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# Reinsurance Pricing and Optimization in Emerging Markets

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## Abstract

This report develops a Reinsurance optimization methodology for an insurance company in emerging markets, as reinsurance material on emerging markets generally lacks a basic level of quantification. Furthermore, this optimization will be presented in its proper context as well as enveloped between key relevant reinsurance concepts and strategies. It is felt that there is a lack of reinsurance reports that cover practices in emerging markets as well as provide guidelines. Thus, this report not only takes on the area of reinsurance optimization for an insurer, but also provides in-depth coverage of key reinsurance concepts, strategies and matters that must be considered by reinsurers in emerging markets. Main coverage for reinsurers is key considerations to be taken when pricing for reinsurance especially for small and national reinsurers that generally lack the skills available to global multinational reinsurers.

We are aiming at intermediate level readers and so will assume working knowledge of basic concepts but it has also not been made only for the advanced user. The Middle East has been taken as a case in point here when referring to emerging markets. Other emerging markets are not explicitly covered but many generic themes may be able to them as well. This report contains a mix of various research and practical experience as senior consultant for the leading actuarial consultancy for the Middle East.

Keywords: Reinsurance pricing, fat tails, reinsurance optimization, reinsurance strategy, tail liabilities, clash covers

Disclaimer: The opinions described here are of the author alone and not those of his employers.

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## 1. OVERVIEW

Please note that this section is written from a reinsurer's point of view. Lloyd's report<sup>1</sup> on reinsurance pricing highlighted two over-arching beliefs that are relevant to us as well which are "intelligent execution" and "communication". Intelligent Execution means remembering the context of the information and environment and focusing most of the time on getting a solid grasp of the key dynamics involved, rather than spending too much time worrying about theoretical purism around the edges. Communication is as much about convincing people of what we do not know and what you cannot infer, as it is about what we do and can.

Reinsurance arrangements are required to have protection against severe or multiple occurrence of losses. Assuming that business is being written on profitable terms the transfer of risk to reinsurers also shrinks the profit margins of primary insurers as obviously, reinsurers would also seek to make profits. Therefore, any reinsurance arrangement needs to be optimized so as to retain the maximum levels of risks accepted by the company's capital structure and the risk profile of its portfolio and thus enjoying maximum return.

Any difference in the level of profitability between the risk retained by the company and that reinsured could result from either:

- discrepancies in the effective rate at which risks are ceded to reinsurers and that charged by the company to clients; or
- the company's pricing mechanism not having adequate loadings to meet commissions and expenses.

Assuming that business is being written on profitable terms the transfer of risk to reinsurers also shrinks the profit margins of primary insurers as obviously, reinsurers would also seek to make profits. Therefore, any reinsurance arrangement needs to be optimized so as to retain the maximum levels of risks accepted by the company's capital structure and the risk profile of its portfolio and thus enjoying maximum return.

An insurance company can feel the requirement to reinsure certain risks on a facultative basis rather than cede it under a treaty.

- Coverage is required against the exclusions of the treaty
- Coverage is required for the cases where MPL is breached (treaty capacity)
- Cases cannot be priced due to underwriting capacity (i.e., underwriters feel that they do not have the experience to underwrite specific risks)
- Cases of fronting arrangement

Although the cases which require facultative cover are few in numbers than those covered by the treaty, but due to their significant share in terms of premium volume they need to be carefully assessed.

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<sup>1</sup> Reinsurance Pricing: Practical Issues & Considerations, 8<sup>th</sup> Sep 2006; 2006 GIRO Reinsurance Matters! Working Party, Mark Flower et al.

For reinsurance, the market rate can be quite different to actuary's technical rates, for a number of reasons<sup>2</sup>:

- The lead underwriter(s) might have made a different assessment of the risk based on their own knowledge and experience.
- This might be cycle related: in a hard market, the underwriter is taking advantage and writing for abnormal profits, or in a soft market the main focus is on client retention instead of sound pricing
- Sometimes there will be significant terms and conditions or other more qualitative features of the risk that are factored in to the market rate (up or down), but which do not feature in the actuary's technical calculations;
- There may be commercial considerations at play, such as writing one contract at an expected underwriting loss (or minimal profit) in order to access other contracts that generate sufficient expected profits that it makes good sense to write the full set. This can happen quite frequently on a reinsurance program where one broker is placing several layers of reinsurance for the same client at the same time and the broker will only allow a market to participate on the attractive layers if they also take a share in the more competitively priced layers. Insurance companies also sometimes write medical insurance at a loss and medical acts as a loss leader because once it is sold, a relationship can be developed and clients can be potentially sold other lines of insurance.

