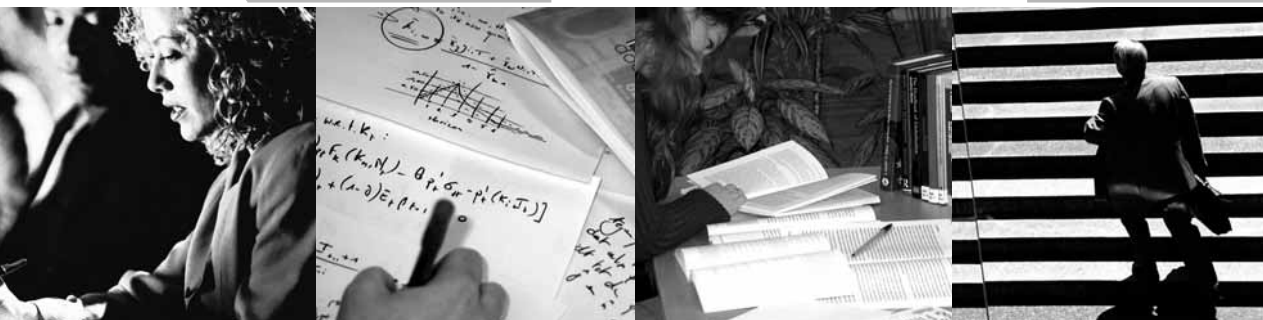


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## Is there a difference between solicited and unsolicited bank ratings and if so, why?

Patrick Van Roy



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## **Abstract**

This paper analyses the effect of soliciting a rating on the rating outcome of banks. Using a sample of Asian banks rated by Fitch Ratings ("Fitch"), I find evidence that unsolicited ratings tend to be lower than solicited ones, after accounting for differences in observed bank characteristics. This downward bias does not seem to be explained by the fact that better-quality banks self-select into the solicited group. Rather, unsolicited ratings appear to be lower because they are based on public information. As a result, they tend to be more conservative than solicited ratings, which incorporate both public and non-public information.

JEL-code : G15, G18, G21

Keywords: Credit rating agencies, Unsolicited ratings, Self-selection, Public disclosure, Accounting transparency

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## 1. Introduction

Several facts have recently drawn public attention to the work and functioning of credit rating agencies. First and foremost was their failure to predict severe financial crises and a wave of corporate scandals (Enron, WorldCom, or Parmalat), and most recently defaults of subprime mortgage-related securities. Second was the potential procyclicality of their assessments and their increasing role in the regulatory mechanism of financial markets. Third have been a number of issues related to the transparency and integrity of the rating process. Among these issues, the practice of unsolicited ratings has prompted controversy among issuers, credit rating agencies, and regulators alike. Unsolicited ratings are formally defined as "ratings that credit rating agencies conduct without being formally engaged to do so by the issuer" (International Organization of Securities Commissions, 2003). As such, and contrary to solicited ratings, unsolicited ratings do not imply the payment of a rating fee and do not automatically involve any formal meetings between the credit rating agency and the entity being rated.<sup>1</sup> Such meetings, which are part of the solicited ratings process, typically provide an opportunity for credit rating agencies to get an overview of a company's activities and to obtain more information than what is disclosed in its published annual reports.<sup>2</sup>

The main concern surrounding unsolicited ratings is the fact that, all else being equal, they "do not appear to be empirically as favorable as solicited ratings" (Securities and Exchange Commission, 2005). Even though this could be interpreted as evidence that unsolicited ratings are assigned to "blackmail" issuers into paying for a solicited rating, it could also simply indicate that better-quality issuers request a rating or that credit rating agencies issue more conservative ratings in the absence of non-public information.

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<sup>1</sup> Golin (2001) insists that credit rating agencies conducting unsolicited ratings attempt to invite the participation of the rated entity, either through submission of questionnaires, informal visits, or informal reviews of the draft report. Fitch (2005 and 2006) claims that some issuers choose to participate to the rating process following this initial contact.

<sup>2</sup> Fight (2001) reports excerpts of a survey which indicate that more than 90% of companies release either selected or substantial non-public information to their rating agency during these meetings.

This paper contributes to the literature on unsolicited ratings by investigating whether there is a difference between solicited and unsolicited bank ratings and, if so, why. The analysis makes use of a sample of bank ratings assigned by Fitch Ratings ("Fitch") in Asia because several sources allow identification of the solicited status of ratings assigned by Fitch in that region (see Section 3). After confirming a systematic difference between solicited and unsolicited ratings for similar banks, the paper tests two hypotheses. The first is the "self-selection hypothesis", which states that solicited ratings tend to be higher than unsolicited ones because they are the result of self-selection, i.e., better-quality issuers self-select into the solicited group by choosing to obtain rating services. This hypothesis is tested using an endogenous switching regression model, which extends the standard model of sample selection due to Heckman (1979).

A rejection of the self-selection hypothesis is consistent with at least two different interpretations: unsolicited ratings are lower to punish issuers who otherwise would not purchase ratings coverage; alternatively, unsolicited ratings are lower because they are based only on public information and, as a result, tend to be more conservative than solicited ratings. The latter gives rise to the second hypothesis tested by the paper: the "public disclosure hypothesis", which states that (i) disclosure of public information has only an impact on the rating of issuers who choose not to be rated; (ii) issuers who do not request a rating but who disclose a high enough amount of public information do not receive a lower rating than do similar issuers who have solicited a rating. In this paper, information disclosure is measured by an index capturing the level of accounting information publicly released by issuers (see Baumann and Nier, 2004).

Interestingly, the importance of information disclosure for nonfinancial firms has recently become the focus of several empirical papers. Mitton (2002) and Baek et al. (2004) find that East Asian firms that had higher disclosure quality experienced better stock price performance during the financial crisis of 1997-98. Jorion et al. (2005) find for the U.S. that the stock price effect of rating changes has been larger since the implementation of Regulation Fair Disclosure, which prohibits public companies from disclosing non-public information to favored investment

professionals, except to credit rating agencies. Finally, Yu (2005) shows that U.S. firms improve their credit rating by 0.5 notches on a 1 to 20 rating scale by elevating their disclosure quality above the median disclosure index.

Given the importance of information disclosure for nonfinancial firms, one should expect disclosure to play at least as important a role for banks. Indeed, several studies suggest that banks are inherently more opaque than nonfinancial firms. For instance, Morgan (2002) reports that Moody's Investors Service Inc. (Moody's) and Standard and Poor's (S&P) disagree more often over U.S. banks' and insurance companies' ratings than over other types of firms' ratings and that Moody's is systematically more conservative than S&P in its ratings, and relatively more so for banks. The latter result can be explained by the fact that the opacity of banks' assets makes conservative rating agencies err even more on the side of caution. Iannotta (2006) looks at bond ratings of European firms and also finds that credit rating agencies disagree the most on bank ratings. Akhigbe and Martin (2006) provide additional evidence on the importance of information disclosure for financial services firms by showing that firms with greater financial statement disclosures experienced more favorable wealth effects following the passage of the Sarbanes-Oxley act.

In addition to the recent interest in firms' information disclosure, several papers have been devoted to the question of differences in solicited versus unsolicited ratings. The existing literature on this topic can be divided into three groups of papers.

The first group of papers (Poon, 2003a and 2003b; Poon and Firth, 2005; Poon et al., 2007 ) focuses on credit ratings assigned by S&P and Fitch to companies located in different countries and finds that unsolicited ratings are lower than solicited ones.<sup>3</sup> While these studies attempt to control for sample selection, their somewhat conflicting results make it difficult to infer whether

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<sup>3</sup> Poon et al. (2007) show that the difference between solicited and unsolicited ratings can be explained by differences in their solicitation status and financial profile. However, the authors do not control for the level of information disclosed by issuers hence their results may suffer from an omitted variable bias. Shimoda and Yuko (2007) look at S&P's ratings of nonfinancial companies in Japan and confirm the existence of a downward bias in unsolicited ratings.

sample selection in credit ratings does exist and, if so, whether it is responsible for the lower unsolicited ratings.

The second group of papers (Butler and Rodgers, 2003; Gan, 2004) looks at solicited and unsolicited ratings assigned by Moody's and S&P to U.S. companies. Butler and Rodgers (2003) find that solicited ratings are not higher than unsolicited ones, while Gan (2004) finds a statistically significant difference between the two types of ratings but no statistically significant difference between the issuers' performance after a rating has been assigned. These results lead Gan (2004) to reject the idea that issuers with unsolicited ratings are discriminated against.

Finally, the last group of papers (Behr and Güttler, 2008; Bannier et al., 2007) focuses on the informational content of unsolicited ratings. Behr and Güttler (2008) look at whether the stock market reacts to the assignment of and changes in unsolicited ratings by S&P. The authors find that investors react negatively in both cases, implying that unsolicited ratings convey new information to the stock market. Bannier et al. (2007) find no systemic bias in unsolicited ratings of U.S. firms, which leads them to reject the hypothesis that unsolicited ratings are assigned to blackmail issuers and conclude that lower unsolicited ratings are probably due to the opaqueness of firms which seek a rating (the authors do not, however, test this claim).

