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Solicited and Unsolicited Credit Ratings: A Global Perspective

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Abstract

We conducted a global study of the long-term issuer ratings of nonfinancial firms from Standard and Poor's Ratings Services (S&P) for the period 1998–2003. Specifically, we focused on the solicited versus unsolicited ratings and sample-selection bias in the analysis. Unlike the literature, we adopted an improved method using Wooldridge's instrumental-variable approach to mitigate the concern of specification errors in Heckman's model. We found that the probability of seeking a long-term issuer rating is positively related to the size and profitability of the firm, and negatively related to the growth opportunities and debt levels of the firm. The credit rating is positively related to the sovereign rating, size, and profitability of the issuer, and negatively related to the debt ratio of the issuer. Consistent with the literature, we found sample-selection bias in credit ratings. Our findings suggest that the firms with solicited ratings seem to be more profitable, more liquid, and have lower leverage than the issuers with unsolicited ratings. After controlling for sample-selection bias and some key financial ratios, we found that unsolicited firms, on average, seem to have lower long-term issuer ratings.

JEL Classification: G15, G24, D53

Contents

1. INTRODUCTION

To improve credit ratings quality and protect investors, the Credit Rating Agency Reform Act of 2006 was enacted in the United States (US) (US Securities and Exchange Commission [SEC] 2009). In response to the requirements of this act, some new rules relating to the oversight of credit rating agencies registered as Nationally Recognized Statistical Rating Organizations (NRSROs) were recently adopted by the SEC (SEC 2007). One of the proposed rules attempts to prohibit the practice of issuing some unsolicited ratings (SEC 2007). Specifically, SEC states that "it would be unfair, coercive, or abusive to issue an unsolicited credit rating and communicate with the issuer or obligor to induce or attempt to induce them to pay for the credit rating or another product or service of the NRSRO or its affiliates" (SEC 2007: 178). The practice of issuing unsolicited ratings by some NRSROs might have raised sufficiently serious public concerns (from issuers and/or investors) to draw the attention of major regulators like the SEC.

These growing concerns and controversies might have been triggered by the observation that unsolicited credit ratings, on average, tend to be lower than the solicited ratings (see, for example, Poon 2003; Gan 2004; Shimoda and Kawai 2007; Fairchild, Flaherty, and Shin 2009; and Poon, Lee, and Gup 2009). Some researchers asked whether unsolicited ratings were lower than they deserved. Some issuers with unsolicited ratings questioned whether they had been fairly treated by the rating agencies and whether the creditworthiness of these ratings was lower than those of the solicited ratings (Behr and Güttler 2008). Shimoda and Kawai (2007) found that the differences between solicited and unsolicited ratings were smaller than before, but they believed that strong and deep-rooted concerns about the reliability of unsolicited ratings still remained among issuers.

Amid increasing debate on the issue of unsolicited ratings, the SEC has recently made an attempt to seek more information from NRSROs on how they define "unsolicited credit ratings" and their practices, procedures, and methodologies (if any) with respect to these ratings (SEC 2007). The SEC defines an unsolicited rating as "one that is determined without the consent and/or payment of the obligor being rated or issuer, underwriter, or arranger of the securities being rated" (SEC 2008).

Probably as a consequence of the Credit Rating Agency Reform Act and the related subsequent rules, the three major global NRSROs—Standard & Poor's Ratings Services (S&P), Moody's Investors Service (hereafter Moody's), and Fitch Ratings, Ltd. (hereafter Fitch)—have issued updated policy statements with respect to unsolicited ratings. Specifically, S&P declares that "this rating(s) was initiated by S&P. It may be based solely on publicly available information and may or may not involve the participation of the issuer's management" (S&P 2007: 1). Moody's states that "this (unsolicited) rating was initiated by Moody's and was not requested by the issuer" (Moody's 2006a: 1, 2006b: 1). Under Fitch's policy, Fitch asserts that "the decision to issue these (unsolicited) ratings must meet the same standards for information and analysis as the decision to issue solicited credit ratings. Since 2001, Fitch has publicly disclosed such ratings as having been initiated by Fitch" (Fitch 2007: 1–2).[1] In sum, credit ratings that are initiated and paid by issuers are called "solicited ratings," and credit ratings that are not paid for by the issuing firm are called "unsolicited ratings." We use these definitions throughout the paper.

In addition, the dispute over unsolicited ratings might become a discussion topic for bank regulators and supervisors worldwide in relation to the calculation of the minimum capital requirements of Basel II (Fitch 2006; Behr and Güttler 2008). Basel II (Basel Committee on Banking Supervision 2006) provides a framework for the international convergence of capital

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[1] In addition, Fitch has clarified a few misconceptions surrounding agency-initiated ratings in its recent publication *Unsolicited Ratings and Basel II* (Fitch 2006).

measurement and capital standards. Specifically, the First Pillar of Basel II suggests that the regulatory capital of banks should be based on risk-based assets and that banks can use eligible external credit assessment institutions, such as some global credit rating agencies, to determine their credit risk. However, Basel II allows each country's national bank supervisory authority to decide whether its country's banks can use unsolicited ratings in addition to solicited ratings in determining their credit risk in relation to regulatory capital (Basel Committee on Banking Supervision 2006). This indirectly draws distinctions between the solicited and unsolicited ratings of eligible external credit assessment institutions and may put pressure on national bank regulators to make a decision on whether their banks can use unsolicited ratings in the same way as solicited ratings for capital adequacy purposes according to Basel II.

This paper examines whether unsolicited credit ratings are lower than solicited ratings using a global sample of nonfinancial firms. Our study is related to Poon (2003), Poon and Firth (2005), and other literature, but is distinct in two aspects. First, we use a global sample of nonfinancial firms. Given the regulatory structure of financial firms, the financial characteristics that affect financial firms' decisions to seek credit ratings and credit rating levels are very different from those affecting nonfinancial firms. A cross-country comprehensive study of nonfinancial firms can clarify the issue of solicited versus unsolicited credit ratings. Our study also encompasses a longer sample period than Poon (2003). Second, given that the decision to seek credit ratings and credit rating determination are endogenous in the rating process, the literature (e.g., Poon and Firth 2005) primarily uses Heckman's two-step method to account for the sample-selection bias. Heckman's procedures rely on a well-specified rating decision (i.e., the decision to seek credit ratings) equation in the first step. The credit rating literature, however, does not have a theoretical foundation in choosing specific financial characteristics to explain a firm's decision to seek credit ratings. The decision on whether to include a particular financial characteristic seems to depend on some conceptual arguments as well as on data availability. That is, specification errors may exist in Heckman's procedures. To resolve this concern, we used Wooldridge's (2002) instrumental-variable approach in our analysis. Wooldridge (2002) shows that his instrumental-variable approach does not require a perfectly specified rating decision equation. Hence, our research method is an improvement over similar studies in the literature.