Reinsurance is all about peak risks or risk volatility on Severity, frequency or both (Aggregate loss amount). Mathematics and Statistics help to decompose information available and to analyze each component, to recompose results into a synthesis and translate results into economic and business interpretations<sup>3</sup>.

Whatever the reinsurance actuary is doing, it must be kept in context. What metrics are being used by reinsurance management to allocate capital, measure underwriting returns and remunerate the underwriting team? It is very important to align risk loading methodologies with these metrics.<sup>4</sup>

It is important to remember not to over-complicate matters. This is not personal lines or life insurance where the actuary can accurately quantify and evaluate much of the risks. There will usually be significant uncertainty around the expected recoveries from a reinsurance layer, so a complex risk load that takes a lot more effort to calculate and communicate than a simple approach, but which offers only a small increase in "theoretical robustness", may not be the best one to use. It could also undermine actuary's credibility with the underwriter if they struggle to understand and accept the actuary's approach.<sup>5</sup>

This report is structured as follows:

## 2. Market review

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<sup>2</sup> Ibid

<sup>3</sup> Reinsurance Pricing: Dr. Michael Frohlich 3 Sep 2014. DEUTSCHE AKTUAR AKADEMIE GmbH

<sup>4</sup> Reinsurance Pricing: Practical Issues & Considerations, 8<sup>th</sup> Sep 2006; 2006 GIRO Reinsurance Matters! Working Party, Mark Flower et al.

<sup>5</sup> Ibid

3. Key considerations for optimizing reinsurance
4. Reinsurance optimization model
5. Basis for design of reinsurance program
6. Reinsurance strategy
7. Conclusion

## **2. MARKET REVIEW<sup>6</sup>**

The Middle East insurance and reinsurance market is still in emerging stage. There are two categories in between mostly, i.e. the national insurers and multinationals. Multinationals have branches here mostly for only generating new business. The technical aspects are mostly done at headquarters in developed countries. Moreover, the market is highly fragmented which means that the top 3 or 5 dominate the market in terms of premiums and the other dozens of companies compete for the rest of the business. This effectively means that national insurers only at top level in market are able to concentrate on technical aspects and there is normally no major diffusion of technical skills and resources from the multinationals.

The oil crisis has certainly shaken GCC markets as they realize that they cannot remain addicted to oil revenues and must diversify now on a concrete basis. This has brought in a number of structural changes. It is suggested that technical skills should be seen as a source of competitive advantage and of monetary value now when undertaking such structural changes. Industry wide initiatives need to be undertaken to increase awareness and a gradual opening of the black box of insurance operations and specially reinsurance needs to be given priority.

Advice to reinsurers is that the employees should know their terminologies! Reinsurance accounting is far more complex and intricate than insurance accounting and training initiatives in the GCC region need to be increased for reinsurance employees.

For reinsurers, it is increasingly becoming relevant that they should be aware of the cedants' changing behavior and adapt accordingly. Regulations mean that there is increased pressure to insurers in the GCC region to increase their capital adequacy and retention levels. This is creating preference for reinsurers that can offer more security, line sizes, global offering and network of local presence. National reinsurers are still preferred sometimes because of lower quotations, higher limits given, relationships developed already with them, regulatory requirements to cede a minimum floor to them, some niche markets like marine war and so on. There is a push for smaller reinsurance panels so that monitoring costs are reduced and insurers are better able to assess the counterparties instead of being unaware of them.

Loss adjustment expenses are generally much more important for reinsurance treaties than for insurance contracts generally. Nothing is being done to highlight this crucial difference in emerging markets.

Regulations have taken a key stage in making structural changes to markets especially UAE and Saudi regulators. Actuaries are more in demand for the value addition they bring from motor pricing, medical pricing, reserving and other quantitative assessments. However, retention ratios for commercial insurance is still very low and actuarial expertise is mostly utilized for personal lines of general insurance. More penetration by actuaries in commercial insurance and reinsurance companies needs to be propagated.