In light of the above, the main contributions of this paper are the following. First, this study makes use of a sample where the solicited status of credit ratings is clearly identified through various sources. While some of the existing studies use larger samples, they do not always distinguish completely between solicited and unsolicited ratings.<sup>4</sup> Second, this paper addresses the issue of self-selection through the use of an endogenous switching regression model (self-selection hypothesis). Third, this paper tests whether disclosure of public information only matters for banks with unsolicited ratings (first part of the disclosure hypothesis) and whether the

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<sup>4</sup> For instance, Poon and Firth (2005) identify Fitch's solicited ratings as corresponding to its "non-shadow" ratings. However, Fitch claims that some of its non-shadow ratings are also unsolicited (see Section 3). Butler and Rodgers (2003) and Gan (2004) rely on estimated rating fees to distinguish between solicited and unsolicited ratings, which may lead to some misidentifications given the difficulty of identifying a fee threshold below which ratings should be considered as unsolicited.



difference between solicited and unsolicited ratings disappears when banks with unsolicited ratings release a high enough amount of public information (second part of the public disclosure hypothesis). As far as I am aware, the public disclosure hypothesis has not yet been tested in the literature.

Several results emerge from the analysis. First, I find no evidence that, in determining ratings, Fitch assigns different weights to observable bank characteristics in the solicited and unsolicited groups (except the degree of public disclosure). However, I do find that unsolicited bank ratings are lower than solicited ones after controlling for observable bank characteristics. The estimated difference between the two types of ratings is also economically significant, as it averages 1.2 notches on a 1 to 9 rating scale.

On the one hand, these findings appear to give some credence to Fitch's claim that it maintains the same standards of analysis for its solicited and unsolicited ratings (see Fitch, 2005). On the other hand, they seemingly contradict the figures in Fitch (2006), which tend to show that there is no difference in Fitch's credit judgment of firms with unsolicited ratings.<sup>5</sup>

A second result is that there is no evidence of a sample selection problem in bank ratings. Hence the self-selection hypothesis is rejected.

Third, the results provide support for the public disclosure hypothesis. Disclosure of public information has a positive impact on the rating of banks which choose not to be rated, but no impact on the rating of banks which ask to be rated. In addition, high disclosure banks with an unsolicited rating and low disclosure banks with a solicited rating do not receive ratings which are significantly different from the rating of high disclosure banks with a solicited rating. However, low disclosure banks with an unsolicited rating do receive lower ratings than the latter group of banks.

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<sup>5</sup> Note however that the solicited status of the Moody's and S&P's ratings used as control groups in Fitch (2006) is unknown.

The latter finding is important in light of the fact that the theoretical impact of public disclosure on the relation between soliciting a rating and the actual rating outcome is ambiguous. On the one hand, the impact of public disclosure might be positive if issuers who do not request a rating and who disclose a high enough amount of public information receive the benefit of the doubt. On the other hand, the impact of public disclosure might be negative if it adds to negative perceptions or intuitions about issuers who choose not to be rated. This study suggests that the first effect dominates the second.

The results of the test of the public disclosure hypothesis are also of interest in the particular case of Fitch. A former official of Fitch's BankWatch has acknowledged that "It is true that unsolicited ratings are often more conservative than solicited ratings. The reason is not that agencies are attempting to punish companies that decline to pay for a rating, but that where there is doubt, the agencies will tend to err on the side of caution. Correspondingly, the more information provided to the agencies, the more transparent the disclosure process, the more comfort agency analysts will feel in giving the company the benefit of the doubt (...) As a matter of practice, less disclosure tends to be associated with higher risk. In the context of risk assessment, disclosure is not only the means by which the assessment is performed, it is also arguably a positive credit consideration in itself" (Golin, 2001, pp. 534-535).<sup>6</sup>

The remainder of the paper is organized as follows. Section 2 reviews the background on unsolicited ratings. Section 3 presents the data used in the analysis. The research methodology is described in Section 4 and the results are presented in Section 5. Section 6 concludes and offers some policy implications.

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<sup>6</sup> One may also argue that credit rating agencies assign lower unsolicited ratings not because they are conservative but because they are rational. Indeed, as mentioned earlier, credit rating agencies often stress that issuers are given the opportunity to participate in the unsolicited ratings process. Therefore, issuers who refuse to participate in such process must have something to "hide" and a lower rating may be warranted. However, there have been cases in which issuers with no negative inside information have refused to participate in the unsolicited ratings process (see, e.g., the case of Hannover Re, which is discussed at the beginning of Section 2) hence this argument may not be entirely convincing.

## **2. Background on unsolicited ratings**

Even though the vast majority of credit ratings are assigned on a solicited basis, unsolicited ratings currently account for a sizeable portion of the total number of credit ratings. According to the Cantwell survey (Fight, 2001), unsolicited ratings represented between 6% (S&P) and 26.6% (Fitch) of the total number of credit ratings assigned in industrial countries in 2000.

Recently, there have been many instances in which credit rating agencies have been accused of assigning lower unsolicited ratings in order to "blackmail" issuers into paying for and participating in a rating process (see, e.g., Hill, 2004, for a review). An example cited as an alleged abuse of power is the series of successive downgrades of Hannover Re, one of the world's largest reinsurance companies, by Moody's. Hannover Re was initially approached by Moody's in 1998 to subscribe to its rating services but declined the offer. Despite being turned down, Moody's decided to go ahead and rate Hannover Re at no charge. Over the next five years, Moody's rating actions (3 downgrades, from Aa2 to Baa1) surprised many analysts given that other credit rating agencies continued to give the insurance company credit ratings several notches higher than Moody's. Hannover Re's comments were that Moody's decisions were "pure blackmail" and that company's officials had been told on many occasions that if they paid for a rating, it "could have a positive impact" on the grade (Wall Street Journal, 2004).

In spite of the controversy surrounding unsolicited ratings, credit rating agencies insist on defending this practice. Their main argument is that they do not issue higher solicited ratings to keep existing customers or lower unsolicited ratings to attract new customers, as this would imply that they are willing to jeopardize their reputation in order to benefit from a temporary increase in revenues (Golin, 2001).

Interestingly, rating agencies provide different degrees of transparency with respect to the solicited status of their credit ratings. S&P designates unsolicited ratings as such or as "public information ratings" in its publications. The other two major rating agencies (Moody's and Fitch)

identify in their initial credit rating announcements the ratings for which the issuer has declined to participate in the assignment process (Fitch issues such ratings under the name "agency-initiated ratings"). However, both rating agencies do not normally disclose the solicitation status of ratings afterwards (Fitch, 2005; Moody's, 2006).

Over the last years, unsolicited ratings have come under the attention of several committees and regulatory bodies as part of wider investigations into the role and function of credit rating agencies. Some of the most recent developments are detailed below.

In 2004, the International Organization of Securities Commissions (IOSCO) published a code of conduct for credit rating agencies, which asks credit rating agencies to "disclose whether the issuer participated in the rating process" and to identify each rating not initiated at the request of an issuer as such (IOSCO, 2004a).<sup>7</sup> However, as of 2008, the three major credit rating agencies are still not compliant with this requirement (see CESR, 2008). As a result, it is often difficult for market participants to obtain information on whether a credit rating is solicited or not.

In the U.S., the Senate Banking Committee enacted in 2006 the Credit Agency Reform Act, which aims at fostering accountability, transparency and competition in the credit rating industry. More specifically, the Act foresaw that the Securities and Exchange Commission (SEC) would issue final rules to prohibit any act or practice related to "modifying or threatening to modify a credit rating (...) based on whether the obligor (...) purchases or will purchase the credit rating or any other service or product of the nationally recognized statistical rating organization" (U.S. Congress, 2006). However, one year later, the SEC decided not to prohibit these acts and practices for the moment because it wanted "to gain a better understanding (...) of how credit rating agencies define unsolicited credit ratings and the practice they employ with respect to these ratings" (SEC, 2007).

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<sup>7</sup> Interestingly, Fitch's response to the IOSCO code was that it did "not believe that it is necessary or appropriate to require the disclosure of whether a rating is initiated or whether the issuer has cooperated in the rating process" and that such requirements "interfere in the editorial process of the rating agencies" (IOSCO, 2004b).

### 3. Data

This study is based on a sample of solicited and unsolicited bank ratings assigned by Fitch in Asia. The unsolicited bank ratings included in the sample were called "shadow ratings" and were appended with an "s" in Fitch's publications until June 2005. These ratings were introduced by Fitch in 2000 to bring into its coverage the large number of credit evaluations previously conducted by Thomson BankWatch, a credit rating agency it acquired that year (Fitch, 2001).

Private correspondence with a Fitch Ratings analyst confirmed that all shadow ratings are Fitch-initiated (i.e., unsolicited) but revealed that some non-shadow ratings may also be unsolicited. A suggestion, which was followed in this paper, was to reclassify non-shadow ratings of banks with a short-form credit report (10 ratings from the initial sample) as unsolicited.<sup>8</sup> This is because banks without a shadow rating but covered in short-form are generally rated on a Fitch-initiated basis (see also Golin, 2001, p. 580).

The solicited and unsolicited bank ratings used in this study are individual ratings. Contrary to debt ratings, these ratings focus on the ability of issuers to satisfy their obligations in general and are primarily used by interbank lenders to assess the overall creditworthiness of their counterparty. As a result, banks' decision to request an individual rating is not necessarily determined by their need to raise debt on the public market.

The individual ratings and the corresponding financial information were obtained from Bankscope and Fitch Research. Specifically, in the remainder of the paper, I use cross-sectional regressions where the dependent variable is the bank individual rating on 31 January 2004. Since shadow ratings were introduced in 2000 and some of them were modified between 2000 and 2004, the unsolicited ratings used in this paper include both first-time and re-ratings of banks. The same is true of the solicited ratings.

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<sup>8</sup> Fitch produces two types of bank credit reports: short-form reports called "credit updates" and long-form reports called "full rating reports".

