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Abstract

This paper examines the credit ratings assigned to Japanese non-financial corporations by Japanese and foreign rating agencies. More of the variance in Japanese than foreign agency ratings can be explained using financial ratios and a few dummy variables. Credit ratings are closely related to market-determined credit spreads, effectively supplementing the information content of financial indicators in the pricing of corporate risk in Japan. The market appears to take the ratings of both Japanese and foreign agencies into account when pricing the debt of Japanese corporations, for a combination of both Japanese and foreign ratings predicts spreads more precisely than any single set of ratings.

Key words: credit ratings, credit risk, bond spreads, keiretsu

JEL classification: G2, G3, G33

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Over the past decade, there has been a dramatic increase in the number of ratings assigned by credit rating agencies to the obligations of Japanese companies. Borrowers in the Japanese bond market represent a wider variety of default risks than before. While most of the published risk assessments are made by credit rating agencies headquartered in Japan, many are made by foreign agencies as well.

In this article, we examine the risk assessments of Japanese (non-financial) companies published by the two largest Japanese rating agencies and the two largest foreign rating agencies. After measuring the ability of quantitative and qualitative indicators of credit risk to predict the ratings of Japanese companies published by both Japanese and foreign rating agencies, we evaluate the predictive power of both sets of ratings in explaining a cross-section of quoted corporate bond spreads over Japanese government bonds (JGBs).

Our results indicate that, while Japanese agency ratings are higher than foreign agency ratings on average, they are also somewhat easier to predict using financial indicators that might be associated with the likelihood of default. We also find that the market -- as gauged by quoted corporate bond spreads over JGBs -- broadly shares both Japanese and foreign rating agencies' views regarding the relative ranking of credit risks in Japan. In addition, both sets of credit ratings appear to have an independent influence over yields over and above their correlation with other publicly available information.

I. Credit Ratings in Japan

Credit ratings are assessments of the relative likelihood a borrower will default on its obligations.[1] Companies in Japan, and elsewhere, generally seek credit ratings in order to facilitate their issuance of bonds and commercial paper. Many investors prefer rated securities over unrated securities of similar credit risk.[2] In the past in Japan, many companies were not allowed to issue bonds unless they had ratings, or rating above a certain level. However, the Japanese government has since relaxed regulations and credit ratings, while helpful for issuance, are no longer mandatory.

Credit ratings are important not only because they help investors sort out risks in the Japanese capital markets, but also because these assessments may affect the ability of Japanese companies to borrow in overseas markets and the price at which they borrow.

Four rating agencies dominate the business of rating Japanese companies in Japan: Japan Rating and Investment Information (R&I), Japan Credit Rating Agency (JCR), Moody's Investors Service, and Standard & Poor's (S&P). Table 1 describes the Japanese agencies' and Moody's rating scales. The bond ratings assigned by the ratings agencies are meant to indicate the likelihood of default or delayed payment of the security. Most of the rating agencies use the same set of symbols for ranking the risk of default from extremely safe to highly speculative. However, the set of symbols used by Moody's Investors Service are distinctive. Gradually, a correspondence among the major agencies' ratings has emerged, which is recognized in regulatory practice (Table 1). For example, the broad letter grade category Baa used by Moody's corresponds to BBB used by the other rating agencies. To provide finer rating gradation to help investors distinguish more carefully among issuers, Moody's and S&P started attaching plus and minus symbols (or in the case of Moody's, 1,2, and 3) to their ratings in the late 1970s and early

1980s. Since Japanese agencies were established after this period, they have used modified ratings from the start. Other modifications of the grading schemes include the addition of a credit watch category to denote that a rating is under review. In the remainder of this article, the symbols by the Japanese agencies and S&P are used to refer to the ratings of all agencies.

The principal characteristics of the four major rating agencies operating in Japan are reported in Table 2. The two Japanese agencies or their predecessors, headquartered in Tokyo, have been in business rating Japanese credits since 1985. R&I is the result of the merger of two separate rating agencies, Japan Bond Rating Institute (JBRI) and Nippon Investors' Service (NIS) in 1998. Moody's and S&P, headquartered in New York, are much older institutions. The practice of rating corporate bonds started in 1909 when John Moody started to rate U.S. railroad bonds. A year later, Moody extended his ratings activity to utility and industrial bonds. S&P started rating corporate bonds in 1926.

The ownership structure of the two foreign rating agencies do not pose conflict of interest issues, as the major agencies are all either independent or owned by nonfinancial companies. In the case of the Japanese agencies, R&I and JCR are owned, at least in part, by consortia of financial institutions which may receive credit ratings of their own, as well have important business relationships with borrowers that receive ratings. This ownership structure is perhaps best understood as the result of the need to rely on private sector assistance in the development of credit analysis capabilities at the time the Japanese agencies were formed in 1985. The potential for conflict of interest means that greater efforts must be made to ensure the integrity of the ratings process.

While Moody's and S&P are the behemoths of the international credit ratings industry, with substantial international franchises, the Japanese agencies have the greater depth and

frequency of coverage in Japan. According to a IBJ securities report of July 1998, R&I and JCR rate 475 and 830 firms, well over the 294 and 141 covered by Moody's and S&P, respectively. Interestingly, in finance the coverage is just about equal between the Japanese and foreign rating agencies. In non-financial industries, however, the coverage of the Japanese rating agencies greatly exceeds that of the two foreign agencies. In the empirical work to follow, we will be focusing on the ratings of non-financial firms, since the financial ratios of non-financial firms we will be using to estimate ratings are not comparable with those of financial firms.

