Did Government Regulations Lower Credit Rating Quality?

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Abstract

New SEC regulations in 1975 gave select ratings agencies increased market power by increasing barriers to entry and increasing reliance on ratings for regulations. We test whether these regulations led to lower ratings quality. We find that defaults and other negative credit events are more likely for firms given the same rating if the rating was assigned after the SEC action compared to before. We also find the default likelihood is stronger for smaller firms, as these firms are less visible and less likely to harm reputational capital. These results indicate that the market power derived from the SEC led to lower ratings quality.

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1 Introduction

Credit ratings assess the creditworthiness of corporate bonds, but the quality of these ratings has been questioned. Current debate surrounding the role of credit rating agencies focuses on potentially changing the way these agencies are paid and whether to decrease the reliance on credit ratings in rules and regulations.[1] The use of ratings in rules and regulations was solidified in June of 1975, when the Securities and Exchange Commission (SEC) issued new rules that established bank and broker-dealer capital requirements based specifically on ratings, and designated that ratings only from a select group of agencies would count for these regulations. Rating agencies whose ratings could be used in regulations, including both Moody's and Standard and Poor's, were defined for the first time as Nationally Recognized Statistical Ratings Organizations or "NRSROs." These changes certified the value of ratings provided by these NRSROs to companies and investors, thereby giving these rating agencies new significance in the marketplace, and increased barriers to entry in the rating industry. Arguably, ratings from these select agencies henceforth had guaranteed value in the marketplace regardless of the quality of the ratings, thus changing the incentive structure for these rating agencies. In this paper, we investigate whether this new regulatory standing led to lower ratings quality.

The main focus of this paper is to test whether ratings quality deteriorates after June 1975 (the post "SEC-certification" period) compared to ratings quality before the new rules. We examine this issue first by comparing default likelihoods for firms rated before the new regulations to the default likelihoods for firms whose ratings were initiated with the same rating in the post SEC-certification period. We find that, conditional on the rating, firms have a greater likelihood of default if they were rated in the post period relative to those rated in the pre period. If the new rules have no effect on ratings quality, we would expect that, for

[1] For example, the Dodd-Frank bill calls for investigations into both of these issues.

example, a firm rated Baa before the rule change should have the same probability of default as those rated Baa after the rating change. Instead, we find that firms of a given rating after June 1975 are more likely to default than firms with that same rating prior to June 1975.

We use two different windows of analysis to decrease the likelihood that our results are contaminated by some omitted macro factors. Our main tests use the same post period window for defaults for both the treatment and control groups (from July 1975 to the end of 1987). This approach guarantees that all bond issues in the pre and post period face the same macro environment during the evaluation period of our predictive tests. We also conduct tests that use the same length of time following the time when the rating was issued (10 years). Our results are similar across both approaches. We also examine two other measures of ratings quality: The likelihood that a firm rated investment grade is eventually downgraded to speculative grade, and changes in Altman z-score (Altman, 1968). The results hold for all three of these measures of credit risk, i.e. firms with the same rating are more likely to have negative changes in these measures of credit risk if rated in the post period. These results imply that rating agencies gave more favorable ratings to firms following the new regulations of June 1975. Our results are consistent with a regulatory power hypothesis: Since rating agencies were given a guaranteed client base due to the new regulations, the agencies could focus more on new business generation with less concern for their ratings quality. To our knowledge, this is the first paper to show that the introduction of NRSRO status is at least partially responsible for lower ratings quality.

We conduct additional tests to explore how incentives may have changed for ratings agencies in the post SEC-certification period. We conduct cross-sectional tests to examine whether large or small firms are rated differently following SEC-certification. Ratings agencies still must consider their reputational capital when determining ratings. As such, we posit that

ratings agencies may be more likely to inflate ratings of smaller firms in the post period, since these firms are less visible and therefore negative credit events may have less impact on rating agency reputational capital. For larger firms, ratings agencies might choose to provide ratings that are accurate to avoid any significant events that would impact their reputation. We provide evidence consistent with this conjecture. While our main result holds for both large and small firms, default likelihoods are significantly higher for small firms in the post period, conditional on ratings levels. Z-scores are also more likely to fall for small firms in the post period compared to large firms. Ratings quality deteriorates more for small firms following the SEC action. But rating agencies might also choose to provide favorable ratings for larger firms to gain their business, since these are the firms most likely to generate future fees. We find some evidence for this, but only for investment grade firms. Large firms rated investment grade in the post period are more likely to be downgraded to speculative grade than large firms rated investment grade in the pre period. So ratings agencies provide favorable ratings to large investment grade firms, but for firms closer to default, they are more likely to provide favorable ratings to small firms.

With any empirical tests relying on an event at a given period of time to provide exogenous variation, one must worry about other contemporaneous changes that may confound the interpretation of the results. One potential confounding event is that in July 1974 Standard and Poor's (S&P) changed the way it received revenues, from investors paying for ratings to issuers paying for ratings. This change might also reduce ratings quality, but our results are distinct from this event for several reasons. First, our tests use Moody's ratings data instead of S&P's, and Moody's did not have a similar change at that time (they switched to issuer-pay in 1970). We focus our results on Moody's to identify a direct impact of the SEC-certification event. Second, these two events do not occur at the exact same time, so we make use of the 12-month period when they do not overlap to determine which effect is more prevalent. When

a careful analysis around these different dates is conducted, our evidence suggests that the SEC-certification effect dominates the change in payment method effect.

Other potential confounding events are the recession and oil price shock of 1973-1974 and the recession of 1981-82. The earlier recession occurs before our event, so our evaluative period for defaults does not overlap with that event. In any case, we conduct robustness tests modestly adjusting windows for the event itself, as well as time windows in the evaluative period. The results are robust to these changes. The 1981-82 recession overlaps with all post event time periods for both the treatment and control samples, so the effect of this recession should impact both samples in the same way. Finally, we conduct placebo tests, artificially using different (incorrect) years for the cutoff event. In these cases, we do not find similar results, indicating our results are not driven mechanistically by a time trend in the data.

To the best of our knowledge, this paper is the first study to examine empirically the initial introduction of NRSRO status by the SEC in 1975. The introduction of NRSRO status is a watershed event in terms of rating agency certification provided by regulators and hence provides an ideal setting to test theories of regulatory-based distortions on credit rating agencies. Our paper is related to several lines of ratings research. One complementary area of ratings research examines the impact of ratings regulations on bond yields (e.g. Kisgen and Strahan (2010)) and systemic risk (e.g. Hanley and Nikolova (2014)). Kisgen and Strahan (2010) examine the impact of a ratings agency, DBRS, receiving NRSRO status in 2003. They find that DBRS ratings have a significantly greater impact on yields after DBRS is granted NRSRO status. This result confirms that regulations based on ratings are material considerations for firms as they directly affect their cost of capital; thus supporting our contention that regulations give ratings agency a captive client base. A second group of papers looks at the differences in ratings quality between issuer pay and investor pay, with the overall

conclusion that the investor pay model lowers rating quality. Beaver et al. (2006) and Cornaggia and Cornaggia (2013) find that investor-paid ratings are more accurate than issuer-paid ratings. Bruno et al. (2013) find that when an investor-paid rating agency (Egan Jones) becomes an NRSRO, its ratings quality does not decline. This result is consistent with the superior accuracy of the investor pay based model being maintained after being granted NRSRO status. Jiang et al. (2012) examine the impact of S&P switching to issuer pay from investor pay in 1974, and find that S&P ratings rise to meet Moody's ratings levels following the switch. Xia (Forthcoming) evaluates how investor paid raters positively influence issuer paid rating agencies. Another line of research examines unsolicited ratings under the issuer pay model, including Bannier et al. (2010) and Fulghieri et al (2014). Other papers look at the impact of ratings competition on ratings quality, both theoretically and empirically, with the general conclusion that competition has a mixed impact on ratings quality. These papers include Bongaerts et al. (2012), Becker and Milbourn (2011), Manso (Forthcoming) and Bolton et al. (2012). And lastly, a significant research also looks at the information content of ratings generally, including Jorion et al. (2005) and Kliger and Sarig (2000).

2 Regulatory background of ratings and hypothesis development

In this section we discuss the regulatory background of ratings and the specific event analyzed in this paper. We also describe the key hypotheses that we will test as a result of this event.

2.1 Regulatory background

In 1909, John Moody published the first manual of credit ratings called "Moody's Analyses of Railroad Investments". At that time, the United States had the largest corporate bond market in the world, and railroads represented a significant percentage of the market for corporate bonds. John Knowles Fitch founded the Fitch Publishing Company in 1913, and Poor's Publishing Company was established in 1916 (although Henry Vernum Poor first published

reports on railroads as early as 1860). The use of ratings in regulations effectively began in the 1930s. Regulations based on credit ratings began as early as 1931, when banks were required to mark-to-market lower rated bonds. In 1936, the U.S. Treasury Department stipulated that banks could not invest in bonds that were deemed "speculative", according to "recognized rating manuals". These events of the 1930s arguably represent the biggest initial events with regard to ratings regulations, with 1975 being the second most important. Data limitations preclude us from evaluating events of the 1930s.

