Disclosure quality and Competition for capital*

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Abstract

We study how competition for capital amongst municipal bond issuers can influence their disclosure decisions. Moody's 2010 recalibration of the municipal rating scale advantaged heavily upgraded issuers and disadvantaged lightly upgraded issuers. We develop a simple model in which bond issuers compete for capital from the same pool of investors. The disadvantaged issuers respond to the recalibration by offering investors better financing terms to compete for investors' capital with the advantaged issuers. These better financing terms heighten financing costs that, in turn, can induce and exacerbate a potential conflict between social welfare and government officials' personal preferences. The conflict of interest calls for higher quality disclosure to assure investors that the government officials will not pursue their personal preference over social welfare. Empirically, we find that Moody's recalibration induces the disadvantaged issuers to provide timelier financial statements than before the recalibration, particularly when those issuers face relatively intense competition for capital. This evidence supports the idea that issuers competing for capital consider their credit risk relative to their peers when making disclosure decisions.

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1 Introduction

Much of our understanding of the implications of competition on firms' disclosure practices comes from product market competition. An upward shift in product market competition induces firms to trade-off the heightened proprietary costs of disclosure and the heightened capital market benefits of disclosure. In general, the theoretical and empirical literature find that voluntary disclosure declines when product market competition amongst existing rivals intensifies (Verrecchia, 1983; Clinch and Verrecchia, 1997; Li, 2010). However, product markets are not the only source of competitive pressure. Our objective in this paper is to consider whether entities change their disclosure policies in response to *capital* market competition.

The municipal bond market is an apt setting in which to study the disclosure effects of competition for capital. Municipal bond issuers face qualitatively different tradeoffs in making their disclosure choices than corporations do because local governments are not product market competitors. Therefore, the proprietary costs of disclosure, which are a powerful force in most competition studies, are minimal. In addition, capital markets for municipal bonds are competitive and fragmented[1] (Feroz and Wilson, 1992) and peer benchmarking is common because of its opacity and illiquidity.[2] Given these features, it is reasonable to believe that a municipal bond issuer cares not only about its own credit risk but also its risk relative to its peers.

Moody's recalibration of the municipal rating scale offers an opportunity to identify a plausibly exogenous change in issuers' competitive disadvantage relative to their capital

[1] See also www.sec.gov/news and institutional.fidelity.com.

[2] For example, see reports.data.montgomerycountymd.gov, Miranda and Picur (2008), and www.nctreasurer.com.

market peers. In 2010, Moody's recalibrated municipal bonds from the traditional Municipal Rating Scale (which ordinally ranks bonds based on their probability of default) to the Global Rating Scale (which measures expected loss as a combination of the probability of default and loss given default). The recalibration resulted in zero-to-three-notch upgrades for municipal bonds rated by Moody's. According to Moody's, these upgrades merely reflect a change in Moody's evaluation criteria rather than an indication of a change in credit quality (Moody's, 2010). Nonetheless, investors responded to the recalibration. Yield spreads on upgraded bonds decreased relative to non-upgraded bonds, particularly when retail participation in the bond was high (Cornaggia et al., 2017).

This unique setting allows us to examine whether issuers change their disclosure quality in response to a competitive disadvantage in raising capital. Within a given peer group, issuers that are relatively heavily upgraded are advantaged whereas those that are relatively lightly upgraded are disadvantaged by the recalibration. We are interested in how the disadvantaged issuers respond to the recalibration. These disadvantaged issuers' own credit risk either decreased or stayed the same (because their credit ratings are either slightly higher or unchanged). Thus, if issuers in this setting do not compete for capital, they should only respond to changes in their own credit risk and we should observe reduced or unchanged disclosure quality for these disadvantaged issuers. However, if competition for capital induces the disadvantaged issuers to care about their relative credit risk (which increased as a result of the recalibration), we should observe improved disclosure quality.

To analyze disadvantaged issuers' disclosure choice, we develop a parsimonious model to capture the competitive and fragmented capital market in which municipal bond issuers operate. In the model, two ex-ante identical issuers are peers in the sense that they compete for capital from the same underlying pool of investors. After the recalibration, investors prefer to buy bonds issued by a heavily-upgraded issuer (issuer A) over those issued by a lightly-upgraded issuer (issuer B). In response, issuer B must offer investors better loan terms (i.e., higher interest rates, shorter maturities) to retain the competitiveness of its bonds. We show that although better loan terms help issuer B regain its competitiveness, they also can trigger and exacerbate the conflict of interest between investors and the bond issuer.

For example, consider an issuer that must choose to either improve an existing road or build a new road that requires additional investment. Whether building a new road is socially optimal depends on balancing the cost of financing and its expected benefit. The social benefit of a new road depends on local economic conditions, such as expected traffic growth and future infrastructure plans, which are privately known only to the issuer (i.e., local government). When the cost of financing is low, both the investors and issuers prefer a new road as its benefit outweighs the (relatively low) financing cost. Their preferences may conflict when the cost of financing is high: it could be socially optimal to improve an existing road when the expected traffic volume (privately known to the bond issuer) is not high enough to justify its additional cost, but the issuer may still prefer to build a new road because of the additional personal benefit (such as fame or political benefits) that local government officials derive.

The conflict of interest triggered by the higher cost of financing creates a vicious cycle: bond investors correctly anticipate that the officials sometimes make inefficient investment decisions ex post and, thus, demand better borrowing terms to protect themselves. The higher financing cost further exacerbates the potential conflict of interest, which leads to even more inefficient investment and, hence, an even higher financing cost in the first place.

Higher disclosure quality can prevent this vicious cycle. Specifically, timelier disclosures provide information about demand for the underlying project (i.e., issuer's private information) quickly to investors, underwriters, and voters. Thus, by adopting timelier disclosure practices, the issuer essentially commits to not choose his personal preference over social welfare. Although this commitment does not impose proprietary costs on the issuer, it does impose reputational and administrative costs. The commitment is also valuable because it enables the issuer to sell its bonds on more favorable terms.

Empirically, we measure the quality of disclosure based on how timely it is. The SEC (Securities and Exchange Commission) and the GASB (Governmental Accounting Standards Board) believe that timeliness is one of the key characteristics that make state and local governmental financial reports informative.[3] SEC Chairman Clayton highlighted in 2018 that "timely and accurate financial information is essential for investors and analysts. Without that, it is challenging to accurately evaluate the current financial condition of a municipal issuer."[4] Moreover, the SEC highlighted in 2012 that as time passes, financial statements lose their usefulness because the information contained in the statements is stale (SEC, 2012). The timelier the information is provided to users, the more informative it is about the condition of the issuer. We measure timeliness as the time difference between the end of the fiscal period and the date of the audit report.

We identify peers that compete for capital as issuers that share a pre-recalibration credit rating, geography (state), and size (population quintile). This definition follows prior

[3]https://www.gasb.org/st/concepts/gconsum1.html

[4]See https://www.sec.gov/news/public-statement/statement-clayton-120618 .

research that documents the market for municipal bonds is segmented across state lines and differs for small and large issuers (Feroz and Wilson, 1992; Rivers and Yates, 1997). For each recalibrated issuer, we measure an abnormal upgrade equal to the difference between the issuer's upgrade and the average upgrade of its peer group. A positive abnormal upgrade indicates the issuer is advantaged by the recalibration, whereas a negative abnormal upgrade indicates the issuer is disadvantaged by the recalibration.

Consistent with the model's predictions, we find that the disadvantaged issuers improve their disclosure timeliness. In economic terms, a one-standard-deviation increase in the issuer's disadvantage is associated with a 2 to 5 percent improvement in timeliness. Thus, the benefit of improving the timeliness of disclosure after a shift in relative credit risk exceeds the cost.

We also test three cross-sectional predictions of the model. First, we expect disadvantaged issuers' improved disclosure timeliness to be pronounced among issuers in particularly competitive capital markets. These issuers must offer investors the most costly financing terms to make their bonds attractive to investors. Consistent with this prediction, we find that issuers in states with a large number of bonds, those in large states (where more issuers compete for capital from investors), and those that issue new bonds after the recalibration improve the timeliness of their financial statements. For these issuers that are most affected by the competitive shift, disadvantaged issuers' improved disclosure timeliness is pronounced.

Second, we expect the improved disclosure timeliness to be pronounced for disadvantaged issuers that operate in poor governance environments before the recalibration. Disclosure timeliness is not necessary to curb the government official's opportunistic behavior when strong governance mechanisms are in place. By contrast, the role of disclosure timeliness is pronounced for those with weak government mechanisms. Consistent with this expectation, we find that issuers that received qualified audit opinions in the past and those that operate in states with limited voter participation are more likely to improve the timeliness of their financial statements.