The relative size and specialization of the agencies parallels their coverage. While the foreign agencies are much larger, and each employ over 1000 employees world-wide, they do not have as many analysts on the ground in Japan. In Japan, R&I and JCR employ 84 and 49 analysts relative to 20 and 18 employed by Moody's and S&P, respectively. However, a number of foreign agency analysts work on the ratings of Japanese companies from corporate headquarters in New York, so the numerical Japanese agency analytical advantage may be overstated.

The Use of Ratings in Regulation. In the United States, ratings were first introduced within the private sector, and then much later used by regulators of financial markets and institutions to simplify the task of prudential oversight. By contrast, in Japan, ratings were used immediately upon the formation of Japanese agencies in 1985 as a means of obtaining regulatory approval to issue bonds. After 1985, many Japanese corporate bonds were required to have a minimum credit rating just to be issued. While the required credit rating was steadily lowered throughout the mid-80s into the mid-90s, it was not until January 1996 that the minimum bond rating requirement was abolished.

Even after the minimum rating criteria were abolished for bond issuance, there remained a large number of regulatory guidelines that keyed off ratings to simplify the task of prudential oversight in Japan. Many regulatory capital requirements, disclosure requirements, and investment prohibitions remained tied to a variety of ratings.

A list of selected regulatory guidance using credit ratings in Japan is given in Table 3, which was taken from a publication of one of the credit rating agencies. Many of these parallel similar regulations in the United States. For instance, there is a simplification of securities issuance procedures if a security is rated above a certain rating. There remains an eligibility requirement for commercial paper issuance. The capital that securities firms are required to put aside for potential losses in their trading books are dependent on the credit ratings of the securities being traded. Ratings are also used in the management guidelines for local and national public pension investments. Ratings are allegedly used to determine whether yen-denominated foreign bonds are appropriate collateral to be posted at the Bank of Japan; and ratings are used in the prompt corrective active assessment of bank asset quality by the Financial Supervisory Agency.

II. Ratings Differences: Japanese and Foreign Agencies

Given the existence of regulations that key off credit ratings in Japan, it is a matter of interest whether there are consistent ratings differences between Japanese and foreign agencies. Since most regulations key off the highest or second highest rating, the more lenient agencies effectively determine which regulations are binding.

The distribution of ratings for a sample of 157 corporations as of June 1998 that had ratings from at least one Japanese agency and at least one of the two major foreign agencies is

shown in Table 4. On the horizontal axis is charted the rating of the Japanese agencies; on the vertical axis is charted the rating of the two foreign agencies. (In the case of multiple Japanese or foreign ratings, the lower rating is taken.) The area with dashes indicates where the Japanese and foreign ratings are identical.

As is readily apparent, not only are there very few cases of identical Japanese and foreign ratings, but there is only one case of Japanese ratings lower than the foreign ratings. All but four of companies lie under the diagonal set of dashes; that is, have ratings from the foreign rating agencies below those of the Japanese rating agencies. The foreign ratings were usually much more than two notches lower on the scale than the Japanese ratings. [A rating notch is a one level difference on a rating scale, such as the difference between A and A- for S&P or between A2 and A3 for Moody's.]

Average rating differentials between Japanese and foreign agencies can be calculated from Table 4. The average differential is 3.5 notches, or more than one-full letter grade. Clearly, Japanese agencies tend to rate higher than U.S. agencies. More than three-quarters of the companies have Japanese ratings a full letter grade higher than their foreign ratings. Extremely large ratings differentials are prevalent as well. 31 firms, or nearly one-fifth of the sample, have Japanese ratings that are six or more notches—more than two full letter grades—higher than their foreign ratings.

Given that Japanese credit ratings agencies rate higher on average than Moody’s and S&P across all jointly-rated borrowers, Japanese letter grade ratings cannot imply the same level of default risk on Japanese borrowers as the same foreign letter grade ratings. Since these differences are well-known in the Japanese financial community, if Japanese investors were to

use both sets of ratings, it is highly unlikely they would directly compare Japanese and foreign ratings.[3]

Investors may instead consider which companies Japanese agencies rate high relative to other Japanese agency ratings, and which companies foreign agencies rate high relative to other foreign agency ratings. The average absolute level of each set of ratings does not imply anything about the relative correlation or explanatory power of either set of ratings in predicting spreads.

III. The Determinants of Japanese Corporate Credit Ratings

Explanatory Variables

In the ratings materials on their websites and publications, the rating agencies indicate a number of criteria that may underlie their credit ratings. Nonetheless, mapping from cited criteria to ratings is difficult for a number of reasons. First, the number of criteria cited in the array of industry publications is quite large. Second, the agencies provide little guidance as to the relative weights to assign to various factors, and the degree to which the factors interact. Finally, some of the criteria are difficult to quantify, and based on subjective judgements of the rating agency.[4]

Nonetheless, the degree to which foreign and Japanese agency are predictable based on a relatively small number of observable variables is of interest. If one type of agency was to depend more on subjective judgments than another, we would expect to be able to explain those ratings less easily with quantifiable variables. We have selected nine quantifiable variables that either are related to standard credit risk factors used by Altman (1993), or variables that rating agencies and other financial analysts have suggested may be related to creditworthiness in Japan.

The causal linkages from these nine variables to a company's creditworthiness are generally straightforward.

Retained Earnings. Higher levels of retained earnings over total assets indicate better profit performance over time. Higher levels of cumulative profitability suggest that existing debt burdens will be easier to service over time.