In 1951, the National Association of Insurance Commissioners (NAIC) established the Securities Valuation Office (SVO) to assign risk ratings to bonds held in the investment portfolios of insurance companies. Insurance companies' capital requirements are determined by these ratings. At this time, the NAIC began equating the term "investment grade" to bonds with a Baa-rating or better. Investment grade (IG) bonds were therefore bonds with a rating of Baa (BBB) or higher by Moody's (respectively S&P); and speculative grade (SG) bonds (also known as junk bonds or high-yield bonds) are those with a rating of Ba (BB) or lower by Moody's (respectively S&P). This event marks the only significant change to the regulatory landscape from the 1930s until 1975.

The use of ratings in rules and regulations creates the potential for manipulation of the process. At an extreme, one might imagine a firm that desired higher ratings for its investments could simply create a new rating agency and allow them to produce higher ratings for the investments. To address this issue, on June 26, 1975, the SEC set the standard for determining acceptable credit rating agencies when it started to use credit ratings issued only by Nationally Recognized Statistical Rating Organizations (NRSROs) in its rule 15c3-1, which determined net capital requirements for brokers and dealers (SEC Release No. 34-11497). Other regulators followed suit, adopting the notion of NRSRO status for their rating

regulations. Beginning with that event, the use of NRSRO ratings in rules and regulations increased dramatically.

These new rules in 1975 contained two key parts. The first was the new regulation for broker-dealers. The SEC adopted Rule 15c3-1 that set forth broker-dealer haircut requirements that were a function of the credit ratings of those securities. Through this rule, the SEC applied a net capital rule whereby credit ratings became the basis for determining the percentage reduction in the value ("haircut") of bonds owned by broker-dealers for the purpose of calculating their capital requirements. The second is the establishment of NRSROs, giving select ratings agencies significant power with respect to rules and regulations. These two events combined represent the most significant event in recent history with regard to ratings regulation. Corporations also took notice of these developments. Recent research suggests that corporations adjust capital structure and investment decisions based directly on concerns for these regulations, confirming the importance of these regulations to rating agency clients (see Kisgen (2006, 2009) and Begley (2013)).

When the SEC established the use of NRSROs in 1975, three rating agencies, Moody's, S&Ps and Fitch, were grandfathered in. These were the only three NRSROs until 1982, when Duff and Phelps was also granted NRSRO status. In the 25 years following this SEC certification in 1975, only 4 new firms were given NRSRO status, and these ended up merging or being acquired by the big three agencies such that only the original three have NRSRO status 25 years later. The process of obtaining NRSRO status has been contentious, with many firms complaining that they have been unfairly excluded from this select club (see Kisgen and Strahan, 2010). The NRSRO status granted in 1975 unquestionably led to significantly reduced competition for the three largest ratings agencies (White (2010) argues that "the

Securities and Exchange Commission crystallized the centrality of the three rating agencies in 1975").

The change in regulations in 1975 was largely unexpected as well. Although issues with ratings were increasing, especially given the potential conflicts with the issuer-pay system, we have been unable to find news reports suggesting public discussion of the possibility of this new regulatory shift prior to the change. The SEC also awarded NRSRO status through a "no-action" letter system, such that a firm could request to use a rating agency for regulations, and so long as the SEC granted the "no action" letter for it, the agency would be allowed. No specific criteria or definition was outlined, but the most important factor was that the rating agency be "nationally recognized" in the United states as a credible provider of ratings. In that regard, the new rule appears to have been somewhat informally determined.

The payment method for the services provided by rating agencies also changed over time. Originally, investors purchased manuals from Moody's or S&P to obtain their ratings reports. This changed from 1968 to 1974, when those agencies switched and began receiving payment from the issuers instead. Widespread use of photocopying began around this time, which may have led to this change since purchased reports could be more easily disseminated without rating agency approval. Importantly for our analysis, Moody's changed its payment method in 1970 whereas S&P changed its payment method in 1974. Our event is in 1975 and we rely solely on Moody's ratings, so these events do not overlap. However, we also consider any potential spillover effects of the S&P change in 1974 with some additional testing. We do not see any direct impact of the S&P event on our tests.

2.2 Hypothesis development

Our main hypothesis is that the three ratings agencies designated as NRSROs became more entrenched following the new rules from the SEC in 1975 and therefore had lower incentives to provide quality ratings. This entrenchment was a result of the barriers to entry established by the NRSRO designation as well as the expansion of the use of ratings in regulations. The main implication of this hypothesis we test in this paper is that entrenchment led to lower ratings quality. As a result of the certification provided by the SEC, ratings agencies' incentives to provide accurate ratings decreased. In the post SEC certification period, the three ratings agencies no longer had to provide accurate ratings to guarantee a market for their services. Regardless of the quality of the ratings, issuers would demand the ratings for regulatory purposes. Opp et al. (2013) provide a theoretical model evaluating the impact of regulations based on ratings and find that "relative to the equilibrium without regulations, the rating agency has an incentive to rate more firms highly." Partnoy (1999) proposes that with this "regulatory license" the ratings agencies would "no longer need to generate valuable information to sustain their reputations for quality over time." Our hypothesis is not so bold. We merely conjecture that the new regulatory regime lowered incentives for quality.

Rating agencies also need to protect their reputation to some extent in order to retain clients and maintain their NRSRO status. So the null hypothesis is that despite the new regulatory power provided by these law changes, ratings agencies continue to provide quality ratings. During this time period, the bankruptcy of Penn Central Transportation Company in 1970 also led to heightened interest in credit quality. Given this, ratings agencies might want to provide even more stringent ratings to establish their credibility, which would work toward this null and away from our alternative hypothesis. Once again, our tests do not require that rating agencies completely ignore quality; only that rating quality would be reduced due to an upward bias.

In our main tests we compare the predictive power of Moody's bond credit ratings at the end of May 1975, the pre SEC-certification period, to the predictive power of Moody's bond credit ratings that were issued between July 1975 and December 1978, the post SEC-certification period. To test this, we compare the realized defaults of bonds rated in the pre SEC-certification period to the realized defaults of bonds rated in the post SEC-certification period. While we believe that using realized defaults as the outcome measure is the most exact way to test rating accuracy, we also examine downgrades from investment grade to speculative grade and changes in firms' Altman Z-Scores (Altman, 1968) as alternatives. Both of these alternatives allow us to have credit risk realization measures for significantly more firms than in the default regressions.

3 Data and summary statistics

To implement the empirical tests, we first collect all credit rating information on bonds that are issued until December 1978 from Moody's Corporate Default Risk Services (DRS) database. We restrict our sample to U.S. corporate issuers of non-convertible bond/debentures ratings. For instance, we exclude sovereign ratings, structured finance ratings and pooled investment vehicles ratings. Within all corporate issuers, we focus our analysis on firms classified as "banks"; "finance"; "industrial"; "transportation" and "utilities." The DRS database provides us with detailed data on each issuer. It also gives us rating data at the time of issuance and all subsequent credit events, including defaults and credit rating changes, over the lifetime of each bond in our sample.

The Altman Z-Score tests require accounting and market data on bond issuers. As such, we hand-collected CRSP and Compustat identifiers for each issuer and then merged these accounting and market data to the Moody's dataset. The resulting data is an annual panel dataset that contains credit, accounting and market value variables for each bond in our

sample. In particular, these data allow us to compute the Altman Z-score as an alternative credit risk outcome measure for every firm over time. The Altman Z-Score is computed as: Z-Score = 1.2*Working Capital/Total Assets + 1.4*Retained Earnings/Total Assets + 3.3*EBIT/Total Assets + 0.6*Market Value of Equity/Book Value of Total Liabilities + 0.999*Net Sales/Total Assets. All accounting items are taken from Compustat and the market value of equity is taken from CRSP.

We focus on valid long-term ratings issued by Moody's. The rating classification goes from "Aaa" (highest credit quality) to "C" (lowest credit quality).[2] Following the literature, the letter rating is coded numerically in our data with the highest rating "Aaa" getting the lowest score (1) and the lowest rating "C" getting the highest score (9). Table 1 provides an overview of the sample characteristics. In Panel A, we give the number of issues within each rating categories per end of May 1975 for all issues rated before the SEC-certification (pre-NRSRO status); and for all issues rated between July 1975 and December 1978 for the post SEC-certification period. Overall, the sample contains 2,466 firm-year observations. Most bond issues have investment grade ratings, i.e. ratings of Baa or better, both in the pre and post period. This result is not surprising given that we analyze a period before the vast increase of the junk bond market in the 1980s.