Third, we expect disadvantaged issuers' improved disclosure timeliness to be pronounced when the issuer has more discretion over the use of bond funds. Without discretion, government officials do not have the opportunity to use their private information in a way that harms investors. Consistent with this notion, we find disadvantaged issuers' improved disclosure timeliness is pronounced when we limit the sample to general obligation bonds, in which the use of the funds is subject to officials' discretion.

To our knowledge, this paper is the first to consider the implications of capital market competition for disclosure quality. As such, the paper contributes to both the peer effects literature (e.g., Leary and Roberts (2014); Francis et al. (2016); Kedia et al. (2015); Gong et al. (2011)) and the growing body of literature that documents bond issuers use disclosure quality to respond to changes in their own credit risk (Leuz and Schrand, 2009; Cuny, 2016; Basu et al., 2018). Increases (decreases) in an issuer's own assessed credit risk incent the issuer to improve (reduce) disclosure quality. Most of this research assumes that an issuer's response to changing credit risk is made independently of the issuer's peers. However, capital is finite and issuers compete with one another for access to this capital. We add to this literature by documenting that issuers also consider their peers' assessed credit risk when making disclosure decisions. In sum, we enrich the understanding of the role that peers play in opaque and competitive capital markets such as the municipal bond market.

In this spirit, our paper is closely related to a concurrent working paper that examines issuers' own disclosure in response to Moody's recalibration. Gillette et al. (2018) predict that the recalibration reduces issuers' own disclosure benefits and show that Moody's-rated issuers reduce the quantity of public disclosures relative to S&P-rated issuers. They conclude that better credit ratings can adversely affect transparency. We instead examine variation within Moody's-rated issuers in the extent of an issuer's credit rating upgrade relative to its peers. We show that disadvantaged peers improve disclosure timeliness even though their own credit ratings were upgraded. As such, the paper speaks to the SEC's current emphasis on timely access to municipal financial information by documenting that disparity in peers' credit ratings can motivate issuers to provide timelier financial information.

We also contribute to the political economy literature that models the potential conflict of interest between social welfare and the personal welfare of local politicians. Some of these studies consider mechanisms that can limit the social and political costs of this agency conflict. For example, Besley and Burgess (2002) model media coverage as a solution to the social cost of the agency conflict. In this paper, we model a novel channel through which the agency conflict between local government officials and public interests is triggered – by competition within the bond market – and provide empirical evidence that they adjust their disclosure practices in response.

The paper proceeds as follows. In Section 2, we detail the institutional setting. Section 3 presents the model and develops hypotheses. Section 4 describes our research design, section 5 presents results, and section 6 concludes.

2 Institutional Setting

Before 2010, Moody's maintained a dual-class rating system—the Municipal Rating Scale and the Global Rating Scale. The Municipal Rating Scale provides an ordinal ranking of credit risk within the municipal sector, based on distance to distress (i.e., likelihood of default). The rating scale does not account for loss given default, which tends to be small for governmental issuers (Medioli et al., 2012). Under pressure to enhance comparability across asset classes, Moody's recalibrated its municipal credit ratings to the Global Rating Scale in April and May of 2010. The Global Rating Scale, used for corporate bonds, sovereign bonds, and structured financial products, evaluates credit risk based on expected loss (i.e., the product of likelihood of default and loss given default).

Incorporating expected loss given default into municipal bonds' credit ratings results in zero-to-three-notch upgrades for municipal bonds rated by Moody's. The extent of a bond's upgrade depends on the bond's sector and rating. Appendix A provides Moody's primary recalibration algorithm, based on the source of repayment on the bond and the bond's credit rating before the recalibration. According to the algorithm, Moody's expects general obligation bonds to receive the highest upgrades (average of two notches), followed by special tax obligations (average of one notch), followed by housing, healthcare, and other enterprise obligations (average of no change). Most of the housing, healthcare and other enterprise sectors receive no upgrade because they are already well-calibrated with the global scale. The extent of the upgrade also varies with the bond's pre-recalibration credit rating. Moody's expects the highest upgrades to be awarded to mid- to low-rated bonds (those rated between Aa3 and Baa3). Our empirical tests condition on pre-recalibration credit ratings to absorb these differences.

Moody's highlights that: "Market participants should not view the recalibration of municipal ratings as rating upgrades, but rather as a recalibration of the ratings to a different rating scale" (Moody's, 2010). Thus, the resulting upgrade does not reflect a change in the issuer's fundamentals. To determine whether actual upgrades are consistent with the plan laid out by Moody's, Appendix A also documents the number of notches each type of bond is actually upgraded. The actual upgrades for general obligation bonds closely mirror Moody's guidance. As expected, mid-rated general obligation bonds receive the highest upgrades. The actual upgrades for special tax and revenue bonds also broadly mirror Moody's guidance, though it appears Moody's exercised a bit more discretion given the wide variety of revenue sources in these categories. We include a robustness test that limits the sample to general obligation ratings to ensure the results are not driven by Moody's incorporating their opinion about changing fundamentals into the upgrades.

Although the adoption of the new rating criteria by Moody's is not designed to provide new information to market participants, stakeholders and issuers condition their decisions on credit ratings (Boot et al., 2006; Sethuraman, 2018). Empirical evidence shows that the recalibration is consequential for investors, voters, residents, and Moody's itself. Cornaggia et al. (2017) find that higher credit rating upgrades result in greater reductions in the cost of capital. Tang and Li (2019) show that price dispersion increases as the rating scale becomes less granular. Cunha et al. (2018) find that incumbent politicians in upgraded municipalities are more likely to subsequently win elections. Adelino et al. (2017) show that upgraded local governments enjoy greater economic growth and employment. Beatty et al. (2018) find that Moody's collects larger credit rating fees after the recalibration.

Whereas these studies largely focus on the issuers that are advantaged by the recalibration, we consider the implications of the recalibration for issuers that are disadvantaged in a relative sense (those that experience smaller upgrades than their peers). In particular, we ask whether issuers that are disadvantaged relative to their peers respond by improving disclosure timeliness.

3 Proposition & Hypothesis Development

We develop our hypotheses using a parsimonious model. The formal notation and hypotheses are presented in subsection 3.1, and subsection 3.2 provides an illustrative example to demonstrate the main arguments and the mechanism of the model.

3.1 A parsimonious model

Two ex-ante identical municipal government agencies, A and B, sell bonds to a large number of investors. Each investor i has one dollar and chooses to invest in either A or B. We aim to capture the idea that the two issuers compete for capital from the same pool of investors in a parsimonious way: issuer A and B each need to attract half of the investors. An issuer that fails to raise enough capital forgoes the project and receives a reservation payoff that is normalized to zero. The municipal bond issuer's credit worthiness μ is based on the investors' perceived likelihood that they can receive their investment back at $t = 3$ (i.e., non-default probability). Denote by D_0^j (and D_1^j) the default risk of issuer $j \in \{A, B\}$ before (and after) the Moody's recalibration. The two issuers are ex ante identical: they share the same perceived default risk $D_0^A = D_0^B = D_0$ and, hence, offer the same interest rate $r_0^A = r_0^B = r_0$

before the recalibration. After raising the funds, each municipal bond issuer privately learns the state of the local economy θ and then chooses between two investment actions at $t = 2$. To make the discussion concrete, we view the choice as either improving an existing road E or building a new road N. Whether an improved road or a new road is socially optimal depends on the local economy θ (i.e., expected traffic volume, future infrastructure plans, real estate development plans) as well as the incremental cost of the new road. We normalize the social welfare from improving the existing road to zero, and let the *incremental* social gain or loss (also the incremental net present value) from building a new road to be

$$S = \theta K - r\frac{K^2}{2}, \quad (1)$$

where K is the incremental investment to build the new road and r is the cost of financing (i.e., the interest rate). The state of the economy θ, such as the expected traffic volume, is privately known to the bond issuer, i.e., local government. Investors have the prior belief that $\theta \sim U[\underline{\theta}, \bar{\theta}]$ is uniformly distributed between $\underline{\theta}$ and $\bar{\theta}$. Timelier and higher quality public disclosure can help mitigate the information asymmetry by communicating the government official's private information θ to the public. We model disclosure quality as follows: disclosure reveals the government official's private information θ to the public with probability q, and with the complementary probability $1 - q$, disclosure is uninformative. Therefore, the single parameter q is an ex-ante measure of disclosure quality. The issuer chooses its disclosure quality $q \in \{q_L, q_H\}$ upfront at a cost of $C(q)$ and the cost satisfies $C(q_L) = 0 < C(q_H)$. The government official cares about the social welfare (1) generated from the new road, yet he also enjoys personal benefits (such as fame or political benefits) from building a new road. In particular, we assume the government official's incremental personal payoff from building the new road is

$$P = S + bK - C(q), \tag{2}$$

which is the sum of the social value of the new road S shown in (1) and the *personal* benefit bK the official derives from building a new road, net of the disclosure cost $C(q)$. The second term bK gives rise to a potential conflict of interest between the local government official and social welfare. We define the equilibrium formally in Appendix B.