Stability of Earnings. Extreme volatility in earnings indicates the susceptibility of the company to a shock that could affect their ability to service their debts. We proxy for earnings stability using the inverse of the standard deviation of operating profits over total assets over a 10-year period 1986-1996.

Leverage (Inverse Measure). We take an inverse measure of leverage: the market value of firm equity over enterprise value (market value of equity plus net debt). This measure shows how much the value of the firm must decline before the firm becomes insolvent (Altman, 1993). In addition, small debt burdens can indicate that the company may be less susceptible to the unwillingness of creditors to roll over loans.

Size. The greater the size of the company, the greater the ability of the company to sell off parts of its company's operations to repay its debt. We follow Altman, and measure size by total tangible assets (logged) because these are the assets creditors may have recourse to when the company is in financial distress (Altman, 1993).

Profitability. The higher the profits, the healthier the corporate franchise and lower the likelihood of financial distress and default. Our profitability measure is the ratio of operating profits to total assets. Operating profits are a superior measure of going concern value of the corporate franchise as they are independent of interest expenses and uninfluenced by the firm's capital structure.

Net Extraordinary Gains and Losses. Net extraordinary gains (or losses) are often associated with significant holdings of equity, land, and other assets in Japan, and mark-ups or mark-downs on their valuation. A change in this variable can indicate the accumulation of extraordinary gains or losses over time that may affect firm solvency, but not appear in other parts of the balance sheet. We measure total net extraordinary gains or losses over the past eight years divided by total tangible assets.

Interest Coverage. A firm with liquidity problems may be more likely to default on current obligations. Liquidity may have been especially significant in 1997 and 1998 owing to the increasingly tight lending policies of Japanese banks. We measure interest coverage as the ratio of operating and interest income to interest expenses.

Utility Industry. Utility companies are likely to be less risky because of their status as a public utility. A regulated price system plays a role in assuring that they will be allowed to raise prices to maintain solvency in times of financial distress. Thus we include an indicator variable that equals 1 if the company is a public utility, and equals 0 otherwise.

Keiretsu Affiliation. A number of major banks in Japan have managerial ties to and equity stakes in the firms to which they lend. The banks with these ties are usually part of those corporate groupings in Japan known as keiretsu. A body of empirical evidence suggests that the existence of a strong relationship with a keiretsu bank may reduce the agency costs of debt and the costs of financial distress [Prowse (1990), Hwang and Kim (1996), Hoshi, Kashyap, and Scharfstein (1990)].

More specifically, some scholars have proposed that the keiretsu bank in Japan screens financially distressed firms for suitability for reorganization [Suzuki and Wright (1985), Aoki, (1994), Sheard (1994)]. If the private workout process is relatively efficient for keiretsu firms,

these firms may be less likely to file for bankruptcy and default on its debt than other financially distressed firms. We include an indicator variable that equals 1 if the company belongs to a major keiretsu, and equals 0 otherwise.[5]

The Data and Sample Statistics

Table 5 presents the sample means of seven of the nine variables for the rated companies at the end of fiscal year 1997 (March 31, 1998), and frequencies for the two indicator variables, divided into the broad letter rating categories that were assigned by the rating agencies as of March 31, 1998. Statistics are reported separately for the two-hundred and forty-two companies rated by one or both of the Japanese rating agencies, and the one-hundred and thirty-five companies rated one or both of the foreign rating agencies.[6] For example, among the eighteen and three companies that the Japanese agencies and the foreign agencies have assigned AAA ratings, the mean retained earning to asset ratio is 25.7% and 38.3%, respectively.

Many of these variables appear to be systematically related to the assigned ratings. Higher retained earnings, greater stability of earnings, and lower leverage appear fairly consistently associated with higher ratings. Similarly, larger asset size and greater profitability and interest coverage are distinctly related to higher ratings; net extraordinary losses to lower ratings. Being a utility company appears to ensure an AAA or AA status. Most of the associations are apparent with both Japanese and foreign ratings, though it is clear that at any single rating level, the measures corresponding to the foreign rating will indicate lower credit risk than those corresponding to the Japanese rating. For instance, the size of firms rated AAA by foreign agencies is 11.6 trillion yen, relative to 5.0 trillion yen for the (more numerous) group rated AAA by the Japanese agencies. This is as we would expect, given the differences in average Japanese and foreign ratings documented earlier. The median rating level for companies

rated by Japanese agencies is A (56 percent of rated companies); the corresponding median for the foreign agency rated companies is BBB (46 percent of rated companies).

Ratings appear to have a non-linear relation to keiretsu affiliation. While less than half of the companies rated BB or below by the foreign agencies or A and below by the Japanese agencies have a keiretsu affiliation, more than half of the companies in the middle ratings region (A/BBB for foreign ratings; AA for Japanese ratings) have a keiretsu bank affiliation. However, very few of the companies in the upper regions (AAA/AA for foreign ratings, AAA for Japanese ratings) have a keiretsu affiliation. This may reflect the fact that while keiretsu affiliation may add to the creditworthiness of the firm at lower rating levels, most of the firms that have the highest credit standing are utility companies, which are almost always independent of keiretsu affiliation.

We report a correlation matrix of both ratings and explanatory variables in Table 6. The variables most highly correlated with credit ratings are size and the utility dummy. As might be expected from Table 5, the keiretsu variable has a low correlation with credit ratings; its highest correlation is with the size variable (0.26).