We have accounting and market data for 1,067 of the firm-year observations. For this subset, we can compute the Altman Z-score used in some of our predictive power of ratings regressions. Panel B of Table 1 provides averages of three risk-relevant firm characteristics by credit rating category. The first firm characteristic is book value of total assets in USD millions, a proxy for firm size. The second is leverage and the third is return on equity (RoE). As would be expected, higher rated firms are larger, have less leverage and are generally more

[2] We only look at full letter grade ratings. Moody's introduced a more refined rating classification, the so-called "notching", in April 1982. Before April 1982, there was no distinction within a given credit rating category.

profitable than lower rated firms. It is important to note that the average firm in the pre SEC-certification period is very similar along these dimensions to the average post SEC-certification period firm. This alleviates potential concerns of significant differences across the two time periods, at least along observable dimensions.

4 Main Results

4.1 Graphical Evidence

We begin our analysis with a graphical representation of defaults over our sample period. Figure 1 plots over time the cumulative proportions of defaults for bonds rated in the pre versus the post SEC-certification period, independent of the rating category. While both proportions increase until December 1987, the increase is significantly greater for the bonds rated post SEC-certification. In fact, as of December 1987, the cumulative defaults for post SEC-certification rated bonds is about three times higher than for bonds rated in the pre SEC-certification period.

Figure 1 depicts unconditional default frequencies, so any difference between pre and post SEC certification rated bonds could be driven by comparing bonds of different rating categories, that is, of different risk classes. In Figure 2a, we show the default frequencies by rating category over the period running from July 1975 to December 1987. We report separately the default frequencies for bond issues rated in the pre SEC-certification period vs. those rated in the post SEC-certification period.[3] For ratings between Aaa-Aa, there are almost no defaults and, hence, no pronounced increase for post SEC-certification rated bonds. For all other rating categories, the graph shows a clear increase in the default frequencies over the period for bonds rated post SEC-certification. To complement this figure, we provide in

[3] There were no issues assigned a rating between C and Caa in the post-period, hence we do not represent those categories in Figure 2a and 2b.

Figure 2b, the average Z-score change by rating category for issues rated by Moody's both before and after the SEC-certification. The interpretation is consistent with Figure 2a. There is a marked deterioration in credit risk within almost every credit rating category for the post SEC-certification issues.

4.2 Predicting Defaults

We now more formally test the relationship found in the previous section. Specifically, we test whether the NRSRO status granted to credit rating agencies in 1975 affected the predictive power of their ratings. The objective of this exercise is to assess the accuracy of Moody's credit ratings in predicting defaults both before and after the introduction of the NSRO status. If SEC-certification increased a credit rating agency's market power, then one could hypothesize that the increased market power led to less accurate ratings because investors would have to rely on the credit ratings regardless of their predictive power. To test this, we run an outcome test where we regress realized defaults on a dummy variable indicating whether the rating was assigned in the pre or in the post SEC-certification period.

Controlling for the rating level in this test is important because otherwise a higher default likelihood of post SEC-certification period ratings could simply be driven by comparing bonds of different risk classes. Including the rating level ensures that we compare two bonds with the same rating with the only difference being that one rating was assigned before the introduction of the NRSRO status and the other one after it. Within a given rating, we do expect a systematic bias in predictive performance for post SEC-certification bonds relative to pre SEC-certification period rated bonds if the new regulatory power of rating agencies affects their incentives to provide quality ratings. Beyond the rating level, we also include industry fixed effects to control for any risk differences between industries not captured by the

credit rating and for the bond maturity in some specifications. When we include the latter, the sample size is smaller because the maturity is not available for all bonds in our sample.

We do not include any firm-specific control variables. We argue that any firm-specific factor should be subsumed in the rating because the credit rating is a risk predictor that is designed to summarize firm-specific risk factors. Moreover, while the firms in our sample may differ along any observable or unobservable dimension, such differences should be captured by the credit rating if the rating is a meaningful indicator of credit risk. This implies that, for instance, a Baa rated bond in 1974 should have the same risk of defaulting as a Baa rated bond in 1976, unless the predictive power of both ratings differs. This is exactly what we aim to test. We estimate the following regression using OLS:

$$default_i = \beta * post + rating\text{-}level_i + controls_i + error_i \qquad (1)$$

The dependent variable $default_i$ is an indicator variable taking on the value of one if a default of bond i occurred within a specified time period ("time window") after the introduction of the NRSRO status; $post_i$ is an indicator variable taking on the value of one for all new issues rated from between July 1975 and December 1978 and zero if it is from the pre SEC-certification period; $rating\text{-}level_i$ is the (numerical) credit rating of bond i; $controls_i$ are fixed effects controlling for the industry of the bond issuer and bond maturity of bond i; $error_i$ is the error term of the regression. The rating level used in the regressions is the rating as of May 1975 for bonds issued in the pre SEC-certification period and the initial rating of the bonds issued in the post SEC-certification period. The use of the initial rating for the post SEC-certification period bonds assures that we have the smallest possible time difference between the pre and the post SEC-certification period issues. All results hold if we use the end of

December 1978 ratings for the post SEC-certification period instead. Standard errors are clustered at the issuer level in all regressions.

For our predictive test, we have to define a time period during which we record the number of defaults for both the pre and post SEC-certification period bond issues. For the baseline analysis, we record all defaults from July 1975 to end of December 1987.[4] The regression coefficient β in regression model (1) indicates whether bonds have a different default frequency depending on whether they were issued pre or post SEC-certification, controlling for the respective rating level. If SEC-certification led to a lower rating accuracy, we would expect β to be positive and significant.

Our baseline regression results are shown in Panel A of Table 2. Column (I) of Panel A shows a positive and highly significant coefficient of the post-dummy of 0.0428, implying that the default frequency of post SEC-certification bonds is 4.28 percentage points higher than that of pre SEC certification bonds. This effect is both statistically and economically significant considering that the (unconditional) pre SEC-certification default frequency is only 2.18%. In columns (II) to (V) we include sequentially the rating level, industry fixed effects and bond maturity as control variables. While the coefficient size is somewhat smaller when we control for the rating level, it continues to be highly significant. The results are largely unchanged when we control for industry fixed effects and the bond maturity, although the sample size is smaller because of the lack of bond maturity information in some cases. The coefficient for numerical rating is positive and highly significant in all regressions. This result is in line with our expectation given that bonds with higher numerical ratings (i.e. higher credit risk) should have a higher likelihood of defaulting over time.

[4] In robustness tests below we show that all results hold if we choose longer or shorter time windows.

By recording defaults over the period from July 1975 until end of December 1987, we are in effect using different time windows over which we estimate the predictive power of ratings across the pre and post SEC-certification bond issues. Specifically, for bonds rated in the pre-period, our time window extends over a period of 12 years and six months. For bonds rated in the post SEC certification period, the window can be as short as nine years for bonds issued in December 1978. The use of different time windows may bias our results, but the bias is against finding a worsening in credit quality for post period rated bonds, since the post period rated bonds have a shorter window during which to default.

We nonetheless run a second test in which we use time windows of same length. Although this test has the advantage of having a predictive window of identical length across pre and post SEC certification bond issues, it has the disadvantage of having non-overlapping years. Specifically, we compare defaults of pre and post SEC certification issues 10 years after they were rated; which corresponds to the period 1975-1985 for pre-period rated issues and 1978-1988 for post-rated bonds. If macro conditions between 1985 and 1988 differ considerably from those between 1975 and 1985, our results could simply reflect changing macro-conditions over those non-overlapping years. The results are displayed in Panel B of Table 2. We find positive and highly significant coefficients of the post-dummy in all five specifications. The magnitude of the economic effect is even bigger than before, with coefficients ranging from 5.31 to 5.84 percentage points. This finding reinforces the conclusions drawn from Panel A. These results indicate that the introduction of the new regulations in 1975 had an adverse impact on the quality of credit ratings, given the higher barriers to entry and increased reliance on ratings in regulations that resulted from them.

We also consider ratings accuracy from a different perspective. We examine the default likelihood for each rating category to see whether or not the ordinal ranking for ratings is

preserved in the post period. In untabulated results, we find that the ordering of ratings is maintained in the post period, such that each lower rating category shows a higher probability of default than the rating category above it. For example, a Baa rated firm in the post period is 3.6 times more likely to default than an A rated firm, and a B rated firm is 3.1 times more likely to default than a Ba firm. For pre-period rated firms, these ratios are equal to 3.0 and 4.7 respectively. Our main findings show that ratings are in general upwardly biased in the post period. However, the ordinal ranking for ratings levels is preserved. We thus conclude that this aspect of rating quality has not been compromised in the post period.

