

Corporate Transparency and Net Premium Written Flows: Evidence from U.S. Property-Liability Insurers

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Abstract

This paper investigates the relation between corporate transparency and net premium written as a proxy of policyholders' purchase intention in U.S. property-liability insurers. We find that policyholders are willing to buy policies from more transparent insurers. The evidence also shows that policyholders are more sensitive to information about insurers' financial risk when they are more transparent. Furthermore, policyholders are aware of insufficient protection of the guaranty fund. Thus, insurers' transparency plays a crucial role in shaping policyholders' purchase behavior.

Keywords: Corporate transparency, Net premium written, Purchase behavior, Guaranty fund

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1. Introduction

The transparency of insurers refers to a more reliable or higher information quality, which is valued by stakeholders. The transparency of financial institutions such as banks and insurers is an important issue because they are typically considered more opaque than non-financial corporates (Park, 2008). A growing literature suggests that corporates' transparency can improve the resource allocation process, lower transaction costs, reduce the cost of debt, and affect firms' valuation (Francis et al., 2009; Eckles et al., 2014; Lang et al., 2012). Dang et al. (2017) argue that depositors benefit from opacity which facilitates risk sharing between customers. Chen et al. (2022) argue that depositors are aware of information quality, which shapes their behavior, especially for uninsured deposits.

For the insurance industry, due to the nature of the complexity of liability structure and business lines, whether a typical policyholder's purchase intention will be shaped by transparency is an open question. More importantly, policyholders are the main debtholders when they buy insurance policies. Thus, the information quality is valuable for current and potential policyholders. This paper examines the relation between insurers' transparency and the net premium written flows. The lack of transparency may lower policyholders' utility regarding the information risk of whether an insurer's information is reliable. A higher level of transparency means a higher level of outside monitoring, lowering information asymmetry. Everything else equal, insurers with higher level of transparency indicates their disclosures contain more reliable information. Transparency can enhance policyholders' belief in getting repayments when claims arise. Thus, we argue that insurers' transparency will shape policyholders' purchase behavior.

Policyholders are alert to the information related to insurers' financial condition and response to poor financial condition, especially when the information is more accurate. This is the

inherent nature of the insurance policy. Premium is received at the beginning of the policy, and the indemnity is paid when a claim arises. Thus, there is a time lag for policyholders to get repayment. Therefore, policyholders take insurers' financial conditions into consideration when they have purchase intentions. Everything else equal, policyholders prefer to buy policies from more transparent insurers because of the high information quality. We suggest that policyholders are more sensitive to financial risk if the insurer is more transparent.

Policyholders suffer losses when insurers become insolvent even though there is a state-level guaranty association. Because the guaranty fund provides limited coverage and not all lines of business are protected. Thus, policyholders have more incentive to identify safer and more reliable insurers to avoid future losses due to the financial failure of insurers. Transparency is a signal of information reliability because of lower information asymmetry. Therefore, policyholders are sensitive to transparency even though their policies are protected by the guaranty fund.

This paper uses a sample of publicly traded property-liability insurers because the transparency measure is only available for publicly traded insurers. The final sample consists of 498 insurer-year observations from 1997 to 2021. The empirical result shows that policyholders are willing to buy policies from more transparent insurers and a one-standard-deviation decline in the opacity index is associated 16.83% increase in net premium written. A possible reason is that policyholders are aware of the information quality of insurers. We also find that policyholders are more sensitive to information about insurers' financial risk when they are more transparent. For an insurer with an average Expected shortfall at a 99.5 confidence interval, a one-standard-deviation decrease in opacity is associated with an increase of 17.09% in net premium written. Furthermore, the empirical results also show that policyholders have incentives to buy policies

from safer and more transparent insurers due to insufficient protection of the guaranty fund, especially for insurers with high financial risk.

This paper contributes to the literature that explores whether insurers' transparency will shape policyholders' purchase intentions. To our knowledge, this is the first paper to investigate policyholders' purchase behavior regarding to insurers' transparency. We also provide evidence that policyholders are more sensitive to information about insurers' financial risk when they are more transparent. Furthermore, our evidence also shows that policyholders are aware of insufficient protection of the guaranty fund.

This paper is organized as follows. Section 2 reviews the related literature and outlines hypotheses. Section 3 describes the empirical methodology framework and data sources. Section 4 presents the summary statistics of the sample and empirical results. Section 5 concludes.