The equilibrium is solved using backward induction. We first solve for the issuer's investment choice I at $t = 2$, taking its earlier disclosure choice θ and bond interest rate r as given. In the second step, we endogenize the issuer's disclosure choice at $t = 1$. The lemma below illustrates the potential conflict of interest between the local government and social preference.

Lemma 1 *Given disclosure quality q and the interest rate r, building a new road maximizes social welfare if the future demand $\theta \geq \theta_S^* \doteq r\frac{K}{2}$. By contrast, the local government prefers to build a new road whenever $\theta \geq \theta_P^* \doteq r\frac{K}{2} - b$.*

From the social-welfare point of view, the local government "over-invests" whenever the local economy θ lies in the interval $\theta \in [\theta_P^*, \theta_S^*]$. Here, the overinvestment takes the form of building a new road when it is socially optimal to improve the existing road. The government's (ex post) inefficient investment decision, in turn, increases the bond's ex-ante assessed default risk (becase the NPV from building a new road is negative for $\theta \in [\theta_P^*, \theta_S^*]$). It is worth noting that our model can incorporate other types of conflicts of interest between the local government (municipal bond issuer) and the public (investors). For instance, the conflict of interest can be interpreted as choosing the location of a community park or a subway station, working with an arm's length contractor or with a contractor run by relatives, building a small or large stadium, or choosing between assuring the quality and rushing the completion of a public project to gain media coverage. A central idea is that higher interest rates can exacerbate the conflict of interest between the public and the local government officials. To crystalize the idea, we assume $\theta_S^* \doteq r_0 \frac{K}{2} \leq \underline{\theta}$. That is, given the initial low interest rate r_0 prior to the recalibration, a new road is the optimal choice from both the government official's perspective and the social-welfare maximization point of view.

A higher interest rate, however, could induce a conflict of interest between the local government officials' personal welfare and the public's social welfare. Suppose that a recalibration reduces issuer A's perceived default risk more than that of issuer B. Default risk is reduced from D_0 to $D_0 - \Delta$, making A's bond more attractive than that of B. As a result, issuer B must take costly actions to restore the competitiveness of its bond relative to its peer A. For example, issuer B could raise its interest rate r_B to retain its half of the underlying investors to fund the project.

We do not explicitly model the market micro-structure in which the (post-recalibration) interest rate r_1^B is determined. Instead, we assume an arbitrage-free type assumption $\frac{r^A}{\mu^A} = \frac{r^B}{\mu^B}$ (i.e., the Indifferent condition in the Definition of Equilibrium). That is, issuer B pays a higher interest rate $r^B > r^A$ if and only if its perceived default risk μ^B is higher than A's default risk μ^A. Fixing $r^A = r_0$, we can derive $r^B = \frac{r_0 \mu^B}{\mu^A - \Delta}$ where Δ is the magnitude of the credit upgrade that A receives from the recalibration. Note that fixing $r^A = r_0$ is a simplifying assumption to retain tractability. We loosen this assumption in the numerical example in section 3.2. The fact that r_A stays as a constant is not critical to our logic. What is essential is that B has to raise r_B in response to A's upgrade.

If the magnitude of A's upgrade Δ is large, issuer B has to increase its interest rate r^B so much that $\theta_S^* \doteq r^B \frac{K}{2} > \underline{\theta}$. In this case, we know from Lemma 1 that the interval $[\theta_P^*, \theta_S^*]$ over which the government invests in negative NPV projects is non-empty. Anticipating that the government officials will *sometimes* make an inefficient investment decision ex post (i.e., building a new road for $\theta \in [\theta_P^*, \theta_S^*]$ even though its NPV is negative), investors correctly assess a higher default risk and demand a higher interest rate. This rational expectation triggers a vicious cycle: a higher interest rate expands the region over which a negative NPV project is subsequently chosen by the issuer, which, in turn, further pushes up the interest rate required by investors. The iterative process continues until the length of the interval $\theta_S^* - \theta_P^*$ equals the issuer's private benefit from building the new road b. The following results summarize the equilibrium interest rate:

Proposition 1 *Issuer B's equilibrium interest rate r_1^B depends on its disclosure quality q and the magnitude of A's upgrade Δ. In particular, there is a uniquely endogenously determined magnitude $\Delta^* = D(1 - \frac{Kr_0}{2\underline{\theta}})$ such that*

i. for $\Delta \leq \Delta^*$, $r^B = \frac{r_0}{D_0 - \Delta} D_0$;

ii. for $\Delta > \Delta^*$, $r^B = \frac{r_0}{D_0 - \Delta}[D_0 + (1-q)\frac{b}{\theta - \underline{\theta}}]$.

When the upgrade issuer A receives is relatively small (i.e., $\Delta \leq \Delta^*$), issuer B only needs to raise its interest rate r^B moderately (to be as attractive to the investors as A) without causing a conflict of interest in the subsequent investment decision.[5] For more substantial

[5]Here, Δ^* is solved by letting $\frac{K}{2} \frac{r_0}{D_0 - \Delta} D_0 = \underline{\theta}$.

upgrades ($\Delta > \Delta^*$), however, issuer B has to raise its interest rate r^B so much that its subsequent investment choice may be socially inefficient (i.e., the government builds a new road even though the public prefers to improve an existing road). The term $[(1-q)\frac{b}{\bar{\theta}-\underline{\theta}}]$ in Part (ii) is the ex-ante likelihood that the issuer makes a negative investment. Investors anticipate this additional risk and, therefore, demand an additional return $\frac{r_0}{D_0-\Delta}[(1-q)\frac{b}{\bar{\theta}-\underline{\theta}}]$ to compensate the excess risk. The term $(1-q)$ in Part (ii) highlights the benefit of improving disclosure quality q. Simply put, higher disclosure quality helps reveal the local government's private information θ to the public, which prevents an ex post inefficient investment choice. This is beneficial from the issuer's perspective because it lowers the interest rate required by investors in the first place. Taking into account the cost of increasing disclosure quality from q_L to q_H, our model makes the following predictions:

Proposition 2 (Empirical Predictions) *Issuer B is more likely to improve its disclosure quality q if:*

i. the credit rating upgrade Δ that its peer A receives is greater;

ii. competition for capital is more fierce;

iii. issuer B's governance mechanisms are weak before the recalibration;

iv. the bond issued by B is a general-purpose bond.

Part (i) is the main prediction of the model and it follows directly from Proposition 1 and its subsequent discussion. Parts (ii) - (iv) are the cross-sectional predictions of the model. To see Part (ii), note that issuer B increasing its interest rate in response to A's upgrade is a key building block of the model. This "contagion" effect arises because the two issuers compete for the same underlying investors (i.e., local residents that receive tax-free interest on the bonds). As the competition for capital intensifies, we expect that issuer B has to respond more aggressively to A's upgrade, and, therefore, is more likely to benefit from higher disclosure quality. The thinking behind Part (iii) is that issuer B's internal and external governance mechanisms play a similar role as the disclosure quality in curbing the government official's inefficient investment choice. Because strong governance mechanisms and a high disclosure quality policy are substitutes in curbing the official's opportunistic/over-investment behavior, we expect that the benefit of improved disclosure quality is pronounced for those with weak governance mechanisms. For Part (iv), if the government official has more (less) discretion over the funds raised, as in the case of general obligation (revenue) bonds, there is intrinsically more (less) *opportunity* for the government officials to pursue their self-benefiting investment. In other words, the government officials' conflict of interest is of more concern if they have more discretion over the use of the funds, increasing the demand for higher disclosure quality.

3.2 An illustrative example

We now provide a numerical example to illustrate the model. Assume that the two issuers' default risk and interest rates $\mu_0 = r_0 = 3\%$ before the recalibration, the incremental cost of building a new road $K = 100$, local government official's private benefit $b = 0.5$, and the prior belief about local economic conditions $\theta \sim U[\underline{\theta}, \bar{\theta}] = U[2, 4]$ for all examples to ease comparison.

