.0400*	-5.987	0.478	0.027	0.11	0.423	-1.709**
	(-0.85)	(1.71)	(1.94)	(-1.06)	(0.64)	(0.03)	(0.80)	(0.77)	(-2.37)
LTD due Next Year	47.36*	0.439	-0.271	260.6*	15.05	-12.16	0.573	-8.472	-9.724
	(1.78)	(0.30)	(-0.84)	(1.86)	(1.34)	(-0.91)	(0.40)	(-1.21)	(-0.63)
Pre-Crisis	-14.01**	0.473*	0.117**	-46.47**	-0.0665	-12.96	-0.160**	-8.735***	13.30***
	(-2.07)	(1.82)	(2.41)	(-2.13)	(-0.06)	(-0.82)	(-2.70)	(-5.89)	(10.99)
Crisis	-11.2	0.114	-0.0804**	9.524	3.070**	4.390***	-0.194***	-14.78***	13.87***
	(-1.55)	(0.39)	(-2.62)	(0.82)	(2.36)	(4.02)	(-3.09)	(-11.42)	(11.46)
Post-Crisis & Pre Dodd-Frank	-0.952	0.467	-0.0621	26.51*	4.457**	1.78	-0.161**	-4.837***	14.48***
	(-0.35)	(1.27)	(-1.52)	(1.72)	(2.57)	(1.35)	(-2.17)	(-7.35)	(12.31)
Post-Crisis & Post Dodd-Frank	1.766	0.579	-0.0514	13.45*	3.027	0.198	-0.00739	0.396	14.72***
	(0.79)	(1.02)	(-1.42)	(1.94)	(1.63)	(0.15)	(-0.05)	(0.59)	(11.88)
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Clustered SE	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	58,829	58,829	58,829	58,829	58,829	56,443	32,582	58,829	35,780
adj. R^2	0.139	0.024	0.02	0.177	0.048	0.000	0.000	0.285	0.084

Table 3.5

We use OLS to examine the impact of CW initiation and resolution on bond market trading activity, and trade yields and bond prices of the affected firms, controlling for firm-specific factors, 2008 financial crisis fixed effects, and the signing into law on July 21, 2010 of the Dodd-Frank Wall Street Reform and Consumer Protection Act. T-statistics reported in parentheses are obtained from robust standard errors clustered by the firm. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