We offer several interesting findings. First, the firms with unsolicited ratings, on average, are financially weaker than firms with solicited ratings—in some respects. Second, there is indeed a sample-selection bias in credit ratings. That is, the decision to seek a credit rating is not independent of the determinants of credit rating levels. Third, after controlling for some key financial ratios and sample-selection bias, unsolicited ratings seem to be lower. Our results are consistent with the literature and they are robust to the full sample as well as to the Japan subsample.

Section 2 presents the recent literature on unsolicited ratings. The research method used is described in Section 3 and the results are discussed in Section 4. Section 5 includes our conclusions.

2. LITERATURE ON UNSOLICITED RATINGS

Poon (2003) was the first author to empirically analyze unsolicited credit ratings, using S&P long-term credit ratings of 265 corporations in different industries across 15 countries from 1998 to 2000. Poon (2003) found significant self-selection bias in the rating decision. Unsolicited ratings were lower than solicited ratings, and profitability and sovereign credit risk were the two major factors in determining long-term corporate credit ratings. Byoun and Shin (2003) used the unsolicited and solicited ratings of non-US corporations between 1996

and 2002 to study the effects of solicited and unsolicited ratings on firm value. They found that stock prices fell after downgrades of unsolicited ratings and that there were positive market reactions to upgrade announcements. In contrast, for solicited ratings, they found only significant positive market reaction to upgrade announcements.

Butler and Rodgers (2003) examined a sample of 360 corporate bond ratings of 153 nonfinancial companies from Moody's and S&P during 1997. Their results suggest that when relationships existed in the assignment of solicited ratings compared to unsolicited ratings, rating agencies relied less on publicly available "hard" information, and were better able to assess "soft" (or private) information about bond issuers. Using a similar methodology to Butler and Rodgers (2003), Gan (2004) distinguished unsolicited bond issues from solicited bond issues using the rating fees reported in the registration statement. Using a sample of S&P and Moody's credit ratings assigned to 1,410 bond issues of 303 firms between 1994 and 1998, Gan (2004) examined whether Moody's and S&P used consistent standards in solicited and unsolicited issue ratings, and empirically tested two hypotheses—the punishment hypothesis and the private information hypothesis. The results of Gan's study showed that both agencies gave significantly lower ratings to unsolicited issues, but there was no significant difference between the performances of solicited and unsolicited groups. However, Gan (2004) believed that these rating agencies gave lower ratings to unsolicited issuers not as blackmail or punishment, but as a necessary adjustment for the difference in the true and unobserved quality, such as for private information.

Poon and Firth (2005) used an international sample of 1,060 bank ratings from 82 countries during 2002 to analyze shadow ratings,[2] which were based largely on public information, to shed light on the controversy surrounding unsolicited ratings. Their results indicated that shadow ratings were lower than nonshadow ratings and that banks that received shadow ratings were smaller and had weaker financial profiles than the other group. This suggests that bank size, profitability, asset quality, liquidity, and sovereign credit risk are important in determining bank ratings. While Poon and Firth (2005) applied Heckman's two-step estimation method (Heckman 1979) to their estimation model of bank ratings, Van Roy (2006) conducted a study of the credit ratings of Asian banks rated by Fitch, using an endogenous switching regression model. He found that unsolicited ratings appeared to be lower than the solicited ratings after controlling for differences in observed bank characteristics, mainly because they were based exclusively on public information. He suggested that unlike solicited ratings, which incorporated both public and private information, unsolicited ratings tended to be more conservative as a consequence.

Using a comprehensive sample of the issuer ratings of 460 commercial banks in 72 countries from S&P for the period 1998–2003, and adopting an endogenous regime-switching model, Poon, Lee, and Gup (2009) investigated whether solicitation mattered in bank credit ratings. They found that solicited ratings tended to be higher than unsolicited ratings. Banks with solicited ratings tended to be larger, have relatively lower ratios of nonperforming loans to gross loans, and have higher returns on equity than unsolicited banks. Their results indicated that the observed differences between solicited and unsolicited ratings could be explained by both the solicitation status and financial profiles of the banks.

Fairchild, Flaherty, and Shin (2009) employed Moody's solicited and unsolicited credit ratings, collected from a previous survey of Japanese firms, as their sample and came to similar conclusions to those of the authors of the previous studies using S&P ratings. That is, unsolicited ratings were still lower than solicited ratings even though firms with unsolicited ratings had provided Moody's with some degree of inside information. Comparing the

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[2] According to Fitch (2001: 1), "the use of the description 'Shadow' denotes that the Individual ratings is largely based on public information, albeit supplemented with additional information obtained from the rated entity."

unsolicited ratings given by S&P and Moody's, the authors did not find a significant difference between the ratings assigned by the two rating agencies. They believed that firms with unsolicited ratings provided incomplete private information to rating agencies and that as a result their ratings were lower.

Shimoda and Kawai (2007) conducted a thorough study of the recent credit rating gaps in Japan, using ratings from two Japan-based rating agencies (Japan Credit Rating Agency and Rating and Investment Information) and three global rating agencies (Moody's, S&P, and Fitch). The two types of rating gaps that they investigated were: (i) differences between solicited and unsolicited ratings, and (ii) rating splits among different rating agencies. Focusing on the credit ratings of nonfinancial corporations in Japan, the authors found that unsolicited ratings were lower than solicited ratings, which was consistent with the results of other studies using international samples, but these differences seemed to be smaller than before. They suggested that the disparity in the level of information available to rating agencies and cherry-picking actions by the issuers (similar to sample-selection bias) might have contributed to the differences in the ratings.

Recently, Behr and Güttler (2008) and Bannier, Behr, and Güttler (2008) conducted empirical studies on the informational content of unsolicited ratings and the explanations for rating differences between solicited and unsolicited ratings, respectively. Behr and Güttler (2008) examined whether the stock market reacted to initial unsolicited ratings and changes in unsolicited ratings for a sample of firms rated by S&P from January 1996 to December 2005. They found significant negative market reactions to these unsolicited rating actions. Hence, the authors believed that unsolicited ratings did convey new information to stock markets as S&P's unsolicited ratings were mainly based on public information. Bannier, Behr, and Güttler (2008) attempted to explain why unsolicited ratings of non-US firms were lower than solicited ratings with adverse selection and strategic rating (e.g., agency conservatism or blackmailing) arguments, using a sample of S&P ratings data from January 1996 to December 2006. The adverse selection hypothesis was not rejected for the full sample. Moreover, they found that the strategic rating explanation appeared to be important in the subsample of banks.