In the first example, issuer A receives a relatively small upgrade (i.e., $\Delta = 0.5\%$): its perceived default risk decreases from $\mu_0 = 3\%$ to $\mu^A = 2.5\%$, and r^A falls to 2.75%. The upgrade puts issuer B, who receives no upgrade, at a competitive disadvantage. B has to raise its interest rate r^B to continue to attract half of the investors. In particular, r^B is raised to 3.3% so that the investors are still indifferent between buying either of the two bonds: $\frac{r^A}{\mu^A} = \frac{3\%-0.25\%}{3\%-0.5\%} = \frac{r^B}{\mu^B} = \frac{3.3\%}{3\%}$. Given the post recalibration interest rate $r^B = 3.3\%$, we know from Lemma 1 that building a new road is socially optimal if $\theta > \theta_S^* = \frac{r^B}{2}K = 1.65$. In this case, building a new road is always optimal from the social welfare (or NPV) perspective. This is because $\theta > \theta_S^* = 1.65$ is always satisfied, given the state of the economy θ is distributed between 2 to 4. That is, there is no conflict of interest between the government official and social welfare when the cost of borrowing is relatively low (i.e., when $r^B = 3.3\%$.

In the second example, the upgrade that issuer A receives is large (i.e., $\Delta = 2\%$): its default risk is reduced from 3% to 1% and r^A falls to 2%. Following the same argument as above, one might think that the non-upgrade issuer, B, raises its interest rate r^B to 6.0% in equilibrium to ensure that investors are indifferent between the buying the two bonds, i.e., $\frac{r^A}{\mu^A} = \frac{3-1\%}{3\%-2\%} = \frac{r^B}{\mu^B} = \frac{6.0\%}{3\%}$. However, this is not the complete story because the higher interest rate now triggers the conflict of interest between the government official and social welfare. To see this, we can substitute $r^B = 6.0\%$ into Lemma 1 and show that building a new road is optimal from the social point of view if $\theta > \theta_S^* = \frac{r^B}{2}K = 3.0$, whereas the government official prefers to build a new road whenever $\theta > \theta_P^* = \frac{r^B}{2}K - b = 2.5$. Given the distribution of $\theta \sim U[2,4]$, we know that, for $\theta \in [2.5, 3.0]$, the government official wants to build a new road even though its NPV is negative.

The prospect of making a negative NPV investment ex post (particularly, when $\theta \in [2.5, 3.0]$) introduces extra default risk ex ante beyond the $\mu_0 = 3\%$ default risk before the recalibration. The additional default risk is the ex-ante probability that the local government makes a negative NPV investment: $(1-q)\Pr(2.5 < \theta < 3) = (1-q)\frac{0.5}{\bar{\theta}-\underline{\theta}}$ where q is the issuer's disclosure quality. Investors correctly anticipate the additional default risk and demand a higher interest rate to price protect themselves. The equilibrium interest rate is determined as follows: $r^B = 6.0\% + \frac{r^A}{\mu^A}[(1-q)\Pr(2.5 < \theta < 3)] = 6.0\% + 2(1-q)\frac{0.5}{4-2}$.

Now, it is potentially beneficial for the issuer to improve its disclosure quality q at a cost. Let the quality choice be between $q_L = 0.6$ and $q_H = 1$, with a cost $0 = C(q_L) < C(q_H) = C$. The equilibrium interest rate in this second example would be $r^B = 6.0\% + 2 \times (1-q_L)\frac{0.5}{4-2} = 26\%$ if the issuer chooses low disclosure quality $q_L = 0.6$ upfront, whereas the interest rate will be $r^B = 6.0\%$ if the issuer chooses high $q_H = 1$ disclosure quality instead.

Comparing the two examples, we can see that improving disclosure quality at a cost C is more likely to be worthwhile when the upgrade Δ that issuer A receives is relatively large, but not when the upgrade Δ is small. Specifically, issuer B will choose $q_L = 0.6$ in the first numerical example (where A's upgrade is relatively small $\Delta = 0.5\%$) to save the cost C, for there is no ex-post inefficient investment even when disclosure quality is low. By contrast, issuer B is more likely to choose $q_H = 1.0$ in the second numerical example (where A's upgrade is relatively large $\Delta = 2.0\%$) at the cost C.

4 Research Design

An advantage of our setting lies in the fact that Moody's recalibration results in different levels of credit rating upgrades – and no downgrades – across issuers. Hence, we measure each issuer's credit rating upgrade relative to that of its peer group to identify the extent of that issuer's disadvantage. This disadvantage exists only in a relative sense, allowing us to examine whether competition for capital induces municipal bond issuers to respond to changes in relative risk.

Our research design employs a fixed-effects structure that examines changes in disclosure timeliness for disadvantaged issuers relative to advantaged and neutral issuers, using the following regression specification:

$$Timeliness_{i,t} = \alpha_i + \lambda_t + \beta Disadvantage_i \times Post_t + \delta Disadvantage_i + \theta Post_t + \varepsilon_{i,t} \quad (1)$$

where i indexes bond issuers, t indexes years, α_i denotes issuer fixed effects, and λ_t denotes year fixed effects.

Timeliness is the natural logarithm of one plus the number of days from fiscal year end to the year t completion date of the financial statements. $Post_t$ is an indicator variable that equals one if the issuer signs year t's financial statements after Moody's recalibrates the municipal credit rating scale, and zero otherwise. Appendix C provides a visual illustration of how we define the $Post_t$ variable.

$Abnormal_i$ is the issuer's abnormal upgrade relative to its peer group. Specifically, $Abnormal_i$ is equal to the average upgrade of all of issuer i's municipal bonds rated by Moody's minus the average upgrade of issuer i's peer group. We define peers in three ways, each increasing in precision. We begin by identifying peers as those with the same pre-recalibration credit rating (*Rating*). Then, we refine the peer measure to identify peers as issuers with the same pre-recalibration credit rating in the same state (*Rating&State*). Finally, we identify peers as issuers with the same pre-recalibration credit rating in the same state in the same quintile of population size (*Rating&State&Size*).

The variable of interest is *Disadvantage,* which is equal to the average upgrade across issuer i's peer group minus issuer i's average upgrade if $Abnormal_i$ is negative. If $Abnormal_i$ is positive, the issuer is not disadvantaged by the recalibration, and *Disadvantage* equal to zero. This variable captures the extent of issuer i's disadvantage.

The issuer fixed effects absorb issuer-specific determinants of disclosure timeliness. We control for other time-varying determinants of disclosure timeliness, including changes in Gross State Product (*GSP*) and an indicator variable equal to one if the issuer issues a new bond in the year (*New Issue*). The coefficient of interest, β, estimates the change in issuer i's disclosure timeliness after the recalibration, based on its disadvantage relative to its peers. Because we expect disadvantaged issuers to improve disclosure timeliness, we expect β to be positive. All variables are defined in Appendix D.

4.1 Sample

We describe the construction of the sample in Panel A of Table 1. We obtain the credit rating upgrade for each municipal bond rated by Moody's from Moody's. The recalibration list includes 64,919 bonds across 13,439 issuers.

We limit this list to U.S. local governments (i.e., counties and cities) for three reasons. First, local governments can issue either general obligation bonds or revenue bonds. Proposition 2 in our model illustrates that the greatest opportunity for misalignment between government officials' welfare and social welfare exists when the issuer has more discretion over its funds (i.e., it uses general obligation funds). Second, Moody's recalibration resulted in larger upgrades on bonds backed by local governments than other types of governmental agencies and not-for-profit organizations (see Appendix A). Third, the mapping between

Moody's recalibration data, the Single Audit database, and SDC platinum is relatively straight-forward for cities and counties. After limiting the recalibration list to cities and counties, the sample includes 26,265 unique bonds for 4,573 cities and counties.

The recalibration was enacted at the bond level. Because we measure disclosure at the issuer level, we measure each issuer's upgrade as the average upgrade across all of the issuer's outstanding bonds that are rated by Moody's. We obtain the CUSIP numbers associated with municipal bond issuers from Thomson Reuters SDC Platinum. We use the CUSIP numbers to obtain bond issuers' financial filings from the MSRB's Electronic Municipal Market Access (EMMA) web site. We collect local governments' reporting lags and audit opinions from the Single Audit Clearinghouse. This data is available for 2,560 unique city and county issuers.

For other variables, we collect local government population from the 2010 U.S. Census, supplemented by the American Community Survey provided by the U.S. Census Bureau,[6]. We collect gross state product data from the U.S. Bureau of Economic Analysis (BEA). After requiring non-missing control variables and requiring each issuer to have non-missing timeliness in each year, we obtain our final sample of 7,812 issuer-year observations for 1,302 unique issuers.

Panel B of Table 1 describes the composition of the sample by state. The sample includes 3,786 counties and 4,026 cities. The most represented states in the sample are New York (6.61 percent), Ohio (6.61 percent), Texas (6.30 percent), North Carolina (5.99 percent), Florida (5.68 percent), Minnesota (5.22 percent), California (5.07 percent), and Tennessee (5.07 percent). The only state not represented in our sample is Wyoming.