	(1) Total Daily Volume	(2) Average Daily Volume	(3) Average Daily Volume Per Bond	(4) Total Number of Trades	(5) Average Number of Trades	(6) Average Yield	(7) Average Bond Trade Yield	(8) Average Price, % of Par	(9) Average Period Return, %
Downgrade CW	5.902	0.459	0.0402	2.476	0.854	2.707	-0.0789	-2.145	1.118
	(0.89)	(1.09)	(0.67)	(0.19)	(0.67)	(1.19)	(-0.98)	(-1.69)	(1.46)
CW Resulting in Downgrade	-2.130	-0.470	-0.0204	10.42	-1.267	-1.488	-0.153	0.320	-2.401
	(-0.21)	(-0.80)	(-0.34)	(0.64)	(-1.06)	(-0.67)	(-0.97)	(0.24)	(-1.36)
Upgrade CW	1.210	0.423**	0.103**	-17.98	-0.117	-2.075***	-0.370**	-0.960	1.130
	(0.23)	(2.05)	(2.38)	(-1.41)	(-0.11)	(-6.67)	(-2.56)	(-0.86)	(0.67)
CW Resulting in Upgrade	-15.15	-0.436	-0.187***	29.70	4.303	-1.998***	-0.288	-0.750	1.420
	(-1.07)	(-0.90)	(-3.04)	(0.96)	(1.14)	(-5.95)	(-1.38)	(-0.24)	(0.24)
Market Capitalization	0.168***	-0.850***	-0.629**	0.661***	-0.177**	0.173	-0.161***	-0.264	0.660
	(5.66)	(-3.06)	(-2.40)	(5.30)	(-2.29)	(0.87)	(-2.89)	(-0.44)	(1.10)
Current Ratio	19.40*	0.895	0.0643	41.33	-2.333	-4.817	-0.0325	4.190	0.492
	(1.68)	(0.84)	(0.66)	(1.30)	(-0.61)	(-1.22)	(-0.22)	(1.58)	(0.14)
Quick Ratio	-10.64	-0.881	-0.103	-17.18	2.934	5.873	0.0572	-5.451*	0.644
	(-0.78)	(-0.78)	(-1.05)	(-0.46)	(0.75)	(1.45)	(0.33)	(-1.91)	(0.18)
Return on Assets	-40.20	-3.225	-0.172	-205.3	-19.33	-2.900	-0.263	37.77**	-13.45
	(-0.54)	(-0.71)	(-0.35)	(-0.64)	(-0.66)	(-0.09)	(-0.13)	(2.13)	(-0.87)
Cash and STIs to Assets Ratio	-32.64	2.562	0.587	-172.4*	0.360	-9.692*	0.641	7.239	-2.919
	(-1.05)	(1.10)	(1.50)	(-2.01)	(0.04)	(-1.84)	(1.25)	(1.00)	(-0.39)
M&A Indicator	-2.304	-0.101	-0.0166	-1.034	-0.186	-2.310	-0.300	0.278	0.0503
	(-1.21)	(-0.77)	(-0.77)	(-0.33)	(-0.51)	(-1.08)	(-1.27)	(0.63)	(0.10)
Net Change in LTD	2.82***	5.38***	1.99	3.18**	-0.877	-1.03	-2.14	-3.55	0.872**
	(4.01)	(4.41)	(1.01)	(2.51)	(-0.17)	(-0.88)	(-0.89)	(-1.24)	(2.44)
Dividend Indicator	2.516	-0.00149	-0.147	7.694	2.147	-0.959	-0.165	-1.673	-0.916

	(0.74)	(-0.01)	(-1.60)	(0.70)	(1.46)	(-0.35)	(-1.15)	(-1.50)	(-0.48)
Liabilities-to-Assets	117.8**	4.991**	0.525**	190.2***	14.99*	11.61	-1.420***	-13.04**	15.50***
Ratio	(2.31)	(2.41)	(2.65)	(3.78)	(1.85)	(1.02)	(-2.84)	(-2.67)	(3.33)
LTD Issuance	-1.611	0.603*	0.0388*	-5.763	0.568	0.450	0.120	0.414	-1.724**
Indicator	(-0.74)	(1.70)	(1.88)	(-1.01)	(0.73)	(0.00)	(0.91)	(0.74)	(-2.42)
LTD due Next Year	43.52	0.574	-0.286	253.6*	14.86	-12.56	0.526	-8.713	-9.166
	(1.57)	(0.33)	(-0.88)	(1.81)	(1.27)	(-0.96)	(0.39)	(-1.29)	(-0.61)
Pre-Crisis	-14.09**	0.406	0.115**	-45.53**	-0.317	-12.09	-0.165***	-8.685***	13.27***
	(-2.06)	(1.57)	(2.45)	(-2.14)	(-0.29)	(-0.81)	(-3.15)	(-6.09)	(11.12)
Crisis	-12.76*	-0.0708	-0.0841***	5.377	2.556**	4.460***	-0.202***	-14.96***	13.80***
	(-1.73)	(-0.23)	(-2.82)	(0.47)	(2.00)	(3.98)	(-3.17)	(-11.80)	(11.75)
Post-Crisis, Pre	-1.806	0.389	-0.0618	25.39	4.199**	1.866	-0.168**	-4.837***	14.49***
Dodd-Frank	(-0.64)	(1.07)	(-1.52)	(1.64)	(2.46)	(1.46)	(-2.29)	(-7.18)	(12.40)
Post-Crisis, Post	0.764	0.457	-0.0516	12.28	2.651	0.263	-0.0220	0.465	14.80***
Dodd-Frank	(0.31)	(0.87)	(-1.48)	(1.72)	(1.57)	(0.22)	(-0.17)	(0.67)	(11.86)
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Clustered SE	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	58,829	58,829	58,829	58,829	58,829	56,443	32,582	58,829	35,780
adj. R^2	0.135	0.019	0.020	0.172	0.032	0.000	0.000	0.284	0.084