3. RESEARCH DESIGN: DATA AND METHODOLOGY

The data sources, sample firms, S&P corporate rating methodology, and research methodology used in this study are described in this section.

3.1 Sample and Data

We examined 830 corporations in 53 countries, excluding all financial institutions and banks, that had solicited or unsolicited credit ratings issued by S&P from 1998 to 2003. The sample used in this study consists of corporate issuers that meet the following two conditions. First, the corporate issuers must have had long-term issuer credit ratings (LTRs) in local currency provided by S&P for every January from 1998 to 2003. According to S&P's *Corporate Ratings Criteria* (2008), an "issuer credit rating" refers to "an opinion of the obligor's overall capacity and willingness to meet its financial obligations as they come due—whether rated or not" (S&P 2008: 10). Second, the issuers must not only have had issuer credit ratings listed in the S&P *Global Ratings Handbook*, but also have had financial reports that included a Datastream security code provided by the Thomson Reuters Datastream database[3] prior to each of the six rating dates. As a result of this two-step screening process, we found that

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[3] Available at http://online.thomsonreuters.com/datastream/.

all unsolicited issuer ratings from nonfinancial firms during our study period were from Japan.

Specifically, the dependent variables in the rating determinant equation of the two-step model are the LTRs assigned by S&P as of January 1998, 1999, 2000, 2001, 2002, and 2003, which are reported in the S&P *Global Ratings Handbook* in February of each of the above years, respectively (S&P 1998a, 1999, 2000a, 2001, 2002, 2003). Data for the financial variables of the sample issuers are from the financial reports of Thomson Reuters Datastream. Some of the financial ratios used in this study (see Table 1 for the complete list and descriptions) are ones that S&P may examine in determining LTRs (S&P Credit Training Services 2000; S&P 2008). The financial ratios measure profitability, capital or debt structure, cash flow protection, liquidity, and firm size. As rating agencies usually examine the relevant financial variables for the previous three to five years, this study uses a similar approach. For example, in the treatment effects model using Wooldridge's instrumental variable method (Wooldridge 2002), the three-year averages of the financial variables in 1999, 2001, and 2002 (if available) were used as the independent variables to explain the January 2003 ratings. The same approach was applied to compute the three-year averages of financial variables of the other years.

Table 1: List of Variables Used for Statistical Analyses

Variable Code	Variable Name and Brief Explanation
Profitability	
ROC*	return on capital (%)
OM	operating margin (%)
ROA	return on total assets (%)
Capital/Debt Structure	
DTC	total debt to total capital & short-term debt (%)
DTA	total debt to total assets (%)
LDTC	long-term debt to total capital (%)
Cash Flow Protection	
FFOTD*	funds from operations (FFO) to total debt
	[FFO = operating income - income taxes + deprecation, depletion, and amortization + deferred taxes]
NCFCAPEX*	net cash flow (NCF) to capital expenditures
	[NCF = FFO - dividend or: FFO - (preferred dividend + common stock dividend) NCF to capital expenditures = NCF / payments to fixed assets]
Financial Flexibility	
SDTD	short-term debt to total debt (%)
CASHEQ	cash and equivalent (natural logarithm of cash and equivalent)
Liquidity	
CR	current ratio
QUICK	quick ratio
CASH	cash ratio (cash and equivalents/current liabilities)
Size	
TA	total assets (natural logarithm of book value of total assets)
SALES	total sales (natural logarithm of total sales)
Other Variables	
DTEBITDA*	total debt to earnings before interest and taxes plus depreciation and amortization (EBITDA)
MTB	market value to book value ratio
FIXTA	fixed assets to total assets ratio

*Similar ratios are reported as "key ratios" in *S&P* (*2008*).

Source: Authors' summary.

In addition, we used the book value of total assets to measure firm size. While S&P does not have a minimum size criterion for any given rating level, the company believes that size and ratings are correlated because size often provides a measure of diversification and/or affects competitive position. In particular, relative size helps determine market position, extent of diversification, and financial flexibility (S&P 2008). Poon and Firth (2005) and Poon, Lee, and Gup (2009) found that larger banks have more incentive to seek credit ratings and that they tend to have higher bank ratings. Because rating agencies consider sovereign credit risk to be important in assessing the credit standing of banks and corporations (S&P 1997, 1998b), S&P's sovereign credit rating (SOV) is included in the rating determinant models to explain LTRs.

3.2   Standard and Poor's Corporate Rating Methodology

S&P considers an issuer's rating as an overall assessment of an issuer's ability and willingness to meet all financial commitments in a timely manner. Its credit analysts study both quantifiable and nonquantifiable factors in determining LTRs. S&P's corporate rating methodology organizes the analysis on a common framework evaluating each issuer's business risk and financial risk. Country risk, industry factors, competitive position, and comparisons of profitability and peer group underlie its business risk assessment. Government risk tolerance and financial policies, accounting, cash flow adequacy, capital structure and asset protection, and liquidity and other short-term factors are the key aspects assessed by S&P in determining the financial risk of an issuer. A preliminary overall company rating is derived from both the business risk rating and the financial risk rating (S&P Credit Training Services 2000; S&P 2008).

Each of the factors used in its rating methodology is evaluated, but S&P claims that it does not have any predetermined weights for these factors and that the significance of specific aspects varies from situation to situation. In fact, S&P usually establishes a team of expert credit analysts to assess information pertinent to the rating. A rating committee of five to seven voting members is always convened to assign a new issuer rating. The rating committee receives financial statistics and comparative analysis in advance and then the lead analyst makes presentations before the committee determines ratings (S&P Credit Training Services 2000; S&P 2008).

3.3   Univariate Tests

As LTR is not a continuous variable and instead follows an ordinal scale, a nonparametric test—the Mann-Whitney U-test—is used to test the following null hypothesis (H1) in addition to the t-test (a parametric test).

> H1: Solicited and unsolicited issuer ratings have identical distributions.

The alternative hypothesis to H1 is that there is a significant difference in the distribution of ratings between the two groups, which may imply that unsolicited ratings are, on average, lower or higher than solicited ratings.

3.4   Univariate Tests of Differences in Financial Profiles

Differences between the two groups of ratings may be attributable to differences in financial profiles and/or firm characteristics. *T*-tests and Mann-Whitney *U*-tests are conducted to test for differences in financial profiles and firm characteristics between firms with solicited and unsolicited ratings for both the overall sample and the Japanese subsample.

