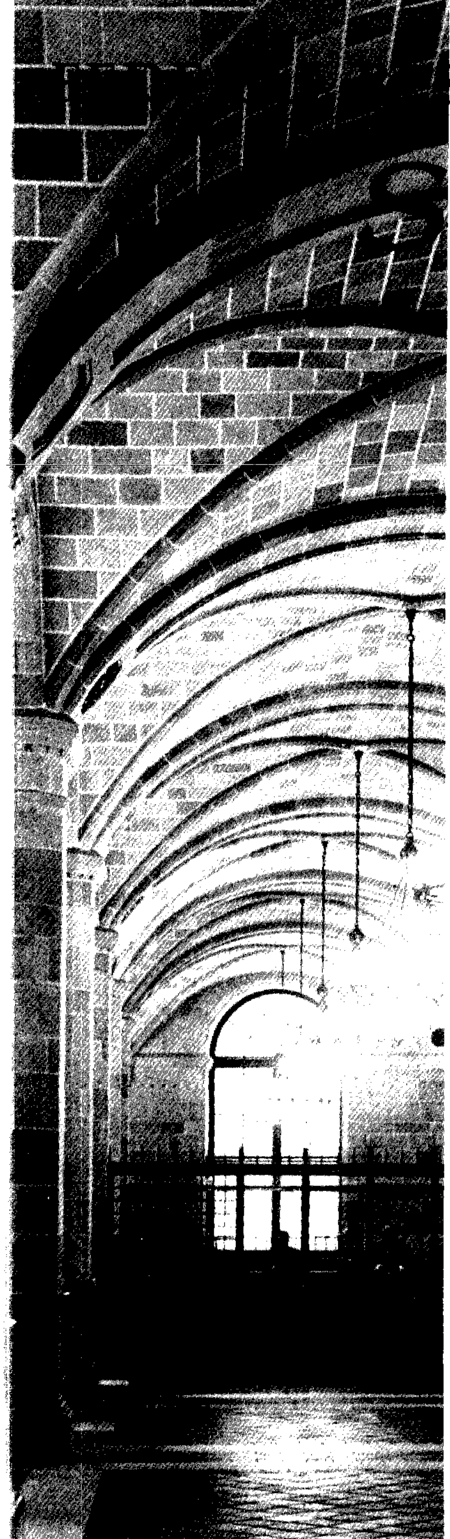

ERVE BANK OF NEW YORK

Staff Reports

Multiple Ratings and Credit Standards: Differences of Opinion in the Credit Rating Industry

Richard Cantor
Frank Packer

Number 12
April 1996

Multiple Ratings and Credit Standards: Differences of Opinion in the Credit Rating Industry

Richard Cantor and Frank Packer
Capital Markets Function
Research and Market Analysis Group
Federal Reserve Bank of New York

Abstract

Rating-dependent financial regulators assume that the same letter ratings from different agencies imply the same levels of default risk. Most "third" agencies, however, assign significantly higher ratings on average than Moody's and Standard & Poor's. We show that, contrary to the claims of some rating industry professionals, sample selection bias can account for at most half of the observed average difference in ratings. We also investigate the economic rationale for using multiple rating agencies. Among the many variables considered, only size and bond-issuance history are consistently related to the probability of an issuer seeking third ratings. The probability appears unrelated to uncertainty over default risk or firms' opportunities to improve their standing under rating-dependent regulations.

This article has benefited from comments received from Michael Fleming, Jean Helwege, David Laster, and Asani Sarkar. We are particularly grateful for the excellent research assistance and comments provided by Kevin Cole.

1. Introduction

Regulators, like investors, value the cost savings achieved through the use of credit ratings in credit evaluation. As a result, they have come to rely on a variety of specific letter ratings as thresholds for determining capital charges and investment prohibitions. The regulatory use of ratings, however, does not account for the fact that some rating agencies appear to have different absolute scales, some rating bonds higher or lower on average on jointly rated issues than Moody's and Standard and Poor's (S&P), the two leading agencies. At present, the ratings of the four major U.S. agencies are used interchangeably in regulations issued by the Securities and Exchange Commission (SEC) and the National Association of Insurance Commissioners (NAIC). Critics of the current system have recommended that regulatory usage be limited only to those agencies that have demonstrated a market impact, or that ratings should not be used at all by financial regulators (Lehn 1995; McGuire 1995).

Often ignored in the debate has been the fact that observed rating differences need not imply different credit standards, but rather could be the result of sample selection bias. While for decades Moody's and S&P have automatically assigned ratings to all corporations issuing in the U.S. public bond markets, Fitch and Duff & Phelps—the two other major agencies—have issued ratings only upon request. These "third" agencies have argued that their ratings have often been sought when there is a strong expectation by issuers of improving upon Moody's and S&P's ratings. However, whenever Fitch and Duff & Phelps would have rated lower, their ratings would not have been purchased.[1]

Certainly, the mechanism of reputation should serve as a powerful incentive to maintain ratings that are not too out-of-line with established standards. The rationale for obtaining credit ratings has traditionally been viewed in the finance literature to be the economies of scale in information collection and the reduction of agency costs in the issuance of debt (Wakeman 1984, Ramakrishnan and Thakor 1984, Millon and Thakor 1985). If investors were to lose confidence in an agency's ratings, issuers would no longer believe they could lower their funding costs by obtaining its ratings. To this extent, we might expect the credit rating agency's reputation in the bond market to play a role similar to that of the underwriter's in the initial public offering (IPO) market, where reputation checks the degree to which low-quality issues are brought to the market (Beatty and Ritter 1986; Carter and Manaster 1990).

It is possible that the reputation mechanism works imperfectly in a credit rating industry characterized by regulation-related demand. Firms may purchase an agency's ratings in order to meet regulatory guidelines independent of how that agency's ratings are viewed in the marketplace. As a result, concerns over "rating shopping" have prompted the SEC to reconsider the use of ratings in regulations and its procedures for identifying

---

[1] In a letter to issuers in October 1995, Fitch explained the planned introduction of a new policy to rate many issuers on an unsolicited basis as part of a strategy to "change the misperception that our ratings are higher than those of our competitors, which has resulted from our previous policy of only rating upon request of the issuer" (*High Yield Report* 1995).

which agencies' ratings it recognizes (SEC 1994).

Ultimately, whether observed rating differences reflect different credit standards is an empirical question. Are the default risks associated with a particular letter grade higher for some agencies than for others? Or, do the third agencies appear to have lower credit standards just because they provide ratings only upon request? In addition, do firms systematically employ third rating agencies to clear regulatory hurdles?

This paper proposes to answer these questions based on the analysis of a sample of 871 corporations that had credit ratings from at least two agencies at year-end 1993. After describing the current regulatory use of ratings and presenting evidence of rating differences, we introduce a model, based principally on Heckman's (1979) two-stage method, to correct for sample selection bias. In the first stage of the model, we estimate the importance of regulatory concerns, ex ante uncertainty, and other factors (such as issue size) in explaining the existence of third ratings. We then estimate the importance of sample selection in determining the higher ratings of Duff & Phelps and Fitch. We conclude with a discussion of the implications of our results.

2. The Credit Rating Industry, Rating Scales, and Regulatory Uses

Two rating agencies, Moody's and S&P, dominate the U.S. credit rating industry. Moody's was the first agency to begin rating bonds, in 1909, and the two companies that formed S&P started their rating operations in 1916 and 1922. Both agencies currently have a policy of rating all taxable corporate bonds publicly issued in the United States, regardless of whether they have been hired by an issuer.[2] The vast majority of issuers pay Moody's and S&P for their ratings despite no legal obligation so they can put their best case before the agencies in the context of a cooperative rating process.

Two other U.S. rating agencies also have a long history, but they do not rate as many issues as Moody's and S&P.[3] Fitch began rating bonds in 1924; Duff & Phelps, which began rating a wide range of companies in 1982, has researched public utility companies since 1932. For our sample of 871 firms at year-end 1993, 33.1 percent had a rating from Duff & Phelps, 18.5 percent from Fitch. These smaller market shares reflect not only less intrinsic demand for their ratings but also each agency's long-standing policy of rating bonds only on request of the issuer.