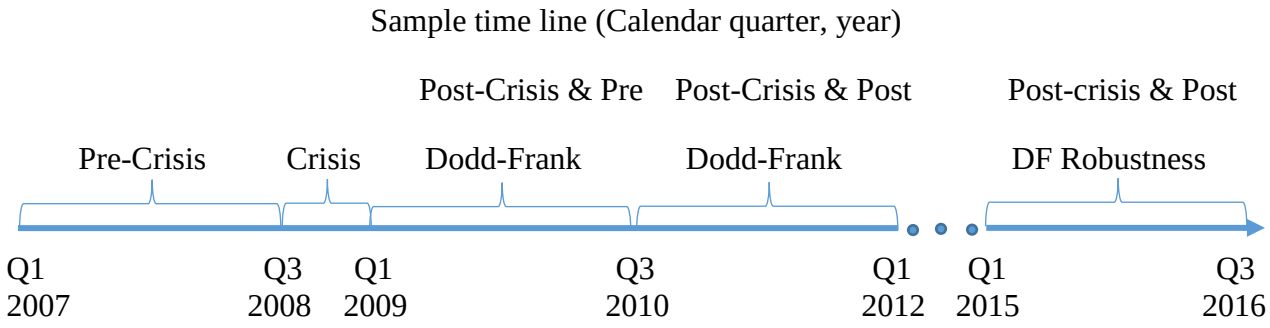
Table 3.6

We use OLS to examine the impact of CW initiation and resolution on bond market trading activity, and trade yields and bond prices of the affected firms, controlling for firm-specific factors, 2008 financial crisis fixed effects, and the signing into law on July 21, 2010 of the Dodd-Frank Wall Street Reform and Consumer Protection Act. T-statistics reported in parentheses are obtained from robust standard errors clustered by the firm. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

	(1) Total Daily Volume	(2) Average Daily Volume	(3) Average Daily Volume Per Bond	(4) Total Number of Trades	(5) Average Number of Trades	(6) Average Yield	(7) Average Bond Trade Yield	(8) Average Price, % of Par	(9) Average Period Return, %
Downgrade CW	10.64	1.168**	0.0805	13.67	2.387*	0.801	-0.145	-3.715***	2.176
	(1.28)	(2.35)	(1.20)	(0.98)	(1.75)	(0.44)	(-1.03)	(-4.18)	(1.44)
Downgrade CW	-6.577	-1.417***	-0.0733	23.95	-0.262	16.71	0.110	1.562	0.515
Pre-Crisis	(-0.79)	(-2.81)	(-0.52)	(1.02)	(-0.20)	(1.10)	(1.11)	(1.06)	(0.14)
Downgrade CW in	-16.17	-2.217***	-0.130	-59.75**	-6.309***	-0.760	0.113	-5.772**	-3.110
Crisis	(-1.62)	(-3.56)	(-1.38)	(-2.66)	(-3.32)	(-0.21)	(0.72)	(-2.65)	(-1.64)
Downgrade CW	-17.50	-1.712*	-0.0972	-9.503	-2.473	-1.592	-0.222	2.894	1.273
Post-Crisis & Post	(-1.33)	(-1.75)	(-1.32)	(-0.46)	(-1.20)	(-0.75)	(-1.01)	(1.59)	(0.25)
Upgrade CW	1.142	0.434**	0.104**	-18.14	-0.0816	20.74***	-0.367**	-0.989	1.069
	(0.22)	(2.10)	(2.38)	(-1.40)	(-0.07)	(6.70)	(-2.57)	(-0.88)	(0.64)
Upgrade CW Post-	22.98	-1.041	-0.0769	21.06	-5.727			3.998	4.496
Crisis & Post DF	(1.67)	(-1.52)	(-0.84)	(0.49)	(-1.26)			(1.24)	(0.70)
Post-CW	-16.59	-0.346	-0.180***	28.63	4.748	-19.90***	0.287	-1.071	0.848
Upgrade	(-1.10)	(-0.69)	(-2.82)	(0.87)	(1.18)	(-5.86)	(1.39)	(-0.32)	(0.12)
Post-CW	1.694	-0.278	-0.0103	1.393	-1.675*	-0.458	0.0462	0.451	-4.317
Downgrade	(0.11)	(-0.37)	(-0.15)	(0.07)	(-1.73)	(-0.35)	(0.22)	(0.49)	(-1.06)
Market	0.169***	-0.849***	-0.628**	0.661***	-0.177**	0.175	-0.161***	-0.266	0.652
Capitalization	(5.75)	(-3.04)	(-2.40)	(5.31)	(-2.29)	(0.88)	(-2.88)	(-0.44)	(1.08)
Current Ratio	19.16	0.874	0.0634	42.55	-2.265	-4.454	-0.0363	4.170	0.570
	(1.67)	(0.81)	(0.65)	(1.34)	(-0.59)	(-1.06)	(-0.24)	(1.56)	(0.16)
Quick Ratio	-10.40	-0.868	-0.103	-18.61	2.826	5.432	0.0603	-5.402*	0.561
	(-0.76)	(-0.76)	(-1.04)	(-0.50)	(0.72)	(1.26)	(0.34)	(-1.88)	(0.15)

Return on Assets	-36.71	-2.981	-0.157	-192.2	-18.41	-0.423	-0.235	37.01**	-12.83
	(-0.50)	(-0.67)	(-0.32)	(-0.61)	(-0.63)	(-0.01)	(-0.12)	(2.15)	(-0.84)
Cash and STIs to Assets Ratio	-32.57	2.641	0.592	-171.1*	0.702	-8.805	0.670	6.986	-3.057
	(-1.05)	(1.13)	(1.51)	(-2.00)	(0.07)	(-1.68)	(1.28)	(0.97)	(-0.41)
M&A Indicator	-2.407	-0.117	-0.0175	-1.357	-0.223	-2.246	-0.297	0.316	0.0127
	(-1.27)	(-0.94)	(-0.81)	(-0.43)	(-0.62)	(-1.08)	(-1.26)	(0.73)	(0.02)
Net Change in LTD	0.281***	0.525***	0.0190	0.317**	-0.17	-0.112	-0.0217	-0.0328	0.0893**
	(4.00)	(4.32)	(0.98)	(2.50)	(-0.22)	(-0.90)	(-0.90)	(-1.13)	(2.35)
Dividend Indicator	2.434	-0.0009	-0.147	7.743	2.163	-0.988	-0.166	-1.683	-0.914
	(0.71)	(-0.00)	(-1.61)	(0.70)	(1.47)	(-0.36)	(-1.16)	(-1.51)	(-0.48)
Liabilities-to-Assets Ratio	118.6**	5.096**	0.531**	192.3***	15.24*	11.54	-1.421***	-13.29**	15.60***
	(2.34)	(2.49)	(2.68)	(3.87)	(1.87)	(1.02)	(-2.83)	(-2.71)	(3.34)
LTD Issuance Indicator	-1.462	0.618*	0.0397*	-5.676	0.589	-0.00143	0.121	0.388	-1.730**
	(-0.68)	(1.73)	(1.93)	(-1.01)	(0.76)	(-0.00)	(0.92)	(0.68)	(-2.42)
LTD due Next Year	45.05	0.556	-0.288	256.0*	14.68	-12.51	0.523	-8.606	-8.808
	(1.63)	(0.32)	(-0.89)	(1.81)	(1.27)	(-0.96)	(0.38)	(-1.28)	(-0.59)
Pre-Crisis	-14.04*	0.438	0.117**	-46.63**	-0.340	-12.70	-0.170***	-8.705***	13.24***
	(-2.01)	(1.66)	(2.50)	(-2.14)	(-0.31)	(-0.83)	(-3.13)	(-5.93)	(11.12)
Crisis	-11.91	0.0438	-0.0773**	8.657	2.897**	4.583***	-0.205***	-15.26***	13.93***
	(-1.59)	(0.15)	(-2.46)	(0.75)	(2.25)	(4.24)	(-3.19)	(-11.55)	(11.88)
Post-Crisis & Pre Dodd-Frank	-1.709	0.402	-0.0611	25.41	4.215**	1.799	-0.168**	-4.859***	14.48***
	(-0.61)	(1.10)	(-1.49)	(1.64)	(2.47)	(1.38)	(-2.29)	(-7.18)	(12.51)
Post-Crisis & Post Dodd-Frank	1.191	0.510	-0.0485	12.62*	2.749	0.316	-0.0177	0.363	14.77***
	(0.53)	(0.95)	(-1.38)	(1.78)	(1.58)	(0.25)	(-0.13)	(0.52)	(12.16)
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Clustered SE	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	58,829	58,829	58,829	58,829	58,829	56,443	32582	58829	35780
adj. R^2	0.136	0.020	0.020	0.173	0.032	0.000	0.000	0.286	0.084

FIGURE 3.1. SAMPLE TIME LINE



APPENDIX A. BLOOMBERG GOVERNANCE INDEX COMPOSITION

Table A.

The governance portion of Bloomberg ESG rating covers seven major areas, with various fields detailed below in each area, for a total of 37 equally weighted field contributions to the final governance rating:

Area	Field	
Remuneration	% Board Compensation Paid in	D MEDI
	Say on Pay Number of Votes FOR	H VAL
	% Non-Executive Directors on	L VAL
	Clawback Provision for Executive	Y
	Chng of Ctrl Benefits/Golden	N
Independence	CEO Duality	N
	% Non-Executive Directors on	H VAL
	% Independent Directors	H VAL
	Independent Chairperson	Y
	Independent Lead Director	Y
	Former CEO or its Equivalent on	N
	Board Size	D MEDIA
Audit	% of Independent Directors on	H VAL
	% of Non-Executive Directors on	L VAL
	% Audit Committee Members on	L VAL
	Audit Committee Meeting %	H VAL
	Independent Audit Committee	Y
	Years Auditor Employed	D MEDIA
Shareholder Rights	Dual Class Unequal Voting Rights	N
	Classified Board System	N
	Poison Pill Plan	N
Diversity	Board Average Age	D MEDIA
	Board Age Range	D MEDIA
	Chief Executive Officer Age	D MEDIA
	Chairman Age	D MEDIA
	% of Executives that are Women	D FIXED
	% of Board Members that are	D FIXE
Entrenchment	# Board Members Serving > 10	D MEDI
	Average Board Tenure	D MEDI
	Average Executive Tenure	D MEDI
	Chief Executive Officer Tenure	D MEDI
	Chairman Tenure	D MEDI
Overboarding	% Non-Executive Directors on 3+	D MEDI
	% of Executive Directors on 2+	D MEDI
	# Board Positions CEO Holds	D MEDI
	# Board Positions Chair Holds	D MEDI
	# Executive Positions Chair Holds	D MEDI

Field values are sorted in ascending or descending order depending on whether a high or a low field value is preferred, within each Bloomberg Industry Classification Systems (BICS) category, and the field rank is assigned by multiplying the difference between the total number of BICS peers plus one and the given company's list rank by the percentile step size. The percentile step size is calculated as one hundred over the number of companies within each BICS category out of the ones that are being analyzed. I.e. the resulting ranking is the percentile the company is at, benchmarked against all the industry peers in each individual field. If no data is available for a given field, a rank of zero is assigned. All the field ranks are then equally weighted and their contributions summed for the final governance ranking.