2. Hypothesis development

2.1 Transparency and Net Premium Written

Due to the nature of insurers, such as the complicated liability structure, they are considered more opaque than non-financial corporates (Park, 2008). Thus, opaque firms are more likely to have a higher degree of information asymmetry, especially for property-liability insurers because of the uncertainty of loss estimation. However, whether insurers' transparency will shape policyholders' purchase behavior is still unclear.

Policyholders are less likely to devote time and resources to understanding annual or even quarterly financial statements thoroughly when they have a demand for policies. The reason is that most consumers can process a limited amount of information in the disclosure unless the information can be combined into a rating or ranking (Craswell, 2006; Sovern, 2010). In addition, consumers can also collect information on insurers through stock market performance and analysts' forecasting as they are not only policyholders but also potential debtholders. Policyholders pay the premium in exchange for the promise of indemnity when claims arise. In this sense, the risk involved (such as information risk) will be considered by policyholders because the repayment might default if the insurer becomes insolvent (Eckles et al., 2014).

For the same type of risk (e.g., automobile, homeowners', etc.), consumers tend not to buy more than one policy. Thus, the information risk of the insurer is non-diversifiable (Eckles et al., 2014). Policyholders can perceive the information quality as a part of the utility function of default risk. If everything is equal, the higher quality of information means a lower default risk. Ertan et al. (2017) argue that loans originated under a transparency regime have lower default probability.

Consumers are more willing to purchase from more transparent firms because greater transparency indicates outsider stakeholder monitor firms in deep. Therefore, the information risk

will be lower for transparent insurers, which benefits policyholders more regarding lower default risk. Thus, transparent insurers provide higher utility to policyholders. For all these reasons, we suggest the following hypothesis:

Hypothesis 1: Policyholders are more willing to buy policies from transparent insurers.

2.2 *Transparency to Net Premium Written-Financial Risk Sensitivity*

The poor financial condition of insurers induces managers to manipulate financial statements to appear solvent (Petroni, 1992; Gaver and Paterson, 2004). Furthermore, under strong investor protection regimes, there are greater financial transparency and less earning management (Bhattacharya et al., 2003). Thus, policyholders are alert to the information on insurers' financial health and respond more strongly to the poor financial condition when the information is more precise. The poor financial information serves as a signal which decreases the belief of policyholders whether they can get repayment when claims arise. In addition, Chen et al. (2022) suggest that uninsured depositors are sensitive to banks' performance when banks are more transparent. Thus, transparency plays an important role in conveying trustful financial information ex ante that is valued by consumers (Dang et al., 2015). Thus, these arguments suggest the following hypothesis:

Hypothesis 2: For less transparent insurers, policyholders are more sensitive to insurers' financial risk.

2.3 *Transparency and Insurance Guaranty Association*

If the guaranty fund provides complete protection to policyholders, there would be no difference to policyholders regarding the level of transparency. The information risk will not impact the belief of whether policyholders can get back repayment if insurers are insolvent with the full protection of the guaranty fund. However, the guaranty fund doesn't cover all lines of

business and provides limited coverage to these lines of business that are covered. Thus, even with the protection of the guaranty fund, the safety and information quality shape policyholders' purchase behavior. Policyholders have the incentive to identify safer insurers in order to avoid future losses due to the failure of insurers.

Higher transparency is expected to be monitored in deep by outsider stakeholders, which motivates insurers to make promises to meet the obligations to pay claims more credible to policyholders. In addition, with incomplete protection of the guaranty fund, policyholders perceive higher utility from insurers with higher information quality. The lower transparency amplifies the concerns of the probability of financial failure when insurers face high financial risk. Thus, policyholders will be attracted to more transparent insurers to enhance their belief in getting repayment. These argument leads to the following hypothesis:

Hypothesis 3-1: Even with the guaranty fund, policyholders are sensitive to insurers' transparency, especially when insurers' financial risk is high.

For lines of business that are not protected by the guaranty fund, these are products against the financial risk, investment risk, or ocean marine, etc.¹ These lines of business are high risk and are covered by limited insurers. Thus, they have limited choices of insurers for these products. If policyholders are aware of the risk of not being protected by the guaranty fund, then they will be more sensitive to the opacity when insurers face high financial risk. Because they get nothing if insurers go bankrupt. Therefore, policyholders of policies that are not protected by the guaranty fund will be more sensitive to financial risk when opacity changes. Thus, we propose the following hypothesis:

¹ The detailed lines of business which are not covered by guaranty fund can be found in *PROPERTY AND CASUALTY INSURANCE GUARANTY ASSOCIATION MODEL ACT*.