It is vital for insurers and reinsurers to be aware of current and upcoming market trends. For instance, as the supply and production chains of global companies become more geographically scattered and

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<sup>6</sup> INTERFIMA; Syed Danish Ali; Jan 2017; Market Review: Reinsurance in the GCC

inventories of key components become smaller, the potential for business interruption losses is also escalating.

Reinsurers in the upcoming future are facing:<sup>7</sup>

- Expanding risk universe
- Growing risk aversion in modern societies
- Growth in emerging markets
- No serious substitutes for reinsurance
- Reinsurance is embracing and will benefit from new technologies

There is significant correlation between commercial general insurance and reinsurance as most of personal general insurance is retained by insurance companies whereas most of commercial general insurance is ceded to reinsurers. Aside from regulations, actuaries also need to pro-actively show their value addition for commercial general insurance.

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<sup>7</sup> The Reinsurance Industry in 2020: Denis Kessler SCOR Re.

### **3. KEY CONSIDERATIONS FOR PRICING REINSURANCE<sup>8</sup>**

This sub section will concentrate on highlighting a number of key considerations to be taken by reinsurers when pricing for reinsurance especially for small and national reinsurers that generally lack the skills available to global multinational reinsurers. Please note that this section is written from a reinsurer's point of view.

Reinsurance is priced around two methodologies:<sup>9</sup>

1. experience rating

2. exposure rating

A lot has been said on these two measures in a lot of publications but we will highlight only some key points here. There is normally no homogenous class of risks that can be collectively priced and each treaty and proposal for facultative coverage has to be assessed on its own. The burning cost shows the average cost to settle claims for a particular reinsurance arrangement. Loss ratio is simultaneously analyzed to corroborate the burning cost as it will need explanation if a treaty has high burning cost but low loss ratio.

Exposure rating sees the exposure that is at risk instead of historical experience. It takes a forward-looking approach rather than the historical approach of experience rating. However as best to our knowledge, there are no ILFs to guide quantitative exposure rating specific to GCC region. Relationship building, qualitative market assessment and reinsurance cycles are the bread and butter of how reinsurance is performed in the GCC.

Generalized Linear Modeling (GLM) should not be used in emerging markets at this stage for most of reinsurance pricing as there is little data available, the data is heterogenous and not credible enough to sufficiently train and test the GLM model in most cases. GLM is extensively used in personal lines like motor and medical pricing because of large data and relatively homogenous risks as compared to commercial insurance and truncated & layered reinsurance data.

Insurers buy reinsurance to stabilize results, reduce volatility in results and reduce peak risk. What this does basically is that reinsurance swaps underwriting risk with credit risk of the reinsurer, which is normally lower. This swapping benefit along with commissions make reinsurance more capital efficient.

Ultimately, the uncertainty surrounding reinsurance pricing cannot be eliminated or even minimized, it can only be contained. This is because while insurers take on tail risks for consumers, reinsurers take on tail risks of insurers and hence by definition is in the business of extremes and tail risk management. Moreover, if reinsurance losses were known with certainty, there would be no need for reinsurance in the first place.

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<sup>8</sup> INTERFIMA: Syed Danish Ali: Jan 2017; Fundamentals of reinsurance pricing: back to the basics.

<sup>9</sup> Reinsurance Pricing: Practical Issues & Considerations, 8<sup>th</sup> Sep 2006; 2006 GIRO Reinsurance Matters! Working Party, Mark Flower et al.



Value at Risk is a useful tool for management of downside risks. It shows how much we stand to lose at a minimum over a specified confidence and time interval. For instance, motor bodily injury VaR is AED 250,000 (with 95% confidence interval over 1 year) which means that this AED 250,000 is the minimum floor which will be exceeded for the 5% worst case losses. However, this floor tells us nothing about how much the losses will go once it exceeds the minimum floor value. For better assessment of tail risks, VaR should be complemented with Tail Value at Risk see how worse can large losses really go when they exceed the minimum VaR floor. For instance, the TVaR for motor bodily injury is AED 3 million which shows that when 5% worst cases losses will occur and exceed the VaR floor, the average value of such claims will be AED 3 million.