> H2: There is no difference between the financial profiles and firm characteristics of firms with solicited and unsolicited ratings.

The alternative hypothesis to H2 is that there are significant differences between the financial profiles and firm characteristics of firms with solicited and unsolicited ratings.

3.5   Wooldridge's Two-Step Treatment Effects Instrumental Variable Model

Liu and Malatesta (2006) argued that a firm's decision to seek a credit rating is mainly influenced by firm characteristics such as firm size, profitability, and tangible asset level.[4] Some of these characteristics, however, are also critical in determining the actual credit rating level of the firm. Hence, some of the characteristics that explain a firm's decision to obtain a credit rating are not independent of the characteristics that determine the credit rating level of the same firm. A financially weak (strong) firm might have less (more) incentive to seek a credit rating because the firm would expect to receive a low (high) credit rating level. Specifically, we need to mitigate the endogeneity of the firm's decision to seek a credit rating. Endogeneity occurs when the characteristics that affect a firm's decision on obtaining a credit rating also determine its credit rating level (i.e., there is a sample-selection bias). The credit rating literature discusses such bias in detail (see Poon 2003; Poon and Firth 2005).

Most previous studies applied Heckman's (1979) two-step estimation method to account for sample-selection bias. The first step in the process is to estimate the selection equation to determine the probability that a firm will seek a credit rating. A sample-selection bias variable (called the inverse Mill's ratio) is estimated in the process. The second step is to estimate the main equation to study the determinants of the credit rating levels by incorporating a set of explanatory variables and the inverse Mill's ratio using a regression model. The challenge of applying Heckman's procedure in the context of credit ratings is that the literature does not provide a theoretical foundation to incorporate specific contributing factors to the credit rating decisions in the rating decision equation. The decisions to include some variables are primarily based on some conceptual arguments or other practical reasons such as data availability. Therefore, the estimated inverse Mill's ratio may change depending on the number of variables used in the selection equation. With a different Mill's ratio, the second step in the Heckman procedure may yield different estimation results.

To circumvent the concern of using Heckman's procedure, we used Wooldridge's (2002) two-step instrumental variable method to account for the sample-selection bias. Similar to Heckman's method, Wooldridge's instrumental-variable approach also uses a probit model to estimate the rating decision equation with a set of firm characteristics in the first step. Then, a fitted probability of seeking a credit rating (*Y_hat*) is obtained from the estimated probit equation for each firm. The fitted probability is then used as the instrumental variable to replace the dummy variable that measures the effect of a solicited versus unsolicited rating (*Y*) in the main equation. In the second step (i.e., estimating the main equation), the credit rating determinants are estimated using a set of explanatory variables and the fitted probability instrumental variable. Wooldridge (2002) showed that such an approach does not require a perfect specification of the selection equation. Thus, the concern of specification errors in the first step in Heckman's method is mitigated. Recent studies, such as Faulkender and Petersen (2006) and Lin and Su (2008), also use Wooldridge's approach to deal with the endogenous selection issue. Using Wooldridge's instrumental-variable method, we tested the following null hypothesis:

> H3: Corporate credit ratings do not reflect a selectivity bias.

The alternative hypothesis to H3 is that a sample-selection bias exists in corporate credit ratings. The sample-selection bias may partially explain the downward bias of unsolicited ratings in comparison to solicited ratings. The two-step Wooldridge treatment effects model is illustrated below.

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[4] Faulkender and Petersen (2006) used a similar set of firm characteristics to model a firm's decision to access the bond market.

Step 1: Rating decision equation (selection equation based on a probit model)

$$Y_i^* = Z_i \gamma + \xi_i \tag{1}$$

The observed decision is $Y_i = 1$ if $Y_i^* > 0$

$$Y_i = 0 \text{ if } Y_i^* \leq 0$$

Step 2: Rating determinant equation (main equation based on a regression model)

$$R_i = X_i \beta + Y_i \delta + \varepsilon_i \tag{2}$$

where

R_i	=	the observed rating category that is assigned to issuer *i;*
X_i	=	a vector of explanatory variables for issuer *i* in the rating determinant equation;
Y_i	=	a binary variable representing whether an issuer has solicited or unsolicited ratings from S&P;
Y_i^*	=	an unobserved continuous latent variable for the selection decision;
Z_i	=	a vector of explanatory variables in the selection equation;
β, δ, γ	=	a vector of coefficients or coefficient;
ε_i, ξ_i	=	the random error terms that follow a bivariate normal distribution with zero mean and correlation $\rho_{\varepsilon\xi}$; and
$\rho_{\varepsilon\xi}$	=	the correlation between ε_i and ξ_i.

In Step 1, we estimated the rating decision with seven explanatory variables by probit. The explanatory variables of the probit model are: (1) *TA* = natural logarithm of total assets; (2) *FIXTA* = fixed asset to total assets ratio; (3) *SOV* = sovereign credit rating where AAA = 9, AA = 8, A = 7, BBB = 6, BB = 5, B= 4, CCC = 3, CC = 2, and SD/D = 1; (4) *ROA* = return on assets; (5) *MTB* = market-to-book ratio; (6) *DTA* = debt to total asset ratio; and (7) *JAPAN* = 1 if the firm is based in Japan. We obtained a fitted probability of obtaining a credit rating for each firm in the estimation process. The inclusion of some of these financial variables follows the work in Faulkender and Petersen (2006), Liu and Malatesta (2006), Poon and Firth (2005), and Poon, Lee, and Gup (2009). We expected that a firm would be more likely to seek a credit rating if it were larger, more profitable, and had more tangible assets.

In Step 2 (i.e., rating determinant equation), the dependent variable of the primary regression equation of interest is the S&P LTR, where AAA = 9, AA = 8, A = 7, BBB = 6, BB = 5, B= 4, CCC = 3, CC = 2, and SD/D = 1. The explanatory variables include: (1) *TA,* (2) *SOV,* (3) *ROA,* (4) *DTA,* (5) *FFOTD* = funds from operations to total debt, (6) various industry dummy variables, (7) *JAPAN,* and (8) *Y* = 1 for a firm having solicited a credit rating in Step 1. A higher value for an explanatory variable (β) suggests a greater probability of a higher credit rating. Because of the sample-selection bias in the decision to seek a credit rating, we used *Y_HAT* (a fitted probability for the likelihood of a firm having a solicited credit rating in Step 1) as an instrumental variable to replace *Y* in Equation (2). The testing of the null hypothesis that δ = 0 was used as the test for selectivity bias (H3) and to test whether the solicited rating was higher than the unsolicited rating (H2).

Multicollinearity in Equation (2) may be a concern because financial variables are highly correlated. Therefore, we selected only key financial variables representing the sovereign rating of the country where the firm is located, firm size, profitability, capital structure, and cash flow protection to explain credit rating levels. We also included industry dummy variables to account for industry effects on credit rating levels.

4. DISCUSSION OF RESULTS

The descriptive statistics of the sample, the comparison between the solicited and unsolicited groups, and the results from the treatment effects model using Wooldridge's instrumental variable method are discussed in this section.

4.1 Descriptive Statistics

Table 2 provides a brief description of LTRs ranging from AAA to D. The table also lists the sample frequency and sample percentage of 3,392 observations across the nine rating levels and by solicited and unsolicited rating subgroups. Only 2.2% of the sample ratings (all from the solicited group) received AAA ratings, which indicates that these firms are "extremely strong" according to S&P's definition. About 70% of the sample firms obtained a rating of BBB or above (labeled as investment-grade ratings hereafter), while about 30% of the sample obtained a rating of BB or below (labeled as speculative-grade ratings hereafter). In the overall sample, the majority of the issuers (82.2%) had solicited ratings from S&P, and 17.8% had unsolicited ratings. Interestingly, while most of the solicited ratings (2,049 out of 2,789 or 73%) are investment grade, only about half of the unsolicited ratings (318 out of 603) are investment grade.

Table 2: Rating Definitions and Distribution of Standard & Poor's Long-Term Issuer Credit Ratings by Rating Categories in the Sample During the Period 1998–2003

| Rating | Frequency in the Sample (percentage in the sample) | | Rating Definitions and Subtotals |
	With Solicited Rating	With Unsolicited Rating	
AAA	73 (2.2%)	0 (0.0%)	**Extremely strong** capacity to meet its financial commitments.
AA	319 (9.4%)	48 (1.4%)	**Very strong** capacity to meet its financial commitments. It differs from the highest rated issuers only by a small degree.
A	752 (22.2%)	83 (2.4%)	**Strong** capacity to meet its financial commitments.
BBB	*905 *(26.7%)	*187 *(5.5%)	**Adequate** capacity to meet its financial commitments.
Subtotal of "BBB" or above ratings	**2049 (60.4%)**	**318 (9.4%)**	**(69.8%)**
BB	373 (11.0%)	174 (5.1%)	**Less vulnerable** in the near term than other lower-rated issuers.
B	252 (7.4%)	94 (2.8%)	**More vulnerable** than the issuers rated BB, but the issuer currently has the capacity to meet its financial commitments.
CCC	50 (1.5%)	7 (0.2%)	**Currently formable**
CC	16 (0.5%)	5 (0.1%)	**Currently highly vulnerable**
SD and D	49 (1.4%)	5 (0.1%)	An "SD" **(selective default)** rating is assigned when S&P considers that the issuer has selectively defaulted on a specific issuer or class of obligations when it comes due. A "D" rating is assigned when S&P considers that the default will be a **GENERAL DEFAULT,** and that the issuer will fail to pay all or substantially all of its obligations as they come due.
Subtotal of "BB" or below ratings	**740 (21.8%)**	**285 (8.4%)**	**(30.2%)**
Total	**2,789 (82.2%)**	**603 (17.8%)**	**(100.0%)**

Notes: * indicates the highest number or percentage in each column, excluding subtotals.

1. All solicited ratings with + or - designations are grouped according to their corresponding letter grades.

2. Percentage in the sample is in parentheses.

3. Rating definitions are extracted from S&P (2003).

Source: S&P (2003) and authors' calculations.

Tables 3 and 4 illustrate the distribution of 3,392 sample ratings from 53 countries during the study period from 1998 to 2003 sorted by country and by year, respectively. Japan had the highest number of ratings in the overall sample (23.5% of the overall sample) and all the unsolicited ratings of the sample. Canada had the highest number of solicited ratings (18.3% of the solicited subsample and 15.1% of the overall sample). Table 4 shows that there were increasing numbers of both solicited and unsolicited ratings during the study period. About 22% of the sample ratings are from 2003.

Table 3: Distribution of Sample Issuers by Country

Country	Frequency in the Sample (percentage of the sample)				Total	
	With Solicited Ratings		With Unsolicited Ratings			
1. Argentina	43	(1.3%)	0	(0.0%)	43	(1.3%)
2. Australia	200	(5.9%)	0	(0.0%)	200	(5.9%)
3. Austria	8	(0.2%)	0	(0.0%)	8	(0.2%)
4. Belgium	8	(0.2%)	0	(0.0%)	8	(0.2%)
5. Bermuda	20	(0.6%)	0	(0.0%)	20	(0.6%)
6. Brazil	43	(1.3%)	0	(0.0%)	43	(1.3%)
7. Canada	*511	*(15.1%)	0	(0.0%)	511	(15.1%)
8. Cayman Islands	2	(0.1%)	0	(0.0%)	2	(0.1%)
9. Chile	70	(2.1%)	0	(0.0%)	70	(2.1%)
10. China, People's Rep. of	1	(0.0%)	0	(0.0%)	1	(0.0%)
11. Colombia	5	(0.1%)	0	(0.0%)	5	(0.1%)
12. Czech Republic	19	(0.6%)	0	(0.0%)	19	(0.6%)
13. Denmark	3	(0.1%)	0	(0.0%)	3	(0.1%)
14. Dominican Republic	6	(0.2%)	0	(0.0%)	6	(0.2%)
15. Egypt	3	(0.1%)	0	(0.0%)	3	(0.1%)
16. Finland	30	(0.9%)	0	(0.0%)	30	(0.9%)
17. France	166	(4.9%)	0	(0.0%)	166	(4.9%)
18. Germany	87	(2.6%)	0	(0.0%)	87	(2.6%)
19. Greece	10	(0.3%)	0	(0.0%)	10	(0.3%)
20. Hong Kong, China	54	(1.6%)	0	(0.0%)	54	(1.6%)
21. Hungary	3	(0.1%)	0	(0.0%)	3	(0.1%)
22. India	9	(0.3%)	0	(0.0%)	9	(0.3%)
23. Indonesia	38	(1.1%)	0	(0.0%)	38	(1.1%)
24. Ireland	13	(0.4%)	0	(0.0%)	13	(0.4%)
25. Israel	9	(0.3%)	0	(0.0%)	9	(0.3%)
26. Italy	24	(0.7%)	0	(0.0%)	24	(0.7%)
27. Japan	195	(5.7%)	*603	*(17.8%)	*798	*(23.5%)
28. Kazakhstan	1	(0.0%)	0	(0.0%)	1	(0.0%)
29. Korea, Rep. of	27	(0.8%)	0	(0.0%)	27	(0.8%)
30. Lithuania	5	(0.1%)	0	(0.0%)	5	(0.1%)
31. Luxembourg	5	(0.1%)	0	(0.0%)	5	(0.1%)
32. Malaysia	17	(0.5%)	0	(0.0%)	17	(0.5%)
33. Mexico	115	(3.4%)	0	(0.0%)	115	(3.4%)
34. Monaco	5	(0.1%)	0	(0.0%)	5	(0.1%)
35. Netherlands	89	(2.6%)	0	(0.0%)	89	(2.6%)
36. New Zealand	48	(1.4%)	0	(0.0%)	48	(1.4%)
37. Norway	27	(0.8%)	0	(0.0%)	27	(0.8%)
38. Peru	2	(0.1%)	0	(0.0%)	2	(0.1%)
39. Philippines	6	(0.2%)	0	(0.0%)	6	(0.2%)
40. Poland	14	(0.4%)	0	(0.0%)	14	(0.4%)
41. Portugal	16	(0.5%)	0	(0.0%)	16	(0.5%)
42. Russia	32	(0.9%)	0	(0.0%)	32	(0.9%)
43. Singapore	5	(0.1%)	0	(0.0%)	5	(0.1%)
44. South Africa	2	(0.1%)	0	(0.0%)	2	(0.1%)
45. Spain	45	(1.3%)	0	(0.0%)	45	(1.3%)
46. Sweden	70	(2.1%)	0	(0.0%)	70	(2.1%)
47. Switzerland	40	(1.2%)	0	(0.0%)	40	(1.2%)
48. Taipei,China	8	(0.2%)	0	(0.0%)	8	(0.2%)
49. Thailand	26	(0.8%)	0	(0.0%)	26	(0.8%)
50. Turkey	2	(0.1%)	0	(0.0%)	2	(0.1%)
51. United Kingdom	366	(10.8%)	0	(0.0%)	366	(10.8%)
52. United States	235	(6.9%)	0	(0.0%)	235	(6.9%)
53. Venezuela	1	(0.0%)	0	(0.0%)	1	(0.0%)
Total	**2,789**	**(82.2%)**	**603**	**(17.8%)**	**3,392**	**(100.0%)**

Notes: * indicates the highest number or percentage in each column. Percentage in the sample is in parentheses.

Source: Authors' calculations.

Table 4: Distribution of Sample Issuers by Year

Year	Frequency in the Sample (percentage of the sample)				Subtotal/ Total	
	With Solicited Ratings		With Unsolicited Ratings			
1998	317	(9.3%)	39	(1.1%)	356	(10.5%)
1999	368	(10.8%)	62	(1.8%)	430	(12.7%)
2000	447	(13.2%)	106	(3.1%)	553	(16.3%)
2001	485	(14.3%)	130	(3.8%)	615	(18.1%)
2002	576	(17.0%)	*133	*(3.9%)	709	(20.9%)
2003	*596	*(17.6%)	*133	*(3.9%)	*729	*(21.5%)
Total	2,789	(82.2%)	603	(17.8%)	3,392	(100.0%)

Notes: * indicates the highest number or percentage in each column.

Percentage in the sample is in parentheses.

Source: Authors' calculations.

4.2   Comparison of Solicited and Unsolicited Ratings

The Mann-Whitney *U*-test and *t*-test results are reported in Table 5. Panels A and B in Table 5 present the results of the overall sample with 3,392 ratings (Panel A) and the Japanese subsample with 798 ratings (Panel B). Japan was the only country with both solicited and unsolicited ratings during the study period.

Table 5: Mann-Whitney *U*-test and *t*-test Results

Panel A: Overall Sample from 53 Countries			
Subsample	**Number of Observations**	**Mean Rank**	**Sample Mean**
Solicited rating	2,789	1,770.87	6.10
Unsolicited rating	603	1,352.50	5.59
Difference		418.37	0.51
Test Statistic: *Z* *t*-test statistics	9.78*** 8.64***		
Panel B: Subsample from Japan with Both Solicited and Unsolicited Ratings			
Subsample	**Number of Observations**	**Mean Rank**	**Sample Mean**
Solicited rating	195	605.76	7.26
Unsolicited rating	603	332.80	5.59
Difference		272.96	1.67
Test Statistic: *Z* *t*-test statistics	14.70*** 19.16***		

Notes: *** indicates significance at the 1% level.

All ratings are coded on a nine-point scale (from 9 to 1) where AAA = 9, AA = 8, A = 7, BBB = 6, BB = 5, B= 4, CCC = 3, CC = 2, and SD/D = 1.

Source: Authors' calculations.

The null hypothesis that unsolicited and solicited bank ratings have identical distributions (H1) can be rejected at the 1% level for both panels in Table 5. The mean rankings in both tables indicate that unsolicited ratings, on average, are lower than solicited ratings for the overall sample and for the Japanese subsample.

4.3 Profiles of Firms

Panels A and B of Table 6 present the descriptive statistics and the *t*-test and *Z*-test results of the two groups.[5] Panel A shows the results of the overall sample while Panel B shows the results of the Japanese subsample. First, referring to the *t*-test and *U*-test results of the profitability ratios (see ratios *ROC, OM,* and *ROA*), the solicited group had significantly higher profitability and earning power than the unsolicited group. Second, all debt ratios in the capital/debt structure group were significantly higher for the firms with unsolicited ratings. This suggests that unsolicited issuers had significantly higher leverage in terms of debt to

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[5] Note that the Thomson Reuters Datastream does not have detailed reports for all sample firms with S&P LTRs. Also, there are missing data in Datastream, so the number of observations varies across financial variables.

capital and debt to total assets than those of the solicited issuers. These results are consistent in both Panels A and B.