Hypothesis 3-2: Without the protection of the guaranty fund, policyholders are sensitive to insurers' transparency when insurers' financial risk is high.

3. Data and methodology

The initial sample consists of US publicly traded property-liability insurers from 1996-2021. Following the literature (Han et al. 2018), the opacity index is calculated based on four factors: trading volume, bid-ask spread, the number of analysts following, and analysts' forecasting error. The trading volume and bid-ask spread data are from the Center for Research in Security Prices (CRPS). The number of analysts following and analysts' forecasting error data are from the Thomson Financial Institutional Brokers Estimate System (I/B/E/S). The insurers' financial data are from the National Association of Insurance Commissioners (NAIC). Value at risk and Expected shortfall, proxies for firm risks, are calculated from CRSP. The rating data is from A.M. Best. After merging all datasets, the final sample consists of 498 insurer-year observations from 1997 to 2021.²

Insurers sell promises, not physical products, to consumers, and the premiums are not earned once received. Thus, insurance customers can be regarded as a combination of policyholders and debtholders. Therefore, information about insurers is essential for current and potential policyholders. Policyholders will be attracted to insurers that provide better utility. The utility perceived by a policyholder is determined by several factors: the policy's price, default risk, demand, and service quality. Based on the periodic public information available to policyholders, they update the view of insurers' default risk.

² NAIC dataset starts from 1996. The return of average equity is available from 1997 and we lag one year so the data sample starts from 1998.

Information quality can influence policyholders' perception of insurers' default risk, which is detrimental to the belief of policyholders in whether they can get indemnity when claims arise. Therefore, information quality is a sign of information risk to policyholders, which can be alleviated by the transparency of insurers. Furthermore, more transparent insurers will attract more policyholders if they take information quality into consideration. The main reason is that they buy promises from insurers. Thus, we argue that policyholders will be more willing to buy policies from more transparent insurers. The baseline regression specification to test our argument is as follows:

$$\ln(\text{Net Premium Written}_{i,t}) = \beta_0 + \beta_1 \text{Opacity}_{i,t-1} + BX_{i,t-1} + f_i + \varepsilon_{i,t}$$

where $\text{Net Premium Written}_{i,t}$ represents the net premium written by insurer i in year t from 1998 to 2021. $\text{Opacity}_{i,t-1}$ is the transparency measure of insurer i in year $t-1$. A lower opacity index means the insurer has more transparent public information. $X_{i,t-1}$ is a set of control variables. f_i is firm fixed effect. Insurance demand is highly subjected to the underwriting cycle due to macroeconomic developments and uncertainties. Thus, for year fixed effect, we use historical hard market episodes year dummies to control. We lag one year for all independent variables because policyholders make the decision based on last year's information.

For policyholders who do not have access to insurers' private information, insurers' public information can come from the stock market, the rating agency, analysts' reporting, etc. Based on the literature (Anderson et al., 2009; Wang, 2011; Han et al., 2018), the insurers' opacity index combines the information of four factors: trading volume, bid-ask spread, the number of analysts following, and analysts' forecasting error. The trading volume is correlated with information asymmetry (Chae, 2005) and captures firm-specific information (Bessembinder et al., 1996). Therefore, we take the natural log of average daily trading volume during the fiscal year as the measure of the trading volume. The second factor is the bid-ask spread, which is widely used as a

proxy for information asymmetry among investors (Nagar et al., 2019), and higher bid-ask spreads imply lower transparency of individual firms (Leuz and Verrecchia, 2000). To calculate the bid-ask spreads, the first step is to calculate daily bid-ask spreads as the daily ask price minus the daily bid price and scaled by the average of daily ask and bid prices. The second step is calculating annual bid-ask spreads by averaging the daily bid-ask spreads during the fiscal year.

Analysts play the role of intermediaries between firms and investors. Analysts' reports provide financial information to investors. If more analysts follow a firm, investors can get more comprehensive information about the firm, indicating lower opacity. Thus, we include the analysts following into the opacity measure. The analysts following is calculated as the natural log of the number of analysts who provide earnings forecasts nine months before the end of the fiscal year. The last but not the least factor in the opacity index is analysts' forecasting error. Hope (2003) suggests that analysts' forecast accuracy is positively related to financial disclosure quality. Anderson et al. (2009) use analysts' forecast errors to proxy information availability. The analysts' forecast errors are calculated as the square of the difference between the mean earnings forecast of all analysts (nine months before the end of the fiscal year) and actual earnings, then scaled by the stock price.