4.3 Predicting Downgrades to Speculative Grade

An outcome test using realized defaults is arguably the most stringent test of ratings quality. In this section and the following, we present additional corroborating evidence that SEC-certification led to lower ratings quality. We first investigate whether firms for a given investment grade (IG) rating in the pre or post SEC-certification period had a higher likelihood of being downgraded to speculative grade (SG). If SEC-certification led to inflated credit ratings, the likelihood of being downgraded to speculative grade should be higher for the post SEC-certification period issues. We focus on the threshold that separates investment grade from speculative grade because investment-grade credit ratings should be associated with lower financing costs and a higher demand for the bonds among investors. Hence, investment grade ratings are particularly valuable for bond issuers and rating agencies might then have stronger incentives to inflate ratings and assign investment-grade ratings even if the risk of the bond would not justify an investment-grade rating. If this is the case, we expect that IG bonds issued in the post-period are associated with a higher likelihood of being downgraded to speculative grade afterwards. We estimate the following OLS regression model to test this hypothesis:

$$\text{SG-downgrade}_i = \beta * \text{post} + \text{rating-level}_i + \text{industry}_i + \text{error}_i \quad (2)$$

In this regression, SG-downgrade$_i$ is a dummy variable taking on the value of one if bond i was downgraded from investment to speculative grade in the evaluative period. All other variables are the same as before. The coefficient β on the post-dummy indicates whether bonds that were rated in the post SEC-certification period had a higher likelihood of being downgraded to speculative grade. If the SEC-certification led to inflated ratings, we would expect β to be positive and significant. Results are shown in Table 3.

Table 3 Panel A shows that investment grade bonds that were issued post SEC-certification had an 8% higher likelihood of being downgraded to speculative grade through until December 1987 relative to pre SEC-certification issued bonds. This effect is also significant at the 1% level. In column 2 of Table 3, we see that the effect is even bigger and again highly significant when we use the 10 year non-overlapping time window. These results provide additional evidence that ratings quality decreased post SEC-certification.

In Panel B of Table 3 we focus only on Baa rated firms. Firms near the investment grade distinction have the most to gain from inflated ratings as regulations concentrate significantly at that level. Thus we would expect firms near the border to be especially prone to enticement from ratings agencies of preferential ratings. These tests examining the transition from investment grade to speculative are a natural environment in which to consider this possibility. If firms are given a Baa rating when they in fact deserved a Ba rating or worse, these firms will be the most likely to be downgraded to speculative grade at a later point. The results of Panel B of Table 3 confirm this. Baa rated firms in the post period are especially likely to be downgraded to speculative grade when compared with Baa rated firms before the SEC action. The likelihood of a downgrade to speculative is 19.5% higher for firms rated Baa

in the post period compared to Baa rated firms in the pre period. We also confirm separately that this value is statistically significantly larger than the value for the full sample of investment grade firms. These results confirm that Baa firms are given favorable ratings in the post period to at least temporarily keep them above the investment grade threshold.[5]

4.4 Predicting Changes in Altman Z-scores

In a third series of tests, we employ a widely used and accepted credit risk measure, the Altman Z-Score (Altman, 1968) as an alternative outcome variable. The Z-Score has the advantage of being available to measure changes in credit risk for all sample firms, rather than only for firms that actually default. As a result, using this measure allows us to expand the sample of firms over which we can evaluate the predictive power of credit ratings. However, as the Altman Z-Score cannot be computed for banks, they are not included in the analysis. This restriction and the lack of accounting data for some firms reduce the sample size to 1,067 firm-year observations. We run two different regressions. First, we estimate the following regression model using OLS:

$$\text{Z-Score change}_i = \beta * \text{post} + \text{rating-level}_i + \text{starting Z-Score}_i + \text{industry}_i + \text{error}_i \qquad (3)$$

In this regression Z-Score change$_i$ is a dummy variable indicating whether the Altman Z-Score of firm i *decreased* for bonds issued in the pre SEC-certification period compared to bonds issued in the post SEC-certification period; starting Z-Score$_i$ is the Altman Z-Score of firm i in yearend 1974 for the pre SEC-certification bond issues and year-end prior to the year in which the initial rating was assigned for the post SEC-certification bond issues.[6] We define

[5] We also test whether the default results are stronger for Baa firms compared to other firms. While a firm rated Baa in the post period is more likely to default than a firm rated Baa in the pre period, we find no statistically significant difference for this effect among Baa firms compared to other rating levels.

[6] If the initial rating was assigned, for instance, in September 1975, the starting Z-Score would be the Altman Z-Score as of yearend 1974; if it was assigned in September 1976, the starting Z-Score would be the Altman Z-Score per end of 1975, etc.

our indicator variable relative to decreases in Z-score so as to reflect a worsening in credit risk. Doing so allows us to have the same interpretation as before for our coefficient of interest β: If the SEC-certification led to inflated ratings, we would expect β to be positive and significant. The inclusion of the starting Altman Z-Score controls for the fact that the initial Z-Score may impact whether or not the Z-score drops during the sample period. The variable $industry_i$ contains fixed effects for the industry of firm i.[7] We estimate equation (2) with and without the initial rating level as an additional control. Panel A of Table 4 contains the baseline Z-score results for the time window until December 1987 and the results for the ten year window, which contains non-overlapping years.

Table 4 shows a positive and highly significant regression coefficient for the pre-period indicator variable across every specification. This implies that firms that issued bonds in the post SEC-certification period experienced decreases of their Altman Z-Score more often than firms that issued bonds in the pre SEC-certification period, controlling for the starting Altman Z-Score and the rating level. This result is in line with the default frequency and the downgrades to speculative grade results because it suggests that a deterioration of credit risk happened more often for firms whose bonds were rated in the post SEC-certification period. The magnitude of the coefficient indicates that a decrease in Altman Z-Score is almost 18% more likely for post period rated bonds. The results are almost unchanged when we use ten year, non-overlapping time windows in columns (3) and (4).

In Panel B of Table 4, we modify equation (2) and regress the Altman Z-Score *level* on the post-dummy and controls instead. Once again, we transform the dependent variable and take its negative value such that a positive coefficient for β indicates a bigger *drop* in Z-scores for post period rated issuers. By controlling for the starting Altman Z-Score, this regression

[7] We do not include the bond maturity as this would further substantially reduce the sample size. All results presented in this section hold if bond maturity is included.

essentially estimates the size of the change in the Altman Z-Score for firms that issued bonds in the pre NRSRO period versus firms that issued bonds in the post SEC-certification period. We run this test for both the overlapping time window up to 1987 and the ten year, non-overlapping time window. The results are displayed in Panel B of Table 4. In both cases, we get positive and highly significant coefficients of similar magnitudes, regardless of whether the regression controls for the rating level. Together, these results confirm the finding from the default and rating downgrades regressions that rating quality deteriorated following to the change in ratings regulation.

5 Additional Tests

This section provides several robustness tests of our main findings. We also implement one additional test to rule out a potential alternative explanation for our main result and to provide further evidence supporting our main findings.[8]

5.1 Robustness tests

Our first robustness test varies the length of the window that we use to test the predictive power of ratings on defaults. We first vary the time window end date; the main results used December 1987 as the end date. In Panel A of Table 5, we show that our main result holds if the evaluative period ends in December 1986 or December 1988. For sake of comparison, we also include the result from the baseline regression. Besides the rating level, we also control for industry fixed effects. The results hold equally well when we further control for bond maturity. The coefficient of the post-dummy is positive and highly significant regardless of the window we use. While the magnitude of the coefficient is smaller when the shorter event window is used (because of a smaller number of defaults); it is almost unchanged when the

[8] All tests presented in this section were also done using downgrades to speculative grade, the Altman Z-Score drop indicator and the negative change in the level of the Altman Z-Score. The results are very similar to the default frequency results, but not presented for the sake of brevity. They are available upon request from the authors.

longer time window is used.[9] These findings confirm that our results are not driven by the choice of the window of analysis.

In a second robustness test, we confirm that potential anticipation of the event does not impact our main results. The introduction of the NRSRO status took place in June 1975. Although the SEC actions were to a large degree unexpected, we run a test in which we exclude all ratings that were assigned or changed between January and May 1975 (the last five months of our pre-period window) in order to account for any potential anticipation of the regulatory change. This restriction reduces our sample to 2,321 firm-year observations. We then run the baseline regression model that uses December 1987 as the end of the default time window. The results are shown in Panel B of Table 5. The coefficient of the post-dummy is positive, highly significant and of a very similar economic magnitude as before. Furthermore, we vary the window of analysis by using December 1986 and December 1988 as alternative end dates. We also find positive and highly significant coefficients of the post-dummy. The magnitude of the coefficient is similar to before. These results suggest that potential anticipation of the regulatory change does not lead to any changes with regards to our main findings.

In the third robustness test, we use a symmetric window for the pre and post SEC-certification period issued bond ratings. Thus far, we use all bond ratings issued in the pre SEC-certification period, but only bond ratings issued between July 1975 and December 1978 for the post SEC-certification period. In this robustness test, we restrict the pre SEC-certification observations to a time period of the same length as the post SEC-certification period. The post SEC-certification period spans 42 months from July 1975 to December 1978. To match this

[9] We also estimate the regression using December 1985 and December 1989 as time windows. The results hold in these regressions as well. Time windows ending prior to 1985 are too short for robust statistical inference given the small number of defaults over these short windows. Longer time windows beyond 1989 would overlap with the collapse of the former investment bank Drexel Burnham Lambert, Inc., which created a severe shock to the bond market, especially in the junk bond segment and hence are deemed not appropriate (see Lemmon and Roberts, 2010).

timeframe, we restrict the pre SEC-certification period observations to an equal time span corresponding to the time period December 1971 to May 1975. Thus, for this robustness test, we only include bonds that were assigned a rating for the first time or whose ratings were changed between December 1971 and May 1975. We then run the baseline regression for this smaller sample. The results are shown in Panel C of Table 5.