Regression Analysis

Assessing the individual and collective significance of these variables in explained ratings requires a technique that simultaneously estimates their significance. As in many studies which transform bond ratings into data for regression analysis (e.g., Horrigan 1966, Billet 1996), we treat ratings as cardinal variables, assigning numerical values to the credit ratings as follows: AAA = 16, AA+ = 15, AA = 14, and so on through B = 2, and B- =1. An average rating is calculated as the arithmetic mean of the associated numerical values. The empirical approach is to regress ratings against the explanatory variables through ordinary least squares.[7,8]

The first column of Table 7 reports a regression of the average of Japanese agency rating against the nine variables discussed above for the 242 that have Japanese ratings and the complete set of available data for March 1998. This specification explains nearly seventy-two percent of the sample variation (i.e., the adjusted R-squared = 0.716) and yields a residual standard error of about 1.2 notches on average. Only four of the prediction errors for specific companies exceed three notches, or one-full letter grade, and only twelve companies have errors that exceed two notches. Another way of measuring accuracy is to compare predicted ratings rounded off to the nearest broad letter rating against actual broad letter ratings. The average rating regression predicts these broad letter ratings with about seventy percent accuracy for Japanese ratings, more than 10 percent higher than the accuracy rate found in the literature for U.S. corporate ratings (Ederington 1985).

Among the individual coefficients, those for size, retained earnings, profitability, leverage, and the utility dummy, all have the anticipated signs and are all highly statistically significant. The coefficients on both the earnings stability and interest coverage also have the correct sign but are not statistically significant. The coefficients on net extraordinary gains and losses, and the keiretsu dummy have the unexpected sign and are insignificant. Thus, there is no evidence that Japanese rating agencies systematically weight membership in a major keiretsu when rating Japanese corporate credits.

The second column of Table 7 reports the results of the foreign agency ratings regressed against the same nine explanatory variables and indicates that foreign agencies broadly share the most significant of the ratings criteria. For instance, the coefficients on size, retained earnings, leverage, and utility industry dummy--the coefficients which had the highest t-statistics in the Japanese rating regression--also came in at the expected sign and highly significant. Neither does

affiliation with a major keiretsu appear to independently affect the rating. The rough similarity in major financial indicators should not be surprising given that the agencies often agree on relative rankings of ratings and the financial indicators appear to vary in the same proportion to ratings in Table 5.

The explanatory power of the foreign ratings regression is 0.650, significantly less than that of the Japanese ratings regression. However, this may be because, as mentioned above, the foreign rating agencies have significantly less coverage than the Japanese rating agencies. It is possible that the foreign agencies are rating firms that require greater use of subjective criteria. The third column attempts to correct for this potential bias by running the regression for Japanese ratings on just those companies that also have foreign ratings. The results are similar to those obtained in the full regression. While the explanatory power of the Japanese ratings regression has declined somewhat from the full sample regression (Adjusted R-squared = .695), it still is significantly higher than the foreign ratings regression. In sum, the results indicate that it is easier to predict Japanese agency ratings using financial indicators and a few dummy variables than it is to predict foreign agency ratings.

IV. Ratings and Yields on Japanese Corporate Bonds

In this section, we investigate the relation of Japanese and foreign agency ratings with the quoted yields on corporate bonds in Japan. While ratings should be correlated with yields, it is not necessarily the case that ratings independently influence yields. The observed correlation could be coincidental if investors and rating agencies share the same interpretation of a common set of public information that pertains to credit risks in Japan.

The Cross-Sectional Relationship Between Ratings and Yields

In the spring of 1998, more than two-hundred non-financial companies had bonds with quoted prices on the Japanese bond market and ratings assigned by at least one of the major Japanese rating agencies. For each of the 240 companies for which we were able to collect a full set of financial indicators, ratings, and bond price quotes, we took the outstanding bond with the remaining maturity closest to five years and obtained its spread over Japanese government bonds of the same maturity at the end of March 1998.[9] The first column of Table 8a reports a regression of the log of these companies' bond spreads against their average Japanese ratings.[10] The single explanatory variable explains eighty percent of the variation in spreads. Alternative regressions were tried based on different combinations of the Japanese agency ratings, but none significantly improved the fit.[11]

The first column of Table 8a measures the relation between ratings and yields independent of their common relationship with measurable credit risk factors. The second column reports the regression of logged spreads against the nine variables that were used to predict credit ratings in Table 7. This regression explains sixty-seven percent of the sample variation. All of the variables except earnings stability have the right signs, and size, retained earnings, profitability, leverage, interest coverage, and the utility dummy are statistically significant. Apparently, most of the ability of ratings to explain relative spreads derives from their mutual correlation with quantifiable indicators of credit risk. Still, the explanatory power from this group of explanatory variables is much less than the simple specification that includes only credit ratings.

The third column in Table 8a presents a regression of spreads against average Japanese ratings and all the determinants of average Japanese ratings collectively. In this specification, the

average ratings coefficient remains highly significant, and four of the financial indicator variables are significant as well. The adjusted R-squared of .839 is higher in the third than either the first or second specification, implying that the combination of Japanese credit ratings and the financial indicator variables add significant explanatory power to the more simple models than preceded it. Ratings contain information that is incorporated into market yields beyond that contained in the group of indicator variables, and some of the indicator variables contain information for market yields beyond that captured by the credit rating.

Next the same exercise is performed again, but only for the sample for which U.S. ratings are also available, so as to facilitate later comparisons (Table 8b). The same results hold qualitatively. While ratings explain more variation in spreads than the set of financial indicators, the combination of ratings and financial indicators explains the most variation. The adjusted R-squared on the best fitting specification is .893, significantly higher than that for the full sample reported in Table 8a.