After calculating these four proxies of the firm's opacity, we rank each proxy to deciles from ten to one. For each rank of the proxy, the rank value of ten means the opaquest information, and the value of one means the most transparent information. Then, we sum up the four rank values of the proxy and scaled by 40 to get the opacity index from 1.0 to 0.1. The lower value of the opacity index means higher transparency. Anderson et al. (2009) argue that this opacity index provides a comprehensive and robust measure of a firm's opacity, which includes market trades and analyst coverage information.

We include a set of control variables in the regression analysis. The price of a policy (*PRICE*) is an essential factor influencing policyholders' purchase intention. There is no available data for unit price; thus, we use loss incurred divided by net premium earned (the inverse of loss ratio) to proxy the price. Policyholders can get public information not only from the stock market and analyst reporting but also from the rating agency. A.M. Best, a leading rating agency, provides rating services specializing in the insurance industry. A.M. Best's financial strength rating incorporates detailed public and proprietary financial information such as liquidity, asset, certified actuarial and loss-reserve reports, investment detail, annual business plans, etc. Once the rating is published, A.M. Best still monitors and updates the rating, which reflects the agency's opinion of whether the insurer can meet the obligation to policyholders and still remain solvent. Therefore, the A.M. Best rating provides comprehensive information to policyholders. Thus, we include the A.M. Best rating as one of the control variables.

We also control the effect of default risk, demand, and service quality on policyholders' purchase intention. Following the literature (e.g., Milidonis et al., 2019), the Expected shortfall (ES) at the 99.5 percent confidence level is used to proxy the financial risk.³ We use 1 year of daily stock returns to calculate Expected shortfall (*ES*), of which the definition is the conditional expected loss. An indicator variable *WEAK* is also used to reflect insurers' financial condition. The insurance industry is highly regulated, and regulators use Insurance Regulatory Information System (IRIS) ratios to target insurers needing regulation attention. *WEAK* takes a value of 1 if the insurer has more than 3 out of the range IRIS ratios and 0 otherwise. Policyholders respond to macroeconomic changes, which result in changes in insurers' performance. We call this effect an underwriting cycle. Thus, we control time dummies of hard market episodes as a proxy for demand.

³ The 99.5 percent confidence level is consistent with the solvency capital requirement (Milidonis et al., 2019).

We include insurer fixed effects and various insurer characteristics to control time-invariant and time-variant components of service quality. We control for return on assets (*ROA*), product diversification (*PRODHHI*), geographical diversification (*GEOHHI*), which are calculated using the Herfindahl Index, and the percentage of net premium written from coastal states (*COASTAL*).

4. Summary Statistics and Empirical Results

4.1 Summary Statistics

Table 1 presents summary statistics on financial variables for the whole sample. The insurer opacity index (OPACITY) has a mean (median) of 0.564 (0.550) and a standard deviation is 0.206, which are comparable to Han et al. 2018. The average insurer in our sample has A.M. Best financial strength rating (Mean of Rating=3.371) between “Superior” (A++ or A+) and “Excellent” (A or A-). The median rating (Median Rating=3) is “Excellent” (A or A-). The 75th quantile of *WEAK* is 0, representing that very few insurers have more than 3 unusual IRIS ratios. The average insurer has a product line Herfindahl Index (*PRODHHI*) of 0.415 and a geographical Herfindahl Index (*GEOHHI*) of 0.196, indicating that the insurer, on average, has approximately 3 business lines and operates in 5 states.

4.2 Opacity and Net Premium Written Baseline Result

Table 2 presents the relation between insurers’ opacity index and the natural log of net premium written. Recall that the lower opacity index means the insurer is more transparent. The coefficient of the insurer opacity index is negative and significant at a 5% level, supporting hypothesis 1 that policyholders are willing to buy policies from more transparent insurers. This indicates that policyholders take information quality into consideration when they purchase policies, suggesting that more transparent insurers provide more utility to policyholders. A one-standard-deviation decline in opacity index is associated 17.92% ($= -0.206 * (-0.870)$) increase in net premium written. This result is consistent with Han et al. (2018), who argue that more transparent insurers provide more conservative loss reserve estimation and prevent earning management through manipulating reserve estimation. Thus, policyholders get higher utility from transparent insurers because of high information quality.

The results of the control variable are consistent with expectations. A.B. Best financial strength rating (*RATING*) is positive and significant at a 5 % level, indicating that insurers with higher ratings attract more policyholders if they use rating to assess insolvent risk. This result is consistent with Halek and Eckles (2010) that information provided by the rating agency is valuable to policyholders. Consumers of financial products are sensitive to insolvency risk, so they demand lower prices of products to compensate for higher risk (Epermanis and Harrington 2006). Financial strength ratings try to provide comprehensive and unbiased opinions regards insurers' insolvency risk and reduce opacity. Thus, the influence of price might be incorporated into financial strength ratings, so the price is insignificant. The time dummy of hard market episodes (*HARD*) is negative and significant at a 1% level, indicating that policyholders respond to macroeconomic shocks. The insurance industry's underwriting cycle is influenced by the hardening market. Geographical diversification (*GEOHHI*) is negative and significant at a 1% level, suggesting that geographical diversification enriches coverage area and diversifies underwriting risk.

4.3 *Opacity and Financial Risk*

This section identifies whether policyholders are more sensitive to financial risk at insurers with lower opacity index. We use Expected shortfall (ES) at a 99.5 confidence interval to proxy the financial risk (Milidonis et al., 2019). The main focus is the interaction term of opacity and Expected shortfall at a 99.5 confidence interval. The coefficient of interaction term measures the change in net premium written-financial risk sensitivity as opacity changes. Table 3 presents the relation between opacity and NPW-financial risk sensitivity of policyholders.

The interaction term between opacity and Expected shortfall at a 99.5 confidence interval is negative and significant at a 5% level, indicating that policyholders are more sensitive to insurers' financial risk with a lower opacity index: a one-standard-deviation decrease in opacity amplifies

the average sensitivity by 71.21% in net premium written ($= -0.206 * (-4.708) / 1.362$). The coefficient of opacity is negative and significant, suggesting that transparent insurers have higher net premium written growth rate: for an insurer with an average Expected shortfall at a 99.5 confidence interval, a one-standard-deviation decrease in opacity is associated with an increase of 18.30% ($= (-0.639 + (-4.708) * 0.0530) * (-0.206)$) in net premium written. Policyholders are more sensitive to information about insurers' financial risk when they are more transparent. It makes sense because policyholders buy promises from insurers; thus, they are more risk-averse. The trustful information provided by transparent insurers increases the utility perceived by policyholders, especially when financial risk is high.

4.4 Opacity and Net Premium Written Protected by Guaranty Fund

If policyholders buy policies from solvent insurers, they can receive the full coverage listed in the policy if a claim happens and also receive services such as roadside assistance. What if insurers become insolvent? The insurance guaranty association is nonprofit and operated at a state level. The stated purpose of the guaranty fund is to provide a backup fund for policyholders to cover policies when the insurer is insolvent. However, the coverage provided by the guaranty fund is limited and varies for different states. Thus, the opacity and financial condition would influence the policyholders' purchase intention.

Table 4 presents the relation between insurers' opacity index and the net premium written from lines of business protected by the guaranty fund. The coefficient of opacity is negative and significant at a 5% level, indicating that policyholders recognize that the guaranty fund doesn't provide them with complete protection; otherwise, the opacity doesn't impact purchase intention. This result is consistent with Sommer (1996); there is no reason for purchasers to pay higher price to buy products from safer firms if the guaranty fund protection is complete. The opacity index

conveys the information quality to policyholders willing to buy policies from more transparent insurers, which provide higher benefits to policyholders. The economic magnitude is also significant: a one-standard-deviation decline in the opacity index is associated 19.32% ($= -0.204 * (-0.947)$) increase in net premium written from lines of business protected by the guaranty fund. The coefficient of price is negative but insignificant, and the rating is significant, indicating that the policyholders are aware that the guaranty fund doesn't provide full protection, so, on average, policyholders will be attracted by insurers with lower opacity and higher ratings.

4.5 *Opacity and Net Premium Written Protected by Guaranty Fund with Financial Risk*

As discussed in the previous section, due to insufficient protection of the guaranty fund, policyholders have incentives to buy policies from safer and more transparent insurers. This incentive will be amplified when they perceive the financial risk of insurers. Therefore, the influence of financial risk on demand will be greater if the insurer is less transparent.

In table 5, we explore whether policyholders will be more sensitive to the net premium written from lines of business protected by guarantee fund with financial risk when opacity changes. The coefficient of the interaction term between opacity and Expected shortfall is negative and significant at a 5 % level, indicating that policyholders are sensitive to opacity, especially when the insurer's financial risk is high. Moreover, the economic magnitude is significant: for an insurer with an average Expected shortfall at a 99.5 confidence interval, a one-standard-deviation decrease in opacity is associated with an increase of 19.86% ($= (-0.687 + (-5.404) * 0.0530) * (-0.204)$) in net premium written. The opacity index indicates higher information quality which benefits policyholders when their policies are not fully protected by the guaranty fund.

4.6 *Opacity and Net Premium Written Not Protected by Guaranty Fund*

The guaranty fund doesn't cover all lines of business; for example, insurance products that offer protection against investment or financial risks are excluded from the protection offered by the guarantee fund. For these products, policyholders are aware of the high risk and concern about the insurers' financial strength. Therefore, they have fewer incentives to buy products with the lowest price regardless of safety. Not all insurers provide products for lines of business that are not protected by the guaranty fund. As a result, policyholders have limited choices of insurers for these products. Based on the initial risks of policies, policyholders are more sensitive to opacity when insurers face high financial risk. Because once insurers go bankrupt, policyholders get nothing and lose the premium they paid. For these policyholders, net premium written-financial risk sensitivity as opacity changes is pronounced. The opacity can provide some information to policyholders; especially when financial risk is high. Furthermore, the comprehensive evaluation of insurers can also be informed by financial strength ratings.

In table 6, the baseline result of the coefficient of opacity is not significant. In column 2, the coefficient of opacity is negative and significant at a 5% level and the coefficient of the interaction term between opacity and rating is positive and significant at a 10% level. This result indicates that the negative effect of opacity is mitigated by rating. The impact of opacity is mitigated by a higher rating because insurers are more trustful with a higher rating. In column 3, the coefficient of the interaction term between opacity and Expected shortfall is negative and significant at a 5% level, indicating that when the insurer's financial risk is high, policyholders are sensitive to opacity: a one-standard-deviation decrease in opacity amplifies the average sensitivity by 40% in net premium written ($= -0.202 * (-13.315) / 6.724$). In addition, the financial strength rating is significant at a 1% level, indicating that policyholders trust the information provided by the rating agency.

5. Conclusion

This paper investigates whether insurers' transparency impacts policyholders' purchase intention. The results indicate that policyholders take information quality into consideration, which means transparency plays an important role when they make purchase decisions.

We explore that transparency positively affects policyholders' purchase intention, especially when insurers' financial risk is high. In addition, the guaranty fund doesn't provide complete protection to policies; thus, policyholders care about the safety and transparency of insurers. For more transparent insurers, policyholders perceive more utility regarding lower default risk because of higher information quality.

Appendix A: Variable definitions

Variable	Definition
Dependent variable	
<i>LNNPW</i>	The natural log of net premium written. (NAIC)
<i>LNNPW_GRT</i>	The natural log of net premium written of business lines protected by the guaranty fund. (NAIC)
<i>LNNPW_NGRT</i>	The natural log of net premium written of business lines not protected by the guaranty fund. ⁴ (NAIC)
Independent variable	
<i>OPACITY</i>	An index that sums up the four rank values of the proxy (trading volume, bid-ask spread, the number of analysts following, and analysts' forecasting error) and scaled by 40 to get the opacity index from 1.0 to 0.1. The lower value of the opacity index means higher transparency. (CRSP and I/B/E/S)
<i>PRICE</i>	The loss incurred divided by net premium earned (the inverse of loss ratio). (NAIC)
<i>RATING</i>	A.M. Best's financial strength rating: "Superior" (A++ or A+) equals 4; "Excellent" (A or A-) equals 3; "GOOD" (B++ or B+) equals 2; "Vulnerable Ratings" (B and below) equals 1. (A.M. Best)
<i>ES_99.5</i>	Expected shortfall (ES) is defined as the conditional expected loss using 1 year of daily firm stock returns at 99.5% confidence level. (CRSP)
<i>WEAK</i>	The WEAK takes a value of 1 if the insurer has more than 3 out of the range IRIS ratios and 0 otherwise. (NAIC)
<i>HARD</i>	Time dummies of hard market episodes. Equals 1 if observations are during 2000-2003, 2008-2012, and 2018-2020, and 0 otherwise. (Swiss Re Institute)
<i>PRODHHI</i>	The line of business Herfindahl Index. (NAIC)
<i>GEOHHI</i>	The geographical Herfindahl Index. (NAIC)
<i>ROA</i>	The return on assets. (NAIC)
<i>COASTAL</i>	The percentage of net premium written from coastal states. (NAIC)

⁴ The detailed lines of business can be found in PROPERTY AND CASUALTY INSURANCE GUARANTY ASSOCIATION MODEL ACT.