Restricting the pre SEC-certification period observations in this way reduces the sample size by about 50% to 1,283 firm-year observations. Despite this substantial sample size reduction, we continue to find a positive and highly significant coefficient of the post-dummy of 2.83 percentage points in column 2 of Panel C. In column 1 and 3, we again vary the timeframe until which defaults are recorded to December 1986 and December 1988 respectively. The coefficient of the post-dummy is positive and highly significant in both cases and its magnitude is largely unchanged. While the economic magnitude of the effect of SEC certification on the rating quality is smaller than in the baseline analysis, this robustness test confirms once more the findings from the baseline analysis.

In a final, unreported robustness test, we investigate whether the oil price shock and economic recession of 1973-1974 have any effect on our findings.[10] To address concerns that this might be the case, we exclude all newly assigned ratings from January 1974 till May 1975 from the pre SEC-certification sample and perform the default analysis without these observations. Other than that, the setup is as in the baseline default regression. We find a positive and highly significant coefficient of the post-dummy of 4.7 percentage points implying that the economic regression of 1973-1974 does not drive our results.

[10] Results are available upon request.

5.2 Placebo tests

As with any natural experiment, it is important to show that our results are specific to the event under study and not driven by time trends or some other confounding factor. To provide support for this assertion, we run two placebo or falsification experiments. In the first falsification test, we only use observations from the 42 months period prior to the introduction of the NRSRO status. We split this time period into two equal halves of 21 months. We use the first half from December 1971 to August 1973 as the placebo pre SEC-certification period and the second half from September 1973 to May 1975 as the placebo post SEC-certification period. We define a placebo post-dummy variable to take on the value of one if the observation is from the placebo post SEC-certification period and zero if it is from the placebo pre SEC-certification period. We regress the default frequency of all bonds rated either in the placebo pre or post SEC-certification period on the placebo post-dummy and the same controls as before. We vary the timeframe during which we record default frequencies from December 1986 to December 1988. Panel A of Table 6 displays the results. The placebo post-dummy is negative and not significant in any of the three regressions. As there was no change in ratings regulation between the placebo pre and post SEC-certification period, this is exactly what we would expect. There was no deterioration of rating quality because the rating agencies were not given more market power in that time period.

For the second placebo test, we only use observations from the time period running from July 1975 to December 1978, the post SEC-certification period. As before, we split the 42 months period into two halves of equal length and define a placebo pre and a placebo post SEC-certification period. The placebo pre SEC-certification period spans the 21 months from July 1975 to March 1977 and the placebo post SEC-certification period stretches from April 1977 to December 1978. For this test, we define a placebo post-dummy to take on the value of one if the observation is from the placebo post SEC-certification period and zero if it is from the

placebo pre SEC-certification period. The dummy variable indicating default of bonds from the post SEC-certification period is then regressed on the placebo post-dummy and controls. We vary the timeframe during which we record default frequencies from December 1986 to December 1988. As before, we should not expect to find a significant difference in the default probability of bonds rated in the placebo pre and post SEC-certification period. Panel B of Table 6 shows that this is indeed not the case. While the coefficient on the post-dummy is positive, it is not statistically significant. Taken together, the results from these placebo tests lend credibility to our findings that the deterioration of rating quality documented above was triggered by the introduction of the NRSRO status in June 1975 and not by some other confounding event or omitted macro factor during this time period.

5.3 S&P's 1974 change in payment method

Jiang et al. (2012) show, that the switch of S&P's business model from investor-pay to issuer-pay affected the quality of S&P's ratings. They argue that after switching to issuer-pay, S&P assigned relatively higher ratings to attract more business and generate higher returns. The switch in payment model took place around June/July 1974, a time period that is reasonably close to the introduction of the NRSRO status in June 1975. As such, our findings could be related to this event. Specifically, if Moody's were to inflate its ratings in reaction to S&P's change in business practices, it could potentially explain why default frequencies in a given rating class increased. However, we show in this section that our findings are unlikely to be driven by this confounding explanation.

To show that our results are not driven by S&P's switch to issuer-pay, we design the following test. We focus only on ratings of bonds issued in the pre SEC-certification period, i.e. until May 1975. We then use the switch of S&P's payment model in June/July 1974 as the event and define the dummy variable post-dummy to take on the value of one if the bond was

rated between July 1974 and May 1975 and zero if it was rated before July 1974. Focusing on observations until May 1975 enables us to isolate the effect of a potential reaction of Moody's to S&P's payment model switch from the SEC-certification event we focus on in this study. We then run the outcome test using the three alternative evaluative periods up to December 1986, December 1987, and December 1988. Other than redefining the post-event dummy, the regression setup is the same as in the baseline analysis. Besides the default frequency, we also use downgrades to speculative grade and the change in the Altman Z-Score as alternative outcome measures.[11] If Moody's reacted to inflated S&P ratings after the switch of the payment model, the coefficient of the post-dummy should load positively and significantly in these regressions. Table 7 contains the results.

In Panel A, we can see that the coefficient of the post-dummy is negative, not significant and close to zero in all three regressions implying that default frequencies of bonds rated before July 1974 and those rated between July 1974 and May 1975 did not differ significantly regardless of the window over which we record defaults. Finding a negative coefficient furthermore alleviates concerns that a non-significant regression coefficient of the post-dummy is driven by the small number of defaults and the lack of statistical power. In Panel B, we run the same regressions using the indicator of a downgrade to speculative grade as the dependent variable. In the baseline case in column 2 of the table, the coefficient of the post-dummy is negative and not significant. When the alternative evaluative periods are used, the coefficients are also negative, but weakly significant. Finally, in Panel C, we run the same regressions using the indicator of a drop in Altman Z-Score as the dependent variable. The post-dummy again loads negatively and not significantly in any of the three regressions.

[11] The results are unchanged when the level of the Altman Z-Score at the end of the time window is used as dependent variable. The results are not reported for brevity, but are available on request.

These results suggest that the deterioration in Moody's rating quality was not caused by a reaction to S&P's switch to the issuer-pay model.[12]

6 Cross Sectional Tests

In this section, we consider cross-sectional variation in our main results. Specifically, we test whether the deterioration in ratings quality we identify after SEC certification is more prevalent among small or large firms. We consider two competing hypotheses for the impact of size on ratings quality during this period. First, ratings agencies might be more inclined to inflate ratings of larger firms in the post period, since larger firms are likely to generate more fees than smaller firms. Certified rating agencies can leverage the fact that firms now require ratings for use in regulations in the post period to generate new higher fee paying clients. The second hypothesis is that rating agencies might be more inclined to give inflated ratings to small firms due to reputational concerns. Even in the post period, ratings agencies have incentives to maintain their reputations. Given that larger firms are more visible than smaller firms, a significant negative credit event for a large well-known company that was rated highly by a rating agency would damage the ratings agency's reputation more. Overall, as firm defaults are the most visible and detrimental events for rating agencies' reputation, we would expect rating inflation to be more prevalent among smaller firms than larger firms.[13]

[12] In untabulated results, we also examined whether stock market investors reacted differently to rating changes following SEC-certification. The stock market reaction to rating changes is not statistically different in the post SEC-certification. While several studies show that stock prices generally react to credit rating changes (e.g. Holthausen and Leftwich (1986) and Hand et al. (1992)), Goh and Ederington (1993)), the impact of the SEC certification could arguably impact returns either direction. On the one hand, if SEC-certification provided more power to rating agencies in the marketplace, we could expect that announcement returns would increase in the post period as investors rely more on these ratings. On the other hand, investors could anticipate a lower quality of credit ratings following the SEC-certification and would therefore react less to credit rating changes.

[13] Another hypothesis for the size impact is based on information production. Small firms are more opaque and hence require relatively more effort to rate them. If credit rating agencies do not exert as much effort in rating new issues following SEC-certification, we would expect smaller firms' ratings to be less accurate. If firms' self-select based on ratings levels, more variance in ratings could lead to upwardly biased ratings. As this relationship is more nuanced, we have not emphasized this explanation in this section.