The bond ratings of the four agencies are comparable in the sense that they attempt to measure the likelihood of the default or delayed payment of a security. But while each agency's ranking of relative default risks is fairly straightforward, the correspondence between their symbols and absolute levels of default risk has not been made explicit by the agencies. S&P, Duff & Phelps, and Fitch all use the same basic set of rating symbols, but Moody's uses a slightly different system. (Table 1 provides the standard correspondence drawn by both the regulatory and investment communities

---

2 The same agencies usually rate municipal bonds, asset-backed securities, and foreign issues only on request, although Moody's frequently issues unsolicited ratings. Our study does not concern ratings for these categories of issuers.

3 Although a number of other credit rating agencies operate in the United States with a narrower focus, the above-mentioned four rating agencies are the only ones that provide credit ratings on U.S. corporate obligations across a broad industry spectrum. For example, Thomson Bankwatch and IBCA (in the United States) exclusively rate financial institutions, and A.M. Best provides ratings on insurance companies' claims-paying abilities.

between Moody's ratings and those of the other agencies.[4])

As ratings have gained greater acceptance in the marketplace, regulators of financial markets and institutions have increasingly used them to simplify the task of prudential oversight. The reliance on ratings extends to virtually all financial regulators, including the public authorities that oversee banks, thrifts, insurance companies, securities firms, capital markets, mutual funds, and private pensions.

The early regulatory uses of ratings drew only on the agency distinction between investment-grade securities—those rated BBB(Baa) and above—and speculative securities—those rated BB(Ba) and below. Regulations required that extra capital be held against speculative securities or prohibited such investments altogether. Although this distinction remains important, over time regulatory capital requirements, disclosure requirements, and investment prohibitions have increasingly been tied to other letter grades as well (Table 2).

Since regulators adopted rating-dependent rules, they have had to specify which agencies qualify for consideration under their regulations. The SEC currently designates only Moody's, S&P, Duff & Phelps, and Fitch as nationally recognized statistical rating organizations (NRSROs) for rating all U.S. corporate bond issues,[5] and the other regulators rely on the SEC's designations. All such regulations implicitly assume comparability of the

4 See, for example, the mapping provided by the National Association of Insurance Commissioners's Securities Valuation Office (1993, pp. 50-53).

5 The ratings of two other agencies, Thomson Bankwatch and IBCA, are recognized as NRSRO ratings by the SEC only to the extent that they are limited to financial institutions.

rating scales across these agencies.

Most rating-dependent regulations require only that a bond issue carry a single agency's rating. However, as issuers almost always have more than one rating, methods are required for dealing with the inevitable differences of opinion across agencies. The most common approach is to adopt an explicit rule, recognizing either the highest or the second-highest rating, regardless of the level of the other outstanding ratings and the identity of the rating agency. Thus, the current regulatory uses of ratings also assume uniformity of absolute rating scales across the agencies in their treatment of rating splits.

However, there is reason to doubt that rating scales are indeed uniform. In Table 3, we summarize the rating differences observed in a large sample of credit ratings assigned at the end of 1993 by Moody's, S&P, Duff & Phelps, and Fitch. Consistent with previous studies (Beattie and Searle 1992; Cantor and Packer 1994), our sample reveals that Duff & Phelps and Fitch assign systematically higher ratings on jointly rated issues than Moody's and S&P. For instance, while Duff & Phelps assigns ratings higher than Moody's nearly one-half of the time, it assigns ratings lower than Moody's only one-tenth of the time, and on average rates 0.57 notches higher than Moody's. (A "rating notch" is the gap between ratings, for example, an A[A2] and an A+[A1]). Similar gaps can be seen in a comparison of Fitch's ratings to Moody's ratings, and in a comparison of ratings from both Duff & Phelps and Fitch to ratings from S&P.

From the point of view of regulatory practice, an agency with a higher average rating scale enables relatively more borrowers to meet regulatory cutoffs. However, the observation of higher average ratings on jointly rated issues may not imply a higher average scale, but may simply be due to more creditworthy firms choosing to obtain a third rating.

3. A Model of Rating Differences and the Effects of Sample Selection

If all agencies rate all firms, then differences in the agencies' average ratings can be interpreted as differences in their rating scales. However, many firms do not receive ratings from Duff & Phelps and Fitch. As a result, observed differences between the average ratings of these agencies and those of Moody's and S&P may reflect the effects of sample selection.

The following model makes the effects of sample selection amenable to empirical examination. Suppose rating agencies were to assign numerical ratings as follows,

$$r_{a,f} = \alpha_a + x_f \beta_a + \varepsilon_{a,f}, \tag{1}$$

where $r_{a,f}$ is the rating assigned by agency a to company f,

α_a is a constant term that may vary across agencies,

x_f is a vector of observable information on company f,

β_a is a vector of coefficients summarizing agency a's rating technology, and

$\varepsilon_{a,f}$ is the unobservable component of agency a's rating of company f.

This final variable, $\varepsilon_{a,f}$, is a random variable that reflects intangible factors inherent to the rating process—public and private information on company f not included in x, and the agency's rating technology that translates that information into ratings with error. The constant term α is defined so that the expectation of $\varepsilon_{a,f}$ taken over the entire population of firms is zero.

Our primary equation of interest is the difference between the ratings of two agencies, m and o, assigned to the same firm, which is defined by

$$(2) \qquad r_{m,f}-r_{o,f} = \alpha_m\alpha_o + x_f(\beta_{m,f}-\beta_{o,f}) + \varepsilon_{m,f}-\varepsilon_{o,f},$$

where the subscripts m and o refer to a "mandatory" agency, or one that publishes ratings on all issuers, and an "optional" agency, or one that only publishes upon request of the issuer. For ease of notation, we will rewrite equation 2 as

$$(3) \qquad r_f = \alpha + x_f\beta + \varepsilon_f,$$

where all variables and coefficients represent differences between agencies m and o and the agency subscripts have been suppressed. If both agencies rated the entire population of firms, the mean of the observed rating differences would be an unbiased estimate of the difference in the agencies' absolute rating scales. However, we know that while the mandatory agency rates the entire population, P, of firms, the optional agency rates only a subsample, S, and thus we have data on r_f only for that subsample.

The hypothetical population regression of equation 3 may be written as

$$(4) \qquad E[r_f|f \in P] = \alpha + E[x_f\beta|f \in P] \ .$$

The regression function for the subsample of the population with ratings from the optional agency is

$$(5) \qquad E[r_f | f \in S] = \alpha + E[x_f \beta | f \in S] + E[\varepsilon_f | f \in S] \ .$$

If the source of sample selection were purely random, the conditional expectation of ε_f in equation 5 would be zero and the conditional mean of x_f would equal its unconditional mean. Therefore, the mean of r_f for the sample S would be an unbiased estimate of the population mean. If the sample selection were nonrandom, the sample mean of r_f may differ from the population mean simply because the mean of x_f differs between the sample and the population. Moreover, if sample selection were conditioned in part on ε_f, estimates of α and β in equation 3 would be biased. In particular, if β were zero, estimates of α would be biased upward if firms were more likely to obtain ratings from the optional agency when they have unusually high values of ε_f—that is, an exceptionally large positive difference between the optional firm's relative ratings ($\varepsilon_{o, f}$) and the mandatory agency's relative ratings ($\varepsilon_{m, f}$).

The existence of this sort of sample selection bias is a distinct possibility. A firm might know that the new agency provides a more favorable rating treatment to firms in an industry with its specific characteristics. Or a firm might already know its rating from the mandatory agency before deciding whether to obtain a rating from the optional agency. Or a firm may be told its likely rating assignment by the optional agency before it is required to commit fully to the new agency's rating process.

Regardless of the source of sample selection, consistent estimates of the true α can be obtained with the two-step approach proposed by Heckman (1979). This approach utilizes information on the sample selection process in a first-stage probit regression on the decision to obtain a third rating. If company f's decision to obtain a rating from the optional agency is based on some exogenous characteristics z_f and a random variable η_f, which may be correlated with ε_f, then company f's decision rule can be summarized by

$$(6) \qquad y_f = z_f\gamma + \eta_f, \quad \text{for } f \in N,$$

where y_f measures company f's incentive to obtain a rating from the optional agency,

γ is a vector of parameters,

z_f is a vector of exogenous characteristics of company f, and

η_f is a random variable with mean zero, variance $\sigma_{\eta\eta}$, and covariance with ε , $\sigma_{\varepsilon,\eta}$.

