

Does adverse selection drive the downward bias in
unsolicited ratings for non-US firms?
The case of S&P

Christina E. Banner* Patrick Behr[†] André Güttler[‡]

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Abstract

This paper examines why, for comparable non-US firms, unsolicited ratings tend to be lower than solicited ratings. Adverse selection arguments may lead firms with positive private information about their creditworthiness to share this by soliciting their ratings in order to improve the rating level, while firms with negative information stick to an unsolicited rating. Comparing empirical default rates of firms with solicited and unsolicited S&P ratings between January 1996 and December 2005, we find that adverse selection indeed seems to play a role. However, financial firms appear to be additionally affected by excessive agency conservatism or even blackmailing in their assignment of unsolicited ratings.

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*Commerzbank Professor of Corporate Finance / SME Finance, Frankfurt School of Finance and Management, Department of Banking and Finance, Sonnemannstr. 9-11, 60314 Frankfurt, Germany, Phone: +49 69 154008 755, Fax: +49 69 154008 4755, E-mail: c.banner@frankfurt-school.de. (Corresponding author)

[†]Department of Finance, Goethe-University Frankfurt, Mertonstr. 17, 60054 Frankfurt, Germany, E-mail: behr@finance.uni-frankfurt.de.

[‡]Department of Finance, Accounting and Real Estate, European Business School, International University, Rheingastr. 1, 65375 Oestrich-Winkel, Germany, E-mail: andre.guettler@ebs.edu.

1 Introduction

Several credit rating agencies such as Moody's, Standard and Poor's (S&P) or Fitch recently started to assign and publish unsolicited ratings additionally to the traditional, commissioned ratings. While the latter, solicited ratings are requested and as such paid for by the rated firms, the former are not. Rating agencies claim that unsolicited ratings mainly serve as a signalling device, demonstrating their market knowledge even in markets in which they do not dispose of considerable market shares. The publication of unsolicited ratings hence intends to expand the agencies' business activities. However, in order to keep the cost of rating preparation low, unsolicited ratings are based only on publicly available information and hence on a weaker information base.¹

Interestingly, firms with unsolicited ratings tend to despise this business practice (Economist (2005)) and often request a solicited rating subsequently. They claim that unsolicited ratings deliberately underestimate their creditworthiness, thereby driving up funding costs and undermining the firms' competitiveness. As a consequence they feel forced to solicit their rating in order to reveal the true creditworthiness and reduce costs. This accusation - mainly put forward by Japanese companies, but also by several European firms - has led to a vehement debate about the use of unsolicited ratings among market participants and observers. In particular, it has spurred regulators to debate the usage of unsolicited ratings for regulatory purposes such as capital adequacy guidelines. Generally, the new capital adequacy rules issued by the Basel Committee on Banking Supervision - known as Basel II - allow the use of unsolicited ratings for the determination of regulatory capital according to the standardized approach. However, regulators in Japan and Austria currently consider to exclude unsolicited ratings because of the controversial discussions surrounding them.

Several recent studies have indeed confirmed the alleged "downward bias" of unsolicited ratings. Fairchild et al. (2006), Poon (2003) and Poon and Firth (2005), for instance, compare the levels of solicited and unsolicited ratings, controlling for firm-specific and macroeconomic variables. Using pooled cross-sectional time-series analysis, they find that unsolicited ratings are on average lower than solicited ratings. This result is particularly strong for Japanese companies and, more generally, for Asian banks. Implicitly, these studies accuse the major rating agencies to deliberately underestimate the creditworthiness of these companies in order to force them to solicit, and hence pay for, their rating.

Corroborating this "blackmailing accusation", further research has shown that the information contained in unsolicited ratings influences investment decisions just as strongly as solicited rating information. Behr and Güttler (forthcoming) analyze stock market reactions to the assignment of an initially unsolicited rating and to subsequent changes of the unsolicited rating. They find significant abnormal returns for both kinds of events, thereby underlining the importance of unsolicited ratings for firms' funding costs.

This paper aims at extending the above mentioned studies by investigating in detail the

¹Moody's and Fitch claim that their unsolicited ratings contain a private information component. Needless to say, this must be a minor component as otherwise the agencies' solicited ratings would be obsolete. Generally, the solicitation of a rating triggers a detailed and institutionalized process of information sharing between the agency and the rated entity.

cause why unsolicited ratings may be lower than solicited ratings. Besides the frequently uttered blackmailing accusation - an argument inherently endogenous to the process of rating assignment due to the fee-based remuneration system borne by the rated entities themselves -, rating level differences may also have purely exogenous reasons. It may be argued, for instance, that only those firms will solicit a rating, and hence reveal private information about their credit quality, who believe that their unsolicited rating is unfairly low, i.e., who feel to be able to disclose much more optimistic private information to the agency as compared to the available public information. This revelation of positive private information should lead to an improvement in the (solicited) rating level. The observed rating level difference would therefore be the result of an adverse selection process: “good” companies, those with positive private information, solicit their rating and reveal the positive information; “bad” companies keep the unsolicited rating until they have positive information to reveal.²

Empirical approaches should be able to differentiate between the two lines of explanations by analyzing the ex-post (empirical) default rates of firms with equivalent solicited and unsolicited ratings. In this respect, exogenous “adverse selection” effects should not result in differing default rates. Both types of rating should rather reflect a “correct” default probability due to a self-selection of firms based on their private information about creditworthiness.³ Endogenous “blackmailing” effects, in contrast, could lead to unjustifiably low unsolicited rating levels so that, for any given rating class, empirical default rates should be higher for solicited than for unsolicited ratings. However, pure “conservatism” in the rating assignment may also drive rating level differences, considering that unsolicited ratings are generated on a weaker (only public) information base than solicited ratings that combine both public and private information.⁴ As this argument is related to the agencies’ quest for maintaining a high level of reputation, it contributes to the endogenous channel of explanations. Since the implications of excessive conservatism for ex-post default rates are less clear, however, we concentrate mainly on testing the adverse selection hypothesis and hence on exogenous causes of the solicited-unsolicited rating difference.

In line with our main research question, Gan (2004) takes a first step towards testing the reasons underlying the observed rating level differences. She uses a sample of US industrial companies rated by Moody’s and S&P and compares the empirical default rates of equivalent firms with unsolicited and with solicited ratings. Her study shows that the default rates do not differ significantly between the two groups. She concludes that, even though unsolicited ratings for US industrial firms are *ceteris paribus* lower than solicited ratings, these rating level differences are not due to deliberate actions on the part of the agencies but seem to stem from reasons exogenous to the rating process.

²In a theoretical paper, Bannier and Tyrell (2006) remark on this argument.

³In this sense, even unsolicited ratings would reflect a certain degree of private information as they include the firm’s signal of being of lower quality.

⁴Since rating agencies use a reduced information set when they assign unsolicited ratings, an unsolicited rating necessarily contains more noise, i.e., the creditworthiness distribution has a greater variance. This may imply that, *ceteris paribus*, the default threshold of a company with an unsolicited rating is on average more quickly reached than the default threshold of a company with a solicited rating. Since the default threshold coincides with the probability of default, which is expressed by the rating level, under this scenario unsolicited ratings must be lower on average.

However, Gan's analysis includes only US industrial firms, so that no general conclusions can be drawn with regard to the current debate that focuses primarily on non-US firms. In our paper, therefore, while we start from a similar analytical approach, we apply our empirical tests to a data set of non-US firms, which is moreover split into industry-specific sub-samples in order to derive more detailed results. In this way, we are able to appropriately comment on the different aspects of the current discussion, for instance with respect to the treatment of financial firms. The distinction between financial and non-financial companies is particularly interesting due to several reasons. First, Gan (2004) analyzed only a sample of non-financial firms. Hence, our study offers a neat comparison of results regarding US and non-US non-financial firms. Second, to the best of our knowledge, no one has ever yet investigated whether financial firms are treated differently than non-financial firms with regard to the assignment of unsolicited ratings. As earlier studies suggest that rating level differences seem to be particularly pronounced for (Asian) banks (see Poon and Firth (2005)), a distinction between non-financial and financial firms should yield further insight on this question.

As a first step, based on the model by Bannier and Tyrell (2006), our paper provides a theoretical framework for the adverse selection hypothesis and its empirical implications. We then test these on a data set of non-US firms rated by S&P in the period January 1996 to December 2005 by comparing empirical default rates of firms with unsolicited and with solicited ratings. We complement our study by an extensive number of robustness checks including, e.g., a consideration of aspects of rating horizon, defaults being rare events and the definition of default events. In line with Gan (2004), we find that the empirical default rates do not differ significantly, controlling for rating level, time, and regional effects. This suggests that rating level differences associated with these firms can be explained by factors exogenous to the rating process such as adverse selection. However, for financial firms, which were not analyzed by Gan (2004), we find weak evidence that empirical default rates do differ between firms with unsolicited and solicited ratings. Exogenous factors hence cannot (fully) explain the observed rating level differences, which leaves some space for deliberate action on the part of S&P to assign lower unsolicited ratings. As financial firms are often seen as more opaque than firms from other industries (Morgan (2002) and Hirtle (2006)),⁵ rating agency conservatism may be a reasonable (endogenous) explanation for our result. Still, unsolicited and solicited rating levels for financial firms relate to different empirical default rates and as such are not fully comparable, which, also from the agencies' viewpoint is not very desirable.