[6]See https://www.census.gov/2010census.

The sample period spans 2007 to 2012, corresponding to three years before and three years after Moody's recalibration. Table 2 shows that local governments, on average, report financial statements with a 234-day reporting lag (the natural logarithm of 1+234 days is 5.46). The average upgrade associated with Moody's recalibration is 1.54 notches, and the average abnormal upgrade (relative to an issuer's *Rating, Rating&State, Rating&State&Size* peers) is zero. Twenty-five percent of issuers (1,974) are disadvantaged relative to peers with the same pre-recalibration credit rating, 26 percent (2,064) relative to peers with the same rating in the same state, and 19 percent (1,494) relative to peers in the same state, with the same rating, and the same population quintile. Among these disadvantaged issuers, the average size of the disadvantage is 0.52 relative to peers with the same pre-recalibration rating, 0.28 relative to peers with the same rating in the same state, and 0.25 relative to peers with the same rating, in the same state, and in the same size quintile.

5 Empirical Results

5.1 Univariate results

Table 3 provides univariate evidence of changes in *Timeliness* around the recalibration. For the purposes of providing univariate statistics, we define *High Disadvantage* as issuers whose *Disadvantage* is greater than the mean. In Panel A, we define peers as those with the same pre-recalibration credit rating. *High Disadvantage_Rating* are issuers whose *Disadvantage_Rating* exceeds the mean *Disadvantage_Rating* of 0.52. *Low Disadvantage_Rating* includes issuers whose *Disadvantage_Rating* is less than the mean of 0.52. *Disadvantage_Rating=0* includes the issuers whose *Abnormal* upgrade relative to issuers with the same pre-recalibration credit rating equals or exceeds that of its peers.

Panels A, B, and C present a consistent picture: highly disadvantaged issuers improve their disclosure timeliness. In Panel A, *High Disadvantage_Rating* issuers improve *Timeliness* from -5.52 to -5.48 (248 days to 239 days). *Low Disadvantage_Rating*, neutral, and advantaged peers do not statistically or economically change disclosure *Timeliness.* In Panel B, *High Disadvantage_Rating&State* issuers improve *Timeliness* from -5.52 to -5.49 (248 days to 241 days), though this difference is not statistically significant. *Low Disadvantage_Rating&State&Size*, neutral, and advantaged peers do not statistically or economically change disclosure *Timeliness.*

In Panel C, using our most precise definition of peers, *High Disadvantage_Rating&State&Size* issuers improve *Timeliness* from -5.51 to -5.46 (258 days to 245 days). *Low Disadvantage_Rating&State&Size*, neutral, and advantaged peers do not statistically or economically change disclosure *Timeliness.* In sum, the disadvantaged issuers improve timeliness in an absolute sense and relative to the advantaged and neutral issuers. If issuers only respond to changes in their own cost of capital, we should not observe this improvement in disclosure quality.

5.2 Main results

Table 4 tests our main hypothesis. We examine the relation between the extent of an issuer's disadvantage with respect to its peers and its change in *Timeliness* after the recalibration. Columns (1), (3), and (5) exclude issuer and year fixed effects. Columns (2), (4), and (6) include issuer and year fixed effects. In Columns (1) and (2), we define peers as those with the same pre-recalibration credit rating. The positive and significant coefficient on *Disadvantage*Post* in Column (1), 0.039, illustrates that a one-standard deviation increase in *Disadvantage_Rating* is associated with a 2.1 percent improvement in timeliness.[7] In Columns (3) and (4), a one-standard deviation increase in *Disadvantage_Rating&State* is associated with a 3.6 percent improvement in timeliness. In Columns (5) and (6), a one-standard deviation increase in a disadvantaged issuer's upgrade relative to its peers, as measured by *Disadvantage_Rating&State&Size,* is associated with a 5.2 percent improvement in timeliness.

The coefficient on *Post* is insignificant in all columns, corroborating the evidence presented in Table 3 that *Timeliness* did not change broadly after the recalibration. When we exclude year fixed effects, *ΔGSP* and *New Issue* tend to be negatively correlated with disclosure timeliness, perhaps because these events induce more economic activity. When we include year fixed effects, the coefficients on the two control variables: *ΔGSP* and *New Issue* are statistically insignificant.

The evidence in Table 4 collectively suggests that municipal bond issuers improve their disclosure timeliness in response to an increase in their peers' credit ratings. Further, our results are pronounced in Columns (5) and (6), suggesting that the most precise definition of peers that compete for capital best identifies incentives to improve disclosure timeliness. We define peers as issuers with the same pre-recalibration credit rating, in the same state, and in the same population quintile in all remaining tables.

[7]The log-transormed coefficient of 0.039 implies a percentage change of 3.98 percent ([1-exp(0.039)]*100), multiplied by the standard deviation of *Disadvantage_Rating* of 0.54.

5.3 Cross-sectional results

Table 5 tests our cross-sectional predictions. In Columns (1) through (3), we examine cross-sectional variation in the extent to which issuer B competes with issuer A for capital. The model predicts that the positive relation between *Timeliness* and *Disadvantage*Post* is pronounced when competition for capital is greater. We identify three proxies that capture heightened competition for capital. First, issuers domiciled in states with an above-median number of CUSIPs face stronger competition for capital than those with a below-median number of CUSIPs. Second, competition for capital is stronger in the ten largest states, by population (CA, TX, FL, NY, PA, IL, OH, GA, NC, and MI). Third, issuers that need to raise capital after the recalibration (i.e., those who issue bonds in the post-recalibration period) face more competition for capital than those that do not. We include these variables (*XS Variable*) in our regressions as interaction terms. We expect the coefficient on *Disadvantage*Post*XS Variable* to be significantly positive.

Column (1) shows that the coefficient on *Disadvantage*Post*ManyCusips* is statistically and economically positive. Column (2) shows that the coefficient on *Disadvantage*Post*LargeState* is statistically and economically positive. Column (3) shows that the coefficient on *Disadvantage*Post*NewBonds* is statistically and economically positive. Collectively, the evidence provided in these three columns indicates that the improved timeliness from disadvantaged issuers is pronounced when competition for capital is stronger. This finding supports our hypothesis and helps to illustrate that the competitiveness of the municipal bond market affects issuers' capital market incentives to improve disclosure timeliness.

Columns (4) and (5) tests our second cross-sectional prediction. Our model predicts that the positive relation between *Timeliness* and *Disadvantage**Post* is pronounced when governance was weak before the recalibration. Column (4) shows that our results are stronger among issuers that received at least one qualified audit opinion before the recalibration. Column (5) shows that our results are pronounced among issuers that are not heavily monitored by voters (i.e., those in states with the lowest quintile of voter participation). These findings are consistent with our hypothesis and suggest that issuers are particularly likely to invest in disclosure timeliness to restore their market competitiveness when their existing governance mechanisms are weak.

Column (6) tests our third cross-sectional prediction. Our primary analyses measure each issuer's upgrade as the average upgrade across all of the issuer's recalibrated (general obligation and revenue) bonds. However, we expect the improvement in timeliness to be pronounced for issuers with the most discretion over the use of bond funds. Column (6) measures each issuer's upgrade as the change in its general obligation credit rating. Our results are statistically and economically pronounced when we measure *Disadvantage* using general obligation ratings only.

5.4 Robustness and additional analyses

In Table 6, we validate that our results are robust to alternate measurement of the independent variables and control samples. In Columns (1) and (2), we measure *Disadvantage* in different ways to ensure our results are not sensitive to measurement. Column (1) measures *Disadvantage* as an indicator equal to one if $Abnormal_i$ is negative.

The coefficient on *Disadvantage*Post* remains statistically and economically positive. In Column (2), we use $Abnormal_i$ (a continuous measure of relative *advantage*) as our main independent variable. The coefficient on *Abnormal*Post* is significantly negative, consistent with the idea that disadvantaged issuers improve disclosure timeliness after the recalibration.

To ensure the results are not driven by the control sample, Columns (3) through (5) include different control samples. In Column (3), we address the concern that our regression specifications pool together issuers that were advantaged ($Abnormal_i > 0$) and those that were neutrally affected ($Abnormal_i = 0$) by the recalibration. We limit the control sample to neutrally affected issuers by creating a new variable, *Advantage,* which is equal to issuer i's average upgrade minus the average upgrade across issuer i's peer group if $Abnormal_i$ is positive, and otherwise equal to zero. The coefficient on *Advantage*Post* is insignificant and the coefficient on *Disadvantage*Post* is significantly positive, consistent with the idea that our results are driven by the disadvantaged issuers improving timeliness after the recalibration, not the advantaged issuers reducing timeliness.