The variables that comprise z_f include any observable factor that would influence the cost or benefit of obtaining a rating. Without loss of generality, we assume company f obtains a rating from a new agency if and only if $y_f>0$ or $\eta_f>-z_f\gamma$. Hence, equation 5 can be rewritten as

$$(7) \; E[r_f|(f \in S)] = E[r_f|\eta_f > -z_f\gamma] = \alpha + E[x_f\beta|f \in S] + E[\varepsilon_f|\eta_f > -z_f\gamma].$$

If ε_f and η_f are jointly normally distributed, equation 7 can be rewritten as

$$(8) \qquad E[r_f|z_f, \eta_f > -z_f\gamma] = \alpha + x_f\beta + (\rho/\sqrt{\sigma_{\varepsilon\varepsilon}})\lambda_f,$$

where ρ is the correlation between ε and η, and λ is the inverse Mills ratio, $\phi(v)/\Phi(-v)$, evaluated at $v = z_f\gamma/\sqrt{\sigma_{\eta\eta}}$.

The inverse Mills ratio is a measure of the extent to which a firm f appears in the sample of firms rated by agency j unexpectedly, based on their observed characteristics z_f. Estimates of the inverse Mills ratio can be derived from a probit estimation of equation 6. Equation 8 is then estimated by ordinary least-squares regression. If estimates of equation 8 reveal a positive coefficient on λ, then $\rho>0$, which implies that firms unexpectedly rated by the optional agency are more likely to have positive values of η_f. Using the least-squares estimates of equation 8,[6] the observed difference between the two agencies' average rating difference can then be decomposed into the difference in the absolute positioning of their rating scales $(\alpha + E[x\beta|f \in P])$, the bias due to sample selection based on the "x's" $(E[x\beta|f \in S] - E[x\beta|f \in P])$, and other sources of sample selection, $(\rho/\sqrt{\sigma_{\varepsilon\varepsilon}})^* E[\lambda_f|f \in S]$.

The methodology outlined above follows much of the empirical literature on ratings that assumes the ratings can be interpreted as cardinal variables, with specific fractional values in relation to one another. As a check on the robustness of our results to the weakening of this assumption, we also estimate an ordered multinomial probit estimation of equation 8 instead of ordinary least squares, which assumes only that ratings signal a positioning relative to other ratings.

In particular, we divide the observed rating differences r_f into three

[6] Consistent estimates of the standard errors of the estimated coefficients for the second-stage regression can be obtained following the procedures suggested by Greene (1981).

categories—the new agency rates higher, the same, or lower—and estimate the probabilities that rating differences will fall into one of these categories. A second-stage ordered probit estimation of ratings differences with the inverse Mills ratio from the first-stage probit model included as an explanatory variable enables us to contrast the relative fractions observed directly in the data (sample S) with those estimated for the population (sample P) when sample selection bias is taken into account.

4. The Data

The dependent variables in our regression analysis are the long-term credit ratings assigned by Moody's, S&P, Duff & Phelps, and Fitch to U.S. corporations with public taxable debt outstanding at year-end 1993. Our primary data source is *Credit Ratings International* (CRI), which tracks the ratings of all the major rating agencies on a quarterly basis. Our sample is drawn from the first issue in 1994, which corresponds to outstanding ratings as of December 31, 1993.

Collecting a consistent dataset for rating comparisons across agencies is difficult because individual firms often receive different ratings for different types of debt issues. CRI, however, presents agency ratings on a consistent basis since it reports only the ratings that agencies have assigned to each company's most representative long-term security, typically its long-term senior unsecured or senior subordinated debt. Because of possible misreporting by the rating agencies and typographical errors, we cross-checked CRI's ratings against alternative sources of information, including ratings given to us directly by Moody's and S&P for the purposes of this study and ratings published in the *Duff & Phelps Rating Guide* and *Fitch*

Rating Book. Discrepancies were resolved through these sources and direct contacts with the agencies themselves. In the end, we were able to obtain reliable data on 1,413 companies rated jointly by Moody's and S&P.

Our primary source for explanatory variables is COMPUSTAT, which records descriptive financial information (e.g., assets and leverage) and nonfinancial information (e.g., industry and location) on a wide variety of companies. Of the 1,413 companies rated by Moody's and S&P, 871 had sufficient information on COMPUSTAT to be included in this study.

Rating differences between agencies are calculated by assigning numerical values to ratings (AAA [Aaa] = 1, AA+ [Aa1] = 2, and so on) and subtracting the associated numerical values from each other. Since the agencies have different letter ranges in the C category, we truncated each agency's ratings from below B- (B3) = 16 to equal 17. Firms in default are not included in the sample.

5. Why Do Firms Have Third Ratings?

The measurement of sample selection bias requires a prior specification and estimation of the factors determining the likelihood of a third rating. Because the existing literature provides very little guidance as to what variables should be used,[7] our specifications are as inclusive as possible given the data available. Factors for which we can construct measures include

[7] The most directly relevant papers are those of Hsueh and Kidwell (1988) and Moon and Stotsky (1993), which estimate the probability that municipalities obtain ratings from Moody's and S&P. Although these papers do not set out to test any particular behavioral model, they do find that rating level, size, and location are important determinants in the probability of receiving ratings from Moody's and S&P.

firm/issue size, uncertainty about firm creditworthiness, agency rating criteria and expertise, regulatory impact, and the length of time the firm has been active in the corporate bond market.

5a. Factors Affecting the Likelihood of a Third Rating

Size Variables. Agencies charge fees that are generally based on the size of the bond issue: a typical fee for a new, long-term corporate bond issue ranges from 2-3 basis points of the principal for each year the rating is maintained. However, floors and caps on fees, as well as special rates for frequent issuers, imply that the cost on a percentage basis is usually smaller, the larger the amount of rated debt (Cantor and Packer 1994).

The potential direct benefit of an additional rating is a lower interest rate on borrowed funds, implying that benefits accrue in direct proportion to the amount of long-term debt issued. Given that the average cost of obtaining a rating declines with the scale of issuance, we expect that firms with greater debt issuance are more likely to have third ratings.[8]

A potential byproduct of the information value of a third rating may also be lower costs for other types of capital. To this extent, more inclusive measures of firm size may capture these additional benefits of a third rating. Therefore, in addition to the log of long-term debt, we include another

[8] Size—measured by issuance—has often been used as a proxy for the degree of ex ante uncertainty in the empirical literature on initial public offerings (Beatty and Ritter 1986). For this reason, measures of size could be inversely related to the probability of obtaining a third rating. However, as we include in our regressions other, more direct proxies for ex ante uncertainty about creditworthiness, we believe the scale effects of size on the costs of ratings should dominate an uncertainty effect.

measure of firm size: the log of total assets.

Uncertainty Variables. The value of a third rating should increase with uncertainty about a firm's creditworthiness. Ramakrishnan and Thakor (1984) and Millon and Thakor (1985) discuss the theoretical role of credit rating agencies as information gatherers and processors. The authors conclude that credit rating agencies can reduce a firm's capital costs by certifying its value in a market characterized by informational asymmetries between purchasers and issuers. Surprisingly, studies investigating municipalities' decisions to obtain ratings have not included explanatory variables proxying for the ex ante uncertainty about the issuer (Hsueh and Kidwell 1988; Moon and Stotsky 1993).

We have constructed three variables that proxy for the level of ex ante uncertainty about a firm's creditworthiness. Our first measure assumes a relationship between the objective level of uncertainty and the average level of Moody's and S&P's ratings. As Moody's and S&P's ratings go lower, they are more likely to disagree both with each other and the market in the rank-ordering of credit risks (Cantor and Packer 1994, 1995). Thus, we have constructed an indicator variable that takes on the value 1 if a firm is rated investment grade by both Moody's and S&P. We expect this variable to be negatively related to the probability of obtaining a third rating.

We also have constructed two other measures of uncertainty derived directly from disagreements between Moody's and S&P—(1) an indicator variable equal to 1 if the two disagree at the rating notch level, and (2) a variable measuring the absolute rating difference (measured in rating notches) between the two agencies. If higher levels of uncertainty about true default probabilities increase the benefits of third ratings, then the expected coefficients on these variables should be positive.

Agency Variables. A rating agency can be viewed as having a particular expertise in assessing the creditworthiness of firms in a particular geographic location or industry. For instance, of the four rating agencies under consideration, only Duff & Phelps is headquartered in Chicago, rather than New York. Duff and Phelps may therefore have relative expertise in the analysis of firms from the Midwest, particularly as regional factors have been shown to affect whether venture capitalists have membership on boards (Lerner 1995). For this reason, we construct an indicator variable that equals 1 if the firm is headquartered in one of twelve Midwestern states for the decision to obtain a Duff & Phelps rating. Similarly, agencies may have a reputation for expertise analyzing risk in particular industries. Therefore, we constructed indicator variables that identify issuer sector—industrial, finance, insurance, or utilities.