While our results do not intend to blame rating agencies for any persistent inaccuracies in unsolicited ratings, we conclude that ratings of non-US financial firms seem to be at least partly affected by factors endogenous to the rating process. Although we cannot confirm the implicit blackmailing accusations of other studies, we may state that the different treatment of solicited vis-à-vis unsolicited ratings is to the detriment of financial firms. Based on this, the uttered critical view on unsolicited ratings seems to be justified and regulators should carefully evaluate the use of unsolicited ratings for regulatory purposes. Moreover, our study underlines the importance of further research on the agencies' objectives in the rating process as this seems to be a significant but nevertheless

⁵However, the evidence regarding the opaqueness of banks is not unequivocal. Flannery et al. (2004) do conclude that banks are not more opaque.

not yet very well understood factor influencing capital markets.

The remainder of the paper is organized as follows. Section 2 describes a theoretical model of adverse selection and derives empirical predictions. Section 3 uses empirical default rates for our sample of non-US firms to test the theoretical implications and also provides some robustness tests. Section 4 is devoted to the discussion of our results, while Section 5 concludes.

2 Theoretical analysis

According to Gan (2004), differences between unsolicited and solicited rating levels stem from factors exogenous to the rating process, most prominently self-selection based on private information. However, there is no general consensus that adverse selection drives the observable rating level differences. Also, the discussion so far lacks a theoretical foundation for adverse selection arguments. The following paragraphs will therefore provide a theoretical framework that allows the derivation of an empirically testable adverse selection hypothesis.

In the following we consider a modified version of the model by Bannier and Tyrell (2006).⁶ Whereas the former rather narrowly analyzes the equilibrium implications of lenders' decisions to foreclose or withdraw loans based on rating information, our model focuses on a broader asset class by studying more generally investors' decisions to buy securities. Consider a risk-neutral firm that continually conducts business projects and has to issue claims to raise the necessary finance. In order to keep the analysis as simple as possible, we may assume that the firm conducts one project each period (the firm is hence equivalent to this project) and may therefore focus on only one period. After the publication of a (unsolicited or solicited) rating about the project's (i.e. the firm's) credit quality, risk-neutral market participants choose whether or not to invest, i.e. buy the issued claims. Again, in order to keep the analysis simple, we presume that the project will be successful only if sufficiently many investors donate financing. Otherwise it will be unsuccessful, yielding a payoff of zero (that does not suffice to repay investors).

The firm's project quality is represented by a random variable θ , which is normally distributed with mean y and variance $1/a$.⁷ The distribution of θ is assumed to be publicly known. The lower a , the higher is the firm's fundamental risk, since quality θ may then deviate strongly from the ex-ante expected value y . While the distribution of θ is commonly known, the realization θ , however, is not observable to market participants. Yet, we assume that investors receive individual private information about firm quality: $x_I|\theta \sim N(\theta, 1/b)$. The higher b , the more closely are investors' private signals distributed around the unknown quality θ . In this respect, b denotes the precision of investors' private information.⁸ Similarly, a rating agency collects private information about the

⁶The paper by Bannier and Tyrell (2006) focuses on the stabilizing, respectively destabilizing, effects that rating agencies may have on the capital markets. Our model, however, concentrates on the implications that rating actions have on the firms' decision to solicit a rating or not.

⁷Since we assume that one project is conducted at a time, the project's quality will subsume also the firm's quality in this period. We may therefore refer to the project's or firm's quality interchangeably.

⁸We may think of investors as institutional market participants who have both strong interest and

project (if the rating is solicited, this is based on a process of information sharing between firm and agency) that results in a private signal of $x_A|\theta \sim N(\theta, 1/c)$. Note that, conditional on θ , private signals are assumed to be independent of each other.⁹ The announced rating, z , may be seen as an additional public signal about the realized value of θ .

Investors dispose of one unit of capital and have to decide on whether to invest this unit into the firm's risky project by buying the firm's securities or to invest into a safe asset. The safe asset may be thought of as a simple storage technology. For the project to be successful, a proportion of $1 - \theta$ of the total investment has to be financed externally, i.e. via the buying of claims by investors. Firm quality θ hence represents the firm's ability to internally finance part of the project. If at least $1 - \theta$ of all investors decide to buy the firm's securities, the project will be successful and delivers a payoff of \bar{V} at maturity that allows a repayment of $R > 1$ to each of the investors. An unsuccessful project, in contrast, yields a payoff of zero and hence does not suffice to repay investors. Thus, the "better" the firm's quality, i.e. the higher θ , the higher is the proportion of total financing that the firm can bear internally and the higher is the probability that the project will be successful and debt will be repaid. The agency's rating therefore refers directly to the firm's credit quality.

The sequence of events in the model (that holds for each period) is then as follows:

- In t_{-2} , the firm announces her willingness to conduct a new business project and her need for debt financing. She offers a repayment of R per unit of debt at the project's maturity (t_{+1}). The firm additionally chooses whether or not to appoint a rating agency to assess the firm's quality.
- In t_{-1} , firm quality θ is realized. While its distribution is common knowledge in the market, the realization itself remains unobservable to market participants. Yet, investors observe individual private signals x_I about firm quality. The agency announces her rating, either solicited, z_S , or unsolicited, z_U .
- In t , investors decide on whether to buy the firm's securities (i.e. invest in the risky project) or the safe asset. Proceeds of the security's sales are invested into the firm's business project.
- In t_{+1} , if at least a proportion $1 - \theta$ of market participants decided to invest, the project yields a payoff of \bar{V} and repayment of R is guaranteed. If the project is not successful, in contrast, a payoff of zero is realized and no repayment to investors takes place.¹⁰

Investors' payoffs are summarized in Table 1. Here, l represents the aggregate amount of investment, i.e. the proportion of investors that decide to buy the firm's securities rather than the safe asset.

capability to collect private information about the firm.

⁹In essence, this assumption implies that signal errors, $\theta - x$, are independent of each other.

¹⁰Consider, for instance, that the project requires a certain amount of administrative duties that lead to relatively high sunk costs. The "real" investment process may start only after these costs are covered. If external financing is too low, the project cannot be successful and the initial amount of financing is "sunk" and cannot be recovered.

Table 1: Investors' strategies and payoffs

| | Project successful ($l \geq 1 - \theta$) | Project not successful ($l < 1 - \theta$) |
|--------------|---|--|
| Invest risky | R | 0 |
| Invest safe | 1 | 1 |

Assuming that investors' private information is sufficiently precise, the model can be solved for a unique equilibrium, using the global games approach.¹¹ As has been shown by Morris and Shin (2003; 2004), the equilibrium will be in trigger strategies, i.e. investors will invest into the risky project if they expect the firm's quality to be sufficiently good (higher than a unique threshold θ^*) and invest into the safe asset otherwise. Equilibrium derivation will then rely on a marginal investor who is indifferent between investing safe or risky. The unique threshold quality θ^* may be translated into a unique private signal x_I^* , below which investors will optimally invest into the safe asset and above which they will optimally buy the risky security of the firm. Proceeding backwards, we will then solve for the optimal firm decision on whether or not to appoint a rating agency to assess the firm's credit quality.

Indifference on the part of investors requires identical expected payoffs from investing safe or risky. Expectations are based on each investor's private information x :

$$\begin{aligned} \pi_I(\text{safe}) &= \pi_I(\text{risky}) \\ 1 &= R \cdot \text{prob}(\theta \geq \theta^* | x). \end{aligned} \quad (1)$$

Investors' (posterior) expectations with regard to firm quality are based on private and public information about θ . If the firm decided to appoint a rating agency, we assume that the solicited rating will be equivalent to the agency's private information, i.e. $z_S = x_A$. Investors' posterior beliefs are therefore distributed as follows

$$\theta | x_I, z_S \sim N\left(\frac{ay + bx_I + cz_S}{a + b + c}, \frac{1}{a + b + c}\right). \quad (2)$$

If the rating is not solicited, in contrast, we may assume that on average the unsolicited rating is equivalent to the mean of public information, i.e. $z_U = y$, so that investors' posterior beliefs are given as

$$\theta | x_I, z_U \sim N\left(\frac{2ay + bx_I}{2a + b}, \frac{1}{2a + b}\right). \quad (3)$$

Plugging these posterior beliefs in (1) delivers the respective indifference condition for the individual investor:

$$x_{I,S}^* = \frac{a + b + c}{b} \theta^* - \frac{a}{b} y - \frac{c}{b} z_S - \frac{\sqrt{a + b + c}}{b} \Phi^{-1}\left(\frac{R - 1}{R}\right), \quad (4)$$

¹¹A global game in the sense of Carlsson and van Damme (1993) is a game where each player noisily observes the game's payoff structure (i.e firm quality θ), which itself is determined by a random draw from a given class of games (in our case via a normal distribution). In the following, we will assume that investors' private information is always sufficiently precise, i.e. $b > \min\{(a + c)^2/(2\pi), 4a^2/(2\pi)\}$, so that a unique equilibrium is guaranteed. We may think of investors in our model as mainly institutional investors who usually hold own research departments that deliver sufficiently precise private information.

or

$$x_{I,U}^* = \frac{2a+b}{b}\theta^* - 2\frac{a}{b}y - \frac{\sqrt{2a+b}}{b}\Phi^{-1}\left(\frac{R-1}{R}\right). \quad (5)$$

Each investor will invest into the safe asset as long as his private signal indicates a low credit quality of the firm, i.e. if $x_I \leq x_{I,S}^*$ resp. $x_{I,U}^*$. Only for sufficiently high private signals $x_I > x_{I,S}^*$ resp. $x_{I,U}^*$ will investors buy the risky security issued by the firm.¹²

As the firm's project needs a critical mass of external financing in order to be successful, we can derive the equilibrium threshold θ^* that divides unsuccessful from successful projects. The project is on the brink of success if

$$\begin{aligned} 1 - \theta &= l = \text{prob}(x \geq x_{I,S}^* | \theta) \\ \theta &= \Phi(\sqrt{b}(x_{I,S}^* - \theta)), \end{aligned} \quad (6)$$

respectively, in the case of an unsolicited rating,

$$\theta = \Phi(\sqrt{b}(x_{I,U}^* - \theta)). \quad (7)$$

The condition considers that, due to the independence of private signals, the proportion of investors observing private signals above the threshold $x_{I,S}^*$ resp. $x_{I,U}^*$ (who are therefore investing in the risky security) is equivalent to the probability with which an individual investor observes a signal above $x_{I,S}^*$ resp. $x_{I,U}^*$.