In Column (4), we include issuers that are not rated by Moody's, and thus, are not affected by the recalibration, as a control group. We derive this control group from the 1,109 cities and counties (6,654 issuer-year observations) with similar available data in the Single Audit database. The coefficient on *Disadvantage*Post* remains significantly positive.

A potential concern with Column (4) is that we pool unrated issuers and those rated by S&P in the control sample. Unrated issuers are potentially different than rated issuers. In Column (5), we limit both this control group and the recalibrated issuers to those that are rated by Standard and Poor's. We download Standard and Poor's credit rating data for municipal bonds from OpenDataSoft, a private software company specializing in sharing and transforming structured data, specifically related to government data, economy, health, education, culture, transport, energy, and environment.[8] After imposing this data requirement, we obtain 1,123 issuers (6,738 issuer-year observations) for the recalibrated group and 742 issuers (4,452 issuer-year observations) for the control group. Column (5) shows that the main findings are robust to limiting the control sample to issuers that are rated by Standard & Poor's (the coefficient on *Disadvantage*Post* remains significantly positive).

6 Conclusion

Peer-based benchmarking is common in the opaque and competitive market for municipal debt. Although a considerable literature in accounting examines the relation between disclosure and product market competition, few studies consider the relation between disclosure and capital market competition. We develop a model that shows competition for capital induces issuers to improve disclosure quality in response to a reduction in their peers' credit risk.

We use the 2010 recalibration of Moody's municipal rating scale as a setting to empirically identify changes in relative credit risk. Although the recalibration resulted in higher ratings for many issuers, it did not equally advantage all issuers within a peer group. Instead, the recalibration made the lesser-upgraded (disadvantaged) issuers' bonds less attractive to investors than their greater-upgraded (advantaged) peers. The appeal of this setting comes from the fact that municipal bond issuers were only disadvantaged in a relative sense – none of the bonds were actually downgraded. Thus, the relatively disadvantaged issuers will

[8] See https://public.opendatasoft.com.

only respond to the recalibration with improved disclosure quality if competition for capital induces them to care about their relative credit risk.

Consistent with the model's predictions, we find that lesser-upgraded issuers improve their disclosure timeliness in response to their disadvantage. These findings are relevant to regulators in the municipal bond sector searching for mechanisms to improve the timeliness of financial information by illustrating the competition for capital can help achieve this objective.

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Appendix A: Moody's Recalibration

In March of 2010, Moody's published a report detailing its plans to recalibrate its long-term U.S. municipal credit ratings to its global rating scale. Table 1 of the report includes the number of notches it expected each bond to be upgraded, based on the source of repayment on the bond and the bond's credit rating before the recalibration. We reproduce Table 1 of the report below (the columns labeled "Planned") and tabulate the average actual upgrade for each rating/source of repayment category ("Actual"). Column "GO" contains the following types of bonds: General Obligation; Water & Sewer; Distribution only Utilities; Municipal Utility Districts. Column "Special Tax" contains the following types of bonds: Special Tax (Non-GO); Mass Transit; Non-Utility Enterprises; Tax Increment Financing Districts (Tifs); Grant Anticipation Revenue Bonds. Column "Public Universities" contains public universities. Column "Revenue" includes: Health Care; Housing; Private K-12 & Charter Schools; Private Universities & Other Not-For-Profits; Transportation & Other Infrastructure Enterprises; Power Generating Utilities; State Revolving Funds; Bond Banks; Federal Leases.

	GO		Special Tax		Public Universities		Revenue	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
Aaa	0	0.00	0	0.00	0	N/A	0	0.00
Aa1	0-1	0.74	1	0.41	0-1	N/A	0	0.04
Aa2	1	0.98	1	0.51	1	1.00	0	0.09
Aa3	1	0.98	1	0.85	1	1.00	0	0.29
A1	2	1.93	1	0.98	1	N/A	0	0.44
A2	2	1.99	1	1.08	1	N/A	0	0.49
A3	2	1.99	1	1.10	1	N/A	0	0.54
Baa1	3	2.97	1	1.17	1	N/A	0	0.45
Baa2	3	2.99	0	0.40	1	N/A	0	0.60
Baa3	2-3	2.38	0	0.37	1	N/A	0	0.84
Ba1	0	0.13	0	0.00	0	N/A	0	0.26
Ba2	0	0.00	0	0.00	0	N/A	0	0.00
Ba3	0	0.21	0	0.00	0	N/A	0	0.00
B1	0	0.00	0	0.00	0	N/A	0	0.00
B2	0	0.00	0	0.00	0	N/A	0	0.00
B3	0	N/A	0	0.00	0	N/A	0	0.00
Caa1	0	0.00	0	0.00	0	N/A	0	0.00
Caa2	0	N/A	0	N/A	0	N/A	0	N/A
Caa3	0	N/A	0	N/A	0	N/A	0	0.00

Appendix B: Model Proofs

Definition of equilibrium: An equilibrium is a collection of a bond issuer's choice of disclosure quality $q \in [q_L, q_H]$ at $t = 1$, investment choice $I \in \{E, N\}$ at $t = 2$, and investors' choice of which bond to buy such that:

- Ex-ante optimal: the issuing government chooses its disclosure quality q at $t = 1$ to maximize its expected payoff P.
- Sequential optimal: the issuing government's investment choice $I \in \{E, N\}$ is sequentially rational at $t = 2$, given the observed θ and the public disclosure y.
- Rational conjecture: given the issuer's disclosure quality choice q, the investors form a conjecture $\hat{I}$ about the issuer's investment strategy, and the conjecture is correct in equilibrium, i.e., $\hat{I} = I$.
- Indifferent condition: investors are indifferent between buying A or B in equilibrium.

Proof of Lemma 1. Since the social gain S and the government official's payoff P are defined on an incremental basis, it follows that building the new road maximizes social welfare if and only $S > 0$, which is equivalent to $\theta \geq \theta_S^* \doteq r\frac{K}{2}$. Similarly, local government officials are better off building the new road if and only if $P > 0$, which is equivalent to $\theta \geq \theta_P^* \doteq r\frac{K}{2} - b$. ■

Proof of Proposition 1. We adopt a arbitrate-free type assumption $\frac{r^A}{D^A} = \frac{r^B}{D^B}$. We can derive $r^B = \frac{r_0 D^B}{D_0 - \Delta}$ where D_0 and r_0 are the two issuers' default risk and interest rate prior to the recalibration, and Δ is the magnitude of the credit rating upgrade that A receives from the recalibration. It remains to determine B's equilibrium default risk D^B *after* the recalibration. We first derive the critical threshold $\Delta^* \doteq D(1 - \frac{Kr_0}{2\underline{\theta}})$ below which issuer B's (post-recalibration) default risk is unchanged even though its interest rate $r^B = \frac{r_0 D_0}{D_0 - \Delta}$ is higher than its original level r_0. Substituting $r^B = \frac{r_0 D_0}{D_0 - \Delta}$ into θ_S^* derived in Lemma 1, we obtain that $\theta_S^* \leq \underline{\theta}$ if and only if $\Delta \leq \Delta^* \doteq D(1 - \frac{Kr_0}{2\underline{\theta}})$. Given the state of the economy $\theta \sim U[\underline{\theta}, \bar{\theta}]$, this means that the interest rate $r^B = \frac{r_0 D_0}{D_0 - \Delta}$ is still low enough that building a new road is always favored by the investors. It is easy to see that the government official also prefers the new road in this case (for $\theta_P^* < \theta_S^*$). In other words, for $\Delta \leq \Delta^*$, there will be no conflict of interest between the government and investors, implying that B's default risk (post-recalibration) is still unchanged even thought r^B is moderately higher. This proves Part (i) of the proposition. For $\Delta > \Delta^*$, B's post-recalibration default risk r^B will be higher than D_0. To see that $r^B = r_0$ cannot be an equilibrium, note that substituting $r^B = \frac{r_0 D_0}{D_0 - \Delta}$ into θ_S^*, we observe the resulting θ_S^* is higher than $\underline{\theta}$. This means that, for $\theta \in [\underline{\theta}, \theta_S^*]$, the local government will build a new road even though its NPV is negative, which increases the ex-ante default risk. Following the discussion in the text, we know that these processes reinforce each other and continue until $\theta_S^* - \theta_P^* = b$. Viewed ex ante, the additional risk (associated with officials' inefficient ex post investment decision) is $(1-q)\frac{b}{\bar{\theta} - \underline{\theta}}$. Substituting $D^B = D_0 + (1-q)\frac{b}{\bar{\theta} - \underline{\theta}}$ into $r^B = \frac{r_0 D^B}{D_0 - \Delta}$ proves Part (ii) of the proposition. ■

Proof of Proposition 2. The argument, which is summarized in the text, follows from Lemma 1 and Proposition 1. ■

Appendix C: Demonstration of Research Design

This table demonstrates the definition of Recalibrated (treated=1, control=0), Upgrade, and Post for local governments with different fiscal year-ends and report dates. The Post variable is defined based on the report date of the local government relative to the date of Moody's recalibration, as demonstrated in columns FY2007 to FY2012.