The expected benefits of a third rating to an issuer may be larger if it expects a better rating assignment than the market expects it to receive. If the third rating agencies weigh certain firm characteristics differently than Moody's or S&P (the β of equation 3 is a nonzero vector), then issuers with such favored or disfavored characteristics may be more or less likely to obtain third ratings. Therefore, we include in the probits a standard set of financial ratios—interest coverage, leverage, and profitability (ROA)—that have been shown in a long line of empirical research to be important determinants of credit ratings (Ederington and Yawitz 1987).[9]

Regulatory Variables. Some issuers may have an incentive to obtain a third rating just to improve their chances of clearing regulatory hurdles and thereby increase their investor base. Indeed, empirical research has shown that some regulations increase the cost of funds to firms with ratings below various threshold levels. West (1973) and Carey, et al. (1993) show that spreads for BB (Ba)-rated borrowers rose following the adoption of regulations that reduced bank and insurance purchases of below-investment-grade securities.

Rating-based regulations accord preferential treatment to securities that meet certain minimum rating levels—in some cases based on a firm's highest rating and in others on a firm's second-highest rating. For this reason, we include two indicator variables to proxy for the regulatory incentives that some issuers may have to obtain a third rating. First, we include an indicator variable that equals 1 if a firm's ratings from Moody's and S&P are Ba1 and BB+, respectively. These firms are the most likely to benefit from a third rating to clear regulations that require just one investment-grade rating.

Second, we include an indicator variable that equals 1 if the ratings of S&P and Moody's fall into different NAIC quality categories. The NAIC's Securities Valuation Office assigns each bond held by an insurance company to one of six quality categories, the first four of which correspond to

[9] For instance, Fitch (1994) stresses that it places greater weight on cash flow coverage than the other agencies. Of course, rating agency selection based on known rating criteria makes sense only if differences in criteria were not transparent to investors, or if a higher third rating allowed the firm to clear a regulatory threshold.

A- (A3) and above, BBB- (Baa3), BB- (Ba3), and B- (B3), respectively. Capital charges are higher as the quality category becomes lower. Because the Securities Valuation Office analysts may choose either the higher or lower rating when there are differences of opinion among the agencies, the value of a third rating may be particularly large for firms with ratings from Moody's and S&P that straddle two NAIC quality categories.[10]

Time Variable. The amount of time that a firm has been active in the public bond market may affect its likelihood of having a third rating. Firms with more experience in the market have more time to learn about the value of a third rating. Moreover, Duff & Phelps and Fitch have had more opportunity to market themselves to firms that have been active a long time than to newer firms. As a proxy for the length of time in the market, we have constructed an indicator variable that takes on the value 1 if the firm had public debt outstanding for ten or more years and the value 0 otherwise.[11]

5b. Summary Statistics

For our sample of 871 corporations at year-end 1993, Tables 4a and 4b pro-

[10] Other (non-NAIC) regulations that require two rather than just one minimum rating generally focus on the investment-grade cutoff. Therefore, firms with Moody's and Standard and Poor's ratings straddling this range may have the strongest incentive to seek third ratings. Such firms constitute a subset of firms with ratings straddling the NAIC quality categories. Although we experimented with a separate indicator for investment-grade/speculative-grade split ratings, these specifications did not produce materially different results.

[11] We used an indicator variable rather than a continuous variable because our historical data begin in 1983. There was little difference in the empirical results when we used other indicator variables taking on the value 1 for firms with six and eight years of experience issuing in the bond market.

vide detail on market share and rating differences across various types of sample disaggregation—by industry, Moody's and S&P ratings, and financial ratio characteristics. Both Duff & Phelps and Fitch rate relatively large shares of utilities, banks and thrifts, and other financial firms. The relative market penetrations of these agencies, however, diverge in other areas. Unlike Duff & Phelps, Fitch has a very limited presence in the rating of insurance companies and other industrial firms; Duff & Phelps has a larger market share in the Midwest than do other agencies.

Contrary to what might be expected if uncertainty over default probabilities increased the demand for additional ratings, Duff & Phelps and Fitch rate proportionately more firms that are rated investment grade by Moody's and S&P than firms rated below investment grade. In addition, Duff & Phelps and Fitch rate proportionately more firms with the same ratings from Moody's and S&P than firms that have split ratings. Disaggregating the data according to firm financial ratios reveals that Duff & Phelps and Fitch rate proportionately more large firms with low leverage.

The data on rating differences also indicate significant variation across market segments. However, the variation appears uncorrelated with the variation in market share. Contrary to what might be expected if rating shopping were common, market niche concentrations for the third rating agencies do not appear to correspond either to larger differences in ratings (Table 4a) or to higher probabilities of obtaining higher third ratings (Table 4b). Of course, simultaneous estimation of the impact of multiple variables is necessary to sort out confounding effects and to measure the impact of sample selection bias based on unobserved factors.

5c. Probit Regression Results

Tables 5 and 6 report the results of probit regressions that estimate the importance of various factors on the likelihood of having a third rating from Duff & Phelps or Fitch, respectively. The estimated coefficients on the industry dummies (not reported) reflected the sample frequencies shown in Tables 4a and 4b. With regard to the Midwest regional dummy included in the Duff & Phelps's probits, its coefficient estimate has the expected positive sign for all five reported specifications (i.e., Midwest firms are more likely to have a rating from Duff & Phelps), although it is not statistically significant in any specification.

The most consistently significant explanatory variables are size, measured by both assets and debt, and the dummy variable indicating whether the firm has had public debt outstanding for more than ten years. The estimated coefficients on all three variables are significantly positive for both Duff & Phelps and Fitch. The positive coefficients on the size variables underscore the importance of the fact that the costs of ratings rise relatively slowly with size. Clearly, the length of time in the market also has a substantial impact on the likelihood of having a third rating.

Uncertainty about default risk does not appear to be a major factor affecting the likelihood of having a third rating. In the case of Duff & Phelps, a firm is less likely to obtain a third rating if the firm is investment grade, but all the coefficients are statistically insignificant; in the case of Fitch, only one of five coefficients is statistically significant, and it is of the wrong sign. The estimated coefficients on the two other rating-based measures of default risk uncertainty almost always have an unexpected negative sign. In the case of the absolute rating difference between Moody's and

S&P, the coefficient is significantly negative in four out of five specifications for the Duff & Phelps probit. *Ceteris paribus*, the larger the difference between the Moody's and S&P ratings, the *less* likely the firm is to have a Duff & Phelps rating.

Regulatory cutoff levels also fail to appear to be important motivations for firms to obtain third ratings. Firms with ratings from Moody's and S&P that straddle different NAIC quality categories or are both just below the investment-grade cusp are *not* more likely to have third ratings than other firms. At least for our sample of corporate bonds, rating shopping does not explain the prevalence of third ratings.

With regard to the three financial ratios—leverage, coverage, and profitability—the latter two were insignificant in all specifications for the existence of a Duff & Phelps rating, while all three were insignificant in all specifications for the existence of a Fitch rating. A significant negative relationship was found between leverage and the existence of a Duff & Phelps rating for four out of five specifications, suggesting that more highly leveraged firms were significantly less likely to have a rating from Duff & Phelps.

6. Sample Selection and Rating Differences

In this section, we analyze the rating differences between the third agencies and Moody's and S&P. We regress the observed rating differences against a variety of possible determinants of relative ratings, while controlling for selection bias using Heckman's (1979) two-step approach. We also examine qualitative differences in ratings (higher, same, or lower) with ordered-probit regressions in the second stage.

Theory and previous empirical work provide only limited guidance as to the selection of appropriate explanatory variables beyond a simple constant term (controlling for potential differences in average rating scales) and the inverse Mills ratio (controlling for sample selection bias not accounted for by other included variables). While a large number of papers have demonstrated that industry dummies and financial variables help predict an agency's *ratings* (for a survey, see Ederington and Yawitz 1987), other research comparing Moody's and S&P ratings (Ederington 1986) suggests that these same variables are unlikely to explain *rating differences.*

Therefore, we begin with the simplest specification, regressing rating differences on a constant and the inverse Mills ratio obtained from the best-fitting probit regressions analyzed in Section 5.[12] We then estimate two more inclusive specifications of the rating difference equations. Our second model adds industry dummies to the rating difference equation. This modification is important if the third agency rates easier or harder on a particular industry relative to Moody's or S&P (relative to their average rating scales) *and* the third agency has a disproportionately small or large market share in that industry.