Combining indifference equations (1) and (6), respectively (7), delivers the equilibrium firm quality:

$$\theta_S^* = \Phi\left(\frac{1}{\sqrt{b}}\left(a(\theta_S^* - y) + c(\theta_S^* - z_S) - \sqrt{a+b+c}\Phi^{-1}\left(\frac{R-1}{R}\right)\right)\right), \quad (8)$$

respectively

$$\theta_U^* = \Phi\left(\frac{1}{\sqrt{b}}\left(2a(\theta_U^* - y) - \sqrt{2a+b}\Phi^{-1}\left(\frac{R-1}{R}\right)\right)\right). \quad (9)$$

Whenever a firm quality below θ^* is realized,¹³ the project cannot be successful because too few investors decide to invest into the risky project and the firm will default on the existing claims.

From an ex-ante viewpoint, the default probability of the firm may therefore be measured by the probability that the realized firm quality will be below θ^* , i.e.

$$\text{prob}(\text{default}) = \text{prob}(\theta \leq \theta^*) = \Phi(\sqrt{a}(\theta^* - y)). \quad (10)$$

As can be seen, the probability of default increases in threshold value θ^* and in all parameters that raise this threshold.¹⁴

We may now proceed and solve for the firm's optimal decision on whether or not to appoint a rating agency. In order to keep the analysis as simple as possible, we assume

¹²One might think of institutional investors who are restricted to investment grade rated issues.

¹³In the following, we will distinguish between θ_S^* and θ_U^* only where necessary and write θ^* otherwise.

¹⁴This setup conveys a general functional idea that has also been derived elsewhere, see for instance Gordy (2003).

that the firm aims at maximizing her expected payoff. While with a successful project the firm may claim the difference $\bar{V} - R$ as her part of the project's profit, an unsuccessful project leaves the firm with a profit of zero. As long as $\bar{V} - R > 0$, the expected firm profit therefore simply hinges on the probability of the project's success, respectively the project's probability of default. Thus, the firm will appoint a rating agency if the announced solicited rating reduces the probability of default (i.e. threshold value θ^*) as compared to a situation where investors have to make their investment decision based on an unsolicited rating (i.e. whenever $\theta_S^* < \theta_U^*$).

Proposition 1 (Rating solicitation as adverse selection process) *Only those firms will appoint a rating agency to announce a solicited rating, who feel to be publicly “undervalued”, i.e. whose precision-weighted difference between the presumed solicited rating and the formerly publicly available information about firm quality is sufficiently high.*

Proof:

$$\begin{aligned}
\theta_S^* &< \theta_U^* \\
a(\theta_S^* - y) + c(\theta_S^* - z_S) - \sqrt{a+b+c}\Phi^{-1}\left(\frac{R-1}{R}\right) &< 2a(\theta_U^* - y) - \sqrt{2a+b}\Phi^{-1}\left(\frac{R-1}{R}\right) \\
cz_S - ay &> (c+a)\theta_S^* - 2a\theta_U^* - (\sqrt{a+b+c} \\
&\quad - \sqrt{2a+b})\Phi^{-1}\left(\frac{R-1}{R}\right) \quad (11)
\end{aligned}$$

q.e.d.

Alternatively, we may assume that by soliciting a rating the firm influences the precision of the agency's private information, c . This is due to the fact that by sharing private information about the firm's credit quality with the rating agency, the firm may increase the agency's private information precision c as compared to a situation without any information sharing. If, by doing so, the firm could decrease the threshold θ_S^* up to which the firm defaults, she will have an interest in soliciting a rating. The following proposition shows that only those firms will want to solicit a rating, i.e. to increase the agency's private information precision, who are certain to disclose sufficiently “good” information to the rating agency.

Proposition 2 *An appointment of a rating agency and the subsequent information sharing will be advantageous only for those firms, who may disclose sufficiently optimistic information about their credit quality.*

Proof:

$$\frac{\partial \theta_S^*}{\partial c} = \frac{\phi(\cdot) \frac{1}{\sqrt{b}}}{1 - \phi(\cdot) \frac{a+c}{\sqrt{b}}} \left[\theta_S^* - z_S - \frac{1}{2\sqrt{a+b+c}} \Phi^{-1}\left(\frac{R-1}{R}\right) \right] \quad (12)$$

The latter partial derivative is negative (positive) if $z_S = x_A > (<) \theta_S^* - \frac{1}{2\sqrt{a+b+c}} \Phi^{-1}\left(\frac{R-1}{R}\right)$.
q.e.d.

Obviously, therefore, only those firms will request a solicited rating who feel to be unfairly valued by the market and hence believe that their unsolicited rating is too low.

If they are confident that they may reveal much more optimistic private information to the agency, they will appoint the announcement of a solicited rating.

The hitherto derived theoretical results allow the formulation of the following testable hypothesis:

Hypothesis 1 (Adverse selection hypothesis)

Only firms of good quality, i.e. which are able to disclose sufficiently good private information about their credit quality, will request a solicited rating. Firms of poor credit quality will remain with an unsolicited rating. On average, both unsolicited and solicited ratings should therefore correctly reflect the firm's credit quality and coincide with observed default rates.

3 Empirical test of the adverse selection hypothesis

3.1 Descriptive statistics and univariate analysis of default frequencies

Our data set comprises S&P rating data for the time period January 1996 to December 2005 with a rating scale of 17 rating classes, ranging from 1 (AAA) to 17 (CCC to C). All rating data were extracted from Bloomberg and all unsolicited ratings were cross-checked with S&P's RatingsDirect. In contrast to Gan (2004), who had to rely on estimates of rating agency fees for bond issuers to differentiate between solicited and unsolicited ratings, we are able to use directly observable and hence more reliable rating information.

Additionally to the rating data, we record whether a company with a given unsolicited or solicited rating defaulted in the following one-year period, which we will refer to as realization period. For example, we use firm ratings per year-end of 1996 and note whether these firms defaulted or survived until the end of 1997. Then we use all ratings per year-end of 1997 and check whether these companies defaulted in 1998, etc. A default is defined as all D (regular or full default), SD (selected default¹⁵) and R ratings. An R rating indicates cases in which financial companies were regulated by national supervisory bodies. Since regulated companies cannot freely decide to continue their debt repayments, we treat them as defaults. We record default information for unsolicited as well as solicited ratings of all non-US firms rated by S&P from January 1996 to December 2005. Our sample thus covers the whole non-US universe of S&P ratings in this period. To exclude the potential effect of right censoring, which may bias the results as we do not know whether the companies would have been able to survive until the end of the realization period or not, we include only companies with valid rating information during the respective realization period. Thus, we exclude companies that exhibit withdrawn ratings that are assigned, for instance, because bonds have expired or called.¹⁶

¹⁵SD ratings were introduced by S&P in 1999 and refer to cases where the respective company stopped its debt service on some but not all of its outstanding obligations.

¹⁶Usually, researchers treat these cases of withdrawn ratings as non-informative (see e.g., Christensen et al. (2004)).

Table 2 provides a descriptive overview of the sectoral and regional distribution of our sample. Panel I shows the sample’s sectoral distribution. It is further subdivided into firm-year observations of companies that did not default in the subsequent one-year realization period and those who defaulted. Also, the table distinguishes between firms with solicited and unsolicited ratings. The category of other financials comprises asset managers, brokerage firms, and the like. The sample contains 9,721 (55.84%) firm-year observations for financial firms and 7,688 (44.16%) for non-financial firms. Of the financial firms 6,327 (65.09%) possess solicited ratings and 3,394 (34.91%) hold unsolicited ratings. In both groups only 14 firms, representing 0.22% of the firm-year observations with solicited and 0.41% with unsolicited ratings, defaulted in the observation period. The non-financial firm-year observations are made up of 6,809 (88.57%) cases with solicited ratings and 879 (11.43%) with unsolicited ratings. 79 (1.17%) non-financial firms with a solicited and 10 (1.15%) non-financial firms with an unsolicited rating defaulted in the observation period. The regional distribution, which is depicted in Panel II, shows that the majority of firms with a solicited rating comes from Europe, whereas the sample of firms with unsolicited ratings consists mainly of firms from both Asia and Europe. Most of the defaults (44 or 2.64% of all firm-year observations in that region) were observed in the South/Middle America region, followed by firms from Asia (32 or 0.80% of all firm-year observations in that region).

Tables 3 and 4 show the rating distribution per year as well as an univariate analysis of the rating level differences between solicited and unsolicited ratings. In Table 3 we first subdivide the sample into financial and non-financial firm-year observations and in a second step into survivors and defaults. Panel I contains the mean rating per year for the financial and Panel II contains the respective results for the non-financial firms.¹⁷ The mean rating per year was calculated by applying a numerical rating scale ranging from 1 (AAA) to 17 (CCC to C) and taking the last valid rating of each firm in a given year. We then simply computed the mean over all rating observations for each year, separately for survivors and defaulted firms with solicited and unsolicited ratings.

Table 4 presents univariate test results for the rating level differences. Panel I provides evidence for the whole sample. The mean rating for firm-year observations of firms that did not default is 7.41 for firms with a solicited rating and 9.79 for firms with an unsolicited rating. This results in a considerable mean rating difference of 2.38 notches. According to the t-test as well as the Wilcoxon signed ranks test this difference is significant on the 1%-level. The rating difference for the defaulted firms of 0.13 notches is negligible and not significant. To further assess the driver of these results, we analyze a sub-sample of firm-year observations including only those firms that survived the realization period. Panel IIa shows a substantial difference of 1.92 notches between solicited and unsolicited ratings of firms with an investment grade rating (BBB- or better). The rating difference for junk (worse than BBB-) rated firms of -0.36 notches, despite being significantly different from zero, seems to be economically negligible, however. Thus, the observed difference between solicited and unsolicited ratings seems to be mainly driven by investment grade rated firms that survived the realization period. Additionally, we find interesting results after subdividing the sample into financial and non-financial firms, which are presented in Panel IIb. The mean rating for firm-year observations of

¹⁷The rating distribution for the whole sample has been omitted due to space restrictions. Results are available upon request.

financial firms that did not default is 6.00 for firms with a solicited rating and 9.77 for those with an unsolicited rating. This results in a considerable mean rating difference of 3.77 notches. The respective rating difference for the non-financial firms amounts to moderate 1.12 notches. Both differences are highly significant.

We checked whether these results remain stable after applying historical default rates instead of the rating level.¹⁸ The former measure of default risk may be more appropriate because the relationship between default risk and ratings is non-linear (e.g. Jorion and Zhang (2007)). Thus, we redid the univariate analysis with smoothed (see Bluhm et al. (2002)) historical default frequencies. To reduce the effect of annual variations in the default rates we used S&P's long-year average over the years 1981-2005 (S&P (2006)). Whereas differences for the firm-year observations of financial firms are still significant on the 1%-level according to both the t-test and the Wilcoxon signed ranks test within the group of survivors, we find that differences in the default frequencies become negative for non-financial firms.¹⁹ For financial firms results are even stronger than in the case of rating levels. While the mean default frequency for firm-year observations of financial companies with solicited ratings equals 0.47%, it more than triples to 1.48% for respective observations with unsolicited ratings.

Summing up, the univariate results suggest that unsolicited ratings of non-defaulting financial firms are too low compared to firms with solicited ratings. Lacking any default event in the observation period, there is no obvious reason for a significant rating difference. This finding may be a first hint that rating level differences for financial firms may not entirely be explained by exogenous, adverse selection arguments. In a next step, we analyze whether the results hold also in a multivariate regression setting.

3.2 Ex-post analysis of empirical default rates

Our basic multivariate analysis is similar to the one undertaken by Gan (2004). To test for differences in the empirical default rates we employ a pooled logit regression model. We define $default_i$ as a dummy variable indicating whether company i defaulted in the realization period (one for default, zero otherwise), and $default_i^*$ as the unobserved linking variable, which is continuous and ranges over the set of real numbers. Hence, we estimate

$$default_i^* = \alpha + \beta_1 \cdot rating_i + \beta_2 \cdot unsolicited_i + \gamma \cdot D + \epsilon_i \quad (13)$$

with

$$default_i = \begin{cases} 1 & \text{if } default_i^* > 0, \\ 0 & \text{if } default_i^* \leq 0, \end{cases}$$

where $rating$ is the rating level of the estimation period expressed as numerical value for company i between 1 (AAA) and 17 (CCC to C) that is followed by the realization period in which the default status is recorded. $Unsolicited$ represents a dummy for the

¹⁸In our robustness check in Section (3.3.1) we further discuss this issue.

¹⁹Test results are not displayed here but are available on request.

rating status (1 for unsolicited, 0 for solicited ratings). In addition, γ is a vector of coefficients for a vector of dummy variables, D , for six²⁰ of the nine realization periods, four business sector dummies, and four region dummies. The year-dummies are necessary to control for varying macroeconomic environments, which are known to affect firms' default probabilities (e.g. Nickell et al. (2000) and Bangia et al. (2002)). Since rating agencies claim that their rating assessments are consistent over all covered business sectors and regions, in principal, no further controls should be necessary. However, particularly in light of our univariate analysis that delivers differing results for financial and non-financial firms, we control for business sector differences in the default frequencies by assigning our observations into five different sub-samples: banks, insurance companies, other financial firms, utilities, and other non-financial firms. Due to the higher number of default observations, the latter category usually serves as the reference group. Additionally, since prior research found particularly pronounced results for Asia, region dummies are built for Asia, Europe, North America, South and Middle America and others. The latter comprises firms from Africa, the Pacific region and the Arabian Peninsula. Usually, and again due to the higher number of default observations, South and Middle America serves as the reference group.

If unsolicited ratings were inadvertently too low we would not expect any significance in the unsolicited dummy. As a reason, consider that if unsolicited ratings properly reflected the default risk of a firm, the empirical default rates should not differ significantly from the default rates of firms with solicited ratings. Rather, adverse selection arguments should lead firms with positive internal information to order a paid rating while firms with weak internal information should stick to the unsolicited rating. Therefore, from an ex-post point of view, there should be no differences between unsolicited and solicited ratings even though the unsolicited ratings show lower levels than the solicited ratings. However, if unsolicited ratings are too low because of endogenous reasons within the rating process then they should be associated with lower empirical default rates. In this case the unsolicited dummy in the regression model would be significantly negative.

Table 5 contains the results of the logit model (13) with one-year realization periods. Regression model I (columns 2 and 3) contains the coefficients and the p-values for the total sample. As can be seen, firms with a lower rating level default significantly more often. The unsolicited dummy is negative but not significantly different from zero, which indicates that, based on the total sample results, exogenous reasons such as adverse selection indeed seem to drive the differences between solicited and unsolicited rating levels. Except for the year 2003, all year dummies are significantly positive. This indicates that default rates are higher than in the reference years 1996, 1997 and 2004. Regarding the business sector dummies, only banks experienced lower default rates than the reference group of other non-financial firms. Additionally, three of four region dummies - Asia, Europe, and Else (Africa, the Pacific region and the Arabian Peninsula) - showed lower default rates than the reference region South and Middle America.

Regression model II (columns 4 and 5) contains the results for a sub-sample including

²⁰We were forced to exclude the dummy variables for the years 1996, 1997, and 2004 because in this time period we did not record any default event.

only Asian firms. In this model, we employ utility and other non-financial firms together as the reference group, since we observed no default in the former business sector. Earlier studies have highlighted that unsolicited ratings of Asian firms, particularly Asian banks, seem to be considerably lower than solicited ratings of Asian firms (Poon and Firth (2005)), which led to the abandoning of the use of unsolicited ratings for regulatory purposes in Japan. As can be seen, the rating level is significantly positive, and the unsolicited dummy is again not significantly different from zero. This finding does not lend support to the critical view on unsolicited ratings in Asia. It rather suggests that existing rating level differences between solicited and unsolicited ratings develop inadvertently, for instance because of adverse selection. We also find a significantly negative coefficient for the bank dummy, indicating that Asian banks defaulted significantly less often in the observation period.

Regression model III (columns 6 and 7) contains the results for all non-Asian firms. The results for this model are very similar to the ones for the total sample. Again, the rating level is significantly positive and the unsolicited dummy not significant.

Finally, we subdivide our sample in financial (regression model IV in columns 8 and 9) and non-financial firms (regression model V in columns 10 and 11). For the financial firms we find a negative unsolicited dummy, which is significant on the 1% level. This is in line with the univariate results. We also observe that insurance companies defaulted significantly less often than banks. For the non-financial firms we fail to detect statistical significance of the unsolicited dummy, a finding, that is also in line with the univariate results. Our findings for non-financial firms hence support the implications of our theoretical model. However, for financial firms, rating level differences seem not to be fully explained by adverse selection arguments.²¹

Since we use longitudinal data, we could also have employed a (logit) panel model alternatively to the pooled regression approach. Since in the non-linear case, fixed effects models include only those observations with a change in the dependent variable over time, this would have reduced our sample to the few companies with default events. Thus, only random effect models are feasible. However, it is not very plausible for our sample to assume the observations to be random draws from a large population because we cover the whole non-US market. We therefore decided against using a panel approach.²²

3.3 Robustness tests

As our empirical results may depend on the choice of underlying assumptions for the analytical approach employed, this section provides a series of tests to diagnose the robustness of our results. We first use default frequencies as an explanatory variable

²¹We have analyzed whether we find rating level differences for industrial as well as financial firms in our sample (controlled for publicly available information). For both types of firms we can confirm that rating levels of unsolicited ratings are lower than rating levels of solicited ratings, *ceteris paribus*. The results are available on request.

²²Notwithstanding our reservations against a panel analysis, we employed it as a robustness check. We find that results remain qualitatively the same as in the pooled logit approach. The unsolicited dummies stay insignificant for all samples except the one including financial firms. In the latter case, the unsolicited dummy is negative, but only weakly significant.

instead of the rating level, then we extend the realization period from a one-year to a three-year period to better match the long-term through-the-cycle character of credit ratings. We also run all regression models with a reduced sample of the survivors to have a better balance between the survivors and the rather small number of defaults. Finally, we discuss the impact of the exclusion of withdrawn ratings from the analysis. One further robustness test that has been suggested by Gan (2004) is the use of the Altman (1968) z-score as dependent variable instead of the default-dummy. We do not employ this robustness test here for two reasons. First, our sample consists of non-financial and financial firms. Whereas for the former, at least for the non-utility firms, the use of the Altman z-score as an alternative credit risk measure may be appropriate, it is not applicable for financial firms. Although we could calculate the z-score for banks (see Boyd et al. (1998) for a discussion of the z-score for banks) instead of the Altman z-score, we would still have difficulties with insurance companies and other financial firms. Yet, an even more important argument for not doing this robustness test is that any kind of credit risk score is based on publicly available accounting information. As the unsolicited ratings (completely) as well as the solicited ratings (to a considerable extent) are based on publicly available accounting information, too, this kind of analysis is likely to suffer from serious endogeneity problems. We therefore decided to omit this analysis and rather focus on the variants mentioned above.

3.3.1 Default frequencies

In section 3.1 we already employed default frequencies instead of numerical rating levels since the use of the latter implies a linear relationship between the rating and the default probability expressed by the rating. However, in reality the relationship between the rating and the default probability is highly non-linear (see Jorion and Zhang (2007) for a discussion). Whereas only small increases in default rates are associated with a rating downgrade of highly rated issuers, say from AAA to AA-, default rates increase significantly for non-investment grade rated companies. We hence substitute the rating level in our regression models with the long-term average default frequency. We use S&P's average default rates per rating class over the years 1981 to 2005 (S&P (2006)). As empirical default frequencies tend to be erratic, we smooth them exponentially²³ in order to obtain strictly monotonically increasing default rates for deteriorating credit ratings.

The results for all five pooled logit models are displayed in Table 6. Confirming our earlier results, the unsolicited dummy is not significantly different from zero for the whole sample, for firms from Asia only, and for firms from non-Asian countries only. For non-financial firms, however, the unsolicited dummy turns out to be significantly positive which is evidence that default rates are higher for companies with an unsolicited rating.²⁴ In addition, for financial firms the unsolicited dummy is not significant anymore. This suggests that our prior finding of too low unsolicited ratings for financial firms is not robust to the substitution of the rating level with the empirical default rates. The default frequency itself is highly significant in all regression models, indicating that

²³Bluhm et al. (2002) provide a description of exponential smoothing.

²⁴This result should be taken with caution, however, as there are no plausible explanations for "too good" unsolicited ratings.

firms with a higher default probability default significantly more often. The results for the control variables of the different regression models are mostly qualitatively similar to the prior results.

Despite the argument that default rates should catch the increasing default risk more appropriately than the rating levels, the adjusted McFadden R^2 is always lower in the robustness test than in the basic analysis of section 3.2. This is particularly striking for the case of financial firms, where the adjusted McFadden R^2 drops from 0.31 to 0.22.

3.3.2 Three-year realization periods

It is a well-established fact that external credit ratings intend to “look through the business cycle” and are thus long-term estimates for default risk (see, e.g., Cantor (2001) and Löffler (2004)). Hence, in order to match S&P’s rating approach more closely, we also employed three-year instead of one-year realization periods. We use three points in time, the ends of 1996, 1999 and 2002, with three realization periods spanning the years 1997-1999, 2000-2002 and 2003-2005. The results of the univariate analysis of these realization periods, which are not displayed here, are similar to the results for the one-year realization periods. For the survivors, the mean solicited rating is 7.05 and the mean unsolicited rating is 9.71. The resulting rating difference of 2.66 notches is significant on the 1%-level for both the t-test and the Wilcoxon signed ranks test. For the defaults the mean unsolicited rating is 1.09 notches worse than the mean solicited rating.

We again estimated the five pooled logit models to see whether the results from the univariate analysis hold in a multivariate setting and whether our results from the basic analysis remain stable. Table 7 contains the results. The results for the whole sample (model I), for Asian firms (model II), and for non-Asian firms are the same as before, the unsolicited dummy is not significantly different from zero. In addition, for financial firms only (model IV) as well as for non-financial firms (model V) we do not detect significance for the unsolicited dummy. It hence seems that the finding of significantly lower defaults for financial firms with unsolicited ratings from our basic analysis does not hold when we use three-year realization periods instead of the nine one-year realization periods. However, despite the fact that longer realization periods are better suited to S&P’s rating approach, this procedure yields much smaller sample sizes than in the case of the nine one-year realization periods. As we require valid rating information during the respective realization period, less companies fulfill this criterion for the longer realization periods. For the total sample, the number of firm-year observations drops from 17,409 to 4,534. Even more crucial is the decrease in the number of defaults from 117 to 89 observations. Also, the explanatory power of all models measured by the adjusted McFadden R^2 goes down considerably.

3.3.3 Rare event adjustment

Admittedly, our data set suffers from a quite low number of observed defaults in the observation period, especially among the group of financial firms. Employing standard statistical procedures in this case tends to underestimate the probability of these rare default events (King and Zeng (2001)). As a further robustness test we therefore re-

duce the number of survivors in the sample in order to obtain a better balance between survivors and defaults. Instead of using the entire sample, we therefore run the regressions on samples including all defaults but only 10% of the survivors. We use randomly stratified samples that match the business sector and rating status (solicited versus unsolicited) distribution of the samples with the complete number of survivors. In order to obtain consistent coefficients we only have to adjust the estimated intercept, $\hat{\alpha}$, by

$$\hat{\alpha} - \ln \left[\left(\frac{1 - \tau}{\tau} \right) \left(\frac{1 - \hat{y}}{\hat{y}} \right) \right] \quad (14)$$

with τ as the mean default frequency before and \hat{y} as the mean after the sampling procedure. We then run the pooled logit models I-V for the new samples. Table 8 presents the results. As can be seen, we obtain a significantly negative unsolicited dummy for financial firms. This supports our finding from the basic analysis that financial firms with unsolicited ratings seem not to default sufficiently often given their rating levels. The remaining results regarding the unsolicited dummy are as before.

3.3.4 Withdrawn ratings

In general, credit ratings are withdrawn by rating agencies because bonds have expired or called. Usually, researchers treat these cases of withdrawn ratings as non-informative (see e.g., Christensen et al. (2004)). However, in our case the exclusion of withdrawn ratings from the analysis is a potential driver for the results we obtained. Since it is quite likely that defaults occur after the rating withdrawal, we analyze whether excluding the sub-sample of withdrawn ratings influences our results. Although we are not able to track the default history of companies with a withdrawn rating beyond the day of the withdrawal, descriptive analysis of the respective sub-sample should reveal whether it exhibits problematic features.

We find that the number of withdrawn ratings for the case of the one-year realization periods is rather small. For the sub-sample of firms with unsolicited ratings they account for 8.69% of all ratings, for the firms with solicited ratings they account for 2.72% of all ratings. For the total sample, the ratio is 4.19% of all rating observations in the sample period. The fact that the ratio is higher for firms with unsolicited ratings seems plausible since the outstanding bond volume of companies with unsolicited ratings is smaller on average and it should thus be more probable that the companies' bonds expire or are called.

More important is the mean rating of the sub-sample of firms with a withdrawn rating. To calculate the means, we use the last available valid rating information before the rating withdrawal. For the whole sample, the mean solicited rating equals 8.56 and is thus 1.15 numerical notches lower than the mean rating for survivors in Table (3). The mean unsolicited rating equals 10.53 and is therefore only 0.74 lower than the results for the survivors with valid rating information. Both mean ratings are far higher than the mean rating for the defaulted firms, which equals 15.08 for the firms with solicited and 15.21 for the issuers with unsolicited ratings.²⁵ Since the differences between firms

²⁵Because of the low absolute number of withdrawn ratings, it is not reasonable in this case to

with valid rating information and between firms with withdrawn ratings in the following year as well as the overall number of withdrawn ratings seem to be rather negligible, we are confident that our exclusion of companies with withdrawn ratings does not bias the results.

4 Discussion of results

Based on our theoretical framework we suggested that adverse selection effects may drive existing differences between solicited and unsolicited rating levels. Consequently, empirical default rates of firms from the two groups should coincide. For non-financial firms we could not reject this hypothesis - in line with earlier findings by Gan (2004) on a sample of US industrial firms. For these firms factors exogenous to the rating process hence seem to play a major explanatory role. The critical view on unsolicited ratings by some market participants and observers therefore does not seem to be fully justified, and the abolishment of unsolicited ratings for regulatory purposes becomes questionable.

On the other hand, we find evidence that unsolicited ratings of financial firms are too low given their ex-post default rates. This result has not been reported in any of the earlier studies, which did not include financial firms. It suggests that for financial firms the observed differences in solicited and unsolicited rating levels seem to be - at least partly - driven by factors endogenous to the rating process. While Poon and Firth (2005) already highlighted that unsolicited ratings seem to be lower than solicited ratings for Asian banks, our study would add the further result that they are not only lower but too low given the realized default levels. However, it seems that this is not only the case in Asia but generally in other regions outside the US. In fact, we did not find any peculiarities associated with Asian firms in our data. Our results hence display a certain validation of blackmailing accusations that have recently been voiced. Interestingly, the blackmailing argument is somewhat analogous to empirical findings in the area of stock recommendations. Stock analysts in investment banks in essence face a similar problem as rating agencies. On the one hand, their compensation often relies on the analyst's "helpfulness" to the corporate finance division. For example, a better recommendation after an IPO might enhance the probability that the company will include this investment bank in the consortium of the next security issuance. On the other hand, an analyst's (external) reputation depends heavily on her forecasting quality. The blackmailing argument, which could potentially explain rating level differences of financial firms with unsolicited ratings, may therefore be related to the literature on analyst recommendations.

In this respect, Michaely and Womack (1999) find for IPOs that in the month after the quiet period,²⁶ lead underwriter analysts issue 50% more buy recommendations than do analysts of other investment banks. Second, they observe significantly inferior short and long performance of lead underwriters' buy recommendations. In the latter

distinguish between financial and non-financial firms. The comparison of the mean ratings is therefore based on the whole sample of firms with solicited and unsolicited ratings.

²⁶The quiet period lasts 25 days after the company's IPO. In this period, analysts are not allowed to disclose earnings estimates and the like to the public.

case, the difference between the underwriter's and non-underwriter's mean size-adjusted buy-and-hold return accounts for more than 50% for a two year period beginning after the IPO. In a more recent paper, Barber et al. (forthcoming) test the SEC's accusation against several investment banks that analysts' conflicts of interest resulted in a reluctance to downgrade buy-rated stocks during the bear market of the early 2000s. In a sample period from 1996 to mid-2003, they find that independent research firms' buy recommendations outperform those of the investment banks by a daily abnormal return of 3.1 basis points. Partitioning the time frame into the period prior to the market peak in March 2000 and afterwards (the bear market), Barber et al. observe that investment banks' buy recommendations following equity offerings significantly underperform the congruent buy recommendations of independent research firms by 8.7 basis points during the bear market. These results parallel our finding that unsolicited ratings of financial firms may to some extent be driven by endogenous reasons.

A number of words of caution with regard to our findings are, however, warranted. First, the finding of too low unsolicited ratings of financial firms is not robust to several changes of the underlying assumptions. When we use the default frequency instead of the rating level as explanatory variable or employ longer (three-year) realization periods, the unsolicited dummy is no longer significantly different from zero. Yet, our basic model specification seems to be best suited to the question at hand as it yields considerably higher explanatory power. The unsolicited dummy also remains significantly negative when we use a reduced sample including only 10% of the survivors and if we use a random effects panel model. The disappearing significance of the unsolicited dummy may be explained by the very low number of defaults in the sub-sample of financial firms, which makes it extremely difficult to produce statistically robust results. One reason for the low number of defaults associated with financial firms could be that the sub-sample of financial firms includes so-called unobservable defaults. An unobservable default takes place when a financial firm is close to default but does not actually default because it is part of a group (for instance a banking group) and the other group members step in to repel the default.

Second, we do not find any direct empirical evidence for the blackmailing argument. Strong conservatism on the part of the agencies cannot be ruled out as a driver for the too low level of unsolicited ratings of financial firms. A high level of reputation is crucial for agencies' business success as otherwise issuers will be uneager to pay for a rating. As unsolicited ratings are based on publicly available information, that is, a reduced information set, only, unsolicited ratings necessarily contain more noise than solicited ratings. Obviously, the assignment of a too good unsolicited rating to a firm that subsequently defaults would pose a more severe problem for the reputation of a rating agency than the assignment of a too low unsolicited rating to a firm that subsequently does not default. To preserve their reputation rating agencies may therefore tend to be more conservative when assigning unsolicited ratings. This argument is particularly compelling for financial firms that are often said to be more opaque (see Morgan (2002) and Hirtle (2006)). Consequently, publicly available information about financial firms is less informative than that about non-financial firms, which would explain the tendency to be overly conservative when assigning unsolicited ratings to financial firms.

5 Conclusion

In this study, we analyzed possible reasons for rating level differences between unsolicited and solicited ratings. We argue in a theoretical framework that unsolicited ratings may be lower than solicited ratings due to reasons purely exogenous to the rating process such as adverse selection. We collect data of non-US firms in the time period January 1996 to December 2005 and test the adverse selection hypothesis by comparing ex-post default rates of firms with unsolicited and those with solicited S&P ratings. For non-financial firms we cannot reject the adverse selection hypothesis, as empirical default rates seem to be adequate for both rating types. This result is in line with the finding of Gan (2004) for a sample of US firms. However, for the sub-sample of financial firms our results indicate that unsolicited ratings are not only lower than solicited ratings, but that they are too low given the empirical default rates. These findings suggest that the observed rating level differences for these firms are not only driven by factors exogenous to the rating process, but also to some extent by endogenous reasons. However, since we do not find a consistent pattern of too low default rates across all business sectors, the frequently uttered blackmailing accusation associated with unsolicited ratings of US rating agencies appears to be not entirely plausible. We rather favor the conservatism argument according to which rating agencies tend to be overly conservative when assigning unsolicited ratings to financial firms because these firms are perceived to be more opaque than non-financial firms. In order to preserve their reputation, a rating agency might hence tend to be more conservative when assigning unsolicited ratings to these firms.

The ultimate question is, of course, what the economic costs of too low unsolicited ratings are and who bears them. Naturally, the rated firms themselves suffer as the assigned ratings determine their funding costs. If the rating level is too low given the true creditworthiness, this unnecessarily drives up funding costs. This argument is even strengthened by the regulatory use of unsolicited ratings. It is questionable, however, whether investors are adversely affected by the bias in unsolicited ratings as well. It may even be conceivable that investors do not object to the downward bias if they succumb to the same degree of risk aversion as the rating agencies. Still, any bias between solicited and unsolicited ratings creates a framework in which the two types of ratings are no longer comparable as they refer to different levels of ex-post default probability. In the long run, this should not leave the agencies' reputation unaffected.

The often-voiced critical view on unsolicited ratings of financial firms therefore seems to be justified. Policymakers should hence carefully evaluate the use of unsolicited ratings for regulatory purposes. However, even though endogenous effects in the rating process seem to play a role for the reported lower unsolicited rating levels of financial firms, our results should be taken as only a first, yet significant, step in investigating the rating process more closely. As our results for the sub-sample of financial firms are not totally robust to changes of the employed empirical tests, a considerable amount of caution in interpreting these results is warranted.

Table 2: This table shows the sectoral (Panel I) and regional (Panel II) distribution of the sample. We use S&P rating data for the time period January 1996 to December 2005. Rating and default data are extracted from Bloomberg, data on unsolicited ratings are cross-checked with RatingsDirect. In Panel II, North-America contains Canada, Else contains Africa, the Arabian Peninsula and the Pacific region.

| Panel I: Business sector | Banks | Insurance | Other fi- nancials | Utilities | Other non- financials |
|--------------------------|-------|-----------|-----------------------|-------------------------|--------------------------|
| Survivors | | | | | |
| Solicited Ratings | 2,983 | 2,089 | 1,241 | 1,195 | 5,535 |
| Unsolicited Ratings | 1,130 | 2,170 | 80 | 39 | 830 |
| Defaults | | | | | |
| Solicited Ratings | 5 | 5 | 4 | 12 | 67 |
| Unsolicited Ratings | 4 | 10 | 0 | 0 | 10 |
| | | | | | |
| Panel II: Region | Asia | Europe | North America | South/Middle America | Else |
| Survivors | | | | | |
| Solicited Ratings | 2,199 | 6,391 | 1,359 | 1,463 | 1,631 |
| Unsolicited Ratings | 1,790 | 1,751 | 51 | 206 | 451 |
| Defaults | | | | | |
| Solicited Ratings | 14 | 20 | 16 | 41 | 2 |
| Unsolicited Ratings | 18 | 3 | 0 | 3 | 0 |

Table 3: This table shows the mean year-end ratings for all firms in our sample grouped into sub-samples of survivors and defaults according to the following one-year realization period. We use rating data from S&P in the time period January 1996 to December 2005. Rating and default data were extracted from Bloomberg, data on unsolicited ratings were cross-checked with RatingsDirect. The ratings are translated into a numerical rating scale ranging from 1 (AAA) to 17 (CCC to C). Panel I shows the mean numerical rating level at a certain point in time for all survived (Panel Ia) and defaulted (Panel Ib) financial firms with solicited and unsolicited ratings. Panel II provides the respective information for the non-financial firms.

| | Rating per year-end of | | | | | | | | | | | Sum | Mean |
|---------------------------------|------------------------|--------|---------|---------|---------|---------|---------|---------|---------|---------|------|-----|------|
| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | | |
| Panel I: Financials | | | | | | | | | | | | | |
| Ia) Survivors | | | | | | | | | | | | | |
| Number of solicited ratings | 352 | 460 | 555 | 636 | 695 | 778 | 869 | 945 | 1.023 | 6,313 | | | |
| Mean solicited rating | 4.9148 | 5.4152 | 5.5550 | 5.5991 | 5.6676 | 5.8702 | 6.3418 | 6.5439 | 6.6442 | 5.9976 | | | |
| Number of unsolicited ratings | 46 | 387 | 477 | 510 | 464 | 426 | 366 | 359 | 345 | 3,380 | | | |
| Mean unsolicited rating | 10.2391 | 9.6512 | 9.6625 | 9.6569 | 9.4741 | 9.7465 | 9.9836 | 10.0780 | 10.0725 | 9.7737 | | | |
| Ib) Defaults | | | | | | | | | | | | | |
| Number of solicited ratings | 0 | 0 | 6 | 2 | 2 | 2 | 1 | 1 | 0 | 14 | | | |
| Mean solicited rating | 0.0000 | 0.0000 | 16.0000 | 15.0000 | 9.5000 | 13.5000 | 17.0000 | 16.0000 | 0.0000 | 14.6429 | | | |
| Number of unsolicited ratings | 0 | 0 | 1 | 3 | 6 | 2 | 1 | 0 | 1 | 14 | | | |
| Mean unsolicited rating | 0.0000 | 0.0000 | 17.0000 | 15.0000 | 13.5000 | 14.0000 | 15.0000 | 0.0000 | 17.0000 | 14.5000 | | | |
| Panel II: Non-financials | | | | | | | | | | | | | |
| IIa) Survivors | | | | | | | | | | | | | |
| Number of solicited ratings | 273 | 401 | 527 | 638 | 751 | 865 | 949 | 1.094 | 1.232 | 6,730 | | | |
| Mean solicited rating | 7.2381 | 8.0000 | 8.5370 | 8.5784 | 8.6418 | 8.7249 | 8.8514 | 9.0356 | 9.1688 | 8.7331 | | | |
| Number of unsolicited ratings | 1 | 60 | 80 | 118 | 157 | 160 | 107 | 97 | 89 | 869 | | | |
| Mean unsolicited rating | 15.0000 | 9.0500 | 9.4875 | 9.9492 | 10.1210 | 10.2813 | 9.6636 | 9.7526 | 9.6742 | 9.8573 | | | |
| IIb) Defaults | | | | | | | | | | | | | |
| Number of solicited ratings | 0 | 0 | 9 | 3 | 16 | 37 | 9 | 4 | 1 | 79 | | | |
| Mean solicited rating | 0.0000 | 0.0000 | 14.3333 | 12.0000 | 15.6875 | 15.0000 | 16.2222 | 15.7500 | 17.0000 | 15.1519 | | | |
| Number of unsolicited ratings | 0 | 0 | 1 | 4 | 1 | 1 | 3 | 0 | 0 | 10 | | | |
| Mean unsolicited rating | 0.0000 | 0.0000 | 15.0000 | 16.0000 | 15.0000 | 17.0000 | 17.0000 | 0.0000 | 0.0000 | 16.2000 | | | |

Table 4: This table shows univariate test results of rating levels differences between solicited and unsolicited ratings for different sub-samples. Rating and default data were extracted from Bloomberg, data on unsolicited ratings were cross-checked with RatingsDirect. The former is translated into a numerical scale ranging from 1 (AAA) to 17 (CCC to C). We conduct the analysis for the whole sample (Panel I) and for firm-year observations of companies that survived the one-year realization period (Panel II). Panel IIa shows firm-year observations of firms with investment grade and junk (worse than BBB-) ratings. Panel IIb provides rating level differences between firm-year observations of financial and non-financial firms. The third column provides the mean rating before the realization period and the fourth column the respective difference between firm-year observations of companies with unsolicited and solicited ratings. The fifth and sixth column show the p values of the t-test and the Wilcoxon signed ranks test.

| | Observations | Mean rating | Difference | t-test p value | Wilcoxon p value |
|-----------------------|--------------|-------------|------------|----------------|------------------|
| Panel I: Whole sample | | | | | |
| Survivors | | | | | |
| Solicited Rating | 13,043 | 7.4091 | | | |
| Unsolicited Rating | 4,249 | 9.7908 | 2.3817 | <.0001 | <.0001 |
| Defaults | | | | | |
| Solicited Rating | 93 | 15.0753 | | | |
| Unsolicited Rating | 24 | 15.2083 | 0.1331 | 0.9388 | 0.7810 |
| Panel IIa: Survivors | | | | | |
| Investment grade | | | | | |
| Solicited Rating | 10,426 | 5.8718 | | | |
| Unsolicited Rating | 2,669 | 7.7898 | 1.9180 | <.0001 | <.0001 |
| Junk Rating | | | | | |
| Solicited Rating | 2,617 | 13.5338 | | | |
| Unsolicited Rating | 1,580 | 13.1709 | -0.3629 | <.0001 | <.0001 |
| Panel IIb: Survivors | | | | | |
| Financial | | | | | |
| Solicited Rating | 6,313 | 5.9976 | | | |
| Unsolicited Rating | 3,380 | 9.7737 | 3.7760 | <.0001 | <.0001 |
| Non-financial | | | | | |
| Solicited Rating | 6,730 | 8.7331 | | | |
| Unsolicited Rating | 869 | 9.8573 | 1.1242 | <.0001 | <.0001 |

Table 5: This table shows the results for the ex-post analysis of the empirical default rates using a pooled logit regression approach. The dependent variable takes the value one in case of a default and zero if the firm has survived the next one-year realization period. The independent variables are: unsolicited signifies a dummy for rating solicitation (1 for unsolicited ratings, 0 else), rating indicates the rating level of the estimation period expressed as numerical value for company i between 1 (AAA) and 17 (CCC to C) that is followed by the realization period in which the default status is recorded, and the years 1998 to 2003 control for different macroeconomic environments between the realization periods (the years 1996, 1997 and 2004 with very low default frequencies serve as the reference period). North America contains Canada, and Else contains firms from Africa, the Arabian Peninsula and the Pacific region. In all models, other non-financial firms and firms from South and Middle America serve as the reference. In cases of sub-samples, where we did not observe any default in a certain region or business sector, we omit the respective variable. Regression Model I comprises the whole sample, Model II only Asian firms, Model III includes only firms with a non-Asian headquarter. Regression Model IV comprises only financial and Model V only non-financial firms. We use robust Huber/White sandwich variance estimates (White (1980)).

| Independent variable | (I) | | (II) | | (III) | | (IV) | | (V) | |
|----------------------|--------------|---------|-------------|---------|-------------|---------|-------------|---------|----------------|---------|
| | Whole sample | | Asia | | Non-Asia | | Financials | | Non-financials | |
| | Coefficient | p value | Coefficient | p value | Coefficient | p value | Coefficient | p value | Coefficient | p value |
| Intercept | -14.2005 | <.0001 | -16.1020 | <.0001 | -14.2180 | <.0001 | -15.1613 | <.0001 | -15.1565 | <.0001 |
| Unsolicited | -0.4100 | 0.3180 | 0.2731 | 0.6438 | -1.0127 | 0.1955 | -1.5142 | 0.0097 | 0.7490 | 0.1289 |
| Rating level | 0.6077 | <.0001 | 0.7213 | <.0001 | 0.5770 | <.0001 | 0.6414 | <.0001 | 0.6411 | <.0001 |
| Year 1998 | 3.3643 | <.0001 | 2.6418 | 0.0131 | 3.4448 | 0.0013 | 2.9642 | 0.0083 | 3.7443 | 0.0004 |
| Year 1999 | 2.8392 | 0.0002 | 2.2215 | 0.0406 | 2.8562 | 0.0096 | 2.6903 | 0.0196 | 3.0613 | 0.0042 |
| Year 2000 | 3.4640 | <.0001 | 2.1918 | 0.0432 | 3.9845 | 0.0001 | 3.2492 | 0.0031 | 3.7516 | 0.0003 |
| Year 2001 | 3.5901 | <.0001 | 1.1449 | 0.3329 | 4.3089 | <.0001 | 2.0999 | 0.0670 | 4.1535 | <.0001 |
| Year 2002 | 2.2838 | 0.0028 | 1.1830 | 0.2969 | 2.7714 | 0.0082 | 0.9346 | 0.4469 | 2.8196 | 0.0070 |
| Year 2003 | 1.1826 | 0.1617 | 0.2985 | 0.8340 | 1.6494 | 0.1420 | 0.2745 | 0.8469 | 1.6245 | 0.1497 |
| Bank | -1.0892 | 0.0069 | -1.2484 | 0.0440 | -0.7237 | 0.1369 | | | | |
| Insurance | 0.1563 | 0.7448 | 0.4517 | 0.4715 | 0.0742 | 0.9252 | 1.7068 | 0.0025 | | |
| Other financial | 0.3823 | 0.4720 | 1.4576 | 0.0355 | -0.1028 | 0.8957 | 1.2019 | 0.0525 | | |
| Utilities | 0.1156 | 0.7043 | | | 0.1252 | 0.6899 | | | 0.1012 | 0.7447 |
| Asia | -0.8950 | 0.0007 | | | | | -0.1818 | 0.7133 | -1.5907 | <.0001 |
| Europe | -1.0644 | 0.0002 | | | -0.9383 | 0.0009 | -0.9727 | 0.0958 | -0.8502 | 0.0067 |
| North America | -0.5780 | 0.0732 | | | -0.5778 | 0.0776 | | | -0.5192 | 0.1257 |
| Else | -1.7306 | 0.0196 | | | -1.5956 | 0.0336 | | | -1.2756 | 0.0993 |
| McFadden adj. R^2 | 0.3679 | | 0.3259 | | 0.3878 | | 0.3075 | | 0.3575 | |
| Observations | 17,409 | | 4,021 | | 13,388 | | 9,721 | | 7,688 | |

Table 6: This table shows the results for the ex-post analysis of the empirical default rates using a pooled logit regression approach. The dependent variable takes the value one in case of a default and zero if the firm has survived the next one-year realization period. The independent variables are: unsolicited signifies a dummy for rating solicitation (1 for unsolicited ratings, 0 else), default frequency indicates the smoothed, long-term average empirical default frequency per rating class at the end of the year that is followed by the realization period in which the default status is recorded, and the years 1998 to 2003 control for different macroeconomic environments between the realization periods (the years 1996, 1997 and 2004 with very low default frequencies serve as the reference period). North America contains Canada, and Else contains firms from Africa, the Arabian Peninsula and the Pacific region. In all models, other non-financial firms and firms from South and Middle America serve as the reference. In cases of sub-samples, where we did not observe any default in a certain region or business sector, we omit the respective variable. Regression Model I comprises the whole sample, Model II only Asian firms, Model III includes only firms with a non-Asian headquarter. Regression Model IV comprises only financial and Model V only non-financial firms. We use robust Huber/White sandwich variance estimates (White (1980)).

| Independent variable | (I) | | (II) | | (III) | | (IV) | | (V) | |
|----------------------|--------------|---------|-------------|---------|-------------|---------|-------------|---------|----------------|---------|
| | Whole sample | | Asia | | Non-Asia | | Financials | | Non-financials | |
| | Coefficient | p value | Coefficient | p value | Coefficient | p value | Coefficient | p value | Coefficient | p value |
| Intercept | -7.3338 | <.0001 | -8.1090 | <.0001 | -7.7116 | <.0001 | -8.9282 | <.0001 | -7.7978 | <.0001 |
| Unsolicited | 0.2484 | 0.4392 | 0.7021 | 0.1809 | 0.2294 | 0.6895 | -0.3989 | 0.4421 | 0.9307 | 0.0402 |
| Default frequency | 22.4278 | <.0001 | 24.1992 | <.0001 | 21.5373 | <.0001 | 26.4666 | <.0001 | 22.1473 | <.0001 |
| Year 1998 | 3.4666 | <.0001 | 2.7535 | 0.0087 | 3.5284 | 0.0010 | 2.8809 | 0.0091 | 3.8552 | 0.0003 |
| Year 1999 | 2.9518 | 0.0002 | 2.3149 | 0.0309 | 2.9842 | 0.0072 | 2.6700 | 0.0181 | 3.2016 | 0.0029 |
| Year 2000 | 3.5561 | <.0001 | 2.2004 | 0.0381 | 4.1431 | <.0001 | 3.1951 | 0.0027 | 3.8798 | 0.0002 |
| Year 2001 | 3.6170 | <.0001 | 1.0962 | 0.3517 | 4.3818 | <.0001 | 1.9896 | 0.0837 | 4.2219 | <.0001 |
| Year 2002 | 2.2061 | 0.0043 | 1.1410 | 0.3107 | 2.7005 | 0.0108 | 0.9590 | 0.4385 | 2.7383 | 0.0093 |
| Year 2003 | 1.1459 | 0.1811 | 0.3391 | 0.8125 | 1.6127 | 0.1556 | 0.4045 | 0.7770 | 1.5755 | 0.1658 |
| Bank | -1.3435 | 0.0006 | -1.4344 | 0.0264 | -1.2868 | 0.0084 | | | | |
| Insurance | -0.5459 | 0.1480 | 0.2300 | 0.6969 | -1.2357 | 0.0377 | 1.1534 | 0.0308 | | |
| Other financial | -0.2265 | 0.6703 | 1.2928 | 0.0622 | -0.8965 | 0.2320 | 1.2227 | 0.0790 | | |
| Utilities | -0.2801 | 0.3604 | | | -0.3079 | 0.3308 | | | -0.3190 | 0.2933 |
| Asia | -1.3671 | <.0001 | | | | | -0.1342 | 0.8251 | -1.9103 | <.0001 |
| Europe | -1.4775 | <.0001 | | | -1.3604 | <.0001 | -1.1030 | 0.0525 | -1.1649 | 0.0003 |
| North America | -0.6997 | 0.0425 | | | -0.7336 | 0.0354 | | | -0.5974 | 0.0993 |
| Else | -2.4955 | 0.0009 | | | -2.4218 | 0.0014 | | | -2.0109 | 0.0089 |
| McFadden adj. R^2 | 0.3120 | | 0.2873 | | 0.3294 | | 0.2170 | | 0.3055 | |
| Observations | 17,409 | | 4,021 | | 13,388 | | 9,721 | | 7,688 | |

Table 7: This table shows the results for the ex-post analysis of the empirical default rates using a pooled logit regression approach. The dependent variable takes the value one in case of a default and zero if the firm has survived the next three-year realization period. The choice of three-year realization periods shall account for the long-term characteristic of external credit ratings. The independent variables are: unsolicited signifies a dummy for rating solicitation (1 for unsolicited ratings, 0 else), rating indicates the rating level of the estimation period expressed as numerical value for company i between 1 (AAA) and 17 (CCC to C) that is followed by the realization period in which the default status is recorded, and the years 1999 and 2002 control for different macroeconomic environments between the realization periods (the year 1996 with very low default frequencies serve as the reference period). North America contains Canada, and Else contains firms from Africa, the Arabian Peninsula and the Pacific region. In all models, other non-financial firms and firms from South and Middle America serve as the reference. In cases of sub-samples, where we did not observe any default in a certain region or business sector, we omit the respective variable. Regression Model I comprises the whole sample, Model II only Asian firms, Model III includes only firms with a non-Asian headquarter. Regression Model IV comprises only financial and Model V only non-financial firms. We use robust Huber/White sandwich variance estimates (White (1980)).

| Independent variable | (I) | | (II) | | (III) | | (IV) | | (V) | |
|----------------------|--------------|---------|-------------|---------|-------------|---------|-------------|---------|----------------|---------|
| | Whole sample | | Asia | | Non-Asia | | Financials | | Non-financials | |
| | Coefficient | p value | Coefficient | p value | Coefficient | p value | Coefficient | p value | Coefficient | p value |
| Intercept | -7.9544 | <.0001 | -8.9230 | <.0001 | -8.7804 | <.0001 | -9.0409 | <.0001 | -10.4946 | <.0001 |
| Unsolicited | -0.2522 | 0.5155 | 0.7121 | 0.2709 | -1.0496 | 0.1518 | -0.6396 | 0.2841 | 0.2197 | 0.8261 |
| Default frequency | 0.4586 | <.0001 | 0.6287 | <.0001 | 0.4548 | <.0001 | 0.4815 | <.0001 | 9.8349 | <.0001 |
| Year 1999 | 0.6937 | 0.1332 | -2.6454 | 0.0081 | 1.6687 | 0.0064 | -0.2324 | 0.7925 | 1.6898 | 0.0911 |
| Year 2002 | -1.2342 | 0.0103 | -3.9370 | <.0001 | -0.4749 | 0.4600 | -2.2352 | 0.0117 | -1.8271 | 0.0677 |
| Bank | -1.3916 | 0.0020 | -2.9962 | 0.0026 | -0.5682 | 0.2382 | | | | |
| Insurance | 0.1914 | 0.6595 | 0.5161 | 0.4056 | 0.3879 | 0.5969 | 1.7238 | 0.0030 | | |
| Other financial | 0.0060 | 0.9926 | 0.7962 | 0.4055 | -0.1297 | 0.8654 | 1.1164 | 0.1510 | | |
| Utilities | 0.2782 | 0.5513 | | | 0.3988 | 0.3940 | | | 0.7153 | 0.4744 |
| Asia | -0.8673 | 0.0103 | | | | | -0.3584 | 0.5425 | -2.1288 | 0.0333 |
| Europe | -1.2134 | 0.0003 | | | -1.1378 | 0.0007 | -0.8158 | 0.1568 | -2.6869 | 0.0072 |
| North America | -0.5385 | 0.1412 | | | -0.4618 | 0.2172 | | | -1.0111 | 0.3120 |
| Else | -1.8070 | 0.0117 | | | -1.7668 | 0.0138 | | | -1.6475 | 0.0995 |
| McFadden adj. R^2 | 0.3133 | | 0.3481 | | 0.3174 | | 0.2409 | | 0.2843 | |
| Observations | 4,534 | | 1,005 | | 3,529 | | 2,507 | | | |

Table 8: This table shows the results for the ex-post analysis of the empirical default rates using a pooled logit regression approach for a sample including only 10% of the survivors. For that purpose we employ random stratified sampling that matches the business sector and rating status (solicited versus unsolicited) distribution of the whole sample. The dependent variable takes the value one in case of a default and zero if the firm has survived the next one-year realization period. The independent variables are: unsolicited signifies a dummy for rating solicitation (1 for unsolicited ratings, 0 else), rating indicates the rating level of the estimation period expressed as numerical value for company i between 1 (AAA) and 17 (CCC to C) that is followed by the realization period in which the default status is recorded. North America contains Canada, and Else contains firms from Africa, the Arabian Peninsula and the Pacific region. In all models, other non-financial firms and firms from South and Middle America serve as the reference. In cases of sub-samples, where we did not observe any default in a certain region or business sector, we omit the respective variable. Regression Model I comprises the whole sample, Model II only Asian firms, Model III includes only firms with a non-Asian headquarter. Regression Model IV comprises only financial and Model V only non-financial firms. We use robust Huber/White sandwich variance estimates (White (1980)). The intercept is adjusted according to King and Zeng (2001). We omit results for the year dummies due to space restrictions.

| Independent variable | (I) | | (II) | | (III) | | (IV) | | (V) | |
|----------------------|--------------|---------|-------------|---------|-------------|---------|-------------|---------|----------------|---------|
| | Whole sample | | Asia | | Non-Asia | | Financials | | Non-financials | |
| | Coefficient | p value | Coefficient | p value | Coefficient | p value | Coefficient | p value | Coefficient | p value |
| Intercept | -14.3272 | <.0001 | -16.9909 | <.0001 | -14.7006 | <.0001 | -15.0423 | <.0001 | -15.9264 | <.0001 |
| Unsolicited | -0.4116 | 0.3065 | 0.3280 | 0.5741 | -1.2600 | 0.1360 | -1.2197 | 0.0436 | 1.0550 | 0.1171 |
| Rating level | 0.6044 | <.0001 | 0.7488 | <.0001 | 0.5928 | <.0001 | 0.6000 | <.0001 | 0.6737 | <.0001 |
| Bank | -1.2193 | 0.0103 | -1.9825 | 0.0065 | -0.5655 | 0.4328 | | | | |
| Insurance | 0.3105 | 0.4997 | 1.4469 | 0.0476 | -0.1348 | 0.8643 | 1.8129 | 0.0028 | | |
| Other financial | 0.4758 | 0.4870 | 0.9242 | 0.3065 | 0.2292 | 0.8228 | 1.3732 | 0.0903 | | |
| Utilities | -0.3959 | 0.4002 | | | -0.2672 | 0.5797 | | | -0.3931 | 0.4287 |
| Asia | -0.9371 | 0.0166 | | | | | -0.0177 | 0.9786 | -2.0392 | 0.0008 |
| Europe | -1.1119 | 0.0023 | | | -0.8462 | 0.0173 | -0.9401 | 0.1741 | -0.7361 | 0.0691 |
| North America | 0.0339 | 0.9411 | | | 0.0325 | 0.9461 | | | 0.2195 | 0.6706 |
| Else | -2.2335 | 0.0045 | | | -1.8759 | 0.0065 | | | -1.3753 | 0.0591 |
| McFadden adj. R^2 | 0.4928 | | 0.4622 | | 0.5169 | | 0.3962 | | 0.4834 | |
| Observations | 1,847 | | 420 | | 1,412 | | 997 | | 850 | |

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