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# A comprehensive examination of insurer financial strength ratings



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**Abstract**

While unsolicited financial strength ratings have been studied in the banking literature, these sometimes controversial ratings have not been studied in insurance. Utilizing data from multiple sources, including a proprietary dataset, we provide the most comprehensive examination of insurer financial strength ratings to date and the first analysis of unsolicited ratings for U.S. property-liability insurers. Similar to bank ratings, we find that insurers' unsolicited ratings tend to be lower than solicited ratings. We also find some consistency in the importance of organizational and key financial characteristics when comparing the results for unsolicited and solicited ratings across the agencies.

Keywords: Financial Strength Ratings, Selection Bias, Unsolicited Ratings, Demotech, A. M. Best

## 1. Introduction

Insurance companies have several options with respect to financial strength ratings. Existing ratings research has focused on a wide variety of topics including the determinants of ratings, differences across rating agencies, reasons to obtain ratings, and the impact of ratings on firms. One particular area of investigation has been unsolicited ratings. Unsolicited ratings are based solely on public information, while most financial strength ratings are based on publicly available information as well as proprietary information provided by the firms being rated. In banking, research has shown that unsolicited ratings, sometimes called shadow ratings, are lower than solicited ratings [Poon (2003), Poon and Firth (2005), and Poon et al. (2009)].<sup>1</sup> Differences in solicited and unsolicited ratings may be partially due to the fact that banks with unsolicited ratings are typically smaller and have weaker financial profiles than banks with solicited ratings [Poon and Firth (2005)].

Given the important information that financial strength ratings provide to consumers, regulators, investors and other insurers, ratings have been the subject of extensive academic, regulatory and industry analysis.<sup>2</sup> In the current study, we add to existing literature in financial strength ratings by utilizing data from multiple sources, including a proprietary dataset from Demotech, to provide a comprehensive study of both unsolicited and solicited ratings from multiple rating agencies. More specifically, our sample includes solicited ratings from five rating agencies (A. M. Best, S&P, Moody's, Fitch and Demotech) as well as unsolicited ratings from three agencies (S&P, Fitch and Demotech) over a nine-year period for property-liability insurers in the U.S.. Our sample of unsolicited ratings includes Demotech provisional ratings, which are quite similar to the unsolicited ratings of the other rating agencies in the sense that these ratings are based on publicly available information only and initiated by the rating agency.<sup>3</sup> However, unlike traditional unsolicited ratings, Demotech's provisional ratings are generally

assigned to all insurers with available data in a given year. Thus, we are able to track a large sample of insurers rated with a process similar to traditional unsolicited ratings. Given that all insurers with available data are generally assigned a provisional rating by Demotech, this also helps to reduce the problems associated with sample selection bias that can be present in other studies of unsolicited ratings, where only a small subset of firms have an unsolicited rating. Moreover, Demotech does not release the provisional ratings to the public.<sup>4</sup> This provides an interesting contrast to the rating practices of S&P and Fitch, both of which do make public their unsolicited ratings without consent of insurers. To our knowledge, this type of comparison has not been possible in prior ratings studies due to the data constraints. Finally, the study carefully controls for potential selection bias due to the fact that not all firms receive unsolicited and solicited ratings from all of the agencies in a manner similar to prior literature [Cantor and Packer (1997) and Pottier and Sommer (1999)].

In summary, our study accomplishes several goals. First, based on the structure of the data and analysis, we are able to examine the distribution of ratings across the various rating agencies. Second, we contrast the types of firms with published ratings from the various agencies (solicited and unsolicited) as well as the firm characteristics that have the most influence on financial strength ratings. Our initial presentation of summary statistics allows the reader to better understand which insurers possess various types of unsolicited and solicited ratings as well as the differences in the distribution of these financial strength ratings. Third, we provide an analysis of the characteristics impacting the ratings as well as the relative importance of these characteristics across ratings agencies. This builds on the prior studies in the area of insurance that have considered both the determinants of financial strength ratings as well as differences in the rating methodologies of these agencies [Harmelink (1974), Pottier and Sommer (1999), and Gaver and Pottier (2005)].<sup>5</sup>

1 Poon (2003), Poon and Firth (2005), and Poon et al. (2009) study solicited and unsolicited bank ratings across different countries.

2 The importance of ratings is highlighted in the case of AIG before the government bailout. As reported in Wall Street Journal (September 16, 2008), AIG had to "post \$14.5 billion in collateral to bolster its credit rating" as well as "additional collateral to investment banks and others it trades with" after its credit downgrades.

3 To our knowledge this is the first time the provisional ratings have been studied in the ratings literature.

4 The provisional ratings are proprietary and made available for this study by Demotech. Demotech generally creates a provisional rating based on publicly available data for all insurers each year and provides that information to the firm. If the insurer elects to finalize this rating, then a fee is paid and the rating is made public. While the insurer is given the opportunity to provide additional information, the finalized rating is still based largely on publicly available information. These ratings were made available to the authors for this sample period. The authors are unable to extend the data beyond the current sample due to availability of data.

5 Other studies have examined a number of related areas including the decision to be rated, the similarities and differences of financial ratings across different firms, and industries and competition among rating agencies [Cantor and Packer (1997), Van Roy (2006), Poon et al. (2009), Gonis et al. (2012), and Doherty et al. (2012)].

Finally, the inclusion of Demotech provisional ratings allows for a comprehensive study of unsolicited insurer financial strength ratings for the very first time and provides some insight into whether differences are observed between unsolicited ratings that are made available to the public and those that are not. A better understanding of these issues for property-liability insurers not only helps to better perceive different types of ratings but also has key public policy implications for the regulators, consumers, and investors relying on these ratings as well as the insurers rated by the agencies.