In Table 9, we report regressions for the same sample of firms used in Table 8b's regression, but this sample use the average foreign rating in place of the average Japanese rating. 83 percent of the variation in spreads can be explained fairly well by the ratings alone, virtually identical to the result using Japanese ratings in Table 8b. But the combination of the foreign ratings with the credit risk indicator variables is distinct from that of the earlier table. While the fit is better than that using the rating alone, it is significantly worse than the combination of Japanese ratings and credit risk indicators. A combination of foreign ratings and financial indicators can explain only 86 percent of the variation in spreads, compared to more than 89 percent for the Japanese rating and financial indicator combination.

Finally, in Table 10, we estimate similar regressions, but this time including Japanese rating and foreign rating variables simultaneously. The simple specification including both ratings as explanatory variables explains 90 percent of the sample variance, higher than any of the previous regressions. When combined with the financial indicators, the adjusted-R-squared increases to 0.925. It appears that there is significant supplementary information in both sets of ratings that can explain spreads that is not incorporated in any single average rating alone. When combined with both sets of ratings, financial indicators show additional marginal power to explain yields.

Similar tests of the information content of ratings have been conducted with corporate bond data (Ederington, Yawitz and Roberts 1987), with municipal bond data (Moon and Stotsky 1993), and with sovereign bond market data (Cantor and Packer, 1996). Like those studies, we find that credit ratings--both of Japanese and of foreign agencies--may contain information not available in other publicly available information. Similar to the first two of these studies, we also find that other financial indicators provide information useful in predicting yields over and above their correlations with ratings. The market appears to take the ratings of both Japanese and foreign agencies into account when pricing the debt of Japanese corporations.

V. Concluding Remarks

Credit ratings of Japanese companies are growing increasingly important. We find that the ordering of risks that Japanese and foreign agencies imply is broadly consistent with quantitative indicators of credit risk. A regression using nine variables explains more than 72 percent of the cross-sectional variation in average Japanese ratings; 65 percent of the variation in average foreign ratings. In particular, a company's rating appears largely determined by its size,

retained earnings, profitability, leverage, and whether or not it was a utility. We do not, however, find any systematic relationship between ratings and keiretsu affiliation.

Credit ratings in Japan are also closely related to market-determined credit spreads, effectively supplementing the information content of financial indicators in the pricing of corporate risk in Japan. Most of the correlation appears to reflect a common interpretation by the agencies and market participants of public information about the credit risk of Japanese corporations. Nonetheless, the relationship between ratings and spreads is stronger than just that implied by their mutual correlation with quantitative indicators: cross-sectional results suggest that both the U.S. and Japanese rating agencies' opinions have independent effects on market spreads. Further, the combination of both U.S. and Japanese ratings predicts spreads more precisely than a single set of ratings. The best fit is provided by both sets of ratings in combination with the financial indicators.

In sum, while the agencies' ratings have a largely predictable component, they also appear to provide information about Japanese corporations used by the market beyond that available in publicly available data. Information is independently provided by both Japanese and U.S. ratings. While there may be large ratings differences observed between Japanese and foreign rating agencies, there are not large differences in the ability of either sets of ratings to predict the spreads of non-financial firms in the Japanese financial markets.

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Table 1
Ratings Symbols

Japanese and most Foreign Rating Agencies		Moody's Investors Service	
Broad Letter Categories	**Modified Categories**	**Broad Letter Categories**	**Modified Categories**
High Investment Grade			
AAA	AAA	Aaa	Aaa
AA	AA+	Aa	Aa1
	AA		Aa2
	AA-		Aa3
Low Investment Grade			
A	A+	A	A1
	A		A2
	A-		A3
BBB	BBB+	Baa	Baa1
	BBB		Baa2
	BBB-		Baa3
Non-Investment Grade			
BB	BB+	Ba	Ba1
	BB		Ba2
	BB-		Ba3
B	B+	B	B1
	B		B2
	B-		B3

Table 2

Selected Credit Rating Agencies in Japan

	Japan Ratings and Investment Information (R&I)	**Japan Credit Rating Agency (JCR)**	**Moody's Investors Service**	**Standard & Poor's**
Headquarters	Tokyo	Tokyo	New York	New York
Year Started Ratings	1985	1985	1909	1926
Ownership	Nikkei, Financial Institutions	Financial Institutions	Dunn & Bradstreet	McGraw-Hill
Coverage in Japan	830 firms	475	294	141
Manufacturing	500	248	156	45
Non-manu.	251	162	61	29
Finance	79	65	77	78
Analysts	84	49	20	18
Extent of Coverage	Mostly Japan	Mostly Japan	International	International

Source: IBJ Securities, Credit Commentary, July 1998.

Table 3

Selected Regulatory Guidance Using Credit Ratings in Japan

- On financial statements, companies allowed to disclose rating if from approved agency;
- Simplification of securities issuance procedures if rated above certain level;
- Eligibility requirement for CP issuance;
- Capital requirements for securities firms depends on the ratings of the securities held;
- Security company can lead manage issue of parent if it is rated;
- Management guidelines for local and national public pension investments;
- Standards for yen-denominated foreign bonds to be posted as collateral at the Bank of Japan;
- Used in the Prompt Corrective Action assessment of asset quality by FSA;
- Minimum rating criteria (Baa3/BBB-) for bond issuance (abolished 1996).

Source: Japan Credit Rating Agency (JCR).