Table 6 Panel A: Overall Sample

Descriptive Statistics, t-test, and Mann-Whitney U-test Results

of Financial Variables of the Sample Issuers

Variable	Solicited Rating			Unsolicited Rating			t-value	Z-value
	Mean	Median	N	Mean	Median	N		
Profitability								
ROC	6.44	6.96	2,472	1.71	1.97	589	12.42 ***	19.68 ***
OM	6.85	9.59	2,510	5.60	4.36	589	0.45	14.28 ***
ROA	1.43	3.17	2,524	0.49	0.65	589	2.60 ***	14.55 ***
Capital/Debt Structure								
DTC	49.52	45.28	2,518	59.36	64.18	589	(5.42) ***	(12.32) ***
DTA	35.37	32.60	2,522	42.39	43.50	589	(7.31) ***	(9.16) ***
LDTC	49.10	37.86	2,518	46.69	48.17	589	0.33	(7.07) ***
Cash Flow Protection								
FFOTD	0.58	0.34	2,349	1.38	0.13	565	(0.81)	18.41 ***
NCFCAPEX	5.98	1.74	2,106	1.64	1.33	546	1.17	7.24 ***
Financial Flexibility								
SDTD	26.08	20.09	2,487	45.99	44.81	585	(19.95) ***	(19.60) ***
CASHEQ	13.69	13.36	2,472	17.98	18.12	589	(57.53) ***	(30.17) ***
Liquidity								
CR	1.48	1.14	2,513	1.15	0.98	589	2.26 **	6.63 ***
QUICK	1.07	0.77	2,508	0.76	0.59	589	2.14 **	8.91 ***
CASH	0.39	0.21	2,513	0.34	0.17	589	2.25 **	1.76 *
Size								
TA	16.71	16.30	2,524	20.56	20.62	589	(60.27) ***	(30.03) ***
SALE	16.22	15.91	2,517	20.34	20.33	589	(64.77) ***	(30.72) ***
Other Variables								
DTEBITDA	2.86	2.50	2,445	5.03	6.22	578	(1.20)	(14.97) ***
MTB	(0.24)	1.53	2,432	1.51	1.46	588	(0.66)	(0.84)
FIXTA	0.45	0.44	2,478	0.41	0.39	588	4.51 ***	3.97 ***

Notes: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Descriptive statistics include mean, median, standard deviation, and number of observations (*N*) of each variable. *T*-values refer to the *t*-test statistics of the means between the solicited rating group and the unsolicited rating group, and *Z*-values refer to the *Z*-test statistics of the Mann-Whitney *U* between the solicited rating group and the unsolicited rating group.

1. See Table 1 for variable definitions.

2. Note that the Thomson Reuters Datastream does not have detailed financial reports for all sample issuers with S&P LTRs. There are also missing data in Datastream for some variables, so the number of observations varies across financial variables.

Source: Authors' calculations.

Table 6 Panel B: Subsample from Japan with Both Solicited and Unsolicited Ratings

Descriptive Statistics, t-test and Mann-Whitney U-test Results

of Financial Variables of the Sample Issuers

Variable	Solicited Rating			Unsolicited Rating			*t*-value	*Z*-value
	Mean	Median	*N*	Mean	Median	*N*		
Profitability								
ROC	3.16	3.01	183	1.71	1.97	589	4.09 ***	4.79 ***
OM	6.63	6.42	184	5.60	4.36	589	2.65 ***	3.93 ***
ROA	1.62	1.44	184	0.49	0.65	589	4.36 ***	5.34 ***
Capital/Debt Structure								
DTC	48.27	47.09	184	59.36	64.18	589	(5.16) ***	(5.15) ***
DTA	35.79	33.19	184	42.39	43.50	589	(3.74) ***	(3.79) ***
LDTC	39.66	35.04	184	46.69	48.17	589	(3.04) ***	(3.20) ***
Cash Flow Protection								
FFOTD	0.96	0.22	171	1.38	0.13	565	(0.40)	5.51 ***
NCFCAPEX	1.07	1.08	167	1.64	1.33	546	(5.29) ***	(4.55) ***
Financial Flexibility								
SDTD	37.70	36.98	183	45.99	44.81	585	(4.88) ***	(4.62) ***
CASHEQ	19.09	19.14	184	17.98	18.12	589	9.57 ***	9.04 ***
Liquidity								
CR	1.34	1.19	184	1.15	0.98	589	2.67 ***	3.93 ***
QUICK	0.89	0.81	184	0.76	0.59	589	2.54 **	4.43 ***
CASH	0.41	0.26	184	0.34	0.17	589	1.78 *	3.81 ***
Size								
TA	21.70	21.67	184	20.56	20.62	589	11.98 ***	11.84 ***
SALE	21.48	21.48	184	20.34	20.33	589	12.02 ***	11.75 ***
Other Variables								
DTEBITDA	1.28	3.08	178	5.03	6.22	578	(1.28)	(6.11) ***
MTB	1.89	1.70	185	1.51	1.46	588	0.92	2.93 ***
FIXTA	0.42	0.31	184	0.41	0.39	588	0.39	(1.27)

Notes: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Descriptive statistics include mean, median, standard deviation, and number of observations (N) of each variable. T-values refer to the t-test statistics of the means between the solicited rating group and the unsolicited rating group, and Z-values refer to the Z-test statistics of the Mann-Whitney U between the solicited rating group and the unsolicited rating group.

1. See Table 1 for variable definitions.

2. Note that the Thomson Reuters Datastream does not have detailed financial reports for all sample issuers with S&P LTRs. There are also missing data in Datastream for some variables, so the number of observations varies across financial variables.

Source: Authors' calculations.

Third, the cash flow protection ratios (*FFOTD* and *NCFCAPEX*) show that the firms in the solicited group had more funds from operation (FFO) and net cash flow (NCF) compared to their total debt and capital expenditure than those in the unsolicited group in the overall sample. On the other hand, the results of the Japanese subsample indicate that the Japanese firms with unsolicited ratings had more NCF to payments to fixed assets than the Japanese firms with solicited ratings.

Lastly, the comparisons of the three liquidity ratios (*CR, QUICK,* and *CASH*) illustrate that the issuers with solicited ratings were more liquid than the issuers with unsolicited ratings. In addition, the *SDTD* ratio in the financial flexibility group indicates that the firms in the unsolicited group were tied up with more short-term debts compared to their total debts in

both the overall sample and the Japanese subsample. However, the results of *CASHEQ, TA,* and *SALE* were mixed. The unsolicited group in the overall sample was significantly larger in asset size and sales revenues and had more cash than the solicited group, while the solicited group in the Japanese subsample was larger and had more cash than the unsolicited group.

In sum, the results indicate that those issuers with solicited ratings were more profitable and more liquid, and had lower leverage, than the issuers with unsolicited ratings. These results suggest that the solicited group had stronger financial profiles in terms of profitability, liquidity, and debt structure than the unsolicited group. Therefore, the null hypothesis of H2, that there is no difference in the financial profiles between the issuers with solicited and unsolicited ratings, can be rejected for the sample in this study.