For various fields, various data outcomes are preferred from the governance perspective. The last row of table A presents the preferred outcomes for each field variable. The legend is as follows:

1. D_MEDIAN(D_FIXED) – Low deviation from the sector median (fixed median) is preferred.
2. H_VAL(L_VAL) – High Value (Low Value) is preferred.
3. Y(N) – Policy in place (not in place) is preferred.

APPENDIX B. LIST OF RESTRICTIVE BOND COVENANTS

Negative Pledge, also known as Limitation on Liens: “Agilent will not, and will not permit any subsidiary to, create, incur, assume or permit to exist any lien on (i) any Principal Property or (ii) the capital stock of any subsidiary, to secure any indebtedness of Agilent, any subsidiary or any other person without securing the debt securities equally and ratably with such indebtedness for so long as such indebtedness shall be so secured, subject to certain exceptions.”

Change of Control: “If a change of control repurchase event occurs, unless Agilent has exercised its right to redeem the notes as described above, Agilent will be required to make an offer to each holder of the notes to repurchase all or any part (in excess of $2,000 and in integral multiples of $1,000) of that holder's notes at a repurchase price in cash equal to 101% of the aggregate principal amount of the notes repurchased plus any accrued and unpaid interest on the notes repurchased to, but not including, the date of repurchase.”

Fundamental Change clauses prohibit the borrower and other loan parties from merging, liquidating, or disposing of assets, with exceptions for carve-outs or baskets.

Limit of Indebtedness covenant limits additional debt which may be incurred by the issuer, with a goal of protecting current lenders.

Cross Default: “Each of the following constitutes an event of default under the form of indenture with respect to any series of debt securities: … default under any mortgage, indenture or instrument under which there may be issued or by which there may be secured or evidenced any indebtedness for money borrowed by AWCC or American Water (or the payment of which is guaranteed by AWCC or American Water), if that default is caused by a failure to pay principal at its stated maturity after giving effect to any applicable grace period, or results in the acceleration of such indebtedness prior to its stated maturity…”

Negative Covenants (incl. Certain Sales of Assets) are any covenants that require the issuer to abstain from a specific action, such as selling certain assets.

Debt Service Coverage Ratio and/or Free Cash Flow to Debt Service Ratio covenants require the issuer to maintain a certain level of operating profitability in order to meet interest payment obligations.

Restrictive Covenants are any covenants that require the issuer to cease or avoid doing something, such as mergers activity, subsidiary debt issuance or dividend payments.

Restriction on Activities including, but not limited to Merger Restrictions: “Agilent may not consolidate or merge with or into another entity, or sell, lease, convey, transfer or otherwise dispose of its property and assets substantially as an entirety to another entity unless…”

Limitation on Sale-and-Leaseback “Agilent will not, and will not permit any subsidiary to, enter into any arrangement with any person pursuant to which Agilent or any subsidiary leases any property that has been or is to be sold or transferred by Agilent or the subsidiary to such person (a "sale and leaseback transaction"), except that a sale and leaseback transaction is permitted if Agilent or such subsidiary would be entitled to incur indebtedness secured by a lien on the property to be leased (without equally and ratably securing the outstanding debt securities of any series) in an amount equal to the present value of the lease payments with respect to the term of the lease remaining on the date as of which the amount is being determined, discounted at the rate of interest set forth or implicit in the terms of the lease, compounded semi-annually (such amount is referred to as the "attributable debt").”