Table 4

Ratings Matrix on Japanese Corporations: June 1998

		Japanese Agency Rating															
		AAA	**AA+**	**AA**	**AA-**	**A+**	**A**	**A-**	**BBB+**	**BBB**	**BBB-**	**BB+**	**BB**	**BB-**	**B+**	**B**	**B-**
Foreign Agency Rating	**AAA**	**-2-**															
	AA+	**6**	**---**														
	AA	**5**		**---**													
	AA-	**3**	**1**		**---**												
	A+		**2**	**4**	**1**	**---**											
	A		**4**	**4**	**2**	**2**	**-1-**										
	A-		**2**	**2**	**4**	**3**	**1**	**---**									
	BBB+			**2**	**1**	**6**	**3**		**---**								
	BBB		**1**	**4**	**11**	**6**	**9**	**5**		**---**							
	BBB-				**1**	**4**	**7**	**9**			**---**						
	BB+						**1**	**4**				**---**					
	BB			**1**		**5**	**7**	**2**	**2**	**1**			**---**				
	BB-					**1**	**1**	**3**	**2**	**1**				**---**			**1**
	B+							**1**	**2**						**---**		
	B							**1**		**3**						**---**	
	B-																**---**

Source: IBJ Securities, *Credit Commentary*, July 1998.

Table 5

Sample Means by Broad Letter Rating Categories: Japanese Rating (Foreign Rating)

	AAA	AA	A	BBB	BB	B
Size (Billion Yen)	4996 (11,552)	2283 (4241)	572 (3038)	249 (1215)	-- (1051)	-- (752)
Retained Earnings	25.7% (38.3%)	28.6% (24.6%)	26.4% (22.9%)	21.9% (24.1%)	-- (11.8%)	-- (0.8%)
Stability Earnings	9.7 (7.4)	6.9 (8.4)	3.2 (4.7)	2.8 (5.4)	-- (2.6)	-- (2.5)
Extraordinary Gains/Losses	-0.5% (-0.5%)	-1.2% (-0.3%)	-1.4% (-1.1%)	-1.3% (-1.4%)	-- (-1.7%)	-- (-5.6%)
Profitability	5.0% (5.5%)	3.9% (5.1%)	3.6% (3.2%)	2.8% (3.2%)	-- (2.6%)	-- (2.4%)
Leverage (Inverse Measure)	52.0% (68.9%)	67.1% (52.3%)	61.8% (61.7%)	53.9% (63.8%)	-- (37.7%)	-- (18.7%)
Interest Coverage	4.5 (9.9)	6.3 (4.0)	6.2 (4.7)	2.9 (3.8)	-- (2.0)	-- (1.3)
Utility Dummy (Frequency)	50% (33%)	0% (50%)	0% (0%)	0% (0%)	-- (0%)	-- (0%)
Keiretsu Dummy (Frequency)	11% (0%)	50% (12.5%)	36% (58%)	16% (52%)	-- (44%)	-- (33%)
Number of Firms	18 (3)	60 (16)	136 (24)	38 (62)	-- (27)	-- (3)

Table 6

Correlation Matrix of Explanatory Variables

	Japan Rating	Foreign Rating	Size	Retained Earnings	Stability Earnings	Net Extra-ordinary Gains	Profitability	Leverage	Interest Coverage	Utility Dummy	Keiretsu Dummy
Japan Rating	**1**										
Foreign Rating	**0.85**	**1**									
Size	**0.74**	**0.53**	**1**								
Retained Earnings	**0.07**	**0.25**	**-0.35**	**1**							
Stability Earnings	**0.18**	**0.13**	**0.08**	**0.09**	**1**						
Net Extraordinary Gains/Losses	**0.06**	**0.22**	**0.09**	**0.11**	**0.02**	**1**					
Profitability	**0.13**	**0.25**	**-0.11**	**0.34**	**0.06**	**-0.18**	**1**				
Leverage (Inverse)	**0.06**	**0.13**	**-0.29**	**0.66**	**0.07**	**0.01**	**0.40**	**1**			
Interest Coverage	**0.06**	**0.19**	**-0.07**	**0.32**	**0.01**	**-0.00**	**0.51**	**0.27**	**1**		
Utility Dummy	**0.39**	**0.56**	**0.28**	**-0.09**	**0.15**	**0.08**	**0.07**	**-0.20**	**-0.04**	**1**	
Keiretsu Dummy	**0.09**	**-0.13**	**0.26**	**-0.15**	**0.04**	**-0.01**	**-0.15**	**-0.11**	**0.06**	**-0.15**	**1**

Note: Correlation coefficients calculated for total sample with Japanese ratings, except for correlation coefficients including foreign ratings. Variables as defined in text.

Table 7

Determinants of Credit Ratings: Japanese and Foreign Agencies

	Average Japanese Agency Rating	**Average Foreign Agency Rating**	**Average Japanese Agency Rating (Small Sample)**
Intercept	-10.024**	-18.946**	-10.672**
	(1.093)	(2.630)	(1.672)
Size	1.499**	1.799**	1.520**
	(0.072)	(0.179)	(0.114)
Retained Earnings	3.057**	5.464**	2.952**
	(0.544)	(1.436)	(0.878)
Stability Earnings	0.010	-0.012	0.005
	(0.012)	(0.012)	(0.007)
Net Extraordinary Gains/Losses	-4.036	2.610	-6.479
	(3.041)	(7.063)	(4.319)
Profitability	8.064**	12.331	15.399**
	(4.084)	(11.167)	(6.890)
Leverage (Inverse Measure)	0.986**	1.983**	1.427**
	(0.363)	(0.804)	(0.493)
Interest Coverage	0.010	0.052	0.050
	(0.006)	(0.060)	(0.037)
Utility Dummy	2.083**	5.117**	2.030**
	(0.446)	(0.817)	(0.505)
Keiretsu Dummy	-0.147	-0.303	-0.150
	(0.156)	(0.351)	(0.216)
Sample size	242	132	131
Adj R-squared	0.716	0.650	0.695
Standard Error	1.214	1.874	1.146

Note: Standard errors of parameter estimates are in parenthesis. ** indicates statistical significance at the 5 percent level; * at the 10 percent level. Variables are as defined in text.