Local Government	Recalibrated	Upgrade	Year-end		FY2007	FY2008	FY2009	FY2010	FY2011	FY2012
City of Arlington, TX	1	1	Sep 30	Report Date	Apr 21, 2008	Mar 31, 2009	Mar 16, 2010	Mar 17, 2011	Apr 9, 2012	Mar 20, 2013
				Value of *Post*	0	0	0	1	1	1
City of Ketchikan, AK	1	3	Dec 31	Report Date	May 8, 2008	Jun 3, 2009	May 19, 2010	May 27, 2011	May 15, 2012	Aug 15, 2013
				Value of *Post*	0	0	1	1	1	1
County of Tuolumne, CA	1	2	Jun 30	Report Date	Jun 27, 2008	Mar 20, 2009	May13, 2010	Mar 17, 2011	Mar 26, 2012	Mar 15, 2013
				Value of *Post*	0	0	1	1	1	1
City of Saint Paul, AK	0	N/A	Dec 31	Report Date	Jul 24, 2008	Jul 23, 2009	Jun 18, 2010	Jun 29, 2011	Sep 17, 2012	Jul 9, 2013
				Value of *Post*	0	0	1	1	1	1
County of Augusta, VA	0	N/A	Jun 30	Report Date	Jan 3, 2008	Dec16, 2008	Jan 5, 2010	Dec 20, 2010	Dec 20, 2011	Jan 16, 2013
				Value of *Post*	0	0	0	1	1	1
City of Bellevue, WA	1	0	Dec 31	Report Date	Sep 8, 2008	Sep 1, 2009	Sep 27, 2010	Sep 28, 2011	Sep 27, 2012	Sep 24, 2013
				Value of *Post*	0	0	1	1	1	1

Appendix D: Variable Definitions

Variable	Definition
Abnormal	The average upgrade of an issuer's municipal bonds rated by Moody's less that of all issuers in the same peer group. We define peer groups in three ways: (1) issuers that have *the same credit rating* before the recalibration, (2) issuers with *the same credit rating* before the recalibration and domiciled in *the same state*, and (3) issuers with *the same credit rating* before the recalibration, domiciled in *the same state*, and in *the same population quintile* before the recalibration.
Disadvantage	The average upgrade across issuer i's peer group minus issuer i's average upgrade if *Abnormal<0*, and otherwise equal to zero.
ΔGSP	The annual percentage change in gross state product.
New issue	An indicator variable that equals one if a local government issues a municipal bond in year t and zero otherwise.
Post	An indicator variable that equals one if a local government signs off its financial statements after Moody's recalibration.
Timeliness	The local government's reporting timeliness, measured as the natural log of one plus the issuer's reporting lag between the fiscal year end and the filing date of the financial statements, multiplied by -1.
Upgrade	The average credit rating upgrade of the issuer's municipal bonds rated by Moody's.

Table 1: Sample Construction and composition

This table describes the construction and composition of our sample. In Panel A, we begin with Moody's list of recalibrated bonds and proceed to measure reporting quality at the issuer level. In Panel B, we describe the sample composition of the sample by state.

Panel A: Sample construction

	Bonds	Issuers	Issuer-years
Moody's Recalibration list	64,919	13,439	N/A
After limiting to cities and counties	26,265	4,573	N/A
After requiring Single Audit data	N/A	2,560	11,866
After requiring observable controls	N/A	1,686	9,356
After requiring measurable disclosure variable in all 6 years	N/A	1,302	7,812

Panel B: Sample composition

State	County	City	Total	Percentage	State	County	City	Total	Percentage
AK	30	6	36	0.46%	MT	0	24	24	0.31%
AL	60	102	162	2.07%	NC	348	120	468	5.99%
AR	6	18	24	0.31%	ND	24	36	60	0.77%
AZ	18	78	96	1.23%	NE	18	30	48	0.61%
CA	132	264	396	5.07%	NH	6	48	54	0.69%
CO	60	48	108	1.38%	NJ	108	96	204	2.61%
CT	0	84	84	1.08%	NM	30	78	108	1.38%
DE	12	12	24	0.31%	NV	18	12	30	0.38%
FL	210	234	444	5.68%	NY	294	222	516	6.61%
GA	78	42	120	1.54%	OH	294	222	516	6.61%
HI	18	0	18	0.23%	OK	6	12	18	0.23%
IA	78	108	186	2.38%	OR	66	66	132	1.69%
ID	0	18	18	0.23%	PA	102	60	162	2.07%
IL	72	126	198	2.53%	RI	0	54	54	0.69%
IN	42	42	84	1.08%	SC	96	54	150	1.92%
KS	42	60	102	1.31%	SD	12	24	36	0.46%
KY	24	42	66	0.84%	TN	330	66	396	5.07%
LA	0	54	54	0.69%	TX	192	300	492	6.30%
MA	0	234	234	3.00%	UT	42	36	78	1.00%
MD	102	30	132	1.69%	VA	144	156	300	3.84%
ME	6	66	72	0.92%	VT	0	6	6	0.08%
MI	168	156	324	4.15%	WA	108	126	234	3.00%
MN	288	120	408	5.22%	WI	0	144	144	1.84%
MO	36	36	72	0.92%	WV	0	6	6	0.08%
MS	66	48	114	1.46%	Total	3,786	4,026	7,812	100%

Table 2: Descriptive statistics

This table describes the main test variables used in the study. We define peer groups in three ways: (1) issuers with the same pre-recalibration credit rating (*Rating*), (2) issuers with the same pre-recalibration credit rating that are domiciled in the same state (*Rating&State*), (3) issuers with the same pre-recalibration credit rating that are domiciled in the same state and are in the same population quintile (*Rating&State&Size*). All variables are defined in Appendix D.

	Obs	Mean	Std Dev	P10	P25	P50	P75	P90
Timeliness	7,812	-5.46	0.31	-5.81	-5.61	-5.46	-5.25	-5.12
Unqualified	7,812	0.934	0.248	1.00	1.00	1.00	1.00	1.00
Upgrade	7,812	1.54	0.75	0.67	1.00	2.00	2.00	2.00
Abnormal_Rating	7,812	0.00	0.41	-0.61	-0.02	0.09	0.20	0.34
Abnormal_Rating&State	7,812	0.00	0.28	-0.26	0.00	0.00	0.07	0.24
Abnormal_Rating&State&Size	7,812	0.00	0.22	-0.11	0.00	0.00	0.00	0.18
Disadvantage_Rating	1,974	0.52	0.49	0.02	0.12	0.46	0.71	1.16
Disadvantage_Rating&State	2,064	0.28	0.32	0.01	0.04	0.16	0.43	0.73
Disadvantage_Rating&State&Size	1,494	0.25	0.30	0.00	0.04	0.14	0.42	0.63

Table 3: Univariate statistics

We summarize changes in issuers' reporting timeliness, based on an issuer's disadvantage relative to its peer group after Moody's Recalibration. In Panel A, we define peers as issuers that have the same pre-recalibration credit rating. In Panel B, we define peers as issuers that have the same pre-recalibration credit rating and are domiciled in the same state. In Panel C, we define peers as issuers that have the same pre-recalibration credit rating, are domiciled in the same state, and are in the same population quintile. *Timeliness* is the natural logarithm of an issuer's reporting lag plus one, multiplied by -1. *Disadvantage* is equal to the average upgrade across issuer *i*'s peer group minus issuer *i*'s average upgrade if the peer group's upgrade exceeds that of the peers, and otherwise equal to zero. *High Disadvantage* refers those that are above the mean disadvantage (i.e., *Disadvantage_Rating* exceeds the mean of 0.52, *Disadvantage_Rating&State* exceeds the mean of 0.28, or *Disadvantage_Rating&State&Size* exceeds the mean of 0.25). *Low Disadvantage* refers to those that are lightly disadvantaged (*Disadvantage_Rating, Disadvantage_Rating&State, Disadvantage_Rating&State&Size* are less than the mean). *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level using two-tailed tests, respectively.