Limitation on Subsidiary Debt: “Agilent may from time to time, without notice to or the consent of the holders of the debt securities of any series, create and issue additional debt securities

having the same terms as, and ranking equally and ratably with, the debt securities of such series in all respects (except for the issue date and, if applicable, the payment of interest accruing prior to the issue date of such additional debt securities and the first payment of interest following the issue date of such additional debt securities). Such additional debt securities may be consolidated and form a single series with, and will have the same terms as to ranking, redemption, waivers, amendments or otherwise, as a previously issued series of debt securities and will vote together as one class on all matters with respect to such debt securities."

Restricted Payments covenants require that the issuer restricts dividend payment to equity holders in the event that certain level of operating profitability sufficient for meeting interest obligations is not achieved.

Ratings Trigger: "…Ratings Trigger shall mean any provision in any document applicable to any Indebtedness of the Borrower or any Subsidiary stating that if the Borrower or any Subsidiary shall not maintain a minimum debt rating by S&P, Moodys or any other ratings agency: (i) the Borrower or such Subsidiary shall be deemed not to have complied with such document, (ii) a default or event of default or other acceleration event shall be deemed to have occurred under such document, or (iii) Indebtedness governed by such document shall be prepaid or the holder of such Indebtedness shall have the option to require such prepayment (whether immediately or with the giving of notice, passage of time or both)."

Collective Action Clause: "The holders of at least a majority in aggregate principal amount of the outstanding debt securities may waive compliance by Agilent with certain restrictive provisions of the indenture with respect to the debt securities. The holders of at least a majority in aggregate principal amount of the outstanding debt securities may waive any past default under

the indenture, except a default not theretofore cured in the payment of principal or interest and certain covenants and provisions of the indenture which cannot be amended without the consent of the holder of each outstanding debt security."

Material Adverse Change Clause: "If there occurs a material adverse change in Borrowers prospects, business or financial condition, or if there is a material impairment in the prospect of repayment of any portion of the Obligations or a material impairment in the perfection, value or priority of security interests in the Collateral…"

Force Majeure: "In no event shall the Borrower be responsible or liable for any failure or delay in the performance of its obligations hereunder arising out of or caused by, directly or indirectly, forces beyond its control, including, without limitation, strikes, work stoppages, accidents, acts of war or terrorism, civil or military disturbances, nuclear or natural catastrophes or acts of God, and interruptions, loss or malfunctions of utilities, communications or computer (software and hardware) services..."

VITA

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EDUCATION

Ph.D., Finance, University of Mississippi, December 2018
Dissertation: Three Essays on Corporate Bonds issuance and Trading
M.B.A., University of Mississippi, August 2012
Specialist, Linguistics, Amur State University, Blagoveshchensk, RF, June 2011

TEACHING EXPERIENCE

Instructional Assistant Professor of Finance, 2017 – present
University of Mississippi
Courses: Business Finance I, Intermediate Financial Management

Graduate Instructor, 2014 – 2017
University of Mississippi
Courses: Business Finance I, Intermediate Financial Management

Teaching and Research Assistant, 2012 - 2016
University of Mississippi

HONORS and FELLOWSHIPS

Office of Student Disability Services ACCESS Award, 2016
Graduate Teaching and Research Assistantship, 2012-2016
Graduate School Honors Fellowship, 2012-2016
Outstanding MBA Student Award, 2012
John N. Palmer MBA Assistantship, 2011-2012
United States Department of State Bureau of Educational and Cultural Affairs Undergraduate Exchange Program Scholarship, 2009-2010

PUBLICATIONS and PRESENTATIONS

Cole, B., V. Davydenko, and K. Fuller. "The Bond Market's Reaction to Dividend Announcements: The Case of Dividend Increases, Dividend Decreases, and Special Dividends". Presented at the Eastern Finance Association Annual Meeting, Baltimore, Maryland, 2016
Cole, B., V. Davydenko, and K. Fuller. "The Bond Market's Reaction to Dividend Announcements: The Case of Dividend Increases, Dividend Decreases, and Special Dividends". Scheduled for presentation at the Southern Finance Association Annual Meeting, SanDestin, Florida, 2016