As Fitch asks for a minimum of three years' annual data and a maximum of five years' when assigning a bank rating (see Fitch, 2004), I use the five-year average (1999 to 2003) of bank variables if available and their three-year average (2001 to 2003) if not.

Table 1 illustrates the distribution of the sample bank ratings by country. Note that only those countries that have both solicited and unsolicited bank ratings are included in the analysis. Unsolicited ratings constitute the majority of ratings in the sample with 105 banks, while solicited ratings account for the remainder of the sample with 64 banks.

[Insert Tables 1 and 2 about here]

Table 2 shows the sample distribution of solicited and unsolicited ratings by rating level. Observe that, contrary to Fitch's debt ratings, which use the standard AAA to D rating scale, Fitch's individual ratings are based on an A to E classification. Slightly less than a third of the sample banks obtain C ratings or above, meaning that their overall creditworthiness is adequate to very strong. The remaining sample banks are classified below C, meaning that their overall creditworthiness is somewhat weak to very weak.

In Table 3, I present summary statistics for the entire sample of bank ratings. Fitch (2004) indicates that its bank ratings are determined by a number of quantitative and qualitative variables that can be classified into several categories which include, among others, risk management, funding and liquidity, capitalization, earnings and performance, market environment, diversification and corporate governance. Based on this classification, the variables which show the strongest correlation with Fitch's bank individual ratings are included in the first part of Table 3.<sup>9</sup>

[Insert Table 3 about here]

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<sup>9</sup> The banking and finance score estimated by the Heritage Foundation is used to capture aspects related to the market environment of banks. This index, which measures the relative openness of a country's banking and financial system on a 0-100 scale, has been shown to be strongly correlated with a sample of bank individual ratings assigned by Fitch in Asia (Pasourias et al., 2007). The banking and finance score was preferred to Fitch's sovereign credit ratings because the latter exhibit a low correlation with the bank individual ratings and are available for fewer countries.

Fitch (2004) also emphasizes the need for a detailed breakdown of banks' balance sheet and income statement when assigning a rating. This requirement is captured by a disclosure index which ranges between 0 and 100 and which measures the level of detail that banks provide on 17 key dimensions of accounting information in their published accounts (see Baumann and Nier, 2004).

In the empirical analysis, the disclosure index is transformed into a dummy variable: 1 if the bank is a "high" disclosure bank and 0 otherwise. High disclosure banks are defined as those having a disclosure index equal to or higher than the 50<sup>th</sup> percentile of the sample distribution of disclosure indexes, which is equal to 67.7 (see Table 3).<sup>10</sup> This transformation is made because testing the public disclosure hypothesis requires splitting the sample into high and low disclosure banks (see Subsection 5.3). As a robustness check, I also used the 40<sup>th</sup> and 75<sup>th</sup> percentiles of the sample distribution of disclosure indexes to define the high disclosure dummy variable (these percentiles are respectively equal to 65.7 and 71.4). The main results of this paper are robust to these alternative definitions of the high disclosure dummy.

Finally, the last part of Table 3 shows summary statistics for variables used later in the analysis (i.e., unqualified statement dummy, long-term debt rating dummy, outside rating dummy, Z-score, and four interaction variables).

Interestingly, t-tests comparing the mean value of the variables included in Table 3 reveal some significant differences between the solicited and unsolicited groups (for the sake of brevity, the results of these tests are not reported in a table).<sup>11</sup> For instance, banks with unsolicited ratings are less capitalized (i.e., have a lower equity to total assets) than banks with solicited ratings. Also, there are more banks which are majority-owned by the state in the unsolicited than in the

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<sup>10</sup> Since Fitch (2004) asserts that its rating determinants take into account national and regional bank characteristics, I use the 50<sup>th</sup> percentile of the sample distribution of disclosure indexes (67.7) rather than the 50<sup>th</sup> percentile of the world distribution of disclosure indexes (56.0) to define the high disclosure dummy.

<sup>11</sup> Throughout the paper, significance refers to a level of confidence of 95% and marginal significance to a level of confidence of 90%.

solicited group (40.0% vs. 7.9%) and the level of the banking and finance score is higher in the solicited than in the unsolicited group (55.6 vs. 43.0).

There does not seem to be any significant difference between the level of disclosure of banks with solicited ratings and unsolicited ratings. However, banks which request a rating are more likely to have a financial statement which has been approved by the auditors without qualification (88.3% of banks in the solicited group vs. 78.3% in the unsolicited group). Finally, banks which choose to ask for an individual rating are more likely to have already a long-term rating from Fitch (40.6% of banks in the solicited group vs. 6.7% in the unsolicited group).<sup>12</sup>

Overall, Table 2 suggests that unsolicited ratings tend to be more frequently assigned at the lower end of the rating scale than solicited ones while results of t-tests show some differences in the characteristics of the solicited and unsolicited groups. In order to answer the question of whether there is a difference between solicited and unsolicited bank ratings and, if so, to explain why, I now turn to the econometric analysis.

#### **4. Methodology**

This section outlines the methodology used to test whether banks with solicited ratings and those with unsolicited ratings obtain the same rating *ceteris paribus*.

##### *4.1. Ordinary least squares*

I first use a simple ordinary least squares regression of the form:

$$Rating_i = X_i\beta + \delta Solicited_i + \varepsilon_i, \quad (1)$$

where  $Rating_i$  corresponds to the individual rating of bank  $i$  coded on a 9 (A) to 1 (E) scale,  $X_i$  is a matrix of financial and nonfinancial characteristics that explain the individual rating of bank  $i$  and  $Solicited_i$  is a dummy variable that equals one if bank  $i$  has requested an individual rating

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<sup>12</sup> A vast majority of these long-term ratings is solicited (private correspondence with a Fitch Ratings analyst).



and zero otherwise. Although  $Rating_i$  takes nine different discrete values, it is treated as a continuous variable in the analysis for two reasons. First, researchers often treat discrete variables as continuous when the range of values that they take is large enough. Second, the existing studies on the determinants of credit ratings show that this type of analysis is not very sensitive to the choice between ordinary least squares and ordered probit, a statistical model for discrete random variables (see, e.g., Cantor and Packer, 1997).

Looking at equation (1), the coefficient of  $Solicited_i$ ,  $\delta$ , measures the so-called treatment effect. In this context, the treatment is whether or not banks have requested an individual rating from Fitch. The null hypothesis to be tested is whether  $\delta = 0$ , i.e., whether soliciting a rating has no effect on the rating itself once controlling for relevant bank characteristics. One issue that arises in this setup is the potential endogeneity of the variable  $Solicited_i$ , i.e., the possibility that  $\text{corr}(Solicited_i, \varepsilon_i) \neq 0$ , yielding biased and inconsistent least squares estimates. For instance, if the typical bank which chooses to request a rating would have a relatively high rating whether or not it asked to be rated, there will be a positive correlation between  $Solicited_i$  and  $\varepsilon_i$ . In this case, the least squares estimates of  $\delta$  will actually overestimate the treatment effect. Therefore, I use an extension of the standard model of sample selection due to Heckman (1979) to test the self-selection hypothesis.<sup>13</sup>

#### 4.2. Endogenous switching regression model

The endogenous switching regression model is based on the following selection equation:

$$Solicited_i^* = W_i\gamma + u_i, \quad (2)$$

$$Solicited_i = 1 \text{ if } Solicited_i^* > 0, 0 \text{ otherwise,} \quad (3)$$

where  $W$  collects all variables in  $X$  plus any other variables that affect the decision to request an individual rating but not the rating itself. The model further assumes that  $W$  is exogenous.

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<sup>13</sup> Poon (2003a) and Poon (2003b) use Heckman's standard model of sample selection and are therefore unable to estimate the impact of soliciting a rating while simultaneously controlling for the selection bias. Poon and Firth (2005) use a treatment effect model. Butler and Rodgers (2003) and Gan (2004) do not control for sample selection.

Contrary to the ordinary least squares model, the endogenous switching regression model also assumes that soliciting a rating may have a slope effect, i.e., the coefficients of the  $X$ s in equation (1) may differ according to the solicited status. The outcome equation is thus given by:

$$Rating_{1i} = X_i\beta_1 + \varepsilon_{1i} \text{ if } Solicited_i = 0, \quad (4)$$

$$Rating_{2i} = X_i\beta_2 + \varepsilon_{2i} \text{ if } Solicited_i = 1, \quad (5)$$

where it is assumed that  $X$  is exogenous and that  $\varepsilon_1$ ,  $\varepsilon_2$  and  $u$  follow a trivariate normal distribution with mean vector zero and symmetric covariance matrix  $\Omega$  equal to:

$$\Omega = \begin{bmatrix} \sigma_1^2 & \cdot & \sigma_{1u} \\ \cdot & \sigma_2^2 & \sigma_{2u} \\ \cdot & \cdot & \sigma_u^2 \end{bmatrix}, \quad (6)$$

where  $\sigma_1^2$  and  $\sigma_2^2$  are the variances of the error terms in the outcome equations,  $\sigma_u^2$  is the variance of the error term in the selection equation and  $\sigma_{1u}$  and  $\sigma_{2u}$  are the covariances between  $\varepsilon_1$  and  $u$  and  $\varepsilon_2$  and  $u$ , respectively (the covariance between the error terms in the outcome equations is not defined since  $Rating_{1i}$  and  $Rating_{2i}$  are never observed simultaneously). Since  $\gamma$  can be estimated only up to a scale factor, it is further assumed that  $\sigma_u^2 = 1$  hence  $\sigma_{1u} = \rho_{1u}\sigma_1$  and  $\sigma_{2u} = \rho_{2u}\sigma_2$  where  $\rho_{1u}$  and  $\rho_{2u}$  are the coefficients of correlation between  $\varepsilon_1$  and  $u$  and  $\varepsilon_2$  and  $u$ , respectively.

Using equations (2) to (6), one can show that the expected rating conditional on having requested one is given by:

$$E(Rating_{2i} \mid Solicited_i = 1, X_i, W_i) = X_i\beta_2 + \rho_{2u}\sigma_2 \left[ \frac{\phi(W_i\gamma)}{\Phi(W_i\gamma)} \right], \quad (7)$$

where  $\phi$  denotes the normal density function and  $\Phi$  the normal cumulative function.

For banks with unsolicited ratings, the counterpart to (7) is:

$$E(Rating_{1i} \mid Solicited_i = 0, X_i, W_i) = X_i\beta_1 + \rho_{1u}\sigma_1 \left[ \frac{-\phi(W_i\gamma)}{1 - \Phi(W_i\gamma)} \right]. \quad (8)$$

The difference in expected rating between banks which request a rating and those which do not is given by the difference between equations (7) and (8):

$$E(\text{Rating}_{2i} \mid \text{Solicited}_i = 1, X_i, W_i) - E(\text{Rating}_{1i} \mid \text{Solicited}_i = 0, X_i, W_i) = X_i(\beta_2 - \beta_1) + \rho_{2u}\sigma_2 \left[ \frac{\phi(W_i\gamma)}{\Phi(W_i\gamma)} \right] - \rho_{1u}\sigma_1 \left[ \frac{-\phi(W_i\gamma)}{1 - \Phi(W_i\gamma)} \right], \quad (9)$$

where the first term on the right-hand side,  $X_i(\beta_2 - \beta_1)$ , is the average treatment effect (ATE), which measures the average gain or loss from soliciting a rating for a randomly chosen bank (this quantity was denoted by  $\delta$  in Subsection 4.1). The second and third terms on the right-hand side are the sample selection correction terms. Under fairly weak assumptions, a consistent estimator of the average treatment effect is given by:

$$\hat{ATE} = \bar{X}(\hat{\beta}_2 - \hat{\beta}_1), \quad (10)$$

where  $\bar{\cdot}$  is used to denote average and  $\hat{\cdot}$  parameter estimates obtained by estimating the system formed by equations (2)-(3) and (4)-(5).

In this setup, a test for  $\rho_{2u}\sigma_2 = \rho_{1u}\sigma_1 = 0$  is a test of selection based on unobservable rating determinants. If the test fails to reject that both parameters are jointly equal to zero, we cannot reject the null hypothesis of no selectivity bias in the solicited and unsolicited groups and we have no argument against using ordinary least squares. A Chow test can also be used to test whether the  $\beta$ s are identical in the solicited and unsolicited groups. If they are, a simple treatment effect model is more efficient than the endogenous switching regression model.<sup>14</sup>

The endogenous switching regression model is estimated by maximum likelihood using the procedure outlined in Greene (1995).

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<sup>14</sup> The treatment effect model (see, e.g., Greene, 1995) is based on the same sample selection equation as the endogenous switching regression model but assumes that the treatment has the same effect across individuals.

## 5. Results

In this section, I discuss the results of the estimation procedures described above. Next, I turn to the test of the public disclosure hypothesis.

### *5.1. Ordinary least squares*

Two basic specifications of equation (1) are reported in Table 4. To avoid multicollinearity problems, the first specification only includes five financial variables and three nonfinancial variables in addition to a solicited rating dummy. These variables cover the different areas of Fitch's bank rating methodology: risk management (loan loss provisions/net interest revenue), liquidity (net loans/total assets), capitalisation (equity/total assets), earnings and performance (return on assets), market environment (banking and finance score), diversification/franchise (log of total assets), corporate governance (bank ownership dummy – one if the bank is majority-owned by another bank and zero otherwise), and public disclosure (high disclosure dummy).<sup>15</sup>

The second specification adds two variables that control for additional aspects of market environment (unqualified statement dummy) and corporate governance (state ownership dummy – one if the bank is majority-owned by the State and zero otherwise). In addition, the second specification also interacts the solicited rating dummy with the outside rating dummy, which is equal to one if the bank had an individual rating from a competitor agency before it obtained an individual rating from Fitch and zero otherwise. The resulting variable captures whether there is a rating difference between banks which request an individual rating without being rated by a competitor of Fitch and banks which request an individual rating while already being rated by a competitor agency.

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<sup>15</sup> The results of this paper are robust to the choice of alternative variables for each category, e.g. cost to income ratio instead of return on assets (for earnings and performance) or log of total deposits instead of log of total assets (for diversification). The results of Tables 4 and 5 also hold if Baumann and Nier's original disclosure index is substituted for the high disclosure dummy.

[Insert Table 4 about here]

The two specifications are estimated by ordinary least squares (OLS) and by two-stage least squares (2SLS) to account for the potential endogeneity of equity/total assets and the high disclosure dummy, i.e., the two explanatory variables that are most likely to suffer from an endogeneity bias (see, e.g., Baumann and Nier, 2004). The set of instruments for both variables consists of all the other exogenous explanatory variables in the regression and country dummies (one for all but one country to avoid perfect collinearity). I also carried out a Durbin-Wu-Hausman test, the null hypothesis for which states that OLS delivers consistent estimates, i.e., that instrumental variables techniques are not required. The values of the Durbin-Wu-Hausman statistic in specifications (1) and (2) are 8.15 and 6.72, with an associated probability of 0.02 and 0.03 respectively, meaning that the null hypothesis that OLS delivers consistent estimates is rejected in both specifications. The discussion of Table 4 is therefore based on the 2SLS results.

The coefficient of the solicited rating dummy in specifications (1) and (2) is equal to 1.234 and 1.439 respectively and is highly significant. This means that there is an important premium for banks which request an individual rating once controlling for other rating determinants. For the control variables, the results appear to be standard. For example, loan loss provisions/net interest revenue and net loans/total assets negatively impact individual ratings, while higher values of the return on assets, the banking and finance score, the high disclosure dummy, and the bank ownership dummy are associated with higher individual ratings (but only in the first specification for the latter variable). Other variables common to both specifications as well as the variables added in the second specification are not significant at the 95% confidence level. The statistics at the bottom of the table also indicate that the two specifications have similar prediction rates and classify about one-third of banks in the correct rating category and about one-half in the rating category immediately above or below the actual rating. Since the variables

added in specification (2) are not significant, I work only with the variables included in specification (1) from now on.<sup>16</sup>

## 5.2. *Endogenous switching regression model*

The coefficient of the solicited rating dummy in Table 4 suggests that there is an important difference between the rating of banks which ask for a rating and those which do not. This result confirms the findings of some of the studies reviewed in the introduction. However, as noted earlier, ordinary least squares may overestimate the impact of the treatment if banks which request a rating are positively self-selected. Moreover, the parameters of the outcome equation may differ according to whether or not banks have solicited a rating. For these reasons, I proceed to use the endogenous switching regression model described in Subsection 4.2. Given the low number of observations in the solicited group (54) with respect to the number of explanatory variables (9), the system formed by equations (2)-(3) and (4)-(5) is estimated without equity/total assets and the bank ownership dummy on the right-hand side of each equation.<sup>17</sup>

For identification purposes, the selection equation must include at least one variable that affects the decision to ask for an individual rating but not the rating itself (see, e.g., Sartori, 2003). The variable which enters the selection equation but not the outcome equations is the long-term debt rating dummy, which is equal to one if the bank had a long-term debt rating from Fitch before it obtained an individual rating and zero otherwise. The long-term debt rating dummy is used as an exclusion restriction because banks which first obtained a long-term rating should be more likely to have subsequently asked and paid for an individual rating if they were satisfied with Fitch's rating services (note that this is true irrespective of whether the long-term

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<sup>16</sup> Note that a Chow test does not reject the null hypothesis that the coefficients of the explanatory variables (except the constant and the high disclosure dummy) are the same in the solicited and unsolicited groups (test statistic = 1.08, p-value = 0.38). The test of the first part of the public disclosure hypothesis is based on a regression which assumes different intercepts and coefficients of the high disclosure dummy in both groups (see Subsection 5.3).

<sup>17</sup> Both variables were removed because neither of them is significant at the 95% confidence level in Table 4. None of the main results of Table 5 are affected if I use the full list of variables instead.

rating was solicited or not). At the same time, it is unlikely that having a long-term debt rating would influence the level of the individual rating.

[Insert Table 5 about here]

Table 5 reports the results of the endogenous switching regression model. The first column shows the results of the selection equation, while the last two columns show the results of the outcome equations. For consistency with the 2SLS results in Table 4, I report results where the high disclosure dummy has been instrumented before performing the maximum-likelihood estimation suggested in Greene (1995). As in Table 4, the instruments for the high disclosure dummy consist of the other exogenous variables and country dummies (one for all but one country to avoid perfect collinearity). Bootstrapped t-statistics are in parentheses.

Looking at the selection equation, the results indicate that banks located in countries with open banking and financial systems are more likely to request an individual rating *ceteris paribus*. Consistent with the intuition developed above, the long-term debt rating dummy is also significant, though only marginally (t-test = 1.94, with associated probability = 0.05).

The results of the outcome equations are as follows. First, two explanatory variables are significant in the solicited and unsolicited ratings groups but only one (the banking and finance score) is common to both groups. These variables have the expected sign, i.e., higher values of return on assets, the banking and finance score and the high disclosure dummy increase the individual rating of banks.

Second, the average treatment effect (ATE), which measures the average gain from soliciting a rating for a randomly chosen bank, was obtained by estimating equation (10). This effect is equal to 2.014 and is significantly different from zero at the 95% level (the bootstrap percentile confidence interval is [0.253; 3.305]).

Third, an F-test of the null hypothesis that the sample selection terms  $\rho_{1u}\sigma_1$  and  $\rho_{2u}\sigma_2$  are jointly insignificant was performed. The value of the test statistic is 0.66 with an associated probability of 0.42, meaning that one cannot reject the null hypothesis that both terms are equal

to zero and that there is no selection bias in bank individual ratings. Thus, the results in Table 5 do not support the self-selection hypothesis.

Finally, a Chow test of the null hypothesis that the coefficients of individual rating determinants (except the constant and the high disclosure dummy) are the same in the solicited and unsolicited groups was carried out. The value of the test statistic is 0.78 with an associated probability of 0.58, meaning that one cannot reject the null hypothesis that the coefficients of the six rating determinants considered are identical in both groups and that the endogenous switching regression model is less efficient than a treatment effect model. Therefore, I estimated a treatment effect model, the results of which confirm the existence of a significant difference between solicited and unsolicited ratings (+ 2.261) and the absence of any sample selection bias in bank individual ratings.

To sum up, the ordinary least squares regression and the endogenous switching regression model both find a positive and significant difference between solicited and unsolicited ratings. However, the endogenous switching regression model fails to provide evidence for a sample selection problem in bank individual ratings. There is thus no evidence that that this model is more appropriate than equation (1) to study the determinants of bank ratings. For this reason, I rely on the latter specification to test the public disclosure hypothesis.

### *5.3. Test of the public disclosure hypothesis*

The public disclosure hypothesis consists of two predictions: (i) disclosure of public information has only an impact on the rating of banks which choose not to be rated; (ii) a high enough amount of public information eliminates the difference between solicited and unsolicited ratings. Together with (i), (ii) implies that high disclosure banks which have not solicited a rating and low disclosure banks which have solicited a rating do not receive a lower rating than high



disclosure banks with a solicited rating. However, low disclosure banks which do not solicit a rating do receive a lower rating than the latter group of banks.

There are reasons to believe that these predictions might well hold. First, the results of the endogenous switching regression clearly show that the high disclosure dummy is significant in the unsolicited group and insignificant in the solicited group. Second, Table 6 shows the results of an experiment which divides the sample into two groups of banks, those with a Z-score below or equal to the sample median (5.5) and those with a Z-score above.<sup>18</sup> The aim of this experiment is to look at the effect of solicitation status and disclosure on bank ratings while simultaneously controlling for credit risk, i.e. the main determinant of credit ratings. The Z-score, which can be seen as an accounting-based measure of distance-to-default, is a well-used measure of credit risk in the banking literature.

[Insert Table 6 about here]

The results for banks with a Z-score below or equal to the median (i.e., those with relatively high credit risk) are clearly supportive of the disclosure hypothesis. First, disclosure appears to play only a role in the unsolicited group. Second, low disclosure banks with an unsolicited rating receive significantly lower ratings than the other three groups of banks. The results for banks with a Z-score above the median are more mixed. On the one hand, low disclosure banks with a solicited rating and high disclosure banks with an unsolicited rating receive comparable ratings. On the other hand, high disclosure banks with a solicited rating receive ratings above these two groups of banks. Also, disclosure appears to matter both in the solicited and unsolicited groups.

Two characteristics of the high disclosure banks with a solicited rating and a Z-score above the median may explain the latter results, which contradict the disclosure hypothesis. First, banks in this group are mostly located in countries with higher banking and finance scores than the

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<sup>18</sup> Following Mercieca et al. (2007) and others, the Z-score of banks is calculated as  $Z = (ROA + EA) / SD(ROA)$ , where ROA is the average return on assets, EA is the average equity to assets ratio and SD(ROA) is the standard deviation of the return on assets. All three variables are based on the same number of years (either 5 years, from 1999 to 2003, or 3 years, from 2001 to 2003). The Z-score thus measures the number of standard deviations below the mean by which bank profits would have to fall just to deplete equity capital.

other three groups of banks. Second, these banks tend to exhibit much lower loan loss provisions as a percentage of net interest revenue than the rest of the sample. Given that the banking and finance score and loan loss provisions/net interest revenue have a significant impact on credit ratings (see Tables 4 and 5) but that these variables are not included in the Z-score, Table 6 should thus only be seen as a preliminary attempt to isolate the impact of solicitation status and disclosure from the other determinants of bank individual ratings. A more systematic econometric analysis is needed to assess the independent effect of each variable on credit ratings and is therefore undertaken in the remainder of this section.

The two predictions made by the public disclosure hypothesis are formally tested using equations (11) and (12), which control for a wider range of bank characteristics than those included in the Z-score:

$$Rating_i = X_i\beta + \delta_1 Unsolicited_i + \delta_2 High\ disclosure_i + \delta_3 (Unsolicited_i \times High\ disclosure_i) + \varepsilon_i \quad (11)$$

$$Rating_i = X_i\beta + \delta_4 (Unsolicited_i \times High\ disclosure_i) + \delta_5 (Unsolicited_i \times Low\ disclosure_i) + \delta_6 (Solicited_i \times Low\ disclosure_i) + \varepsilon_i \quad (12)$$

where  $Unsolicited_i$  is a dummy variable equal to  $(1 - Solicited_i)$  and  $Low\ disclosure_i$  is a dummy variable equal to  $(1 - High\ disclosure_i)$ .

If the first prediction holds, we should observe that  $\delta_2 = 0$  and  $\delta_2 + \delta_3 > 0$  in equation (11). If the second prediction is true, we should have that  $\delta_5 < 0$  and  $\delta_4 = \delta_6 = 0$  in equation (12).

Both equations are estimated by ordinary least squares and by two-stage least squares to account for the potential endogeneity of equity/total assets and any interaction variable involving the high (or low) disclosure dummy.<sup>19</sup> As in Tables 4 and 5, the instruments consist of all other exogenous variables in each equation and country dummies (one for all but one country to avoid perfect collinearity). Since a Durbin-Wu-Hausman test rejects the null hypothesis that OLS

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<sup>19</sup> Specifically, the following variables are instrumented (in addition to equity/total assets): High disclosure dummy and (Unsolicited rating dummy  $\times$  High disclosure dummy) in equation (11); (Unsolicited rating dummy  $\times$  High disclosure dummy), (Unsolicited rating dummy  $\times$  Low disclosure dummy) and (Solicited rating dummy  $\times$  Low disclosure dummy) in equation (12).

delivers consistent parameter estimates in equations (11) and (12) - the values of the test statistic are 15.28 and 27.62, both with an associated probability of 0.00 -, the discussion of Table 7 is based on the 2SLS results.

[Insert Table 7 about here]

Looking at Table 7, the estimated coefficients of the first seven explanatory variables (from loan loss provisions/net interest revenue to the bank ownership dummy) are close to those shown in Table 4, though slightly less significant. This result is not surprising given that equations (11) and (12) are relatively similar to equation (1). I now turn to the test of the two predictions made by the public disclosure hypothesis.

In equation (11) estimated by 2SLS, one cannot reject the null hypothesis that disclosure does not have any impact on the rating of banks in the solicited group ( $\delta_2 = 0$ ). However, one is able to reject the null that disclosure has no impact on the rating of banks in the unsolicited group ( $\delta_2 + \delta_3 = 0$ ). Indeed, in the latter case, the sum of both coefficients (2.47) is positive and significantly different from zero (F-test = 16.35, with associated probability = 0.00). This result, which is consistent with the results of the endogenous switching regression model, is in line with the first prediction made by the public disclosure hypothesis.

In equation (12) estimated by 2SLS, one is able to reject the null hypothesis that the rating of low disclosure banks which do not request a rating is identical to the rating of high disclosure banks with a solicited rating ( $\delta_5 = 0$ ). However, one is unable to reject the null that the rating of high disclosure banks with an unsolicited rating and the rating of low disclosure banks with a solicited rating is identical to the rating of high disclosure banks with a solicited rating ( $\delta_4 = \delta_6 = 0$ ).<sup>20</sup> This finding is consistent with the second prediction made by the public disclosure hypothesis.

Finally, a question is whether the above results are transferable to banks located outside Asia. The appendix shows the results of equations (11) and (12) estimated on a sample of bank long-

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<sup>20</sup> As shown at the bottom of Table 7, the F-test of joint significance has a value of 1.85 (p-value = 0.16).

term debt ratings assigned across Asia, Europe, Africa and Latin America by S&P as of 31 January 2004 (the sample, which includes banks from 18 countries, is similar to that used in Poon, 2003b).<sup>21</sup> Results of preliminary regressions (not reported here) confirm the existence of a significant difference between S&P's solicited and unsolicited bank ratings: all else being equal, the former tend to be higher than the latter by 1.5 notches on average on a 1 to 20 rating scale. The results shown in the appendix (2SLS regressions) indicate that the public disclosure hypothesis might well account for this difference. First, the high disclosure dummy is only significant in the unsolicited group. Second, low disclosure banks with unsolicited ratings receive ratings which are significantly lower than those of the three other groups of banks. Both results, however, are only significant at the 90% confidence level.

## **6. Conclusion**

This paper investigates whether there is a difference between solicited and unsolicited bank ratings and, if so, why. It is based on a somewhat smaller sample of credit ratings (assigned by Fitch to Asian banks) than some of the existing studies. However, and contrary to most of them, it distinguishes clearly between solicited and unsolicited ratings in the analysis. The results show that unsolicited bank ratings tend to be lower than solicited ones after controlling for observable bank characteristics. The difference between both types of ratings is economically significant as it averages 1.2 notches on a 1 to 9 rating scale.

The existence of a difference between solicited and unsolicited ratings has already been documented for other credit rating agencies. While some issuers believe that such a difference is due to the fact that credit rating agencies attempt to force them to pay for a solicited rating, several alternative explanations are consistent with it. For instance, better-quality issuers may

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<sup>21</sup> This sample is smaller than the one based on Fitch's ratings. It is not possible to estimate a regression on a combined sample of S&P and Fitch ratings because explanatory variables may vary from one rating agency to the other.

request a rating or, alternatively, unsolicited ratings may be more conservative than solicited ones since they do not involve the disclosure of non-public information.

In contrast to some previous contributions on the differences between solicited and unsolicited ratings, this paper explicitly controls for potential sample selection by using an endogenous switching regression model to test whether better-quality banks self-select into the solicited group (self-selection hypothesis). Although the analysis does find a significant difference between solicited and unsolicited ratings, no evidence is found in favour of the sample selection hypothesis.

The paper also tests whether Fitch assigns different weights across solicited and unsolicited groups to observable bank characteristics and in particular to the amount of public information released by banks. After showing that information disclosure has only an impact on the rating of banks which do not request one (first part of the disclosure hypothesis), the paper tests whether the difference between solicited and unsolicited ratings disappears for banks with unsolicited ratings but which disclose a high enough amount of public information (second part of the public disclosure hypothesis). Support is found for this: high disclosure banks which have not asked to be rated receive ratings that are not significantly different from the ratings of banks which have asked to be rated.

The above-mentioned findings are interesting for three reasons at least. First, as mentioned in Section 2, possible measures concerning the use of unsolicited ratings are being considered at the European and U.S. levels. The results of this study support additional measures designed to clarify the differences between solicited and unsolicited ratings. For instance, it should be required that credit rating agencies clearly label unsolicited ratings as such in their regular publications and that they make the characteristics and limitations of this type of ratings transparent to the public.

Second, national supervisory authorities dealing with the implementation of the Basel II framework have recently decided on the eligibility of unsolicited ratings for risk-weighting

purposes by banks. While some countries have decided to allow the conditional use of unsolicited ratings in their jurisdiction, others have decided to forbid them. The results of this paper, which show that credit rating agencies are simply more conservative in the absence of non-public information, may help supervisors to reassess their decision in the future.

Third, one of the main objectives of Basel II is to increase public disclosure by banks. It is therefore necessary that financial institutions understand the need for more disclosure and move in this direction on their own. This paper provides an incentive for bank managers to disclose information as it documents the impact of public disclosure on credit ratings and on the relation between soliciting a rating and the actual rating outcome. Public disclosure not only appears to have a positive effect on the credit rating of banks which choose not to be rated, but it also seems to eliminate the downward bias of unsolicited ratings.

Finally, it is worth stressing once again that the credit ratings used in this study are assigned to banks located in Asia. Although this caveat implies that the policy recommendations should be interpreted with care, the fact that the public disclosure hypothesis seems to hold for a more international sample suggests that the results could well carry over.

## References

- Akhigbe, A., Martin, A.D. (2006). Valuation impact of Sarbanes-Oxley: evidence from disclosure and governance within the financial services industry. *Journal of Banking and Finance* 30: 989-1006.
- Baek, J.-S., Kang, J.-K., Park, K.S. (2004). Corporate governance and firm value: evidence from the Korean financial crisis. *Journal of Financial Economics* 71: 265-313.
- Bannier, C.E., Behr, P., Güttler, A. (2007). Why are unsolicited ratings lower than solicited ratings? A theoretical and empirical assessment. Unpublished working paper, Goethe University.
- Baumann, U., Nier, E. (2004). Disclosure, volatility, and transparency: an empirical investigation into the value of bank disclosure. *Economic Policy Review* 10, 31-45. Federal Reserve Bank of New York, New York, NY.
- Behr, P., Güttler, A. (2008). The informational content of unsolicited ratings. *Journal of Banking and Finance* 32: 587-599.
- Butler, A.W., Rodgers, K.J. (2003). Relationship rating: how do bond rating agencies process information? Unpublished working paper, Pennsylvania State University.
- Cantor, R., Packer, F. (1997). Differences of opinion and selection bias in the credit rating industry. *Journal of Banking and Finance* 21: 1395-1417.

Committee of European Securities Regulators (2008). CESR's second report to the European Commission on the compliance of credit rating agencies with the IOSCO code and the role of credit rating agencies in structured finance. CESR, Paris.

Ficht, A. (2001). The ratings game, John Wiley & Sons, England.

Fitch Ratings (2001). Fitch introduces shadow individual ratings. Financial institutions special report. Fitch, London.

Fitch Ratings (2004). Bank rating methodology. Criteria report. Fitch, London.

Fitch Ratings (2005). Rating initiation and participation disclosure. Credit policy special report. Fitch, London.

Fitch Ratings (2006). Unsolicited ratings and Basel II. Fitch, London.

Gan, Y. (2004). Why do firms pay for bond ratings when they can get them for free? Unpublished working paper, The Wharton School, University of Pennsylvania.

Golin, J. (2001). The bank credit analysis handbook: a guide for analysts, bankers and investors. John Wiley & Sons (Asia) Pte Ltd.

Greene, W. (1995). Limdep user's manual (version 7.0). Econometric Software Inc, New York, NY.

Heckman, J. (1979). Sample selection as a specification error. *Econometrica* 47: 153-162.

Heritage Foundation (2007). Index of economic freedom. Washington, DC.



Hill, C.A. (2004). Regulating the rating agencies. American Law & Economics Association Annual Meetings.

Iannotta, G. (2006). Testing for opaqueness in the European banking industry: evidence from bond credit ratings. *Journal of Financial Services Research* 30: 287-309.

International Organization of Securities Commissions (2003). Report on the activities of credit rating agencies. IOSCO, Madrid.

International Organization of Securities Commissions (2004a). Code of conduct fundamentals for credit rating agencies. IOSCO, Madrid.

International Organization of Securities Commissions (2004b). Fitch's comments on the draft code of conduct fundamentals for credit rating agencies. IOSCO, Madrid.

Jorion, P., Liu, Z., Shi, C. (2005). Informational effects of regulation FD: evidence from rating agencies. *Journal of Financial Economics* 76: 309-330.

Mercieca, S., Schaeck, K., Wolfe, S. (2007). Small European banks: Benefits from diversification? *Journal of Banking and Finance* 31: 1975-1998.

Mitton, T. (2002). A cross-firm analysis of the impact of corporate governance on the East Asian financial crisis. *Journal of Financial Economics* 64: 215-241.

Moody's Investors Service (2006). Report on the code of professional conduct. Moody's, New York, NY.

- Morgan, D. (2002). Rating banks: risk and uncertainty in an opaque industry. *American Economic Review* 92: 874-888.
- Pasiourias, F., Gaganis, C., Doumpos, M. (2007). A multicriteria discrimination approach for the credit rating of Asian banks. *Annals of Finance* 3: 351-367.
- Poon, W. (2003a). Are unsolicited credit ratings biased downward? *Journal of Banking and Finance* 27: 593-614.
- Poon, W. (2003b). Are unsolicited bank ratings lower after controlling for financial and sovereign risk? Unpublished working paper, Lingnan University, Hong Kong.
- Poon, W., Firth, M. (2005). Are unsolicited credit ratings lower? International evidence from bank ratings. *Journal of Business Finance & Accounting* 32: 1741-1761.
- Poon, W., Lee, J., Gup, B. (2007). Do solicitations matter in bank credit ratings? Results from a study of 72 countries. Unpublished working paper.
- Sartori, A. (2003). An estimator for some binary-outcome selection models without exclusion restrictions. *Political Analysis* 11: 111-138.
- Securities and Exchange Commission (2005). *Regulatory issues and economic principles*. SEC, Washington, DC.
- Securities and Exchange Commission (2007). *Oversight of credit rating agencies registered as nationally recognized statistical rating organizations; final rule*. SEC, Washington, DC.

Shimoda, N., Yuko, K. (2007). Credit rating gaps in Japan: differences between solicited and unsolicited ratings, and "rating splits". Working paper # 7-E-11, Bank of Japan, Tokyo.

U.S. Congress (2006). Credit Rating Agency Reform Act of 2006. U.S. Government Printing Office, Washington, DC.

Wall Street Journal (2004). Credit raters' tactics in pursuing new work frustrate companies, 25 November.

Yu, F. (2005). Accounting transparency and the term structure of credit spreads. *Journal of Financial Economics* 75: 53-84.

Table 1  
Distribution of bank individual ratings by country

Country	Solicited		Unsolicited		Total	
	#	%	#	%	#	%
Bangladesh	1	0.6	5	3.0	6	3.6
China	1	0.6	15	8.9	16	9.5
Hong Kong	7	4.1	11	6.5	18	10.7
India	3	1.8	29	17.2	32	18.9
Indonesia	8	4.7	4	2.4	12	7.1
Macau	9	5.3	3	1.8	12	7.1
Malaysia	2	1.2	1	0.6	3	1.8
Philippines	6	3.6	5	3.0	11	6.5
South Korea	6	3.6	7	4.1	13	7.7
Taiwan	20	11.8	19	11.2	39	23.1
Vietnam	1	0.6	6	3.6	7	4.1
Total	64	37.9	105	62.1	169	100

The sample consists of 169 bank individual ratings assigned by Fitch. Ratings are as of 31 January 2004, and come from Bankscope and Fitch Research. Only those countries that have both solicited and unsolicited bank individual ratings are included in the sample.

Table 2  
Distribution of bank individual ratings by rating level

Individual rating	Interpretation	Solicited		Unsolicited		Total	
		#	%	#	%	#	%
A	A very strong bank	-	-	-	-	-	-
A / B		1	0.6	1	0.6	2	1.2
B	A strong bank	2	1.2	0	0.0	2	1.2
B / C		9	5.3	5	3.0	14	8.3
C	An adequate bank	17	10.1	14	8.3	31	18.3
C / D		11	6.5	14	8.3	25	14.8
D	A bank with weaknesses	17	10.1	23	13.6	40	23.7
D / E		4	2.4	24	14.2	28	16.6
E	A bank with serious problems	3	1.8	24	14.2	27	16.0
Total		64	37.9	105	62.1	169	100

The sample consists of 169 bank individual ratings assigned by Fitch. Ratings are as of 31 January 2004, and come from Bankscope and Fitch Research.

Table 3  
Descriptive statistics of bank characteristics

Variable	Definition	Obs.	Mean	SD	Min.	Max.
Loan loss provisions/Net int. rev.	$100 \times (\text{Loan loss provisions}/\text{Net interest revenue})$	155	35.36	53.54	-417.51	312.88
Net loans/Total assets	$100 \times (\text{Loans}/\text{Total assets})$	169	50.74	16.97	-0.08	91.43
Equity/Total assets	$100 \times (\text{Equity}/\text{Total assets})$	169	9.29	12.23	-20.17	84.00
Return on assets	$100 \times (\text{Net income}/\text{Total assets})$	169	0.48	1.97	-11.01	7.21
Banking and finance score	Relative openness of a country's banking and financial system, between 0 (repressive government) and 100 (negligible government influence)	169	49.64	22.20	30	90
Log (total assets)	Log of total assets (in billion of U.S. \$)	169	15.76	1.58	11.69	20.14
Bank ownership dummy	1 if the bank is majority-owned by another bank, 0 otherwise	163	0.16	0.37	0	1
State ownership dummy	1 if the bank is majority-owned by the state, 0 otherwise	163	0.27	0.45	0	1
Disclosure index	$\text{Disclosure index} = \frac{1}{21} \sum_{i=1}^{17} \text{category}_i,$ <p>where <math>\text{category}_i</math> is equal to 0 if there is no entry in any of the corresponding sub-categories in Bankscope and 100 otherwise. The 17 categories include 7 asset categories, 4 liabilities categories, 4 memo lines categories and 2 income statement categories. See Baumann and Nier (2004) for the exact formula.</p>	169	64.77	12.36	23.81	93.33
High disclosure dummy	1 if disclosure index $\geq 50^{\text{th}}$ percentile of the sample distribution of disclosure indexes, 0 otherwise	169	0.49	0.50	0	1
Solicited rating dummy	1 if the bank has a solicited individual rating from Fitch, 0 if it has an unsolicited individual rating	169	0.38	0.49	0	1
Unqualified statement dummy	1 if the bank's annual accounts have been accepted by the auditors without any remark, 0 otherwise	169	0.82	0.25	0	1
Long-term debt rating dummy	1 if the bank had a long-term debt rating from Fitch before it obtained an individual rating, 0 otherwise	169	0.20	0.40	0	1
Outside rating dummy	1 if the bank had an individual rating from another rating agency before it obtained an individual rating from Fitch, 0 otherwise	169	0.70	0.46	0	1
Z-score	$Z = (\text{ROA} + \text{EA}) / \text{SD}(\text{ROA})$ , where ROA = average return on assets, EA = average equity to assets ratio and SD (ROA) = standard deviation of the return on assets, all measured over a 3- or 5-year period.	150	8.34	16.08	-4.32	172.41
Unsolicited rating dummy $\times$ High disclosure dummy	Interaction variable	169	0.32	0.47	0	1
Unsolicited rating dummy $\times$ Low disclosure dummy	Interaction variable	169	0.30	0.46	0	1
Solicited rating dummy $\times$ High disclosure dummy	Interaction variable	169	0.17	0.37	0	1
Solicited rating dummy $\times$ Low disclosure dummy	Interaction variable	169	0.21	0.41	0	1

The sample consists of 169 bank individual ratings assigned by Fitch as of 31 January 2004. All variables come from Bankscope and Fitch Research except the 2003 banking and finance score, which is from the Heritage Foundation (2007). Variables in the first part of the table were selected according to Fitch's bank rating methodology (Fitch, 2004). Statistics include number of observations (Obs.), mean (Mean), standard deviation (SD), minimum (Min.) and maximum (Max.) of each variable. Following Fitch (2004), the 5-year average of variables (1999 to 2003) is used if available, the 3-year average (2001 to 2003) if not.

Table 4

Determinants of bank individual ratings: ordinary least squares and two-stage least squares regressions

Independent variables	Ordinary least squares		Two-stage least squares	
	(1)	(2)	(1)	(2)
Constant	0.923 (0.70)	0.649 (0.49)	-0.293 (0.21)	-0.411 (0.29)
Loan loss provisions/Net interest revenue	-0.005** (2.56)	-0.006*** (2.87)	-0.005*** (2.63)	-0.006*** (2.98)
Net loans/Total assets	-0.024*** (3.21)	-0.025*** (3.31)	-0.017** (2.23)	-0.020*** (2.61)
Equity/Total assets	-0.001 (0.04)	-0.013 (0.47)	0.018 (0.34)	0.004 (0.07)
Return on assets	0.335*** (3.06)	0.357*** (3.36)	0.307** (2.13)	0.334** (2.42)
Banking and finance score	0.031*** (5.36)	0.031*** (5.34)	0.023*** (3.90)	0.024*** (4.34)
Log (total assets)	0.091 (1.19)	0.122 (1.43)	0.128 (1.61)	0.171* (1.88)
Bank ownership dummy	0.610*** (2.72)	0.454* (1.90)	0.697** (2.43)	0.552* (1.82)
High disclosure dummy	0.519** (2.37)	0.461** (2.06)	1.500*** (4.02)	1.412*** (3.87)
Solicited rating dummy	1.185*** (5.88)	1.148*** (3.64)	1.234*** (5.67)	1.439*** (3.80)
Unqualified statement dummy	-	0.265 (0.73)	-	-0.096 (0.22)
State ownership dummy	-	-0.477* (1.83)	-	-0.404 (1.50)
Solicited rating dummy × Outside rating dummy	-	-0.135 (0.37)	-	-0.393 (0.90)
Observations	149	149	149	149
Adjusted R-squared	0.53	0.54	0.45	0.47
Classification accuracy (%):				
actual - predicted rating = 0	29.5	27.5	30.9	31.5
actual - predicted rating = -1 or 1	55.0	57.7	48.3	46.3
actual - predicted rating ≤ -2 or ≥ 2	15.4	14.8	20.8	22.2

The dependent variable in each regression is the bank individual rating coded on a 9 (A) to 1 (E) scale. The first two columns report ordinary least squares estimates which treat equity/total assets and the high disclosure dummy as exogenous. The last two columns report two-stage least squares estimates obtained by instrumenting equity/total assets and the high disclosure dummy with all other exogenous variables and country dummies (one for all but one country to avoid perfect collinearity). Robust t-statistics are in parentheses; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Durbin-Wu-Hausman chi-sq test ( $H_0$ : regressors are exogenous):

  Specification (1): test statistic = 8.15 ~ chi-sq(2), p-value = 0.02

  Specification (2): test statistic = 6.72 ~ chi-sq(2), p-value = 0.03

Chow test ( $H_0$ : all regressors but the constant and the high disclosure dummy are identical across groups):

  Two-stage least squares, specification (1): test statistic = 1.08 ~ F(7,131), p-value = 0.38

Table 5  
Determinants of bank individual ratings: endogenous switching regression model

Independent variables	Selection equation	Outcome equations	
		Unsolicited	Solicited
Constant	-0.679 (0.82)	2.075** (2.45)	3.750*** (3.91)
Loan loss provisions/Net interest revenue	0.006 (1.57)	-0.005 (0.79)	-0.008 (1.21)
Net loans/Total assets	-0.010 (1.27)	-0.023 (1.63)	-0.003 (0.15)
Return on assets	-0.074 (0.84)	0.281 (1.04)	0.425*** (3.35)
Banking and finance score	0.013*** (2.11)	0.022*** (2.73)	0.022* (1.89)
Bank ownership dummy	-0.047 (0.01)	0.550* (1.71)	0.861** (2.01)
High disclosure dummy	-0.298 (0.61)	1.955*** (3.26)	0.630 (0.87)
Long-term debt rating dummy	1.212* (1.94)	-	-
Standard deviation ( $\varepsilon_1$ ) = $\sigma_1$	-	1.065*** (7.85)	-
Correlation ( $\varepsilon_1, u$ ) = $\rho_{1u}$	-	0.056 (0.12)	-
Standard deviation ( $\varepsilon_2$ ) = $\sigma_2$	-	-	1.285*** (7.15)
Correlation ( $\varepsilon_2, u$ ) = $\rho_{2u}$	-	-	-0.689 (1.58)
Observations	149	95	54
Pseudo (sel.) / Adjusted (out.) R-squared	0.13	0.43	0.40
Classification accuracy (%) - Selection: correctly classified	71.8	-	-
Classification accuracy (%) - Outcome: actual - predicted rating = 0	-	36.8	25.9
actual - predicted rating = -1 or 1	-	44.2	57.4
actual - predicted rating $\leq -2$ or $\geq 2$	-	18.9	16.7

The table reports the results of the endogenous switching regression model. The first column shows the results of the selection equation where the dependent variable is the solicited individual rating dummy (1 if solicited, 0 otherwise). The last two columns show the results of the outcome equations where the dependent variable is the bank individual rating code on a 9 (A) to 1 (E) scale. Results were obtained by instrumenting the high disclosure dummy before performing the maximum-likelihood estimation suggested in Greene (1995). The instruments for the high disclosure dummy consist of all other exogenous variables and country dummies (one for all but one country to avoid perfect collinearity). Bootstrapped t-statistics are in parentheses; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

F-test ( $H_0: \rho_{1u}\sigma_1 = \rho_{2u}\sigma_2 = 0$ ):

Outcome equations: test statistic = 0.66 ~ F(1,133), p-value = 0.42

Chow test ( $H_0$ : all regressors but the constant and the high disclosure dummy are identical across groups):

Outcome equations: test statistic = 0.78 ~ F(6,133), p-value = 0.58



Table 6

Average bank individual rating across groups of banks (number of observations in parenthesis)

Type of bank	Z-score $\leq$ median	Z-score $>$ median
Solicited rating, high disclosure (SH)	3.5 (14)	5.7 (14)
Solicited rating, low disclosure (SL)	3.5 (13)	4.2 (14)
Unsolicited rating, high disclosure (UH)	3.0 (29)	4.0 (14)
Unsolicited rating, low disclosure (UL)	2.1 (19)	2.8 (23)

The table shows the average individual rating of four groups of banks (SH, SL, UH and UL) split up into two categories: those with a Z-score below or equal to the median (5.5) and those with a Z-score above. The Z-score measures the number of standard deviations below the mean by which bank profits would have to fall just to deplete equity capital.

Wilcoxon rank-sum test:

Z-score  $\leq$  median

$H_0$ : SH = SL, test-statistic = -0.05  $\sim$  N(0,1), p-value = 0.96

$H_0$ : SH = UH, test-statistic = -1.25  $\sim$  N(0,1), p-value = 0.21

$H_0$ : UH = UL, test-statistic = -2.32  $\sim$  N(0,1), p-value = 0.02

Z-score  $>$  median

$H_0$ : SH = SL, test-statistic = -3.19  $\sim$  N(0,1), p-value = 0.00

$H_0$ : SH = UH, test-statistic = -3.04  $\sim$  N(0,1), p-value = 0.00

$H_0$ : UH = UL, test-statistic = -2.36  $\sim$  N(0,1), p-value = 0.02

Table 7

Determinants of bank individual ratings: test of the public disclosure hypothesis

Independent variables	Ordinary least squares		Two-stage least squares	
	Eq. (11)	Eq. (12)	Eq. (11)	Eq. (12)
Constant	2.206* (1.71)	2.301* (1.80)	0.394 (0.22)	1.814 (0.76)
Loan loss provisions/Net interest revenue	-0.005*** (2.79)	-0.005*** (2.79)	-0.008*** (3.31)	-0.009*** (3.31)
Net loans/Total assets	-0.022*** (3.02)	-0.022*** (3.02)	-0.011 (1.20)	-0.011 (1.24)
Equity/Total assets	-0.005 (0.19)	-0.005 (0.19)	0.071 (1.00)	0.034 (0.44)
Return on assets	0.350*** (3.20)	0.350*** (3.20)	0.254 (1.49)	0.329* (1.73)
Banking and finance score	0.032*** (5.50)	0.032*** (5.50)	0.022*** (3.40)	0.019*** (2.79)
Log (total assets)	0.097 (1.28)	0.097 (1.28)	0.219* (1.92)	0.150 (1.33)
Bank ownership dummy	0.608*** (2.61)	0.608*** (2.61)	0.768** (2.22)	0.755** (2.11)
Unsolicited rating dummy	-1.540*** (5.37)	-	-3.174*** (4.12)	-
High disclosure dummy	0.094 (0.29)	-	-1.289 (1.12)	-
Unsolicited rating dummy × High disclosure dummy	0.667* (1.66)	-0.873*** (3.12)	3.759** (2.51)	-1.157 (1.31)
Unsolicited rating dummy × Low disclosure dummy	-	-1.635*** (5.16)	-	-3.403*** (5.15)
Solicited rating dummy × Low disclosure dummy	-	-0.094 (0.29)	-	0.405 (0.36)
Observations	149	149	149	149
Adjusted R-squared	0.54	0.54	0.28	0.29
Classification accuracy (%):				
actual - predicted rating = 0	27.5	27.5	25.5	26.9
actual - predicted rating = -1 or 1	57.1	57.1	44.3	46.3
actual - predicted rating ≤ -2 or ≥ 2	15.4	15.4	30.2	26.8

The dependent variable in each regression is the bank individual rating coded on a 9 (A) to 1 (E) scale. The first two columns report ordinary least squares estimates which treat equity/total assets, the high disclosure dummy and the three interaction variables at the bottom of the table as exogenous. The last two columns report two-stage least squares estimates obtained by instrumenting these five variables with all other exogenous variables and country dummies (one for all but one country to avoid perfect collinearity); \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Durbin-Wu-Hausman chi-sq test ( $H_0$ : regressors are exogenous):

Equation (11): test statistic = 15.28 ~ chi-sq(3), p-value = 0.00

Equation (12): test statistic = 27.62 ~ chi-sq(4), p-value = 0.00

F-test ( $H_0$ : high disclosure dummy + unsolicited rating dummy × high disclosure dummy = 0):

Two-stage least squares, equation (11): test statistic = 16.35 ~ F(1,138), p-value = 0.00

F-test ( $H_0$ : (unsol. rating dummy × high disclosure dummy = 0) and (solicited rating dummy × low disclosure dummy = 0)):

Two-stage least squares, equation (12): test statistic = 1.85 ~ F(2,138), p-value = 0.16

Appendix - Test of the public disclosure hypothesis on a sample of S&P's bank ratings

Independent variables	Ordinary least squares		Two-stage least squares	
	Eq. (11)	Eq. (12)	Eq. (11)	Eq. (12)
Constant	5.330** (2.08)	5.810** (2.26)	7.690** (2.19)	6.080* (1.67)
Loan loss provisions/Net interest revenue	0.002 (0.42)	0.002 (0.42)	0.019* (1.76)	0.019* (1.77)
Net loans/Total assets	0.043*** (3.18)	0.043*** (3.18)	0.017 (0.82)	0.018 (0.85)
Equity/Total assets	0.002 (0.08)	0.002 (0.08)	-0.211** (1.99)	-0.215** (2.00)
Return on assets	0.270* (1.88)	0.270* (1.88)	0.669** (2.54)	0.655** (2.44)
Banking and finance score	0.069*** (5.28)	0.069*** (5.28)	0.077*** (4.05)	0.076*** (3.90)
Log (total assets)	-0.089 (0.58)	-0.089 (0.58)	0.007 (0.04)	-0.003 (0.02)
Bank ownership dummy	0.405 (0.79)	0.405 (0.79)	0.447 (0.65)	0.395 (0.56)
Unsolicited rating dummy	-1.315* (1.92)	-	-4.518** (2.48)	-
High disclosure dummy	0.480 (0.78)	-	-2.099 (1.09)	-
Unsolicited rating dummy × High disclosure dummy	0.078 (0.09)	-1.237** (2.35)	4.678* (1.75)	-0.275 (0.18)
Unsolicited rating dummy × Low disclosure dummy	-	-1.795*** (2.85)	-	-2.954* (1.72)
Solicited rating dummy × Low disclosure dummy	-	-0.480 (0.78)	-	2.059 (1.06)
Observations	114	114	114	114
Adjusted R-squared	0.47	0.47	0.11	0.11
Classification accuracy (%):				
actual - predicted rating = 0	23.7	23.7	21.1	20.2
actual - predicted rating = -1 or 1	31.6	31.6	34.2	29.8
actual - predicted rating ≤ -2 or ≥ 2	44.7	44.7	44.7	50.0

The dependent variable in each regression is S&P's bank long-term debt rating coded on a 20 (AAA) to 1 (D) scale. Ratings as of 31 January 2004, and come from Bankscope. Only those countries that have both solicited and unsolicited ratings from S&P are included in the regression (4 countries from Africa, 6 from Asia, 6 from Europe, and 2 from Latin America). The first two columns report ordinary least squares estimates which treat equity/total assets, the high disclosure dummy and the three interaction variables at the bottom of the table as exogenous. The last two columns report two-stage least squares estimates obtained by instrumenting these five variables with all other exogenous variables and country dummies (one for all but one country to avoid perfect collinearity); \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Durbin-Wu-Hausman chi-sq test ( $H_0$ : regressors are exogenous):

Equation (11): test statistic = 10.16 ~ chi-sq(3), p-value = 0.02

Equation (12): test statistic = 10.47 ~ chi-sq(4), p-value = 0.03

F-test ( $H_0$ : high disclosure dummy + unsolicited rating dummy × high disclosure dummy = 0):

Two-stage least squares, equation (11): test statistic = 3.60 ~ F(1,103), p-value = 0.06

F-test ( $H_0$ : (unsol. rating dummy × high disclosure dummy = 0) and (solicited rating dummy × low disclosure dummy = 0)):

Two-stage least squares, equation (12): test statistic = 1.04 ~ F(2,103), p-value = 0.36

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