Table 8a

The Cross-Sectional Relationship of Between Ratings and Spreads: Japanese Ratings

Dependent Variable: Log Spreads

Intercept	2.178**	3.844**	2.300**
	(0.067)	(0.217)	(0.183)
Average Japanese Rating	-0.183**		-0.155**
	(0.006)		(0.010)
Size		-0.254**	-0.021
		(0.016)	(0.019)
Retained Earnings		- 0.671**	-0.192**
		(0.118)	(0.089)
Stability Earnings		0.000	0.002
		(0.002)	(0.001)
Net Extraordinary Gain/Losses		-0.583	-1.256**
		(0.662)	(0.467)
Profitability		-2.603**	-1.401**
		(0.891)	(0.631)
Leverage (Inverse Measure)		-0.237**	-0.093
		(0.079)	(0.056)
Interest Coverage		-0.003**	-0.002*
		(0.001)	(0.001)
Utility Dummy		-0.756**	-0.429**
		(0.102)	(0.074)
Keiretsu Dummy		-0.000	-0.026
		(0.039)	(0.027)
Sample size	240	240	240
Adj R-squared	0.800	0.674	0.839
Standard Error	0.207	0.264	0.185

Note: Standard errors of parameter estimates are in parenthesis. ** indicates statistical significance at the 5 percent level; * at the 10 percent level. Variables are as defined in text.

Table 8b

The Cross-Sectional Relationship of Between Ratings and Spreads: Japanese Ratings (Small Sample)

Dependent Variable: Log Spreads

Intercept	2.465**	4.136**	2.119**
	(0.104)	(0.360)	(0.255)
Average Japanese Rating	-0.204**		-0.182**
	(0.008)		(0.012)
Size		-0.267**	0.014
		(0.025)	(0.024)
Retained Earnings		- 0.764**	-0.226**
		(0.197)	(0.122)
Stability Earnings		0.001	0.002**
		(0.002)	(0.001)
Net Extraordinary Gain/Losses		-0.821	-1.994**
		(0.968)	(0.577)
Profitability		-4.773**	-1.810**
		(1.530)	(0.931)
Leverage (Inverse Measure)		-0.417**	-0.151**
		(0.110)	(0.067)
Interest Coverage		-0.020**	-0.009**
		(0.008)	(0.004)
Utility Dummy		-0.700**	-0.346**
		(0.111)	(0.071)
Keiretsu Dummy		0.041	0.009
		(0.048)	(0.029)
Sample size	131	131	131
Adj R-squared	0.827	0.703	0.893
Standard Error	0.193	0.257	0.152

Note: Standard errors of parameter estimates are in parenthesis. ** indicates statistical significance at the 5 percent level; * at the 10 percent level. Variables are as defined in text.

Table 9

The Cross-Sectional Relationship of Between Ratings and Spreads: Foreign Ratings

Dependent Variable: Log Spreads

Intercept	1.102**	4.136**	2.231**
	(0.150)	(0.360)	(0.294)
Average Foreign Rating	-0.136**		-0.101**
	(0.005)		(0.008)
Size		-0.267**	-0.086**
		(0.025)	(0.023)
Retained Earnings		- 0.764**	-0.215
		(0.197)	(0.142)
Stability Earnings		0.001	-0.000
		(0.002)	(0.001)
Net Extraordinary Gain/Losses		-0.821	-0.559
		(0.968)	(0.661)
Profitability		-4.773**	-3.533**
		(1.530)	(1.049)
Leverage (Inverse Measure)		-0.417**	-0.218**
		(0.110)	(0.076)
Interest Coverage		-0.020**	-0.015**
		(0.008)	(0.005)
Utility Dummy		-0.700**	-0.186**
		(0.111)	(0.088)
Keiretsu Dummy		0.041	0.011
		(0.048)	(0.033)
Sample size	132	131	132
Adj R-squared	0.829	0.703	0.861
Standard Error	0.195	0.257	0.175

Note: Standard errors of parameter estimates are in parenthesis. ** indicates statistical significance at the 5 percent level; * at the 10 percent level. Variables are as defined in text.

Table 10
The Cross-Sectional Relationship of Between
Ratings and Spreads: Foreign and Japanese Ratings Combined

Dependent Variable: Log Spreads

Intercept	1.958**	4.136**	1.683**
	(0.096)	(0.360)	(0.222)
Average Japanese Rating	-0.112**		-0.130**
	(0.011)		(0.012)
Average Foreign Rating	-0.073**		-0.055**
	(0.008)		(0.008)
Size		-0.267**	0.031
		(0.025)	(0.020)
Retained Earnings		- 0.764**	-0.080
		(0.197)	(0.104)
Stability Earnings		0.001	0.001
		(0.002)	(0.001)
Net Extraordinary Gain/Losses		-0.821	-1.520**
		(0.968)	(0.487)
Profitability		-4.773**	-2.036**
		(1.530)	(0.780)
Leverage (Inverse Measure)		-0.417**	-0.120**
		(0.110)	(0.057)
Interest Coverage		-0.020**	-0.010**
		(0.008)	(0.004)
Utility Dummy		-0.700**	-0.161**
		(0.111)	(0.065)
Keiretsu Dummy		0.041	0.003
		(0.048)	(0.024)
Sample size	131	131	131
Adj R-squared	0.898	0.703	0.925
Standard Error	0.148	0.257	0.127

Note: Standard errors of parameter estimates are in parenthesis. ** indicates statistical significance at the 5 percent level; * at the 10 percent level. Variables are as defined in text.

Endnotes

[1] Some agencies have begun to systematically incorporate expected loss in the event of default as well as default probability into their ratings. For the vast majority of pair-wise comparisons, ranking securities by expected probability of default will yield the same result as ranking by the product of expected loss and the probability of default.

[2] Cantor and Packer (1994) provide a broad overview of the uses of credit ratings in the U.S., and their history and reliability.

[3] The stark differentials of Table 4 suggest that Japanese agency ratings scales are more lenient than foreign agency scales, foreign agencies rate Japanese corporations with a tougher scale than other corporations, or both. In a result suggestive of more lenient Japanese agency rating scales, Cantor and Packer (1994) found that, for ratings of international banks, observed differences between U.S. and Japanese agency ratings reflected principally differences in the scales of individual ratings agencies, rather than home-country bias. In probit regressions using the database of Moody's rated issuers between 1983 and 1998, Ammer and Packer (2000) found that, after controlling for time and ratings effects, the difference in default rates between U.S. and non-U.S. borrowers were insignificantly different from zero. On the other hand, the findings of a JCIF study (1999) suggest that U.S. agency ratings may be relatively tough on Japanese firms. Of the 25 Japanese issuers rated speculative grade by Moody's as of January 1994, none had defaulted five years later; by contrast, the average default rate for all firms rated Ba by Moody's was 11.4% and for firms rated B was 28.6%. In other words, the possibility that the default rate for the Japanese firms was similar to identically rated other firms was very unlikely, though, as the study puts it, "… the small sample size means that, strictly speaking, it is impossible to derive statistically significant conclusions."

[4] A number of studies have attempted to quantify the determinants of ratings on corporate and municipal bonds in the United States, as well as the sovereign ratings of the U.S. agencies. Ederington and Yawitz (1987) survey the studies on U.S. corporate bonds, and Moon and Stotsky (1993) analyze municipal bond ratings. Cantor and Packer (1996) investigate the determinants of sovereign ratings.

[5] In this paper, the keiretsu firms are firms that are identified in Dodwell (1996) as having a strong affiliation to one of the eight horizontal keiretsu (Mitsubishi, Mitsui, Sumitomo, Fuyo, DKB, Sanwa, Tokai, and IBJ).

[6] To calculate the Japanese rating, we average the ratings of Japan Bond Rating Institute, Nippon Investors' Service (i.e., the two predecessor institutions to R&I), and Japan Credit Rating Agency. To calculate the foreign rating, we average the ratings of Moody's and S&P. In the case of ties, ratings were assigned to the lower category.

[7]The simple linear specification of the ratings variable worked considerably better than nonlinear alternatives such as logarithmic or exponential functions. Another possible approach would be to estimate the relationships with ordered probit techniques, relying only on the ordinal properties of credit ratings. Related work on U.S. corporate ratings (Ederington 1985) suggests that, with larger sample sizes, inferences drawn from ordered probits are likely to be similar (and perhaps slightly more accurate) to those drawn from least squares regressions. In contrast, Kaplan and Urwitz (1979) argue that linear least squares perform better out of sample than ordered probits in their study of corporate bond ratings.

[8] As we've seen in Table 6, some of the explanatory variables are fairly highly correlated with each other. While coefficient estimates remain unbiased in the face of multicollinearity, the variance of the estimates can be fairly large. However, the majority of variables are statistically significant in all regressions, and the same variables tend to be significant in both the U.S. and Japanese regressions. Even if the estimates of the variances of the individual coefficients were to be high due to

multicollinearity, the estimate of the linear combination of coefficients need not have a particularly high variance, and the prediction errors would not necessarily be reduced by an alternative estimation procedure. The one variable which is of independent interest in both the rating and spread regression is the keiretsu dummy; its correlation with the other independent variables is relatively low, and the estimate is of the wrong (unexpected) sign in 9 of the 11 reported regression estimates. Multicollinearity is thus probably not responsible for an inability to reject the hypothesis that keiretsu affiliation does not increase ratings, or reduce spreads.

[9] As in Hamao and Hoshi (1998), firms in the construction sector with extremely discounted bonds were not included in the sample. For a detailed discussion of trends in the pricing of Japanese corporate bonds, see Ieda and Ohba (1998), and Miyanoya (1998).

[10] The relationship between ratings and yields is nonlinear; the preferred specification is the natural logarithm of yields against ratings. This specification eliminates heteroskedasticity in the residuals as measured against rating levels.

[11] We used either the higher, or the lower rating as the sole explanatory variable. We also tried other explanatory variables in addition to the average rating regressor, including dummy variables that indicate when there are ratings from two agencies or when the two agencies disagree. For an investigation of the impact of split ratings on spreads in the U.S. context, see Cantor, Packer, and Cole (1997).