Reference

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Table 1: Summary Statistics

This table presents summary statistics of variables used in the regression model. The sample period is from 1997 to 2021. All the variables are defined in Appendix A.

Variable	N	MEAN	SD	MIN	P25	P50	P75	MAX
<i>LNNPW</i>	499	14.050	1.265	11.630	13.110	13.890	14.750	17.080
<i>OPACITY</i>	499	0.564	0.206	0.125	0.400	0.550	0.725	0.925
<i>PRICE</i>	499	1.957	0.629	1.197	1.621	1.808	2.059	5.184
<i>RATING</i>	499	3.371	0.527	1	3	3	4	4
<i>ES99.5</i>	499	0.053	0.030	0.021	0.035	0.045	0.064	0.296
<i>WEAK</i>	499	0.112	0.316	0	0	0	0	1
<i>HARD</i>	499	0.493	0.500	0	0	0	1	1
<i>PRODHHI</i>	499	0.415	0.295	0.118	0.167	0.259	0.647	1
<i>GEOHHI</i>	499	0.196	0.269	0.039	0.055	0.073	0.146	0.997
<i>ROA</i>	499	0.048	0.038	-0.060	0.023	0.046	0.070	0.156
<i>COASTAL</i>	499	0.487	0.197	0.0240	0.377	0.499	0.551	1

Table 2: Opacity and Net Premium Written

This table presents the main results of the baseline model, testing the relation between insurers' opacity index and net premium written using the OLS regression method. The dependent variable is the natural log of net premium written (*LNNPW*). All the variables are defined in Appendix A. The *t*-statistics are reported in parentheses. Significant levels at the 1%, 5%, and 10% are indicated by ***, **, and *, respectively.

Variable	LNNPW
<i>OPACITY</i>	-0.870** (-2.556)
<i>PRICE</i>	-0.013 (-0.267)
<i>RATING</i>	0.222** (2.474)
<i>ES99.5</i>	-0.736 (-1.146)
<i>WEAK</i>	-0.105 (-1.526)
<i>HARD</i>	-0.082*** (-3.604)
<i>PRODHHI</i>	-0.035 (-0.128)
<i>GEOHHI</i>	-1.629*** (-3.071)
<i>ROA</i>	-0.609 (-1.188)
<i>COASTAL</i>	-0.284 (-0.478)
Intercept	14.414*** (32.648)
Observations	499
Adjusted R-squared	0.951
Firm FE	Yes

Table 3: Opacity and Net Premium Written with Financial Risk Mechanism

This table presents the results of the interaction term model, testing the relation between insurers' opacity index and net premium written with the financial risk mechanism. The dependent variable is the natural log of net premium written (*LNNPW*). All the variables are defined in Appendix A. The *t*-statistics are shown in parentheses. Significant levels at the 1%, 5%, and 10% are indicated by ***, **, and *, respectively.

Variable	LNNPW
<i>OPACITY</i>	-0.639* (-1.716)
<i>OPACITY</i> × <i>ES99.5</i>	-4.708** (-2.360)
<i>ES99.5</i>	1.362 (1.401)
<i>PRICE</i>	-0.010 (-0.206)
<i>RATING</i>	0.220** (2.427)
<i>WEAK</i>	-0.103 (-1.500)
<i>HARD</i>	-0.073*** (-3.636)
<i>PRODHHI</i>	-0.037 (-0.133)
<i>GEOHHI</i>	-1.601*** (-3.092)
<i>ROA</i>	-0.659 (-1.244)
<i>COASTAL</i>	-0.276 (-0.471)
Intercept	14.304*** (31.665)
Observations	499
Adjusted R-squared	0.951
Firm FE	Yes

Table 4: Opacity and Net Premium Written Protected by Guaranty Fund

This table presents the main results of the baseline model, testing the relation between insurers' opacity index and net premium written of business lines protected by guaranty fund using the OLS regression method. The dependent variable is the natural log of net premium written of business lines protected by the guaranty fund (*LNNPW_GRT*). All the variables are defined in Appendix A. The *t*-statistics are reported in parentheses. Significant levels at the 1%, 5%, and 10% are indicated by ***, **, and *, respectively.