Panel A: Disadvantage_Rating					
	Obs	Pre	Post	Diff	LESS Disadvantage=0
High Disadvantage_Rating	912	-5.519	-5.480	0.039*	0.040*
Low Disadvantage_Rating	1,062	-5.420	-5.439	-0.019	-0.017
Disadvantage_Rating=0	5,838	-5.458	-5.460	-0.001	

Panel B: Disadvantage_Rating&State					
	Obs	Pre	Post	Diff	LESS Disadvantage=0
High Disadvantage_Rating&State	744	-5.518	-5.491	0.028	0.029
Low Disadvantage_Rating&State	1,320	-5.411	-5.416	-0.005	-0.004
Disadvantage_Rating&State=0	5,748	-5.464	-5.465	-0.001	

Panel C: Disadvantage_Rating&State&Size					
	Obs	Pre	Post	Diff	LESS Disadvantage=0
High Disadvantage_Rating&State&Size	558	-5.51	-5.46	0.05*	0.05*
Low Disadvantage_Rating&State&Size	936	-5.39	-5.40	-0.01	-0.01
Disadvantage_Rating&State&Size=0	6,318	-5.47	-5.47	-0.00	

Table 4: Disclosure timeliness and credit rating disadvantage

$$Timeliness_{i,t} = \alpha_i + \lambda_t + \beta Disadvantage_i \times Post_t + \delta Disadvantage_i + \theta Post_t + \varepsilon_{i,t}$$

This table presents the results of OLS regressions of *Timeliness* on the extent to which Moody's recalibration disadvantaged an issuer. *Timeliness* is the natural logarithm of an issuer's reporting lag plus one, multiplied by -1. *Disadvantage* is equal to the average upgrade across issuer *i*'s peer group minus issuer *i*'s average upgrade if the peer group's upgrade exceeds that of the peers. Otherwise, *Disadvantage* is equal to zero. In Columns (1) and (2), we define peers as issuers with the same pre-recalibration credit rating. In Columns (3) and (4), we define peers as issuers with the same pre-recalibration credit rating that are domiciled in the same state. In Columns (5) and (6), we define peers as issuers with the same pre-recalibration credit rating that are domiciled in the same state and are in the same population quintile. *Post* is an indicator equal to one if the year t financial statements are filed after Moody's 2010 municipal rating scale recalibration. Columns (2), (4), and (6) exclude issuer and year fixed effects. Columns (2), (4), and (6) include issuer and year fixed effects. Standard errors clustered at the issuer level are reported in parentheses underneath the coefficient estimates. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level using two-tailed tests, respectively. All variables are defined in Appendix D.

	(1)	(2)	(3)	(4)	(5)	(6)
	Rating		Rating & State		Rating & State & Size	
Disadvantage*Post	0.039**	0.032*	0.067**	0.084***	0.095***	0.091**
	(0.016)	(0.017)	(0.029)	(0.032)	(0.033)	(0.038)
Disadvantage	-0.077***		-0.106**		-0.114**	
	(0.026)		(0.045)		(0.057)	
Post	0.001	0.012	0.001	0.010	0.001	0.012
	(0.007)	(0.013)	(0.007)	(0.013)	(0.007)	(0.013)
ΔGSP	-0.003**	-0.000	-0.003**	-0.000	-0.003**	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
New Issue	-0.019*	0.006	-0.017*	0.006	-0.017*	0.005
	(0.010)	(0.007)	(0.010)	(0.007)	(0.010)	(0.007)
Observations	7,812	7,812	7,812	7,812	7,812	7,812
R-squared	0.005	0.695	0.004	0.696	0.003	0.696
Issuer fixed effects	No	Yes	No	Yes	No	Yes
Year fixed effects	No	Yes	No	Yes	No	Yes

Table 5: Cross-sectional variation

This table presents the results of OLS regressions of *Timeliness* on the extent to which Moody's recalibration disadvantaged an issuer. *Timeliness* is the natural logarithm of an issuer's reporting lag plus one, multiplied by -1. The cross-sectional variable (*XS Variable*) in Column (1) is an indicator equal to one in states with an above-median number of CUSIPs. In Column (2), it is equal to one if the issuer is in one of the ten largest states, by population. In Column (3), it is an indicator equal to one if the issuer issued new bonds in the post-recalibration period. In Column (4), it is an indicator equal to one if the issuer received a qualified opinion from its auditor in at least one of the three years before the recalibration. In Column (5), it is an indicator variable if the issuer is domiciled in a state in the lowest quintile of voters' participation in elections. *Disadvantage* is equal to the average upgrade across issuer i's peer group minus issuer i's average upgrade if the peer group's upgrade exceeds that of the peers. Otherwise, *Disadvantage* is equal to zero. We define peers as issuers that: have the same pre-recalibration credit rating, are domiciled in the same state, and are in the same population quintile. In Column (6), *Disadvantage* is calculated based only on General Obligation (GO) credit ratings. *Post* is an indicator equal to one after Moody's 2010 municipal rating scale recalibration. All columns include issuer and year fixed effects. Standard errors clustered at the issuer level are reported in parentheses underneath the coefficient estimates. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level using two-tailed tests, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Many CUSIPs	Large State	New Bonds	Poor Reporting Governance	Low Voter Monitor	GO Only
Disadvantage*Post*XS Variable	0.127*	0.201***	0.142**	0.309***	0.198*	
	(0.067)	(0.064)	(0.066)	(0.091)	(0.115)	
Disadvantage*Post	0.023	-0.046	-0.024	0.061*	0.063*	0.120**
	(0.040)	(0.046)	(0.051)	(0.031)	(0.032)	(0.057)
XS Variable*Post	-0.020*	-0.031**	0.005	0.002	-0.002	
	(0.012)	(0.012)	(0.016)	(0.026)	(0.016)	
Post	0.020	0.025*	0.008	0.012	0.013	0.020
	(0.013)	(0.014)	(0.019)	(0.013)	(0.013)	(0.014)
ΔGSP	-0.000	0.000	-0.000	-0.000	-0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
New Issue	0.006	0.006	0.005	0.006	0.006	0.006
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Observations	7,812	7,812	7,812	7,812	7,812	6,858
R-squared	0.696	0.696	0.696	0.696	0.696	0.684
Issuer fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 6: Robustness

$$Timeliness_{i,t} = \alpha_i + \lambda_t + \beta Disadvantage_i \times Post_t + \delta Disadvantage_i + \theta Post_t + \varepsilon_{i,t}$$

This table checks the robustness of our primary results. *Timeliness,* the dependent variable, is the natural logarithm of an issuer's reporting lag plus one, multiplied by -1. Columns (1) and (2) use alternative measures of *Disadvantage*. Column (1) defines *Disadvantage* as an indicator equal to one if the average upgrade across issuer i's peer group exceeds issuer i's average upgrade, and otherwise equal to zero. Column (2) defines *Disadvantage* as issuer i's *Abnormal* upgrade. *Abnormal* is equal to issuer i's average upgrade minus the average upgrade across the issuer's peer group, j. Columns (3) - (5) present results using alternative control samples. In these columns, *Disadvantage* is equal to the average upgrade across issuer i's peer group minus issuer i's average upgrade if the peer group's upgrade exceeds that of the peers. Otherwise, *Disadvantage* is equal to zero. Column (3) separately examines advantaged ($Abnormal>0$) and disadvantaged ($Abnormal<0$) issuers, using neutral issuers ($Abnormal=0$) as the control group. Column (4) includes issuers that are not rated by Moody's, and thus, are not recalibrated as controls. Column (5) includes issuers that are not rated by Moody's, but are rated by S&P as controls. We define peers as issuers with the same pre-recalibration credit rating that are domiciled in the same state and are in the same population quintile. *Post* is an indicator equal to one if the year t financial statements are filed after Moody's 2010 municipal rating scale recalibration. All columns include issuer and year fixed effects. Standard errors clustered at the issuer level are reported in parentheses underneath the coefficient estimates. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level using two-tailed tests, respectively. All variables are defined in Appendix D.

	(1)	(2)	(3)	(4)	(5)
	Alternate Disadvantage		Alternative Control Group		
	(Indicator)	(Abnormal)	Abnormal=0	Non-recalibrated	S&P-rated
Disadvantage*Post	0.043**	-0.057**	0.090**	0.099***	0.107***
	(0.020)	(0.026)	(0.038)	(0.036)	(0.037)
Advantage*Post			-0.012		
			(0.039)		
Post	0.013	0.017	0.013	0.001	0.000
	(0.013)	(0.013)	(0.013)	(0.010)	(0.010)
ΔGSP	-0.000	-0.000	-0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
New Issue	0.005	0.006	0.006	0.006	0.005
	(0.007)	(0.007)	(0.007)	(0.006)	(0.006)
Obs	7,812	7,812	7,812	14,466	11,190
R-squared	0.695	0.695	0.696	0.683	0.695
Issuer fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes