Surety pricing in Latin America.
Can a risk-adequate rate be calculated?

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Abstract

This paper is aimed at answering the issue raised by PASA in its call for the Carlos Dupont Award about whether the surety market rates are adequate to cover the risks. The answer requires a point of comparison of what is considered adequate, i.e., a pricing model that reflects the risk assumed in surety insurance and guarantees the surety's solvency in the future. It is observed that the theory on surety pricing is scarce and that, in most of the cases, the regulations are not adapted to the specific characteristics of the product. Based on the theoretical contributions found, variables are proposed to construct a risk-based general pricing model by integrating actuarial components with the pricing of particular operations. Furthermore, the advantages of using the risk indicators obtained during the underwriting and rating processes as a source of information for the risk management, monitoring and evaluation of commercial actions are highlighted.

Current situation: market practice and regulation

Based on the practical application of pricing models in the direct surety insurance market, they may be put on an equal footing with an asset. When competing for business, the counterparty ignores the minimum rate a competitor may fix, so some market players, in view of the current availability of large capacity, sometimes surprise us by dropping their rates to drum up business. Reflecting on risk-based pricing practices is important in an environment where the rates show a downward trend.

Except in Mexico, in Latin American legislation there is no price control model specifically adapted to the product. For instance, we see that in Spain the companies are free to set their own rates. In general, in other countries the companies are required to file with the supervisory body a technical note describing the rate calculation procedure. However, as there is no particular model applicable to surety insurance for the supervisor to use, such document may well be evaluated for its compliance with general principles or based on criteria applied to property insurance.

Problem outline

The confidentiality of the technical note creates market asymmetry. The fact of not knowing the competitor's calculation bases and the maneuver margin allowed by the scarce specific legislation may lead to the manipulation of pricing models to justify lower rates and be able to compete. This may be happening in Colombian and Brazilian markets, where the rates have continuously dropped in the last years.

In addition, on top of the low transparency in pricing models, the bibliography on this matter is scarce. In this paper, two models are reviewed, and the application of some of their components is proposed so as to contribute to the availability of a general model to serve as a starting point for risk-adequate pricing.

Risk management involves evaluating a company's capital commitment level. If the regional regulations tend to be similar to the Solvency II model, a more detailed supervision of the risk identification, management and assessment technique may be expected. In fact, Solvency II is a risk-based capital model. The improvement of the risk identification and quantification systems should be an objective to pursue, not only to comply with the regulations on determining the adequate capital level for the operation but also to define the risk-adjusted rate level, which will allow an adequate return on capital and guarantee the company's presence in the market.

Bibliographical review

There are few literature records of net premium determination for surety insurance. Two contributions stand out, whose main components are presented below.

The model built by Aguilar Beltrán and Gudiño Antillón follows Mexican regulations whereby the net premium is the one that allows for the return on the cost of capital the company has committed in the period ranging from the payment of a claim (t1) and the recovery through counterguarantees (t2), updated at the time of issue (t0). This implies that the company finances a claim for a period of time, the return on capital being equivalent to the claim amount. The authors include components that, up to the date on which their work was published, were not included in Mexican regulations, such as interest and recovery rates. They propose including the opportunity discount rate and a fixed capitalization rate of return, which should at least be equal to the inflation rate. Thus, the net premium (PN) is obtained with the following formula:

$$p_N = P_{(r)} * \frac{S}{(1+i)^{t_1}} * \left(\alpha \frac{(1+r)^{t_2-t_1} - 1}{(1+i)^{t_2}} \right)$$

Where:

- P(r): probability, in terms of claim frequency in the type of cover.
- S: severity ratio; it refers to the claim amount in terms of bonded amount, 1 being the maximum.
- α: percentage of recovery.
- i: opportunity cost of capital.
- r: fixed rate of return.

It should be noted that the above formula is expressed as capital cost per money unit, and the recovery is assumed to be 100%. If a portion of the claims is deemed irrecoverable, then the above formula should be:

$$p_N = P_{(r)} * \frac{S}{(1+i)^{t_1}} * \left(\alpha \frac{(1+r)^{t_2-t_1} - 1}{(1+i)^{t_2}} \right) (1-\varepsilon) + \varepsilon$$

Where "ε" is the percentage of paid claims deemed irrecoverable.