Similarly, it may be important to incorporate certain financial variables in the regression if third agencies place different weights on specific variables than Moody's or S&P and rate a disproportionate share of firms with high or low realizations of these variables. Our third model, therefore,

[12] Specifically, we use equation 5c from Table 5 for Duff & Phelps and equation 6c from Table 6 for Fitch. Because the implied inverse Mills ratios vary little across the alternative probits presented in Tables 5 and 6, the particular specification chosen from these tables does not influence the second-stage results.

includes four financial variables as regressors in addition to the industry dummies: the log of assets, total debt divided by assets (leverage), return on assets (profitability), and cash flow coverage of fixed charges (coverage).[13]

6a. Least-Squares Regressions

Table 7 presents all three models for the rating differences between Duff & Phelps and both Moody's and S&P. In all six regressions, the coefficient on the Mills ratio is positive and, in five cases, significant at the 1 percent level. With regard to the industry dummies and financial variables, the reported F-statistics imply that neither set of variables adds significant explanatory power to the Duff/Moody's or the Duff/S&P rating difference equations. Hence, equations 7a and 7d are the preferred specifications. Evaluating the inverse Mills ratio at its mean (0.63) for firms obtaining ratings from Duff & Phelps, these two regressions imply that 0.33 of the observed 0.57 rating difference with Moody's and 0.16 of the observed 0.36 rating difference with S&P are explained by sample selection bias.

In Table 8, we present similar regressions, but here we examine factors underlying the differences between Fitch's ratings and those of Moody's and S&P. Looking first at the coefficient on the inverse Mills ratio, we find modest evidence of sample selection in the Fitch/Moody's regression and no such evidence in the Fitch/S&P equations. In the Fitch/Moody's equations, the coefficient is consistently positive and is significant at the 5 percent level in the first model and slightly less significant in the other two

[13] Since coverage ratios are reported only for the nonfinancial firms in COMPUSTAT, for financial firms we set coverage equal to a constant, which, given the presence of industry dummies, eliminated the effect of that variable for nonfinancial firms in the regression.

models. In the Fitch/S&P regression, the coefficient on the Mills ratio changes sign and is never significantly different from zero.

Adding the industry dummies gives significant explanatory power to the Fitch/Moody's equation, though not to the Fitch/S&P equation as shown by the improvement in the R-squared and standard F-tests. The financial variables do not collectively provide significant additional explanatory power in either equation, although in the Fitch/S&P equation, two financial variables appear individually significant. In particular, coverage and profitability appear strongly significant in specifications 8c and 8f, although we are skeptical of the robustness of these estimates since their significance disappears when assets are omitted from the regression (not reported).

Hence, for Fitch there is some evidence in favor of sample selection bias but only in the determination of rating comparisons with Moody's. Based on the preferred specification 8b, evaluating the inverse Mills ratio at its mean (0.78) and evaluating the industry ratings at their population means, we find that 0.31 of Fitch's observed 0.74 average rating difference with Moody's is explained by sample selection bias. Sample selection bias accounts for 0.23 due to unobserved factors (the inverse Mills ratio) and 0.08 due to industry composition of observed ratings that differ from that of the population. However, estimated sample selection bias can account for none of the rating difference between Fitch and S&P.

6b. Ordered-Probit Regressions

We also estimate the second-stage rating-difference equations as trinomial, ordered probits, as presented in Tables 9 and 10. In particular, we define as dependent variables indicator variables that take on one of three possible qualitative outcomes—the third agency ratings that are higher, the same, or lower than Moody's or S&P. The right-hand-side variables are the same as in Tables 7 and 8, including the inverse Mills ratios derived from the probits presented in Tables 5 and 6. While this approach is more general than least squares in some respects, it reduces the weight given to large rating differences, putting all rating differences of the same direction into a single category.[14]

Table 9 presents estimates of the ordinal rating differences between Duff & Phelps and Moody's and Duff & Phelps and S&P. The estimated coefficients on the inverse Mills ratio are all positive and statistically significant in five out of six cases. The coefficient estimates on the industry dummies and the financial variables are similar in sign and significance to those presented in Table 7, although their absolute magnitudes are not directly comparable. Again, we find that the addition of industry dummies and financial ratios fails to add significant explanatory power in these regressions.

Despite its statistical significance, sample selection bias does not appear to explain much of the different frequencies of higher and lower ratings. While Duff & Phelps rates higher than Moody's 48 percent of the time and lower than Moody's 10 percent of the time, correcting for selection bias

[14] We did experiment with other specifications in which the number of values that the indicator variable can take on covers the full range of observed rating differences. These results were broadly the same as those presented in Tables 9 and 10.

implies adjusted frequencies of 41 percent and 13 percent, respectively.[15] Similarly, Duff & Phelps rates higher than S&P 40 percent of the time and lower than Moody's 14 percent of the time; controlling for selection bias implies adjusted frequencies of 35 percent and 17 percent, respectively.

For the Fitch/Moody's specifications, the ordered probits in Table 10 present stronger evidence of selection bias, as the inverse Mills ratio is statistically significant in all three models. As in the least-squares regressions, however, these results again indicate that large rating differences remain after controlling for sample selection. While Fitch rates higher than Moody's 55 percent of the time and lower 7 percent of the time, correcting for selection bias implies estimated frequencies of 46 percent and 11 percent, respectively.[16] In the Fitch/S&P specifications, the ordered-probit approach, like least squares, fails to uncover a evidence of sample selection bias.

---

[15] Selection-bias-adjusted frequencies for Duff & Phelps are calculated using the best fitting specifications in Table 9, equations 9a and 9d. These estimates are obtained by multiplying the estimated coefficient on the inverse Mills ratio by the mean of the inverse Mills ratio, and adding this number to both of the estimated constant terms. The revised constant terms correspond to threshold values that divide the standard normal distribution into three regions whose relative cumulative distributions then reflect the relative frequencies of the three outcomes in the observed data, corrected for sample selection.

[16] These estimates are derived from specification (b) in Table 10, which is the best fitting Moody's/Fitch model and includes industry dummies but not financial ratios. The procedure used is the same as that described in footnote 15, except we also adjusted for differences between the industry compositions of the sample of Fitch-rated firms and the broader population of firms rated by Moody's and S&P.

7. Conclusion

Our findings should prove useful to participants in the debate over the appropriateness of the current uses of ratings by financial regulators. Third agencies, such as Fitch and Duff & Phelps, on average assign higher ratings than Moody's and Standard and Poor's. This pattern may result because the third agencies have more lenient standards or because their policy of rating only on request induces selection bias. Our results suggest that although there is evidence of sample selection in the data, the majority of the observed differences in average ratings appears to reflect differences in standards. Reputational considerations apparently do not ensure equivalence across agency scales, and financial industry regulations that assume such equivalence may be misconceived.

We have been less successful in identifying the role of additional rating agencies in capital markets. We investigated two plausible explanations as to why some issuers are more likely to obtain additional ratings beyond those of Moody's and S&P: third ratings ought to be most valuable to firms with highly uncertain default risks and with ratings from Moody's and S&P that are just below various regulatory thresholds. However, we found no empirical support for either of these hypotheses. Rather, among the many variables considered, only size and bond issuance history are consistently related to the probability of having third ratings. These variables probably reflect differences in the relative costs of third ratings across firms. How the benefits of third ratings vary across firms remains an unanswered question.

References

Beattie, V., and S. Searle. 1992. "Bond Ratings and Inter-Rater Agreement." *Journal of International Securities Markets*, summer: 176-72.

Beatty, R.P., and J.R. Ritter. 1986. "Investment Banking, Reputation, and the Underpricing of Initial Public Offerings." *Journal of Financial Economics* 15: 213-32.

Cantor, Richard, and Frank Packer. 1994. "The Credit Rating Industry." *Federal Reserve Bank of New York Quarterly Review*, summer/fall: 1-26.

_____. 1995. "Sovereign Credit Ratings." *Federal Reserve Bank of New York Current Issues in Economics and Finance* 1, no. 3.

Carey, Mark, Stephen Prowse, John Rea, and Gregory Udell. 1993. "Recent Developments in the Market for Privately Placed Debt." *Federal Reserve Bulletin*, February 1993: 77-92.

Carter, R., and S. Manaster. 1990. "Initial Public Offerings and Underwriter Reputation." *Journal of Finance* 45: 1045-67.

Ederington, Louis H. 1986. "Why Split Ratings Occur." *Financial Management*, spring: 37-47.

Ederington, Louis H., and Jess Yawitz. 1987. "The Bond Rating Process." In Edward Altman, ed., *Handbook of Financial Markets*. New York: John Wiley and Sons.

Fitch Research. 1994. "Cash is King in Bond Analysis." *Special Report*, January 10.

Greene, William. 1981. "Sample Selection Bias As a Specification Error: A Comment." *Econometrica* 49: 795-8.

Heckman, James. 1979. "Sample Selection Bias As a Specification Error." *Econometrica* 47: 153-61.

High Yield Report. 1995. "Fitch Gets Aggressive With Unsolicited Ratings." October 30.

Hsueh, L. Paul, and David Kidwell. 1988. "Bond Ratings: Are Two Better Than One?" Financial Management, spring: 46-53.

Lehn, Kenneth. 1994. Letter to the Securities and Exchange Commission, December 5.

Lerner, J. 1995. "Venture Capitalists and the Oversight of Private Firms." *Journal of Finance* 50: 301-17.

McGuire, Thomas. 1995. "Ratings in Regulation: A Petition to the Gorillas." Speech delivered at the Fifth Annual International Institute for Securities Market Development, Securities and Exchange Commission, Washington, D.C.

Millon, M.H., and A.V. Thakor. 1985. "Moral Hazard and Information Sharing: A Model of Financial Information Gathering Agencies." *Journal of Finance* 40: 1403-22.

Moon, C.G., and J.G. Stotsky. 1993. "Testing the Differences Between the Determinants of Moody's and Standard & Poor's Ratings." *Journal of Applied Econometrics* 8: 51-69.

National Association of Insurance Commissioners. 1993. *Valuation of Securities Manual*, Vols. 1-2.

Ramakrishnan, R.T.S., and A.V. Thakor. 1984. "Information Reliability and a Theory of Financial Intermediation." *Review of Economic Studies* 51: 415-32.

Securities and Exchange Commission. 1994. "Nationally Recognized Statistical Rating Organizations." Release no. 33-7085, August 31.

Wakeman, L. Macdonald. 1984. "The Real Function of Bond Rating Agencies." In Michael Jensen and Clifford Smith, eds., *The Modern Theory of Corporate Finance*. New York: McGraw-Hill.

West, Richard R. 1973. "Bond Ratings, Bond Yields, and Financial Regulation: Some Findings." *Journal of Law and Economics*, April: 159-168.

Table 1

Long-Term Debt Rating Symbols

Interpretation	Moody's	Standard and Poor's Duff & Phelps, and Fitch
Investment-Grade Ratings		
Highest quality	Aaa	AAA
High quality	Aa1 Aa2 Aa3	AA+ AA AA-
Strong payment capacity	A1 A2 A3	A+ A A-
Adequate payment capacity	Baa1 Baa2 Baa3	BBB+ BBB BBB-
Speculative-Grade Ratings		
Likely to fulfill obligations, ongoing uncertainty	Ba1 Ba2 Ba3	BB+ BB BB-
High-risk obligations*	B1 B2 B3	B+ B B-

* The agencies assign ratings to securities below this level of risk (very near or actually in default); however, they use different categorization systems that are difficult to compare. Ratings of the different agencies are not easily comparable because they make very different distinctions among securities at or very near default.

Table 2
Selected Uses of Ratings in Regulation

Year Adopted	Rating-Dependent Regulation	Minimum Rating	How Many Ratings?	Regulator/Regulation
1931	Required banks to mark-to-market lower rated bonds	Baa/BBB	2	OCC and Federal Reserve examination rules
1936	Prohibited banks from purchasing "speculative securities"	Baa/BBB	Unspecified	OCC, FDIC, and Federal Reserve joint statement
1951	Imposed higher capital requirements on insurers' lower rated bonds	Various	N.A.	NAIC mandatory reserve requirement
1975	Imposed higher capital hiarcuts on broker/dealers' below-investment-grade bonds	Baa/BBB	2	SEC amendment to Rule 15c3-1; the uniform net capital rule
1982	Eased disclosure requirements for investment-grade bonds	Baa/BBB	1	SEC adoption of Integrated Disclosure System (Release #6383)
1984	Eased issuance of nonagency mortgage-backed securties (MBSs)	Aa/AA	1	Congressional promulgation of the Secondary Mortgage Market Enhancement Act of 1984
1987	Permitted margin lending against MBSs and (later) foreign bonds	Aa/AA	1	Federal Reserve Regulation T
1989	Allowed pension funds to invest in high-rated asset-backed securities	A/A	1	Department of Labor relaxation of ERISA Restriction (PTE 89-88)
1989	Prohibited S&Ls from investing in below-investment-grade bonds	Baa/BBB	1	Congressional promulgation of the Financial Institution Recovery and Reform Act of 1989
1991	Required money market mutual funds to limit holdings	P1/A1*	1**	SEC amendment to Rule 2a-7 under the Investment Company Act of 1940
1992	Exempted issuers of certain asset-backed securities from registration as a mutual fund	Baa/BBB	1	SEC adoption of Rule 3a-7 under the Investment Company Act of 1940
1994 Proposal	Would impose varying capital charges on bank and S&L holdings of different tranches of asset-backed securities	Aaa&Baa/ AAA&BBB	1	Federal Reserve, OCC, FDIC, OTS Proposed Rules on Recourse and Direct Credit Substitutes

* Highest ratings on short-term debt, generally implying an A long-term debt rating or better.
** If issue is rated by only one nationally recognized statistical rating organization, its rating is adequate; otherwise, two ratings are required.

Table 3

Rating Differences between Agencies

	Distribution of Duff & Phelps's Ratings Relative to:		Distribution of Fitch's Ratings Relative to:	
	Moody's	Standard and Poor's	Moody's	Standard and Poor's
Percent rated higher	47.6	39.9	55.3	46.6
Percent rated same	42.3	46.5	37.9	43.5
Percent rated lower	10.1	13.5	6.8	9.9
Average differences in rating notches	0.57	0.36	0.74	0.56

Note: The table compares 288 firms rated jointly by Moody's, Standard and Poor's, and Duff & Phelps, and 161 firms rated jointly by Moody's, Standard and Poor's, and Fitch at year-end 1993.

Table 4a
Summary Statistics for 871 Firms Rated by Moody's and S&P
(As of year-end 1993)

Firm Categories	Number of Firms	Percent Rated by Duff & Phelps	Observed Rating Differential between Duff & Phelps and Moody's	Observed Rating Differential between Duff & Phelps and S&P	Percent Rated by Fitch	Observed Rating Differential between Fitch and Moody's	Observed Rating Differential between Fitch and S&P
All firms	871	33.1	0.57	0.36	18.5	0.74	0.56
Utilities	140	64.3	0.44	0.31	52.9	0.36	0.35
Banks and thrifts	64	56.3	0.53	0.56	53.1	1.06	1.00
Insurance	38	26.3	1.30	0.70	10.5	2.00	0.50
Other finance	47	53.2	0.72	0.44	53.2	1.12	0.64
Other industrial	582	21.8	0.59	0.29	4.1	0.83	0.50
Investment grade	526	46.6	0.53	0.30	28.5	0.69	0.54
Midwest headquarters	205	40.0	0.62	0.38	22.0	0.58	0.49
Split rating (letter)	235	26.4	0.81	0.15	14.0	1.15	0.70
Split rating (notch)	533	27.6	0.76	0.34	15.4	0.96	0.61
Assets > $2 billion (median)	436	55.0	0.51	0.31	28.9	0.74	0.57
Leverage > 38.6% (median)	436	26.8	0.48	0.37	14.4	0.79	0.49
Profitability > .042 (median)	436	32.6	0.57	0.30	17.7	0.52	0.44
Coverage > 2.32 (median)	361	36.9	0.62	0.26	18.3	0.35	0.26

Notes: Leverage is defined as (long-term debt + current liabilities + 8*rent) / (assets + 8*rent). Profitability is defined as (net income/assets). Coverage is defined as (net income + interest + rent) / (interest + rent). Coverage ratio summary statistics are calculated for utilities and other industrial companies. Midwest, as defined by the Census Bureau, includes twelve states. A firm is defined as investment grade if both ratings from Moody's/S&P are at least Bbb3 (BBB-). Observed rating differential corresponds to the average difference in rating notches calculated for jointly rated firms only. For example, A/A+ corresponds to a one-unit rating notch differential. Positive numbers correspond to higher ratings for Duff & Phelps or Fitch.

Table 4b
Summary Statistics for 871 Firms Rated by Moodys and S&P
(As of year-end 1993)

	Distribution of Duff Ratings Relative to Moody's			Distribution of Duff Ratings Relative to S&P			Distribution of Fitch Ratings Relative to Moody's			Distribution of Fitch Ratings Relative to S&P		
Firm Groupings	Higher	Same	Lower	Higher	Same	Lower	Higher	Same	Lower	Higher	Same	Lower
All firms	47.6	42.3	10.1	39.9	46.5	13.5	55.3	37.9	6.8	46.6	43.5	9.9
Utilities	43.3	46.7	10	35.6	54.4	10	37.8	54.1	8.1	41.9	47.3	10.8
Banks and thrifts	47.2	47.2	5.5	47.2	38.9	13.9	73.5	20.6	5.9	61.8	29.4	8.8
Insurance	60	40	0	50	40	10	75	25	0	50	25	25
Other finance	64	28	8	48	44	8	68	32	0	48	52	0
Other industrial	46.5	40.9	12.6	38.6	44.1	17.3	66.7	20.8	12.5	37.5	45.8	16.7
Investment grade	46.1	45.3	8.6	37.6	48.6	13.9	54.7	38.7	6.7	46	44.7	9.3
Midwest headquarters	53.7	41.5	4.9	43.9	42.7	13.4	46.7	44.4	8.9	46.7	37.8	15.6
Split rating (letter)	51.6	32.3	16.1	33.9	41.9	24.2	72.7	24.2	3	57.6	27.3	15.2
Split rating (notch)	55.1	31.3	13.6	40.1	39.5	20.4	68.3	24.4	7.3	51.2	35.4	13.4
Assets > $2 billion (median)	45.6	43.5	10.9	38.1	48.5	13.4	55.5	37.3	7.1	47.6	42.1	10.3
Leverage > 38.6 (median)	49.2	37.3	13.6	42.4	43.2	14.4	57.8	34.4	7.8	40.6	51.6	7.8
Profitability > .042 (median)	45.1	47.9	7	34.5	54.2	11.3	41.6	49.4	9.1	39	50.7	10.4
Coverage > 2.32 (median)	46.4	47.6	6	36.1	50	13.9	50	42	8	43	46	11

Notes: Variables are defined as in Table 4a; all figures are in percentages.

TABLE 5

Does the Firm Have a Long-Term Rating from Duff & Phelps?

Probit Regressions Using Different Measures of Ratings Uncertainty and Size

	(a)	(b)	(c)	(d)	(e)
Leverage	-1.00*	-0.99*	-.98*	-0.45	-1.76*
	(0.42)	(0.42)	(0.42)	(0.35)	(0.38)
Coverage	-0.01	-0.01	-0.01	-0.01	0.00
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)
Profitability (RoA)	0.32	0.39	0.38	0.46	0.11
	(0.93)	(0.94)	(0.94)	(0.92)	(0.93)
Ten years of public debt	0.77*	0.79*	0.79*	0.79*	0.81*
	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)
Investment grade	-0.25	-0.28*	-0.28	-0.30*	-0.13
	(0.17)	(0.17)	(0.18)	(0.18)	(0.17)
Split at notch	-0.24	—	—	—	—
	(0.13)				
Absolute rating difference	—	-0.21*	-0.21*	-0.22*	-0.20*
		(0.07)	(0.07)	(0.07)	(0.07)
NAIC split	0.14	0.28	0.28	0.29	0.29
	(0.16)	(0.17)	(0.18)	(0.17)	(0.17)
Moody's/S&P BB+/Ba1	0.10	—	0.07	0.12	0.00
	(0.46)		(0.46)	(0.45)	(0.46)
Assets	0.40*	0.41*	0.41*	0.63*	—
	(0.10)	(0.07)	(0.10)	(0.06)	
Long-term debt	0.24*	0.23*	0.23*	–	0.56*
	(0.09)	(0.10)	(0.10)		(0.05)
Midwest headquarters	0.17	0.16	0.16	0.14	0.16
	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)
Sample size	871	871	871	871	871
Number with third rating	288	288	288	288	288
Log likelihood	-325.8	-323.7	-325.0	-331.3	-329.8

Notes: Standanrd errors are in parentheses. The coefficients for the constant and industry dummies are not reported. An asterisk denotes significance at the 5 percent confidence level (two-tailed test). Leverage, coverage, and profitability are defined as in Table 4a. Ten years of public debt is an indicator variable that equals one if the firm has had public debt outstanding for at least ten years. Investment grade is an indicator variable that equals one if the firm is investment grade (as defined in Table 4a). NAIC split and Split at notch are indicator variables that equal one if the Moody's and S&P ratings differ at the NAIC level (e.g., A vs. BBB+, and BB- vs B), and the rating notch level (AAA vs. AA, and AA+ vs. AA-), respectively. Absolute rating difference measures the absolute value of the rating notch differential between the Moody's and S&P ratings. Moody's Ba1/S&P BB+ is an indicator variable that equals one if both Moody's and S&P ratings are one notch below the investment-grade cutoff. Assets and Long-term debt are measured in natural logs of their actual value. Midwest, as defined by the Census Bureau, includes twelve states.

TABLE 6

Does the Firm Have a Long-Term Rating from Fitch?

Probit Regressions Using Different Measures of Ratings Uncertainty and Size

	(a)	(b)	(c)	(d)	(e)
Leverage	0.44 (0.43)	0.50 (0.43)	0.46 (0.43)	0.83* (0.38)	0.37 (0.39)
Coverage	-0.02 (0.02)	-0.02 (0.02)	-0.02 (0.02)	-0.02 (0.02)	-0.02 (0.02)
Profitability (RoA)	2.65 (1.54)	2.53 (1.53)	2.57 (1.54)	2.50 (1.51)	2.51 (1.53)
Ten years of public debt	0.86* (0.15)	0.85* (0.15)	0.85* (0.15)	0.87* (0.15)	0.85* (0.15)
Investment grade	0.46 (0.25)	0.49* (0.25)	0.45 (0.25)	0.43 (0.25)	0.47 (0.25)
Split at notch	0.01 (0.15)	--	--	--	--
Absolute rating difference	--	-0.09 (0.10)	-0.09 (0.10)	-0.11 (0.10)	-0.09 (0.10)
NAIC split	-0.18 (0.22)	-0.07 (0.23)	-0.08 (0.23)	-0.05 (0.23)	-0.08 (0.23)
Moody's Ba1/S&P BB+	-5.63 (1.2E4)	--	-5.70 (1.2E4)	-5.25 (7.4E3)	-5.77 (1.2E4)
Assets	0.06 (0.11)	0.06 (0.11)	0.06 (0.11)	0.23* (0.05)	--
Long-term debt	0.20 (0.10)	0.18 (0.10)	0.19 (0.10)	--	0.24* (0.05)
Sample size	871	871	871	871	871
Number with third rating	161	161	161	161	161
Log likelihood	-225.8	-225.8	225.4	-227.1	-225.5

Notes: Standard errors are in parentheses. The coefficient for the constant and industry dummies are not reported. An asterisk denotes significance at the 5 percent confidence level (two-tailed test). Variables are defined as in Table 5. Fitch does not rate any of the thirteen companies rated Ba1 by Moody's and BB+ by S&P, resulting in large standard errors on the coefficient for Moody's Ba1/S&P BB+.

TABLE 7

OLS Regressions Using Industry Dummies, Financial Variables, and the Inverse Mills Ratio

	Dependent Variable: Rating Notch Difference between Moody's and Duff & Phelps			Dependent Variable: Rating Notch Difference between S&P and Duff & Phelps		
	(a)	(b)	(c)	(d)	(e)	(f)
Constant	0.24* (2.31)	0.10 (.629)	-1.31 (1.16)	0.19* (2.19)	-0.01 (0.06)	0.23 (0.25)
Banks	-	0.18 (0.81)	0.01 (0.02)	-	0.41* (2.20)	0.45* (2.04)
Insurance	-	0.75* (2.05)	0.52 (1.18)	-	0.43 (1.39)	0.56 (1.53)
Other finance	-	0.34 (1.36)	0.49 (1.68)	-	0.28 (1.31)	0.25 (1.05)
Utilities	-	0.12 (0.70)	0.31 (1.36)	-	0.18 (1.27)	0.15 (0.79)
Leverage	-	-	-0.50 (0.96)	-	-	0.04 (0.08)
Coverage	-	-	-0.02 (0.97)	-	-	-0.03 (-1.55)
Profitability (RoA)	-	-	2.13 (1.44)	-	-	0.62 (0.49)
Assets	-	-	0.15 (1.40)	-	-	-0.02 (-0.23)
Inverse Mills ratio	0.53* (4.17)	0.58* (4.15)	0.89* (3.51)	0.26* (2.39)	0.35* (2.94)	0.33 (1.54)
Adjusted R-squared	0.05	0.06	0.06	0.02	0.03	0.02
F-statistics for significance of entire model	17.45*	4.67*	3.17*	5.69*	2.49*	1.73
F-statistics for significance of variables not in (a),(d)	-	1.44	1.35	-	1.67	1.22
F-statistics for significance of variables not in (b),(e)	-	-	1.29	-	-	0.79

Notes: Absolute t-statistics are in parentheses. The Greene formula (1981) for the correct variance/covariance of OLS estimates has been used to calculate T-statistics. An asterisk denotes significance at the 5 percent confidence level (a one-tailed test for the inverse Mills ratio, a two-tailed test for other individual variables). Independent variables are defined as in Tables 4a and 5.

TABLE 8

OLS Regressions Using Industry Dummies, Financial Variables, and the Inverse Mills Ratio

	Dependent Variable: Rating Notch Difference between Moody's and Fitch Investor's Service			Dependent Variable: Rating Notch Difference between S&P and Fitch Investor's Service		
	(a)	(b)	(c)	(d)	(e)	(f)
Constant	0.52* (3.43)	0.32 (0.70)	-0.50 (0.35)	0.56* (3.60)	0.41 (0.83)	-0.27 (0.18)
Banks	-	0.55 (1.43)	1.14* (2.35)	-	0.56 (1.34)	1.36* (2.64)
Insurance	-	1.16* (2.05)	2.24* (2.41)	-	-0.00 (0.00)	2.38* (2.38)
Other finance	-	0.64 (1.54)	0.58 (1.17)	-	0.20 (0.45)	0.62 (1.18)
Utilities	-	-0.13 (0.35)	0.21 (0.41)	-	-0.09 (0.23)	0.40 (0.73)
Leverage	-	-	1.09 (1.63)	-	-	-0.10 (0.14)
Coverage	-	-	-0.11 (0.85)	-	-	-0.39* (2.73)
Profitability (RoA)	-	-	3.76 (0.79)	-	-	14.49* (2.83)
Assets	-	-	0.02 (0.19)	-	-	0.06 (0.58)
Inverse Mills ratio	0.29* (1.82)	0.29 (1.24)	0.41 (1.31)	-0.01 (0.03)	0.05 (0.20)	0.24 (0.73)
Adjusted R-squared	0.01	0.10	0.11	-0.01	0.02	0.05
F-statistics for significance of entire model	3.29*	4.50*	3.13*	0.00	1.51	1.86
F-statistics for significance of variables not in (a),(d)	-	4.70*	3.05*	-	0.83	2.07
F-statistics for significance of variables not in (b),(e)	-	-	1.28	-	-	2.22

Notes: Absolute t-statistics are in parentheses. The Greene formula (1981) for the correct variance/covariance of OLS estimates has been used to calculate T-statistics. An asterisk denotes significance at the 5 percent confidence level (a one-tailed t-test for the inverse Mills ratio, a two-tailed test for other individual variables). Independent variables are defined as in Tables 4a and 5.

TABLE 9

Ordered Multinomial Probit Regressions
Using Industry Dummies, Financial Variables, and the Inverse Mills Ratio

	Ordered Category: Rating Notch Difference between Moody's and Duff & Phelps			Ordered Category: Rating Notch Difference between S&P and Duff & Phelps		
	(a)	(b)	(c)	(d)	(e)	(f)
Intercept 0	-0.23* (2.05)	-0.42* (2.51)	-0.96 (0.83)	-0.39* (3.44)	-0.61* (3.70)	-1.23 (1.09)
Intercept 1	1.12* (8.73)	0.94* (5.44)	0.407 (0.35)	0.98* (8.04)	0.77* (4.58)	0.16 (0.14)
Banks	-	0.27 (1.20)	0.23 (0.85)	-	0.34 (1.51)	0.32 (1.20)
Insurance	-	0.49 (1.23)	0.47 (1.00)	-	0.34 (0.89)	0.45 (0.98)
Other finance	-	0.53* (1.98)	0.59* (1.94)	-	0.43 (1.67)	0.39 (1.31)
Utilities	-	0.14 (0.81)	0.21 (0.89)	-	0.20 (1.21)	0.28 (1.25)
Leverage	-	-	-0.19 (0.35)	-	-	0.08 (0.15)
Coverage	-	-	-0.02 (1.02)	-	-	-0.04 (1.90)
Profitability	-	-	1.76 (1.10)	-	-	1.20 (0.76)
Assets	-	-	0.06 (0.52)	-	-	0.06 (0.58)
Inverse Mills ratio	0.28* (2.01)	0.35* (2.31)	0.49* (1.77)	0.21 (1.58)	0.31* (2.13)	0.47* (1.78)
Log likelihood	-271.1	-268.3	-267.5	-284.8	-282.6	-280.2
LR-statistics for significance of entire model	4.04*	9.65	11.25	2.48	7.05	11.68
LR-statistics for significance of variables not in (a),(d)	-	5.61	7.21	-	4.58	9.21
LR-statistics for significance of variables not in (b),(e)	-	-	1.59	-	-	4.63

Notes: Absolute t-statistics are in parentheses. The ordered categories consist of three difference values, which take a value of -1 when the Moody's /S&P rating is lower than Duff, 1 when the Moody's/S&P rating is higher than Duff, and 0 when the ratings are equal. An asterisk denotes significance at the 5 percent confidence level (a one-tailed test for the Inverse Mills ratio, a two-tailed test for other individual variables). Independent variables are defined as in Tables 4a and 5.

TABLE 10

Ordered Multinomial Probit Regressions
Using Industry Dummies, Financial Variables, and the Inverse Mills Ratio

	Ordered Category: Rating Notch Difference between Moody's and Fitch			Ordered Category: Rating Notch Difference between S&P and Fitch		
	(a)	(b)	(c)	(d)	(e)	(f)
Intercept 0	-0.11	-.61	-2.75	0.04	-0.33	-2.60
	(0.66)	(1.11)	(1.58)	(0.27)	(0.66)	(1.61)
Intercept 1	1.25*	0.82	-1.30	1.42*	1.07*	-1.15
	(6.40)	(1.47)	(0.75)	(7.57)	(2.08)	(0.71)
Banks	-	0.84	1.43*	-	0.56	1.32*
		(1.82)	(2.34)		(1.33)	(2.40)
Insurance	-	0.50	1.38	-	0.08	2.26*
		(0.68)	(1.15)		(0.13)	(2.08)
Other finance	-	0.88	0.97	-	0.44	1.34*
		(1.75)	(1.61)		(0.97)	(2.38)
Utilities	-	0.09	0.74	-	0.15	1.11
		(0.21)	(1.18)		(0.38)	(1.88)
Leverage	-	-	1.15	-	-	-0.79
			(1.30)			(1.05)
Coverage	-	-	-0.06	-	-	-0.38*
			(-0.36)			(2.49)
Profitability	-	-	1.28	-	-	13.23*
			(0.22)			(2.44)
Assets	-	-	0.12	-	-	0.21
			(1.07)			(1.94)
Inverse Mills ratio	0.32*	0.52*	0.87*	-0.17	-0.02	0.51
	(1.82)	(1.75)	(2.17)	(1.05)	(0.06)	(1.42)
Log likelihood	-139.9	-132.8	-130.8	-152.0	-150.0	-145.4
LR-statistics for significance of entire model	3.23	17.31*	21.31*	1.09	5.01	14.19
LR-statistics for significance of variables not in (a),(d)	-	14.08*	18.08*	-	3.93	13.10
LR-statistics for significance of variables not in (b),(e)	-	-	4.00	-	-	9.18

Notes: Absolute t-statistics are in parentheses. The ordered categories consist of three difference values, which take a value of -1 when the Moody's /S&P rating is lower than Fitch, 1 when the Moody's/S&P rating is higher than Fitch, and 0 when the ratings are equal. An asterisk denotes significance at the 5 percent confidence level (a one-tailed test for the inverse Mills ratio, a two-tailed test for other individual variables). Independent variables are defined as in Tables 4a and 5.