To test these hypotheses, we run our three main tests on rating quality (defaults, downgrades to SG, and changes in Z-score) with interactions for the size of the firm. We create a size dummy variable, equal to 1 if the firm is in the upper half of asset size among firms in our sample and zero if below the median asset size. We then run regressions including this dummy variable on its own and interacted with the dummy variable for the post period:

$$\text{credit outcome}_i = \beta_1 * \text{post} + \beta_2 * \text{size}_i + \beta_3 * \text{size}_i * \text{post} + \text{controls}_i + \text{error}_i \quad (4)$$

As in section 4, the outcome variables are defaults, a downgrade to speculative grade, and a negative change dummy to the firm's Z-score. Results from these regressions are shown in Table 8. These results present a mixed picture, but with more evidence in support of the impact of SEC certification on ratings quality being more prevalent among smaller firms. The strongest result is for the default tests, in which the first column shows that smaller firms are more likely to receive inflated ratings in the post period than large firms. Both sets of firms are more likely to receive inflated ratings in the post period, as both large and small firms are more likely to default in the post period than in the pre period (conditional on rating). But the result is particularly strong among small firms, both economically and statistically. This relationship is also supported by the Z-score tests of the third column, which indicate small firms are more likely to have a drop in Z-score in the post period, conditional on rating. This result however is not statistically significant. The combination of these results indicate that rating agencies are more likely to generate business in the post period by inflating ratings for firms that are less visible and therefore less likely to damage their reputations in the event of an inaccurate rating. Since larger firms are more visible, ratings agencies provide more accurate ratings for these firms in the post period.

The results shown in the second column, examining changes from investment grade to speculative grade, depict a different story. The coefficient on the interaction term in these tests is positive, indicating that larger firms that are initially rated investment grade are more likely to get downgraded to speculative grade in the post period compared to the pre period. While a downgrade to speculative grade indicates an initially inflated rating, the downgrade does not impact the reputation of a rating agency to the degree a default does. So for this set of firms that are initially far from a default, rating agencies appear to focus more on fee generation by targeting larger firms. These results are only significant at the 10% threshold so some caution must be taken in reading too much into this single result. The coefficient is large, however, indicating a potentially meaningful impact for this group of firms.

We also consider whether these large investment grade firms might be especially prone to take advantage of the favorable ratings assigned to them by issuing bonds prior to ultimately being downgraded to speculative grade. Ratings agencies would also benefit by getting the additional fees from these new bond issues. In an informal analysis, we examine this conjecture by identifying the subset of large investment grade rated firms in the post period that suffer a downgrade to speculative grade over our window of analysis. We can confirm that at least 88% of these firms do bond offerings following their initial investment grade rating and preceding their downgrade to speculative, and for most cases the firms issue multiple bonds during this window. The face value of these bonds totals more than $10 billion, suggesting that the potential benefit of inflated ratings for these firms is non-trivial. Overall, this anecdotal evidence is consistent with a mutually beneficial motivation for favorable ratings for investment grade firms following the new SEC rules.

7 Conclusion

Ratings agencies are a source of significant controversy, most recently due to their alleged role in the financial crisis of 2007, as well as with Enron and Worldcom and other high profile defaults. Despite this controversy, reforms to the rating system have been slow moving, as alternatives to the historical model are found to be as flawed as the current system. One of the key institutional features of the credit rating industry is the widespread use of ratings in rules and regulations, in particular for ratings provided by NRSROs (Nationally Recognized Statistical Ratings Organizations). Understanding the impact of these regulations on ratings quality is essential for addressing concerns about the current rating system. In this paper, we examine one of the watershed events in the history of credit ratings, the introduction of the NRSRO status, and their use in regulations. June 26, 1975 marks the launching date for the significant expansion of ratings use in rules and regulations, and the establishment of significant barriers to entry in the ratings business.

The evidence we present in this paper is consistent with the regulatory changes instituted in June 1975 leading to lower ratings quality. For the same given rating, a firm prior to June 1975 was less likely to default, less likely to be downgraded to speculative grade, and less likely to have a deterioration in overall financials (as measured by Altman z-score) than a firm with the same rating given in the years following the regulation change. In short, a firm rated Baa in 1976 was of lower quality than a firm rated Baa in 1974, before the regulations. We conduct several diagnostic tests to rule out other potential explanations for this change in quality. Our results are focused on the overall change in credit quality conditional on ratings, but the ordering of ratings quality seems to have been preserved (that is, a Baa firm remains a worse credit than a Ba firm, for example, in the post period). We also present evidence that suggests that rating agencies preserved to some extent the ratings quality of large firms to maintain their reputations, while inflating ratings of smaller, less visible firms. Nevertheless,

by increasing barriers to entry and providing a captive customer base for ratings agencies, the new regulations of 1975 changed the incentive structure for ratings agencies, which led to a material impact on ratings quality. Any change to the ratings landscape should consider the perverse incentives created by the regulatory environment initiated at that time.

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Figure 1: Cumulative proportion of defaults over time

This figure presents the cumulative proportion of defaults over time for issues rated by Moody's both before and after the SEC-certification (introduction of the NRSRO status in June 1975). This figure corresponds to our main sample shown in Table 2. The definition for the pre and post NRSRO sample of debt issues is given in Table 2. The cumulative proportions are shown from 1978 to 1987.

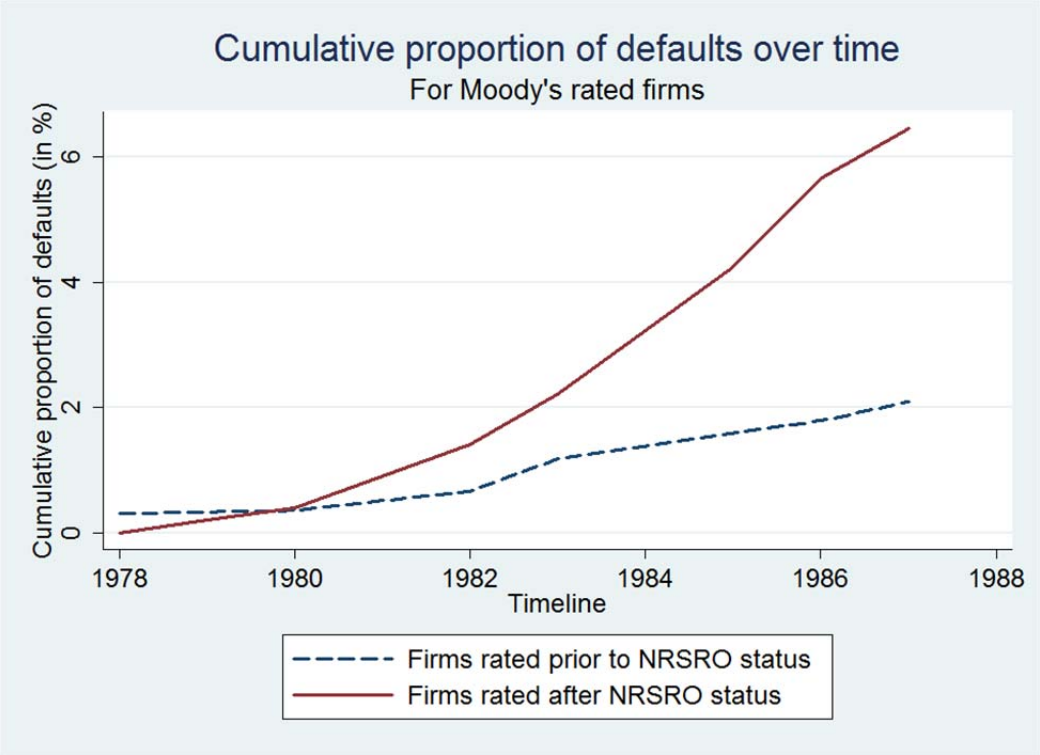

Figure 2a: Default frequencies by rating category pre and post SEC-certification
This figure presents the frequency of defaults by rating category for issues rated by Moody's both before and after the SEC-certification (introduction of NRSRO status in June 1975). For the pre SEC-certification issues, the ratings are taken as of May 1975. The ratings are taken at issuance for all issues post SEC certification. The y-axis shows the frequency of defaults over the period running from July 1975 to December 1987 for pre-period issues and from issuance date to December 1987 for all post-NRSRO bonds issued between July 1975 and December 1978.

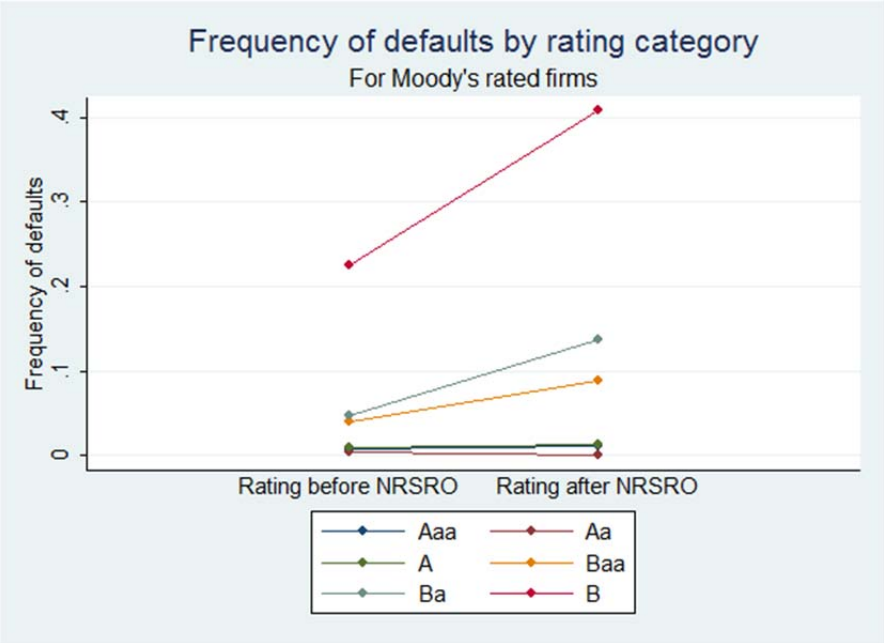

Figure 2b: Z-score changes by rating category pre and post SEC-certification
This figure presents the average Z-score change by rating category for issues rated by Moody's both before and after the SEC-certification (introduction of NRSRO status in June 1975). For the pre SEC-certification issues, the ratings are taken as of May 1975. The ratings are taken at issuance for all issues post SEC certification. The y-axis shows the average z-score change up to December 1987. For pre-NRSRO issues, the starting value for z-score is taken as of yearend 1974; as of the yearend prior to issuance for all post-NRSRO bonds issued between July 1975 and December 1978.

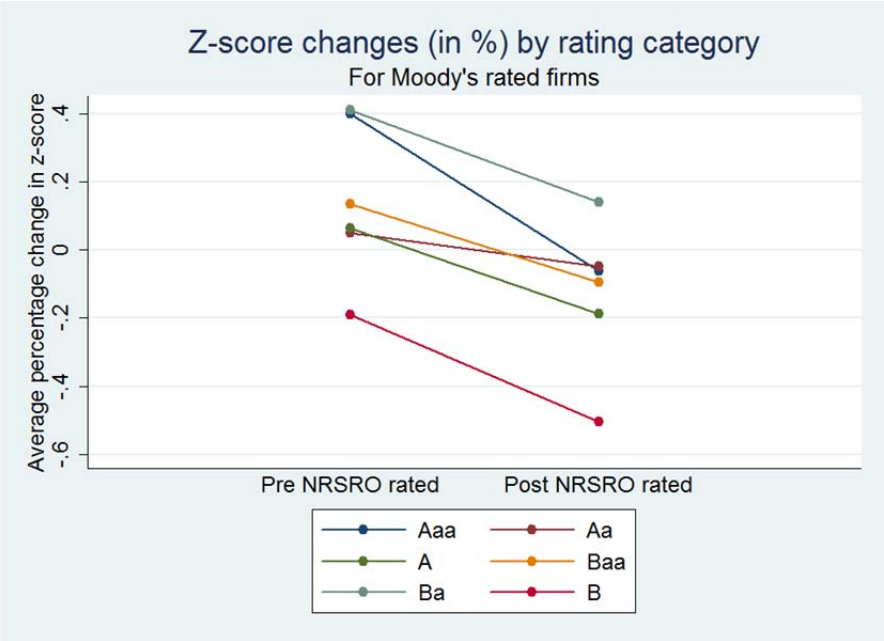

Table 1: Descriptive statistics

This table provides descriptive statistics for our sample. The default sample comprises all debt issues in our default tests. The SEC established the Nationally Recognized Statistical Rating Organization (NRSRO) certification in June 1975. The sample is comprised of all issues with an existing rating from Moody's as of May 1975 (pre-NRSRO sample) as well as all newly rated issues from July 1975 to December 1978 (post-NRSRO sample). The Z-score sample is comprised of the subset of firm years with valid data for our Altman Z-Score-based tests. In Panel A, we provide the number of firm-year observation by rating category for both samples. In Panel B, we provide the median total assets (in million USD), leverage ratio and return on equity (RoE) for both the pre and post NRSRO certification sample. For the pre-NRSRO sample, the values are taken as of yearend 1974, while the values for the post-NRSRO sample are taken as of the end of year in which the initial rating was assigned.

Panel A: Sample Size

	Default sample			Z-Score sample		
Rating category	#Pre	#Post	Total	#Pre	#Post	Total
Aaa	392	97	489	145	35	180
Aa	322	94	416	153	27	180
A	743	165	908	377	45	422
Baa	327	68	395	146	21	167
Ba	125	22	147	60	10	70
B	49	49	98	23	25	48
Caa-C	13	0	13	0	0	0
Totals	1,971	495	2,466	904	163	1,067

Panel B: Sample Characteristics

	Assets		Leverage		RoE	
Rating category	Pre	Post	Pre	Post	Pre	Post
Aaa	3,640	3,669	56.0%	52.8%	8.9%	10.7%
Aa	1,636	2,929	50.0%	53.0%	12.0%	14.4%
A	1,206	1,091	58.8%	59.2%	11.4%	13.5%
Baa	1,641	848	63.9%	62.2%	10.5%	12.1%
Ba	1,340	454	65.5%	68.4%	10.9%	17.0%
B	492	161	77.5%	67.2%	5.5%	12.5%
Caa-C	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Average	1,614	1,349	58.1%	56.4%	11.2%	12.5%

Table 2: Default regressions – baseline

This table presents results for predictive default regressions. The dependent variable is an indicator variable taking on the value of one if a default of the bond occurs within the time window after the introduction of the NRSRO status. In Panel A, the time window over which a default can occur for pre-NRSRO issues is July 1975 to December 1987 and the date of issuance to December 1987for all post-NRSRO bonds issued between July 1975 and December 1978. In Panel B, the time window is 10 years for both pre and post samples, running from July 1975 to May 1985 for the pre-NRSRO rated sample and from December 1978 to December 1988 for the post-NRSRO newly rated issues. The post-dummy variable is an indicator variable for the post-NRSRO sample, i.e. all new issues rated between July 1975 and December 1978. The numerical rating variable is the rating level of the bond as of May 1975 for bonds issued in the pre SEC-certification period and at issuance for the bonds issued in the post SEC-certification period. Industry fixed effects and bond maturity are included in some of our specifications, as indicated in the table. Standard errors clustered at the issuer level are shown in parentheses. ***, **, * indicate significance at the 1, 5, and 10 percent level, respectively.

Panel A: Defaults as of year-end 1987

	(I)	(II)	(III)	(IV)	(V)
post-dummy	0.0428***	0.0395***	0.0404***	0.0359**	0.0392**
	[0.0132]	[0.0120]	[0.0131]	[0.0156]	[0.0177]
Numerical rating		0.0311***	0.0316***	0.0431***	0.0434***
		[0.0055]	[0.0055]	[0.0074]	[0.0076]
Observations	2,466	2,466	2,466	1,682	1,682
Adjusted R^2	0.010	0.068	0.085	0.092	0.112
Industry fixed effects	No	No	Yes	No	Yes
Bond maturity	No	No	No	Yes	Yes

Panel B: Defaults over 10 years window (Pre-period issues: [June 1975-May 1985] / Post-period issues: [Dec 1978- Dec 1988])

	(I)	(II)	(III)	(IV)	(V)
post-dummy	0.0560***	0.0531***	0.0535***	0.0567***	0.0584***
	[0.0145]	[0.0133]	[0.0141]	[0.0169]	[0.0186]
Numerical rating		0.0272***	0.0276***	0.0371***	0.0372***
		[0.0048]	[0.0048]	[0.0066]	[0.0066]
Observations	2,466	2,466	2,466	1,682	1,682
Adjusted R^2	0.022	0.072	0.085	0.095	0.109
Industry fixed effects	No	No	Yes	No	Yes
Bond maturity	No	No	No	Yes	Yes

Table 3: Downgrades to SG regressions

This table presents results for the downgrades to speculative grade regressions. Panel A gives the results for all investment grade rated firms while Panel B focuses only on Baa rated firms. The dependent variable takes on the value of one if an investment grade bond is downgraded from investment grade to speculative grade over a given time frame. The time frame runs from June 1975 to yearend 1987 in column (1) and for 10 years from May 1975 for pre-NRSRO rated bonds and for 10 years from December 1978 for post-NRSRO newly rated bonds in column (2). All explanatory variables are defined in Table 2. Standard errors clustered at the issuer level are shown in parentheses. ***, **, * indicate significance at the 1, 5, and 10 percent level, respectively.