The model does not include a method for calculating P(r), but, as an alternative to the use of frequency and severity {(P(r)*S)}, the authors propose using the paid claims ratio (ω), whose calculation method is defined in Mexican legislation. This ratio is obtained by calculating the percentage of claimed amounts (MR) in each development year with respect to the bonded amounts (MA) in the corresponding year of origin of the policies claimed. Then the average of these values is calculated, so the paid commissions ratio is the sum of the averages observed in all the claim development years. The formula for the net premium including "ω" would be:

$$p_N = \omega * \frac{1}{(1+\mathrm{i})^{t_1}} * \left(\left(\alpha_1 \frac{(1+r)^{t_2-t_1} - 1}{(1+i)^{t_2}} \right) * (1-\varepsilon) + \varepsilon \right)$$

This formula becomes more complex when the different times at which claims and recoveries occur are taken into account, since a partial recovery releases part of the capital.

The second work that is considered here is the paper of Athula Alwis and Christopher Steinbach. The authors claim that a convergence mechanism between financial and surety markets was observed in the United States. The emergence of increasingly sophisticated products led insurers to assume risks in similar terms to those of financial markets. In this scenario, surety insurers offered lower rates. Later, the loss experience in the converging products showed that financial markets had calculated the price better. On this basis, the authors propose including components of the financial market pricing methodology in surety insurance. They also propose using the future default value estimated by the financial markets and adjust it by the loss triggers that differentiate surety insurance from financial products. Once the adjustment has been made, they include the expected recovery rate to obtain the severity.

Alwis and Steinbach rely on the availability of detailed and transparent information from the financial markets, which they think reflects the analysts and markets' consensus. The expected loss they propose is:

$$E(S) = (Ex * EDF) * (1 - r) * \alpha$$

Where:

- E(S): current expected loss value.
- Ex: exposure.
- EDF: estimated probability of loss.
- r: recovery rate.
- α: is calculated as follows:

$$\alpha = \left(\frac{\text{Probability of loss as a surety insurance product}}{\text{Probability of default as a financial instrument}} \right)$$

The alpha variable introduces the differences between the components that cause a loss in surety insurance and those that lead to a default in financial products. While in financial markets the failure to pay the interests on a debt is a default, in surety insurance the loss comprises a more complex process in which the insurer can participate. Following the authors, "α" would be equal to 1 if surety insurance is an unconditional on-demand cover, in which case the financial market's probability of default is the same as that of the surety insurance product.

Problem outline

Interestingly, the model of Aguilar and Gudiño includes actuarial procedures in the determination of surety premiums. The main contributions of the model are summarized below:

- With the calculation of the paid commissions ratio, realistic data on average severity are obtained, based on the product track record.
- Once the claim ratios per year have been calculated, it is easy to estimate the future evolution of the underwriting development years.

- The model considers interest and discount rates, which are key components to determine the current value of the capital required to finance a loss up to its recovery.
- As in the model of Alwis and Steinbach, recovery is introduced so that the quality of collaterals has a direct effect on the price. This model would predict realistic prices for extreme cases such as a cash deposit or the absence of collaterals.
- The model also considers the possibility that a portion of the loss cannot be recovered.

In the model of Alwis and Steinbach, the following contributions are worth noting:

- Being based on financial market data, a good part of the price depends on the market's consensus about a company's risk rating, which is associated with a default rate according to the market experience.
- The calculation to obtain the rate is simple. It requires estimating, in percentage terms, how different the surety insurance product cover is from a financial cover ("α"). The rate for surety insurance cover results from the value estimated for the loss expressed in terms of the insured amount.
- The authors talk about the importance of observing the economic cycle. They point out that the economic and underwriting cycles balance out, so when capital and credit are scarce, the companies go bankrupt. The losses resulting from this scenario justify the rise in rates, so insurers enter a more profitable phase compared to their recession environment. The economic cycle is a key component that will be discussed further on.
- They also say that the model should include an anticorrelation between the expected recovery rate and the future probability of a loss. This is so because, in case of insolvency, recovery is more remote.

As to the weaknesses of the models presented, it could be said that by applying the model of Aguilar and Gudiño, the price is mainly obtained from the product track record. We assume that the paid commissions ratio is reviewed from time to time, so that it is a constant during its applicability period. In addition, in many cases the counterguarantees given for the product are standard, so, within the period the paid claims ratio is in force, the net premium would vary due to changes in the interest rate only. Please note that no components of the inherent risks of a contractor and/or a particular project are included. The starting point of the model is that underwriting lowers the expectations of having cases of no recovery or a lower recovery than the claimed amount, which undoubtedly is the target of the underwriting area. However, the operations accepted by the underwriting staff have different risk levels. In this paper, it is considered that an adequate price should include this component.