Variable	LNNPW_GRT
<i>OPACITY</i>	-0.947** (-2.724)
<i>PRICE_GRT</i>	-0.043 (-0.906)
<i>RATING</i>	0.206** (2.152)
<i>ES99.5</i>	-0.932 (-1.539)
<i>WEAK</i>	-0.109 (-1.560)
<i>HARD</i>	-0.092*** (-3.763)
<i>PRODHHI</i>	0.394 (1.465)
<i>GEOHHI</i>	-1.569** (-2.559)
<i>ROA</i>	-0.618 (-1.177)
<i>COASTAL</i>	-0.314 (-0.463)
Intercept	14.326*** (30.207)
Observations	497
Adjusted R-squared	0.950
Firm FE	Yes

Table 5: Opacity and Net Premium Written Protected by Guaranty Fund with Financial Risk Mechanism

This table presents the results of the interaction term model, testing the relation between insurers' opacity index and net premium written of business lines protected by guaranty fund with the financial risk mechanism. The dependent variable is the natural log of net premium written of business lines protected by the guaranty fund (*LNNPW_GRT*). All the variables are defined in Appendix A. The *t*-statistics are shown in parentheses. Significant levels at the 1%, 5%, and 10% are indicated by ***, **, and *, respectively.

Variable	LNNPW_GRT
<i>OPACITY</i>	-0.687* (-1.828)
<i>OPACITY</i> × <i>ES99.5</i>	-5.404** (-2.518)
<i>ES99.5</i>	1.512 (1.532)
<i>PRICE_GRT</i>	-0.047 (-0.984)
<i>RATING</i>	0.204** (2.094)
<i>WEAK</i>	-0.106 (-1.532)
<i>HARD</i>	-0.084*** (-3.820)
<i>PRODHHI</i>	0.400 (1.525)
<i>GEOHHI</i>	-1.539** (-2.591)
<i>ROA</i>	-0.635 (-1.187)
<i>COASTAL</i>	-0.305 (-0.457)
Intercept	14.210*** (29.688)
Observations	497
Adjusted R-squared	0.951
Firm FE	Yes

Table 6: Opacity and Net Premium Written Not Protected by Guaranty Fund

This table presents the main results of the baseline model, testing the relation between insurers' opacity index and net premium written of business lines not protected by guaranty fund using the OLS regression method and the interaction term between opacity and financial risk. The dependent variable is the natural log of net premium written of business lines not protected by the guaranty fund (*LNNPW_NGRT*). All the variables are defined in Appendix A. The *t*-statistics are reported in parentheses. Significant levels at the 1%, 5%, and 10% are indicated by ***, **, and *, respectively.

Variable	(1)	(2)	(3)
	LNNPW_NGRT	LNNPW_NGRT	LNNPW_NGRT
<i>OPACITY</i>	1.524 (0.923)	-4.814** (-2.500)	2.142 (1.261)
<i>OPACITY</i> × <i>RATING</i>		1.788* (1.984)	
<i>RATING</i>	0.610*** (2.955)	-0.360 (-0.704)	0.607*** (3.027)
<i>OPACITY</i> × <i>ES99.5</i>			-13.315** (-2.239)
<i>ES99.5</i>	1.191 (0.879)	0.833 (0.682)	6.724*** (2.812)
<i>PRICE_NGRT</i>	0.017 (1.113)	0.013 (0.934)	0.021 (1.347)
<i>WEAK</i>	-0.190 (-0.958)	-0.197 (-0.989)	-0.177 (-0.895)
<i>HARD</i>	-0.106 (-1.266)	-0.098 (-1.203)	-0.087 (-1.035)
<i>PRODHHI</i>	-2.181 (-1.664)	-1.942 (-1.554)	-2.160 (-1.671)
<i>GEOHHI</i>	-3.710** (-2.554)	-3.525*** (-3.037)	-3.658** (-2.477)
<i>ROA</i>	-0.760 (-0.316)	-1.600 (-0.644)	-1.099 (-0.451)
<i>COASTAL</i>	0.943 (0.737)	0.579 (0.465)	0.967 (0.737)
Intercept	8.349*** (5.542)	11.997*** (11.583)	8.084*** (5.394)
Observations	398	398	398
Adjusted R-squared	0.907	0.909	0.908
Firm FE	Yes	Yes	Yes