The remainder of the paper is organized as follows. In Section 2, we examine background information related to the financial ratings literature. This is followed in Sections 3 and 4 by a discussion of the data and methodology, respectively. Finally, a discussion of the results as well as conclusions and public policy implications is presented.

## 2. Background information

A variety of studies have examined the determinants of insurer financial strength ratings from various rating agencies. Similar to prior studies examining bank financial ratings [Poon (2003) and Poon and Firth (2005)], studies related to insurers generally find that financial characteristics including capitalization, liquidity, profitability, and firm size are important in determining insurer ratings [Harmelink (1974), Pottier and Sommer (1999), and Gaver and Pottier (2005)].<sup>6</sup> We draw on the variables considered in prior literature to identify the factors important in determining financial strength ratings.

While the studies generally find that financial and operational traits are important determinants of ratings, they also find that there are differences across rating agencies [Cantor and Packer (1997), Pottier and Sommer (1999), Van Roy (2006), and Poon et al. (2009)]. For example, in a study of property-liability insurers, Pottier and Sommer (1999) indicate that rating agencies exhibit systematic differences in the relative importance given to the different factors they consider. Authors have tested whether these are real differences or merely the

artifacts of selection bias, given that different agencies rate different insurers. Given the mixed results of prior literature, we control for potential selection bias in the current study.<sup>7</sup>

Research examining unsolicited ratings is limited to the banking literature (examples include: Poon (2003), Poon and Firth (2005), and Poon et al. (2009)). The general conclusion from these studies is that banks' unsolicited ratings tend to be lower than solicited ratings, even after controlling for self-selection bias. One limitation of these studies is that each analyzes the unsolicited ratings from one particular rating agency only (i.e., S&P, Fitch, and S&P, respectively) and there has been no research examining the unsolicited ratings across multiple rating agencies. And, to the best of our knowledge, no prior studies in the insurance literature have investigated unsolicited insurer ratings. It is our hope that by taking advantage of unsolicited ratings from multiple agencies as well as a proprietary dataset from Demotech, our study will help fill both voids in the literature.

While issues related to the determinants of ratings as well as the potential impact from selection bias and unsolicited ratings are important from an academic standpoint, research has found that the existence of ratings significantly impacts a variety of stakeholders. As stated by Pottier and Sommer (1999), "insurer financial strength ratings are heavily relied upon by insurance agents, brokers and consumers, are used by insurers in their advertising, provide a tool for regulators to assess insurer risk and are often used in academic research as measurers of insolvency risk" (p. 622).<sup>8</sup> Evidence of this impact is found in Doherty and Phillips (2002), who document an increase in rating stringency and conclude that the dramatic capital build-up in the insurance industry can be explained by the pressure experienced by insurers to maintain existing ratings.<sup>9</sup>

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<sup>6</sup> More specifically, Gaver and Pottier (2005) find that all of these variables are important determinants of insurer ratings while Pottier and Sommer (1999) find that firm size and investment in junk bonds are significant determinants for all three of the rating agencies examined.

<sup>7</sup> Cantor and Packer (1997) find that sample selection bias does not explain the average rating differences and that observed differences in average ratings rather reflect differences in rating models. While Pottier and Sommer (1999) find some evidence of selection bias in the rating determinants model for A. M. Best, none of their rating differences models shows evidence of sample selection [Pottier and Sommer (1999, p. 639)].

<sup>8</sup> Ratings have also been used in insolvency prediction [Ambrose and Seward (1988), Singh and Power (1992), Ambrose and Carroll (1994) and Pottier (1998)].

<sup>9</sup> In addition, Epermanis and Harrington (2006) find that an insurer's A. M. Best rating decline is followed by significant premium declines both in the same year and in the following year.

Panel A: Provisional and unsolicited ratings				Panel B: Finalized and solicited ratings					
Year	Demotech (Provisional)	S&P	Fitch	Year	Demotech (Provisional)	A.M. Best	S&P	Moody's	Fitch
2000	1829	218	N/A	2000	195	200	351	146	73
2001	1712	258	N/A	2001	181	548	366	177	196
2002	1591	247	N/A	2002	185	515	363	174	186
2003	1731	355	N/A	2003	177	518	379	214	212
2004	806	119	N/A	2004	175	516	350	211	248
2005	1452	72	3	2005	190	493	365	211	264
2006	1604	36	426	2006	207	496	367	198	279
2007	1575	26	446	2007	221	498	324	200	307
2008	1605	N/A	500	2008	235	490	279	144	317
Total	13905	1331	1375	Total	1766	4274	3144	1675	2082

**Table 1: Number of ratings in sample by year**

### 3. Data

The dataset comprises data from several sources for the period of 2000 to 2008. Insurers' demographic and financial information is from the National Association of Insurance Commissioners' ("NAIC") Database.<sup>10</sup> Insurers without required financial information are deleted. Demotech ratings (both provisional and finalized) are obtained from Demotech, Inc., and A. M. Best's ratings are obtained from A. M. Best Company. Finally, Fitch, Moody's and S&P ratings are obtained from the SNL Database. Similar to Pottier and Sommer (1999), we condense the ratings into five categories using the descriptions provided by the agencies to facilitate comparison across the ratings agencies.<sup>11</sup>

We consider both unsolicited and solicited ratings in our analysis. Due to data limitations, the unsolicited ratings analysis is restricted to the ratings of Demotech, S&P and Fitch.<sup>12</sup>

<sup>10</sup> All continuous variables are winsorized at 1 percent level to minimize the impact of outliers.

<sup>11</sup> It should be noted that while we condense the ratings into five categories, there are no finalized Demotech ratings in the lowest category and very few observations in this category for the other rating agencies.

<sup>12</sup> Table 1 provides information related to unsolicited ratings. Data related to unsolicited financial strength ratings of insurers is somewhat limited. The agencies have generally discontinued this practice or limited the types of insurers to which they assign these ratings. For example, in a press release in early 2009, Fitch announced that it will no longer issue unsolicited ratings, called 'q' ratings, though it noted it may issue 'q' scores (similar to 'q' ratings in the sense that it utilizes historical financial information) in the future if demanded by the market [Business Wire (2009)]. Additionally, recently an A. M. Best document indicates that it only assigns unsolicited ratings, called 'pd' or public data ratings, to "Canadian property/casualty insurers and HMOs and health insurers (United States)" for which the company does not currently provide traditional solicited ratings [A. M. Best (2009)]. Other than Demotech, only S&P and

As noted earlier, Demotech unsolicited ratings are different from the unsolicited ratings of both S&P and Fitch in two important ways: (1) the ratings are generally assigned to all insurers every year rather than a limited group and (2) the ratings are not made available to the public unless the insurer pays for the rating to be finalized and released.<sup>13</sup> However, like traditional unsolicited ratings, Demotech provisional ratings are still initiated by the rating agency. To distinguish Demotech provisional ratings from the more traditional unsolicited ratings provided by S&P and Fitch, we refer to these as provisional ratings throughout the remainder of the paper.<sup>14</sup>

In the analysis of solicited ratings, or those initiated by the insurers, we consider the ratings of the four traditional rating agencies (A. M. Best, S&P, Moody's and Fitch) as well as Demotech. The inclusion of Demotech ratings provides an interesting contrast to traditional solicited ratings given the difference in the rating processes. Unlike traditional agencies, Demotech provides insurers with their provisional ratings and insurers decide whether to make the ratings public. If an insurer elects to finalize the rating, some additional information may be requested that could impact the final rating released to the

Fitch offered unsolicited ratings for some part of the sample period. For S&P, a majority of these ratings were only available through 2003 when there was a significant decline in the unsolicited ratings issued. For Fitch, the unsolicited ratings were only available since 2006.

<sup>13</sup> More information on the process of finalizing a rating is provided below.

<sup>14</sup> Provisional rating is the term used by Demotech.

	Demotech				S&P				Fitch			
	Provisional		Finalized		Unsolicited		Solicited		Unsolicited		Solicited	
	#	%	#	%	#	%	#	%	#	%	#	%
Superior/extremely strong/exceptional	2956	21%	348	20%	10	1%	354	11%	0	0%	194	9%
Excellent/very strong	4052	29%	518	29%	140	11%	1085	35%	0	0%	1121	54%
Good/strong	4486	32%	889	50%	273	21%	1470	47%	546	40%	653	31%
Fair/adequate	934	7%	11	1%	585	44%	198	6%	699	51%	90	4%
Less than fair/adequate	1477	11%	0	0%	323	24%	37	1%	130	9%	24	1%
	13905		1766		1331		3144		1375		2082	

**Table 2: Unsolicited and solicited ratings comparison**

public; however, for the reduced sample of insurers that elect to finalize their ratings, the provisional rating provided to the insurer is typically the same as the final rating released to the public. To distinguish these ratings from the more traditional solicited ratings, we refer to these as finalized ratings.

Table 1<sup>15</sup> provides a summary of the number of insurers rated by each of the rating agencies for the years of our sample.<sup>16</sup> Given that Demotech generally provides its provisional ratings to all insurers with the needed publicly available financial information, it is not surprising that Demotech has the highest number of provisional (unsolicited) ratings. S&P and Fitch have provided approximately the same number of unsolicited ratings; however, the time periods over which these ratings have been provided differ. As shown in the table, while S&P provided a number of unsolicited ratings through 2003, this number dropped significantly in subsequent years. In addition, we do not have any Fitch unsolicited ratings prior to 2006. In terms of solicited ratings, the major two rating agencies in the sample are A. M. Best and S&P with 4,274 and 3,144 firm-year observations respectively. This is followed by Fitch, Demotech and Moody's.

Next, for the agencies for which we have both unsolicited (or provisional) and solicited (or finalized) ratings, we compare the percentage of ratings in each of the categories. This information is summarized in Table 2. First, we contrast the Demotech provisional and finalized ratings. It appears that there is approximately the same percentage of insurers with ratings in the top two categories. However, we find that there is a much larger percentage of insurers with ratings in the good/strong finalized category than the good/strong provisional category (50 percent compared to 32 percent). We also find that while no insurer with a finalized rating receives a rating less than fair/adequate rating, 11 percent of provisional ratings fall in this category. More extreme differences are observed when comparing the unsolicited and solicited ratings of S&P and Fitch. With S&P, for insurers soliciting ratings, 46 percent receive ratings in the top two categories. However, for unsolicited ratings, only 12 percent of insurers receive ratings in these categories. Also, while only 1 percent of insurers soliciting ratings receive a less than fair/adequate rating, 24 percent of insurers fall into this category when considering unsolicited ratings. Finally, for Fitch, we find that only 5 percent of insurers seeking ratings receive a rating in the bottom two categories, and 60 percent of insurers receive unsolicited ratings in these categories. To determine if the differences in the distributions are econometrically significant, we conduct a Wilcoxon rank-sum test<sup>17</sup> for the ratings of each of

<sup>15</sup> Note that the number of observations is low for A. M. Best in 2000 and Demotech in 2004. This is due to data limitations. To ensure this is not influencing the results obtained, these two models are repeated excluding these data years from the sample. The unreported results are generally consistent with those presented in the following section.

<sup>16</sup> Note the total across the rating agencies exceeds the total number of insurer-year observations indicated earlier since insurers are rated by multiple agencies in a given year.

<sup>17</sup> For more information on the Wilcoxon ranked sum test see: [https://en.wikipedia.org/wiki/Wilcoxon\\_signed-rank\\_test](https://en.wikipedia.org/wiki/Wilcoxon_signed-rank_test)

Year	1 Rating	2 Ratings	3 Ratings	4 Ratings
2000	518	144	53	
2001	717	206	93	15
2002	690	210	103	1
2003	700	217	118	3
2004	702	209	124	2
2005	662	213	141	3
2006	698	209	141	2
2007	732	228	118	2
2008	760	209	93	2
Total	6179	1845	984	30

**Table 3: Ratings summary**

the three agencies. Using the full distribution of ratings provided by the agencies, we reject the null hypothesis that the provisional (unsolicited) and finalized (solicited) ratings have identical distributions. This result is similar to the findings in the banking literature, which suggest unsolicited ratings tend to be lower [Poon (2003)].

For finalized and solicited ratings, we examine the number of insurers with multiple ratings. As shown in Table 3, the majority of insurers elect to only be rated by a single agency. This is not surprising given that the rating process can be costly for insurers. However, we do find that more than 30 percent of insurers seek multiple ratings.<sup>18</sup> Given the volume of insurers with multiple ratings, we control for the existence of another rating in our model. This is discussed in more detail in the following section.

Finally, for insurers with multiple ratings, we compare those with secure ratings across the agencies.<sup>19</sup> As shown in Table 4, there appears to be strong consistency in the evaluation of the insurers by the agencies. More specifically, for all comparisons except Demotech and A. M. Best, we find in excess of 90 percent agreement (insurers receiving secure ratings by both agencies). For Demotech and A. M. Best, the percentage of agreement is smaller (i.e., 81 percent). This finding of such consistency in the

<sup>18</sup> These statistics are calculated on an insurer-year observation basis.

<sup>19</sup> An insurer is considered to have a secure rating if it has a rating in one of the top two categories.

Comparison groups	Secure rating by both	Total rated by both	% secure by both
Demotech and A. M. Best	387	479	81%
Demotech and S&P	102	102	100%
Demotech and Moody's	46	46	100%
Demotech and Fitch	32	32	100%
A. M. Best and S&P	184	188	98%
A. M. Best and Moody's	30	30	100%
A. M. Best and Fitch	58	62	94%
S&P and Moody's	1328	1344	99%
S&P and Fitch	1487	1503	99%
Moody's and Fitch	1175	1191	99%

**Table 4: Comparison of secure ratings among the rating agencies**

evaluation of insurers makes it even more important to control for the existence of other rating(s) in the modeling.

## 4. Methodology and variable descriptions

### 4.1 Methodology

Next we turn to our consideration of the characteristics that influence the different types of ratings. We examine both the factors that impact the ratings as well as whether these factors vary across agencies. We first consider Demotech provisional ratings and the unsolicited ratings of S&P and Fitch. Then, we consider Demotech finalized ratings and the solicited ratings of A. M. Best, S&P, Fitch and Moody's.

For the Demotech provisional ratings, we use ordered probit modeling.<sup>20</sup> Given that Demotech generally provides provisional ratings for the population of insurers, this modeling approach is most appropriate. However, for all other models (the unsolicited S&P and Fitch ratings, the finalized Demotech ratings, and the solicited ratings of the other four agencies), we use an estimation procedure that controls for potential selection bias.<sup>21</sup> This is necessary given that only some insurers are selected to receive unsolicited ratings by S&P and Fitch and only some insurers elect to be rated by each of the agencies. More specifically, we use

<sup>20</sup> For more information on ordered probit modeling, please see: [https://en.wikipedia.org/wiki/Ordered\\_probit](https://en.wikipedia.org/wiki/Ordered_probit)

<sup>21</sup> It should be noted that for both the S&P and Fitch models, the sample period is limited to the period for which data is available as shown in Table 1.

a joint approach that models both the insurer's rating and the decision to rate insurer (or the decision by insurer  $i$  to be rated).<sup>22</sup> Given that the variable of interest (i.e., insurer rating) is only observed if a selection condition is met, the following system of equations is used:

1.  $y_i^* = x_i \beta + \lambda \varepsilon_i + \tau_i$
2.  $S_i^* = z_i' \gamma + \varepsilon_i + \zeta_i$

Equation 1 is fitted using an ordinal probit regression model<sup>23</sup> where  $y$  takes on a value of 1 through 5 based on the rating assigned to the insurer. Equation 2 is the endogenous decision model. This approach produces consistent estimators of  $\beta$ .<sup>24</sup>

For comparison purposes, we consider the same set of firm characteristics as potential determinants of financial ratings for each ratings series (i.e., provisional Demotech ratings, unsolicited ratings, Demotech finalized ratings, and solicited ratings models).<sup>25</sup> These characteristics are divided into four categories: organizational characteristics, business mix, business risk and financial strength and flexibility.

#### 4.2 Variable descriptions

With respect to the determinants of financial strength ratings models, we use a set of variables in four categories similar to those used in prior insurance and banking literature [Pottier and Sommer (1999), Poon (2003)].

**Organizational characteristics:** previous literature has shown that different organizational forms are associated with systematically different levels of risk in terms of business written and investments [Lamm-Tennant and Starks (1993), Downs and Sommer (1999), and Cole et al. (2009)]. Our size measure is "direct premiums written."<sup>26</sup> We also include proxies to capture differences in organizational forms ("mutual indicator" and

"other organization type indicator" with stock being the omitted category), group membership ("group indicator") and insurer age ("established age").

**Business mix:** first, we include the "line-of-business Herfindahl" and the "number of states licensed" as measures of concentration. The measures are relatively standard measures of concentration and business mix in the insurance literature. To the extent that diversification reduces firm risk, more diversified firms are expected to have higher ratings. However, if diversification leads to a lack of efficiency in operations that adversely impact profitability, the opposite result may exist. We also include two variables to measure specific business focus as this may impact various aspects of the firm and therefore insurers' ratings: the "percentage in long-tail lines" and the "percentage in personal lines."<sup>27</sup>

**Business risk:** we include "stock to cash and invested assets" as a measure of investment risk as varying levels of stock investment will correlate with varying levels of firm risk. We also include "2-year loss development" as it is an important part of the assessment of an insurer's risk. According to A. M. Best, more than two thirds of an insurer's gross capital requirement is usually generated from its loss reserve and net premiums written components [A. M. Best (2003)]. This measure allows us to determine whether the insurer has been understating or overstating loss reserve estimates in recent periods. "Catastrophe exposure" is proxied by the percentage of the insurer's premiums written in property insurance in states along the Gulf Coast and the Atlantic Seaboard. An insurer's exposure to catastrophic events creates greater uncertainty and thus is likely to be associated with lower financial strength ratings. Finally, two measures related to reinsurance are included: "reinsurance ceded" and "recoverables to surplus." The extent of reinsurance use has a potentially conflicting impact on an insurer's business uncertainty [Borch (1974) and Berger et al. (1992)]. Given that reinsurance transfers part of the risk to a reinsurer, greater use

22 The modeling technique used is *ssm* in STATA. The summary of the modeling description was obtained from Miranda and Rabe-Hesketh (2006). See this article for additional details.

23 See fn 20.

24 We control for heteroskedasticity. There is no evidence of multicollinearity or autocorrelation. 25 There is some variation in the variables included in the decision model. The discussion related to these variables and the results of these models are available from the authors upon request.

26 It should be noted that since larger firms are typically expected to have lower levels of insolvency risk [Cummins and Danzon (1997) and Cummins and Sommer (1996)], the size measure can also be considered a business risk measure.

27 In general, long-tailed lines of business relate to liability, environmental, and bodily injury claims. With these types of claims, it typically takes a longer period from the time of the occurrence of the injury to final settlement of the loss. This can lead to more error in loss reserving as well as more volatility of losses in general. Typically, due to their standardized nature, personal lines coverages are considered less volatile than commercial coverages. It should be noted that both of these measures may also capture varying levels of business risk.

of reinsurance may be associated with reduced uncertainty of the primary insurer's business. Alternatively, greater use of reinsurance can have several adverse effects for the primary insurer: it may make it "more susceptible to short-term dislocations in the overall market," it ties its financial stability to that of the reinsurer and it exposes it to potential uncertainty in payments if a claim dispute occurs [Doherty and Phillips (2002, p. 62)]. In this respect, the use of reinsurance may complicate the assessment of the insurer's risk, which increases the information asymmetry and uncertainty regarding the company. The "recoverables to surplus" is another measure related to reinsurance. Higher levels of recoverables are likely related to a greater probability of insolvency. As discussed in prior research, we would expect this variable to be negatively related to the insurer's rating [i.e., Gaver and Pottier (2005)].

**Financial strength and flexibility:** previous studies have established that insurers that are more profitable and well capitalized are associated with higher ratings [Kahane et al. (1986), MacMinn and Witt (1987), Cummins (1988), Doherty (1989), Pottier and Sommer (1999), Doherty and Phillips (2002) and Gaver and Pottier (2005)]. "Capital to assets" serves as a proxy for an insurer's capitalization while "net income to assets" measures an insurer's profitability. We also include "cash to invested assets" given that prior studies have found that the insurer's levels of liquidity are also likely to impact ratings [Kahane et al. (1986) and Pottier and Sommer (1999)]. An insurer with higher levels of investment in cash is expected to be associated with relatively lower uncertainty and likely higher ratings because cash is much easier to value and less risky than bonds and stocks. Finally, previous research has indicated that growth is important in determining insurer insolvency risk [Harrington and Danzon (1994) and Pottier and Sommer (1999)]. We proxy growth with "change in NPW." The impact of growth on firm's uncertainty and potential impact on ratings is ambiguous as strong premium growth may indicate that policyholders have confidence in the financial health of the insurer and thus indicate lower uncertainty. On the other hand, it may be a result of a property-liability insurer's lowering underwriting standards or underpricing [Harrington and Danzon (1994)].

	All	Unsolicited	Solicited
<b>Organizational characteristics</b>			
Direct premiums written	10.1733	10.3186	10.6565
Mutual indicator	0.2021	0.2087	0.1847
Other organization type indicator	0.1001	0.0664	0.0590
Group affiliation	0.6521	0.6904	0.6617
Established age	42.7033	44.8859	45.1690
<b>Business mix</b>			
Line-of-business Herfindahl	0.5173	0.4909	0.4702
Percentage in long-tail lines	0.6980	0.6904	0.6963
Percentage in personal lines	0.3739	0.4009	0.3930
Number of states licensed	16.0049	16.5506	19.5425
<b>Business risk</b>			
Stock to cash and invested assets	0.1143	0.1178	0.1122
2-year loss development	-0.8428	-1.1127	-0.3846
Catastrophe exposure	6.6966	6.6989	7.1536
Reinsurance ceded	0.5319	0.5458	0.5519
Recoverables to surplus	49.5773	48.3800	49.2293
<b>Financial strength and flexibility</b>			
Capital to assets	0.4272	0.4306	0.4144
Net income to assets	0.0232	0.0231	0.0262
Cash to invested assets	0.1958	0.1679	0.1575
Change in NPW	19.9881	17.1664	17.0099

**Table 5: Summary statistics**

## 5. Results

### 5.1 Summary statistics

Table 5<sup>28</sup> provides summary statistics for the entire sample and separately for insurers with unsolicited and solicited ratings. It appears that insurers that solicit ratings tend to be larger and more diverse in terms of business mix and geographic operation. In addition, these insurers have smaller loss development factors.

<sup>28</sup> Prior research has considered whether the financial profiles are statistically different between solicited and unsolicited samples using t-tests. Given the uniqueness of our sample (data from multiple rating agencies), there are some firms that appear in both the unsolicited and solicited subsamples, which makes a complete comparison of these two subsamples difficult. However, t-tests conducted including the insurers that appear in only one subset show significant differences for all but one of the variables at the 5 percent level. For that variable ("catastrophe exposure"), the t-test shows significant differences at the 10 percent level. It should be noted that the Demotech provisional ratings are included in the unsolicited group and Demotech finalized ratings are included in the solicited group.

	Demotech (provisional)	S&P	Fitch
<b>Organizational characteristics</b>			
Direct premiums written	0.116 <sup>a</sup> (0.00602)	0.348 <sup>a</sup> (0.0359)	0.444 <sup>a</sup> (0.0349)
Mutual indicator	0.0749 <sup>b</sup> (0.0293)	-0.00519 (0.0840)	0.206 (0.163)
Other organization type indicator	-0.0407 (0.0385)	-0.0146 (0.114)	0.154 (0.162)
Group affiliation	0.172 <sup>a</sup> (0.0238)	0.591 <sup>a</sup> (0.0744)	0.544 <sup>a</sup> (0.103)
Established age	0.000131 (0.000284)	-0.000455 (0.000873)	0.000980 (0.000984)
<b>Business mix</b>			
Line-of-business Herfindahl	-0.480 <sup>a</sup> (0.0377)	-0.646 <sup>a</sup> (0.134)	-1.472 <sup>a</sup> (0.153)
Percentage in long-tail lines	0.322 <sup>a</sup> (0.0333)	0.145 (0.152)	0.768 <sup>a</sup> (0.211)
Percentage in personal lines	-0.318 <sup>a</sup> (0.0256)	0.126 (0.0995)	-1.424 <sup>a</sup> (0.174)
Number of states licensed	0.00129 <sup>b</sup> (0.000587)	0.00128 (0.00220)	-0.00282 (0.00243)
<b>Business risk</b>			
Stock to cash and invested assets	-0.140 <sup>b</sup> (0.0637)	-1.540 <sup>a</sup> (0.241)	-1.369 <sup>a</sup> (0.301)
2-year loss development	-0.0112 <sup>a</sup> (0.000522)	-0.00593 <sup>a</sup> (0.00199)	-0.0101 <sup>a</sup> (0.00266)
Catastrophe exposure	-5.51e-05 (0.000500)	0.00312 <sup>b</sup> (0.00158)	0.000322 (0.00210)
Reinsurance ceded	-0.0712 <sup>a</sup> (0.0201)	0.623 <sup>a</sup> (0.0699)	0.686 <sup>a</sup> (0.0998)
Recoverables to surplus	-0.00181 <sup>a</sup> (0.000110)	-0.00307 <sup>a</sup> (0.000640)	-0.00649 <sup>a</sup> (0.000925)
<b>Financial strength and flexibility</b>			
Capital to assets	1.757 <sup>a</sup> (0.0611)	1.529 <sup>a</sup> (0.294)	2.447 <sup>a</sup> (0.489)
Net income to assets	3.120 <sup>a</sup> (0.184)	3.124 <sup>a</sup> (0.811)	6.897 <sup>a</sup> (1.193)
Cash to invested assets	-0.641 <sup>a</sup> (0.0446)	-1.823 <sup>a</sup> (0.398)	-0.996 <sup>b</sup> (0.471)
Change in NPW	0.000430 <sup>a</sup> (0.000134)	0.00159 <sup>b</sup> (0.000723)	-0.000899 (0.00132)
Observations	13905	1331	1375
Year indicator variables included in all models; standard errors in parentheses			
a = p<0.01 b = p<0.05 c = p<0.1			

Table 6: Determinants of provisional and unsolicited financial ratings

### 5.1.1 Provisional and unsolicited ratings

We now turn to an analysis of whether the determinants of unsolicited financial ratings are consistent across the agencies. This includes an analysis of the Demotech provisional ratings as well as the S&P and Fitch unsolicited ratings. As shown in Table 6,<sup>29</sup> it appears that organizational characteristics have less of an impact on the ratings assigned to insurers in comparison to the other categories. More specifically, four (stock to cash and invested assets, 2-year loss development and both reinsurance variables) of the five business risk measures are significant for all three agencies while this is only the case for two (direct premiums written and group affiliation) of the five organizational characteristics. The mutual variable is also significant in the Demotech model. Additionally, all of the financial strength measures are significant for S&P and Demotech and three of the four for Fitch. Finally, as it relates to business mix, while only one of the variables, line-of-business Herfindahl, is significant for S&P, all of these variables are significant for Demotech and three of the four for Fitch.

An examination of the sign and size of the coefficients provides some information as to the magnitude of the impact of the firm characteristics across the various agencies. Examining first the organizational characteristics, we find that size and group affiliation are associated with greater probabilities of being assigned a higher rating for S&P and Fitch in comparison to Demotech.

In terms of business mix, we find that firms that are more concentrated in terms of business are over two times more likely to receive a lower rating from Fitch and three times more likely to receive a lower rating from S&P than from Demotech. In addition, while larger percentages of business in long-tail lines are associated with greater probabilities of being assigned higher ratings for Demotech and Fitch, larger percentages of business in personal lines are associated with greater probabilities of being assigned lower ratings by these agencies.

The results for the business risk measures generally support the hypotheses that greater uncertainty is associated with the probability of being assigned a lower rating.

<sup>29</sup> It should be noted that for the second-stage models, the likelihood ratio test for  $p = 0$  rejects the null hypothesis at a significance level of .05 or better for S&P, but not for Fitch.

	Demotech (finalized)	A.M. Best	S&P	Moody's	Fitch
<b>Organizational characteristics</b>					
Direct premiums written	0.145 <sup>a</sup> (0.0262)	0.354 <sup>a</sup> (0.0202)	0.0703 <sup>a</sup> (0.0204)	0.0311 <sup>c</sup> (0.0185)	0.109 <sup>a</sup> (0.0195)
Mutual indicator	0.199 <sup>b</sup> (0.0810)	0.334 <sup>a</sup> (0.0555)	-0.349 <sup>a</sup> (0.103)	0.264 <sup>a</sup> (0.102)	-0.399 <sup>a</sup> (0.120)
Other organization type indicator	-0.324 <sup>b</sup> (0.143)	0.190 <sup>a</sup> (0.0700)	0.160 (0.111)	-0.0344 (0.358)	0.309 (0.202)
Group affiliation	0.323 <sup>a</sup> (0.0750)	0.185 <sup>b</sup> (0.0730)	0.427 <sup>b</sup> (0.201)	-0.771 <sup>a</sup> (0.295)	-0.330 (0.372)
Established age	0.00201 <sup>b</sup> (0.000803)	0.000850 (0.000610)	-0.00257 <sup>a</sup> (0.000611)	-0.00182 <sup>c</sup> (0.00109)	-0.00187 <sup>b</sup> (0.000807)
<b>Business mix</b>					
Line-of-business Herfindahl	-0.732 <sup>a</sup> (0.122)	-0.455 <sup>a</sup> (0.0793)	0.571 <sup>a</sup> (0.119)	-0.0888 (0.110)	0.681 <sup>a</sup> (0.150)
Percentage in long-tail lines	0.612 <sup>a</sup> (0.149)	0.441 <sup>a</sup> (0.0670)	-0.640 <sup>a</sup> (0.102)	-1.011 <sup>a</sup> (0.150)	-0.691 <sup>a</sup> (0.157)
Percentage in personal lines	-0.157 (0.100)	-0.838 <sup>a</sup> (0.0582)	0.320 <sup>a</sup> (0.0732)	0.0425 (0.132)	0.183 <sup>b</sup> (0.0796)
Number of states licensed	0.00718 <sup>a</sup> (0.00224)	0.0201 <sup>a</sup> (0.00151)	0.000157 (0.00110)	-0.00174 (0.00118)	-0.00653 <sup>a</sup> (0.00144)
<b>Business risk</b>					
Stock to cash and invested assets	-0.806 <sup>a</sup> (0.189)	0.418 <sup>a</sup> (0.144)	1.020 <sup>a</sup> (0.163)	-0.506 (0.655)	1.589 <sup>a</sup> (0.238)
2-year loss development	-0.00769 <sup>a</sup> (0.00175)	-0.00685 <sup>a</sup> (0.00109)	-0.000737 (0.00135)	-0.00262 (0.00182)	-0.000358 (0.00182)
Catastrophe exposure	0.00335 <sup>c</sup> (0.00196)	0.000596 (0.000900)	0.00933 <sup>a</sup> (0.00165)	0.0117 <sup>a</sup> (0.00185)	0.0140 <sup>a</sup> (0.00213)
Reinsurance ceded	0.441 <sup>a</sup> (0.0691)	0.0797 (0.0842)	0.140 <sup>a</sup> (0.0378)	0.0581 (0.143)	0.287 <sup>a</sup> (0.0472)
Recoverables to surplus	-0.00430 <sup>a</sup> (0.000438)	-0.00356 <sup>a</sup> (0.000317)	-0.00163 <sup>a</sup> (0.000246)	-0.000899 <sup>b</sup> (0.000428)	-0.00303 <sup>a</sup> (0.000417)
<b>Financial strength and flexibility</b>					
Capital to assets	1.303 <sup>a</sup> (0.231)	3.139 <sup>a</sup> (0.170)	0.531 <sup>a</sup> (0.136)	0.552 (0.379)	0.389 <sup>b</sup> (0.168)
Net income to assets	1.319 <sup>b</sup> (0.528)	1.653 <sup>a</sup> (0.374)	2.782 <sup>a</sup> (0.612)	2.087 <sup>b</sup> (0.867)	2.936 <sup>a</sup> (0.842)
Cash to invested assets	-0.564 <sup>a</sup> (0.120)	-0.149 (0.0988)	0.750 <sup>a</sup> (0.158)	0.0793 (0.425)	0.0492 (0.268)
Change in NPW	0.000978 <sup>a</sup> (0.000370)	0.000322 (0.000329)	0.00156 <sup>a</sup> (0.000381)	0.00121 <sup>c</sup> (0.000664)	0.00125 <sup>b</sup> (0.000619)
Observations	16859	16859	16859	16859	16859
Year indicator variables included in all models; standard errors in parentheses					
a = p<0.01 b = p<0.05 c = p<0.1					

**Table 7: Determinants of solicited financial ratings**

The only exception is the “reinsurance ceded” variable, which is positive for both S&P and Fitch. This suggests that these agencies may consider that insurers that cede more business are reducing their risk.

While both capitalization and profitability are associated with the probability of being assigned a higher rating, the importance of these factors appears greater for Fitch. Interestingly, the measure of liquidity is associated with probability of receiving a lower rating. The impact of this variable is twice as high for S&P than the other two agencies. Finally, growth is associated with being assigned a higher rating for both Demotech and S&P with the impact being much greater for S&P.

### 5.1.2 Solicited ratings

The results for solicited ratings are presented in Table 7.<sup>30</sup> The results of the solicited models show some differences when compared to the results for the unsolicited models. First, more of the organizational characteristics are significant though the impact varies across the agencies. For example, the size measure is uniformly associated with the probability of being assigned a higher rating. However, mutual form is associated with the probability of receiving a higher rating for Demotech, A. M. Best, and Moody’s but lower ratings for S&P and Fitch. In addition, age is associated with the probability of being assigned a higher rating for Demotech but a lower rating for S&P, Moody’s, and Fitch. Second, while many of the same variables in the other categories that were found to significantly impact unsolicited ratings are also found to impact solicited ratings, the magnitude of the impact varies. In comparing the significance and signs of rating determinants for the three agencies providing both provisional (unsolicited) and finalized (solicited) ratings, there are fewer differences between the models for Demotech ratings in comparison to S&P and Fitch. The result for Demotech is not surprising given the consistency in the provisional and finalized ratings noted earlier. Additionally, these differences observed for S&P and Fitch may be due, in part, to the incorporation of proprietary information into the rating process.

It should be noted that certain organizational characteristics and key business risk and financial strength and flexibility measures are consistent in their impact on ratings.

## 6. Conclusions

In this paper, we examined the differences between unsolicited and solicited ratings of insurers as well as the differences in ratings across rating agencies. In doing so, we provide one of the most comprehensive examinations of ratings within the financial strength ratings literature. Utilizing a proprietary dataset from Demotech that includes a large sample of provisional ratings combined with a limited sample of unsolicited S&P and Fitch ratings, we are able to perform a fairly thorough examination of insurer financial strength ratings. Moreover, the inclusion of both traditional solicited and unsolicited ratings combined with the provisional and finalized Demotech ratings provide us the opportunity to extend both the general ratings literature as well as the insurance literature.

Consistent with the banking literature, our examination of the distributions of provisional (unsolicited) and finalized (solicited) ratings provides some evidence that ratings initiated by rating agencies tend to be lower than ratings initiated by insurers. We also find that there are statistically significant differences between the characteristics of insurers with provisional (solicited) and those with finalized (unsolicited) ratings. In addition, examining the subset of insurers that are rated by multiple agencies, we find that the insurers rated as “secure” by one rating agency generally are considered secure by the other agencies.

We also find that after controlling for sample selection bias, there is some variation in the factors influencing the determinants of ratings across agencies. However, when comparing the results for unsolicited (provisional) and solicited (finalized) ratings, we find there is a certain degree of consistency in the importance of certain organizational and key financial characteristics. Also, within the subsample of insurers where data for ratings initiated by agencies and insurers are both available, we find the greatest consistency in the results for Demotech in comparison to S&P and Fitch. Recall that the biggest difference between Demotech’s unsolicited ratings and those of S&P and Fitch is that the former does not disclose unsolicited (provisional) ratings

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<sup>30</sup> It should be noted that for the second-stage models, the likelihood ratio test for  $p = 0$  rejects the null hypothesis at a significance level of .05 or better for all of the ratings models except A. M. Best, generally indicating the presence of selection bias with the decision to be rated. This supports the use of a two-stage framework in modeling ratings.

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to the public, while the latter two agencies do. While such a difference in disclosure policy offers one possible explanation for the difference in ratings consistency, future research is warranted to explore the consistency/inconsistency between solicited and unsolicited ratings.

Our findings are of particular importance given that serious concerns have been raised regarding the accuracy of unsolicited ratings by both policymakers [U. S. Department of Justice (1998)] and researchers [Baker and Mansi (2002)]. For example, the Department of Justice argues that unsolicited ratings may not be as accurate as solicited ratings because unsolicited ratings are not based on the same type of information as solicited ratings. Baker and Mansi (2002) express similar concerns that unsolicited ratings are less accurate than solicited ratings because the agencies do not have access to important private information obtained in the solicited ratings process. Our findings provide some evidence that although the distributions of unsolicited and solicited ratings differ, unsolicited insurer ratings may be as accurate as solicited ratings.

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