4.4 Results of Two-Step Treatment Effects Model

We present the rating decision equation in Panel A of Table 7. Because there are disproportionately more Japanese companies in the sample, we used a dummy variable to control for the dominance of Japanese companies. We also separately estimated a Japan-only subsample. The findings suggest that firm size (natural logarithm of total assets) and profitability (ROA) are positively related to the probability of seeking a credit rating while market-to-book ratio (MTB) and debt ratio (DTA) are negatively related to the probability. The signs of these variables are consistent with the literature. Both the full sample and the Japanese subsample offer similar results.

Table 7: Result of the Treatment Effects Model Using Wooldridge's Instrumental Variable Method

Panel A: Rating Decision Equation (Model of the Probability of Being Rated)

Explanatory Variable	Full sample (*N* = 2,765)			Japan only (*N* = 771)		
	Coefficient	$\chi 2$ statistic		Coefficient	$\chi 2$ statistic	
Intercept	45.6042	0.00		(15.9819)	109.00	***
TA	0.7487	141.82	***	0.7491	142.00	***
FIXTA	0.2416	0.63		0.2403	0.62	
SOV	(0.0082)	0.00		(0.0066)	0.02	
ROA	0.1781	26.72	***	0.1783	26.75	***
MTB	(0.1255)	6.05	**	(0.1255)	6.05	**
DTA	(0.0107)	6.81	***	(0.0107)	6.76	***
JAPAN	(61.6429)	0.00		—	—	
Log likelihood	(305.33)			(305.32)		

Panel B: Rating Determinant Equation (Main Equation; Dependent Variable Is the Rating Level)

Explanatory Variable	Full Sample (*N* = 2,407)		Japan Only (*N* = 635)	
	Coefficient	t-statistics	Coefficient	t-statistics
Intercept	(2.0721)	-6.29 ***	1.1404	0.85
TA	0.1205	11.06 ***	0.1966	3.00 ***
SOV	0.5217	27.54 ***	0.0763	3.14 ***
ROA	0.0782	22.98 ***	0.1217	6.30 ***
DTA	(0.0242)	-21.16 ***	(0.0307)	-12.10 ***
FFOTD	(0.0061)	-1.26	(0.0077)	-0.43
Industry dummy (Oil and gas)	0.4806	4.41 ***	(0.5878)	-2.74 ***
Industry dummy (Basic materials)	0.2358	2.41 **	(0.0468)	-0.28
Industry dummy (Industrials)	0.1861	1.95 *	(0.4425)	-2.81 ***
Industry dummy (Consumer goods)	0.4253	4.31 ***	(0.1124)	-0.69
Industry dummy (Health care)	0.6030	4.69 ***	0.1082	0.53
Industry dummy (Consumer services)	0.3813	3.85 ***	0.2529	1.46
Industry dummy (Telecommunications)	0.7246	6.44 ***	0.8806	2.43 **
Industry dummy (Utilities)	1.1240	10.41 ***	2.2142	10.17 ***
Y_HAT [Fitted probabilities of getting a rating (from Panel A results)]	1.9767	11.31 ***	1.1991	3.21 ***
JAPAN	1.1644	7.37 ***	—	—
Adjusted R^2	0.5614		0.6486	
F-statistics	206.97***		84.59***	

Notes: ***, **, and * indicate significance at the 1%, 5%, and 10% levels.

For Panel A (rating decision equation), the seven explanatory variables of the probit model are (1) *TA* = natural logarithm of total assets, (2) *FIXTA* = fixed asset to total assets ratio, (3) *SOV* = sovereign credit rating where AAA = 9, AA = 8, A = 7, BBB = 6, BB = 5, B= 4, CCC = 3, CC = 2, and SD/D = 1, (4) *ROA* = return on assets, (5) *MTB* = market-to-book ratio, (6) *DTA* = debt to total asset ratio, and (7) *JAPAN* = 1 if the company is based in Japan.

For Panel B (rating determinant equation or main equation), the dependent variable of the primary regression equation of interest is the S&P long-term issuer credit rating where AAA = 9, AA = 8, A = 7, BBB = 6, BB = 5, B= 4, CCC = 3, CC = 2, and SD/D = 1. The explanatory variables include (1) *TA*, (2) *SOV*, (3) *ROA*, (4) *DTA*, (5) *FFOTD* = funds from operation to total debt, (6) various industry dummy variables, (7) *JAPAN*, and (8) *Y_HAT* = a fitted probability of the likelihood of a firm having solicited credit rating estimated from the probit model in Panel A. *Y_HAT* is an instrumental variable to *Y* in Equation (2).

Source: Authors' calculations.

The findings of the determinants of credit ratings are presented in Panel B of Table 7. Both the full sample and the Japan subsample offer similar findings. The firm size (*TA*), sovereign risk (*SOV*), and profitability (*ROA*) are positively significant at the 1% level. The results suggest that a larger and more profitable firm located in a country with a higher sovereign rating would get a higher LTR. The debt ratio is negatively significant at the 1% level. Other things being equal, a firm with higher leverage would have a lower LTR. The fit probability variable is positive and significant at the 1% level. Hence, there is indeed a sample-selection bias (i.e., a statistically significant *Y_HAT* variable). Therefore, we were able to reject H3 (that corporate credit ratings do not reflect a sample-selection bias). In addition, a positively significant *Y_HAT* variable suggests that unsolicited firms exhibit a lower rating after controlling for other financial characteristics and sample-selection bias. There are a total of nine industries in our sample and we used the technology industry as the basis for comparison. Many industry dummy variables are significant, which suggests that there are industry effects on credit ratings.

5. CONCLUSIONS

We conducted a global study of the LTRs of nonfinancial firms as determined by S&P for the period 1998–2003. Specifically, we focused on the solicited versus unsolicited ratings and sample-selection bias in the analysis. Unlike the existing literature, we adopted an improved method using Wooldridge's instrumental-variable approach to mitigate the concern of specification errors in Heckman's model. We found that the probability of a firm seeking an LTR is positively related to the size and profitability of the firm, and negatively related to the growth opportunities and debt levels of the firm. The credit rating is positively related to the sovereign rating, size, and profitability of the issuer, and negatively related to the debt ratio of the issuer.

Consistent with the existing literature, we found that there is indeed a sample-selection bias in credit ratings, i.e., the rating decision (the decision to seek an LTR) is not independent of the rating determinants decision. Our findings suggest that the firms with solicited ratings seem to be more profitable, more liquid, and have lower leverage than the issuers with unsolicited ratings. After controlling for sample-selection bias and some key financial ratios, we found that unsolicited firms, on average, seem to have lower LTRs. The findings are consistent with the existing literature and are robust to the full sample and to a subsample of Japanese firms.

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