Furthermore, the model of Alwis and Steinbach introduces each contractor's quality of risk at the time of underwriting. Yet, the applicability of this model in Latin America is limited, due to the lack of risk estimation data used in the financial markets, which is the basis of that model.

Proposal

The proposal consists in increasing the base rate obtained by the actuarial model of Aguilar and Gudiño with the incorporation of a differential reflecting the contractor´s credit risk, a key element in Alwis and Steinbach's proposal. It is worth noting that a further adjustment to include administration, acquisition and financing expenses plus the profit margin is needed.

Then, we assume that a pricing model should adequately respond to the following:

- The loss behavior of the type of cover or product.
- The quality of the collaterals securing the transaction.

- The contractor's insolvency risk estimate.
- The project risk estimate.

Aguilar and Gudiño's proposal is adequate for pricing based on the product track record and the quality of collaterals. However, the question is how to achieve a differential which includes the contractor's risk quality, as proposed by Alwis and Steinbach. Besides, the models examined do not include variables for project risk assessment. Components to incorporate these variables are proposed below.

1. **Probability of bankruptcy**

Some developed models classify the companies according to scales of credit risk levels. It would be necessary to calculate the company's probability of filing for bankruptcy in one year and then adjust such estimate progressively for the following years, so that a higher differential may be applied to the price when the policy period is longer and, therefore, there is higher uncertainty on the contractor's financial evolution.

It is worth pointing out that, due to the nature of surety insurance, when the financial solvency indicators are weighted, liquidity should be given a good relative weight. If we take into account that a future deterioration of the contractors' financial indicators may occur due to poor results, it may be expected that they will face lower credit availability to finance the projects underway, in addition to debt maturity. For contractors, liquidity problems are, to a great extent, a vicious circle characterized by the acquisition of more expensive debt or the cross-financing of projects to continue working, thus increasing the probabilities of nonperformance due to a lower maneuver margin.

2. **Economic cycle differential**

In an economic slowdown scenario, portfolio contractors may face liquidity problems because the financial agents, perceiving a general risk increase, limit their credit volume. Liquidity problems may also arise from a cut in public entities' budgets, causing payment difficulties and threatening the collection of receivables based on work progress for more than one portfolio contractor.

This means that the rate could possibly be adjusted according to the expected expansion or recession in the years following underwriting. If the expectation is that the project will be satisfactorily completed under a favorable macroeconomic environment, the differential to be charged for the cycle may be minimal. However, if there are economic slowdown signs and the forecast is pessimistic, it would be reasonable to increase exposure only if the rate is adequate after having incorporated a differential for the higher risk involved in the cycle.

Additional variables proposed

Two easily measurable risk factors to incorporate the conditions of a particular operation are proposed here. The proposal also consists in balancing the relative weight given to the contractor's bankruptcy estimate, as this is not the only risk component of the operation. The following indicator input comes from the underwriting area.

3. **Project financing differential**

It is proposed that the conclusions of the analysis of financing schemes and cash flows of the particular project be incorporated as a pricing variable.

If we take into account that the contractor has to go into debt to finance a project, the future leverage level will be higher than that on the underwriting date. So, the project itself contributes to increasing the contractor's credit risk. The logic behind this variable is that for a project with a good down payment, self-financed with collections based on work progress and which does not need to go into debt to achieve completion, a minimal project financing differential could be charged. If the bank leverage is higher, project completion will be more sensitive to the contractor's financial evolution, so a higher differential is justified.

Cover liquidity differential

In general, in the Latin American countries there exists a procedure to prove the loss claim and estimate its amount before filing a formal surety claim. The officers in charge should follow administrative procedures and fill in several forms to call on a claim. Have in mind that in an unconditional on-demand market the rate should be penalized with a high differential due to the cover liquidity. If the process to prove the loss and formalize the claim is very strict, the cover liquidity differential should be lower.

It is worth noting that this component is proposed even for those markets that are not on-demand. In case of a cover that requires, for instance, joint and several liability with the principal (as in Colombia with the VAT reimbursement policies before the Tax Authority (DIAN)), the product is highly liquid. This means that the different portfolio products involve different enforcement levels; then, this type of evaluation is justified.

Compilation

It has already been said that the model of Aguilar and Gudiño is appropriate to reflect the product track record and the dynamics of recovery per collateral. In order to introduce contractor and project risk indicators, the following components have been proposed:

1. Probability of contractor's bankruptcy
2. Differential based on the economic cycle
3. Differential based on the project financing scheme
4. Differential based on cover liquidity

The proposal consists in using the calculation model devised by Alwis and Steinbach to determine the estimated loss value–using variable 1–and the estimated recovery. If we express this value in terms of the insured amount, we would obtain a rate indicative value arising from the financial risk the contractor involves. The relative weight of the financial risk may be adjusted up and down by applying the previous differentials, which introduce risk components from the economic environment and the particular operation.

Advantages of implementing the model: Function integration

Credit insurance companies' risk management is based on an ongoing monitoring of the risk level involved in the exposures. An early diagnosis gives them the opportunity to react and control their exposures as an answer to a deteriorating sector and increase rates if the insolvency level of an economy increases. On the other hand, although the surety line risk is also insolvency, in practice, many times the companies do not have such an advanced data system. It is worth noting that the size and global presence of few credit insurers have allowed them to develop prediction systems based on their large internal database.

We believe that one of the main difficulties of surety risk management is the dichotomized views of the pricing and risk management areas.

It is evident that the four variables proposed provide information on the future risk level associated with the contractor and the project he has undertaken, which, in essence, is the risk associated with the exposure incorporated into the portfolio. Following Alwis and Steinbach's work, we propose that these pricing system output data be used as input in the exposure control area to make these two areas' performance more efficient.

The incorporation of these indicators into risk management would associate the portfolio exposure with certain risk level, and would offer different advantages:

- Planning the surety's commercial actions: the company's strategy may determine the desired portfolio risk profile. This starting point would allow us to define the price maneuver margins the commercial area has, so as to encourage the incorporation of exposures that meet the target exposure profile.
- Performance evaluation of the commercial task force and brokers: the data obtained enables the evaluation of the volume of exposure incorporated into the portfolio in a certain period in terms of its associated risk level and the price obtained compared to the model price.
- Consistent administration in the pricing and risk management areas: if, when updating the bankruptcy estimates of the main exposures, deterioration is observed, the risk level of the old exposures may be analyzed for current decision-making. The credit quality of the portfolio risks does not remain stable throughout the policy period; introducing and reviewing bankruptcy estimates would make the risk management area more dynamic. Likewise, the diagnosis of deviation from the target of the portfolio risk profile would allow prompt corrections in the commercial area.
- Efficiency: the knowledge of the portfolio exposure associated risk favors the drawing up of a more adequate reinsurance program. In addition, if the risk estimation methodology is shared with and accepted by the reinsurer, both parties achieve a higher level of information and prices more adjusted to the assumed risk.

Conclusions

- We start from the basis that risk-adequate pricing is a necessary exercise and not a variable determined by the market or the brokers. As regional regulations on this matter are not exhaustive and, in practice, there is little transparency, the review of the existing models is justified in order to build a model whose predictions may be compared to the market rate to analyze whether it is adequate for the assumed risk.
- After examining two bibliographic contributions, the conclusion was that those models could complement each other to counteract their weaknesses. We proposed some components to be incorporated into the existing contributions, as well as new variables, so that the price could reflect the risk profile of the contractor and the project.
- The implementation of a pricing model which integrates the risk with the product track record and each particular operation would provide a better risk-adjusted rate than that obtained with the sole application of one of the two components.
- A set of variables reflecting the risk level of the contractor and project was obtained. We proposed integrating this information with exposure management so that these variables become a dynamic component and allow for a better coordination and control of the different areas in charge of the operation. In addition, a useful data system for strategic decision-making, management and control of the commercial area, and dynamic risk management would be created.

Bibliography

AGUILAR BELTRÁN, Pedro and Juliana GUDIÑO ANTILLÓN, *Fundamentos Actuariales de Primas y Reservas de Fianzas: Los procedimientos técnicos de la regulación mexicana*, Instituto de Ciencias del Seguro, Madrid, Fundación Mapfre, 2007.

ALWIS, Athula and Christhoper STEINBACH, "Credit and Surety Pricing and the Effects of Financial Market Convergence," Casualty Actuarial Society (CAS), 2003. Available on: https://www.casact.org/pubs/forum/03wforum/03wf139.pdf