Panel A: All Investment grade rated firms		
Downgrades to speculative grade as of	End of 1987	After 10 years
post-dummy	0.0802***	0.1203***
	[0.0278]	[0.0286]
Numerical rating	0.0851***	0.0753***
	[0.0138]	[0.0136]
Observations	2,233	2,233
Adjusted R^2	0.078	0.084
Industry fixed effects	Yes	Yes
Panel B: Only Baa rated firms		
Downgrades to speculative grade as of	End of 1987	After 10 years
post-dummy	0.1950**	0.2401**
	[0.0940]	[0.0948]
Observations	397	397
Adjusted R^2	0.115	0.123
Industry fixed effects	Yes	Yes

Table 4: Z-Score regressions

This table presents the results for Z-score regressions. In Panel A, the dependent variable is an indicator variable taking the value of one if the Altman Z-Score of a firm *decreases* between yearend 1974 and December 1987 for pre-NRSRO issues (respectively yearend prior to the debt issuance and December 1987 for post-NRSRO issues) in columns 1 and 2 and for 10 years after yearend 1974 (respectively yearend prior to issuance for post-NRSRO issues) for columns 3 and 4. The Z-Score negative change dummy is defined so as to reflect an increase in credit risk. In Panel B, the table shows regression results with Z-Score level as dependent variable. It is defined with a negative sign so as to reflect an increase in credit risk as well. Starting Z-Score is the Altman Z-Score of the firm as of May 1975 for the pre SEC-certification bond issues and per year-end prior to the year in which the initial rating was assigned for the post SEC-certification bond issues. All other variables are defined in Table 2 and included as indicated in the table. Standard errors clustered at the issuer level are shown in parentheses. ***, **, * indicate significance at the 1, 5, and 10 percent level, respectively.

Z-Score as of	End of 1987	End of 1987	After 10 years	After 10 years
Panel A: Z-Score negative change dummy				
post-dummy	0.1775***	0.1727***	0.2087***	0.2081***
	[0.0507]	[0.0508]	[0.0627]	[0.0620]
Numerical rating		0.0153		0.0023
		[0.0253]		[0.0225]
Starting Z-Score	0.1660***	0.1644***	0.1471***	0.1469***
	[0.0242]	[0.0231]	[0.0212]	[0.0207]
Observations	1,067	1,067	1,106	1,106
Adjusted R^2	0.168	0.168	0.188	0.188
Panel B: Z-Score negative level				
post-dummy	0.4066***	0.3922***	0.4945***	0.4914***
	[0.1110]	[0.1033]	[0.1198]	[0.1158]
Numerical rating		0.0456		0.0126
		[0.0527]		[0.0502]
Starting Z-Score	-0.6013***	-0.6060***	-0.5792***	-0.5802***
	[0.0590]	[0.0575]	[0.0552]	[0.0544]
Observations	1,067	1,067	1,106	1,106
Adjusted R^2	0.453	0.454	0.437	0.436
Industry fixed effects	Yes	Yes	Yes	Yes

Table 5: Default regressions – robustness tests

This table presents results for alternative predictive default regressions. All variables are defined in Table 2. In Panel A, we vary the time windows until the default occurrence. Our baseline results of Table 2 are for 1987, we shorten the window by one year in column (1) and we lengthen the window by one year in column (3). In Panel B, the sample period for the pre SEC-certification ends in December 1974; i.e. we exclude observations between January 1975 and May 1975 to account for the potential anticipation of the event. In Panel C, we restrict the pre-NRSRO sample to bonds with a bond issue or credit change that occurs during the period December 1971-May 1975. This restriction makes the time period of the pre-NRSRO sample match with the time period used for the post SEC-certification issues. Standard errors clustered at the issuer level are shown in parentheses. ***, **, * indicate significance at the 1, 5, and 10 percent level, respectively.

Defaults as of yearend:	1986	1987	1988
Panel A: Different time periods			
post-dummy	0.0349***	0.0404***	0.0406***
	[0.0126]	[0.0131]	[0.0138]
Numerical rating	0.0305***	0.0316***	0.0332***
	[0.0052]	[0.0055]	[0.0057]
Observations	2,466	2,466	2,466
Adjusted R^2	0.087	0.085	0.084
Panel B: Anticipation of event			
post-dummy	0.0365***	0.0422***	0.0414***
	[0.0134]	[0.0139]	[0.0146]
Numerical rating	0.0307***	0.0322***	0.0341***
	[0.0052]	[0.0055]	[0.0057]
Observations	2,321	2,321	2,321
Adjusted R^2	0.090	0.091	0.090
Panel C: Symmetric pre and post event sample periods			
post-dummy	0.0235**	0.0283**	0.0282**
	[0.0119]	[0.0123]	[0.0130]
Numerical rating	0.0401***	0.0427***	0.0455***
	[0.0078]	[0.0082]	[0.0087]
Observations	1,283	1,283	1,283
Adjusted R^2	0.111	0.115	0.114
Industry fixed effects	Yes	Yes	Yes

Table 6: Default regressions – Placebo tests

This table presents results for placebo predictive default regressions. The dependent variable is an indicator variable for default of a given debt issue. The dependent variable and all control variables are defined in Table 2. In Panel A, our first falsification test uses only observations from the pre SEC-certification period, from December 1971 to May 1975. In Panel B, our second falsification test uses only observations from the post SEC-certification period, from July 1975 to December 1978. In both falsification tests, the sample period of 42 months is split in two (pre and post) periods of 21 months. The post dummy variable takes the value of 1 for all observations of newly issued debt over the period from September 1973 to May 1975 in Panel A and all newly issued debt over the period from April 1977 to December 1978 in Panel B. Standard errors clustered at the issuer level are shown in parentheses. ***, **, * indicate significance at the 1, 5, and 10 percent level, respectively.

Defaults per end of	1986	1987	1988
Panel A: Dec 1971 to Aug 1973 vs. Sep 1973 to May 1975 (42 months)			
post-dummy	-0.0200	-0.0249	-0.0249
	[0.0174]	[0.0187]	[0.0187]
Numerical rating	0.0232**	0.0268**	0.0274**
	[0.0111]	[0.0125]	[0.0125]
Observations	584	584	584
Adjusted R^2	0.035	0.043	0.040
Panel B: Jul 1975 to Mar 1977 vs. Apr 1977 to Dec 1978 (42 months)			
post-dummy	0.0306	0.0217	0.0150
	[0.0200]	[0.0214]	[0.0223]
Numerical rating	0.0581***	0.0618***	0.0673***
	[0.0119]	[0.0123]	[0.0134]
Observations	495	495	495
Adjusted R^2	0.207	0.200	0.198
Industry fixed effects	Yes	Yes	Yes

Table 7: Is it a reaction to S&P's switch to issuer pay?

This table shows results for predictive default regressions (Panel A) and z-score regression (Panel B) over a sample corresponding to a potential reaction of Moody's to S&P's switch to issuer pay. Specifically, the window of analysis is restricted to observations prior to May 1975 to isolate the change of S&P's payment model from the change in SEC's ratings regulation in June 1975 (introduction of NRSRO). The post-dummy takes a value of one for all new issues over the period from July 1974 to May 1975 and zero otherwise. All other variables are defined as before (see Table 2 for reference). Standard errors clustered at the issuer level are shown in parentheses. ***, **, * indicate significance at the 1, 5, and 10 percent level, respectively.

Per end of	1986	1987	1988
Panel A: Defaults			
post-dummy	-0.0064	-0.0060	-0.0057
	[0.0121]	[0.0122]	[0.0124]
Numerical rating	0.0218***	0.0221***	0.0229***
	[0.0049]	[0.0053]	[0.0053]
Observations	1,973	1,973	1,973
Adjusted R^2	0.046	0.043	0.042
Panel B: Downgrades to SG			
post-dummy	-0.0421*	-0.0382	-0.0462*
	[0.0237]	[0.0241]	[0.0242]
Numerical rating	0.0716***	0.0741***	0.0762***
	[0.0133]	[0.0133]	[0.0134]
Observations	1,809	1,809	1,809
Adjusted R^2	0.059	0.059	0.061
Panel C: Z-Score drop dummy			
post-dummy	-0.0242	-0.0619	-0.0217
	[0.0679]	[0.0677]	[0.0739]
Numerical rating	-0.0218	-0.0151	-0.0030
	[0.0326]	[0.0336]	[0.0354]
Starting Z-Score	0.1539***	0.1586***	0.1530***
	[0.0240]	[0.0262]	[0.0267]
Observations	836	822	749
Adjusted R^2	0.190	0.188	0.161
Industry fixed effects	Yes	Yes	Yes

Table 8: Impact of firm size on ratings quality

This table presents regression results for three outcome variables: (1) Defaults, (2) Downgrades to speculative grade, and (3) Z-Score negative change dummy. The variable Size dummy is a dummy variable taking on the value of one if the bond issuer has assets which are larger than the median asset size of all bond issuers; the post-size interaction variable interacts the post-dummy with this size dummy. All other control variables are defined in Table 2. ***, **, * indicate significance at the 1, 5, and 10 percent level, respectively.

Dependent variable:	Defaults	Downgrades to SG	Z-score negative change dummy
post-dummy	0.0717***	0.0269	0.1820***
	[0.0229]	[0.0354]	[0.0679]
Size dummy	0.0209	0.0293	0.1728**
	[0.0132]	[0.0303]	[0.0867]
post-size interaction	-0.0560**	0.1166*	-0.0335
	[0.0240]	[0.0615]	[0.1099]
Numerical rating	0.0300***	0.1073***	0.0350
	[0.0078]	[0.0185]	[0.0284]
Starting Z-Score			0.1703***
			[0.0220]
Observations	1,667	1,525	1,067
Adjusted R^2	0.082	0.115	0.192
Industry fixed effects	Yes	Yes	Yes