It is important not to take confidence and comfort in precision and quantitative assessments. VaR has become famous for inducing a false sense of security by for instance implying that 95% claims will occur within AED 250,000 amount. This is dangerous because when tail events do occur, they are more than capitalization of the whole company in question. A case in point in is the 63 floors luxury Address Hotel in Dubai which burnt in new years' eve and lead to extremely massive clash cover claim which is still under development. Companies had hardly ever seen such event before.

Some products do not have maximum liability and are unlimited like motor bodily injury, workmen compensation's bodily injury and certain umbrella terms. Hence the reinsurer should carefully evaluate experience to form realistic expectations of such losses. Moreover, even when there are very high but maximum limits, actual losses can still be higher due to Extra Contractual Obligations. Emerging liabilities like liability catastrophes and mass torts like asbestos highlights these points accurately.

Commercial general liability, product liability and all risks products are especially vulnerable to such emerging liabilities. It is of no importance that previous mass liabilities are excluded in today's contracts as no one emerging liability is the same. The next major liability catastrophe will be mostly covered in today's benefits in one form or the other.

Inflation is also a far more important consideration in reinsurance than insurance. This is because many trends like health insurance, tort and legal claims are not following the economic inflation and is in most cases much higher than the economic inflation. Moreover, inflation is not constant over all sizes of claims. For claims with larger amounts, inflation is greater relative to small claims. This means that inflation is superimposed inflation for reinsurance, especially for facultative and excess of loss which absorbs only large claims.

The insurer has to be holistic as well and see the aggregate Reinsurance protection instead of seeing only by lines of business. This is because CAT, aggregate XOL and whole account treaties are also there that takes aggregate loss experience of many lines of business into account.

Reinsurance is effective for both life and general insurance. For life, reinsurance builds protection against new business strain. For general, reinsurance builds capacity for underwriting capacity and economies of scale.

Two other important factors for reinsurance are capital fungibility and loss absorbing capacity. Capital fungibility means surplus capital can be transferred from one country, client, geography etc. to another without hurdles. Regarding loss absorbing capacity, Clash covers has the effect of accumulating and

losses. Short tailed liabilities and losses are better absorbed than long tailed which can be more extensive and long term.

Correlation is very important to take into account for reinsurance. Think what the key correlations might be and try to model these explicitly. For example, if pricing is needed for a whole-account treaty that covers six lines of business, two of which are correlated to, say, stock market performance – in the simulation model these can be treated dependently.

Fat tails represent correlation that has not been recognized. Fat tails are much more prevalent in large losses and reinsurance as reinsurers are harbinger of tail liabilities. Two approaches are suggested to take these into account. Firstly, deep underwriting experience and market intuition as well as expert opinion should not be discarded. This qualitative input can be as important as quantitative, if not more. Secondly, complexity science is a whole field dedicated to handling the complexities of reality but it is not expected that this emerging field will be practically implemented by companies in emerging markets. Hence, for the foreseeable future, the main recourse should be on integrating expert opinion to understand correlations better.

Due to the lack of data, it can be difficult to model correlation rigorously. Even the covariance of 2 variables is often difficult to estimate. It may be that a simple model of linear correlations makes more practical sense than a more complex method (copulas etc.). The time saved with the simplified modelling can be used to test the model. The reinsurance actuary in collaboration with underwriters should try correlating a minimal number of variables with crude correlation coefficients, such as by restricting the choice of correlation to one of:<sup>10</sup>

- o 0% No correlation
- o 30% Weak correlation
- o 60% Reasonable correlation
- o 90% Strong correlation

When doing this, remember that 30% correlation for example really is weak and will not have a dramatic impact.

Another factor that can significantly skew rate level indices is what we would call “cycle spikes” i.e. chunks of opportunistic business written at appropriate times in the underwriting cycle. When markets are hard, the underwriter may write an extra-ordinary category of business at exceptional rates. When markets soften, they will rapidly ditch this same block of contracts. Such behavior can lead to exaggerated swings in the rate level index that are actually not reflective of what is happening in the “core” business. Applying this to price core reinsurance can be misleading.<sup>11</sup>

For the actuary, given the cyclical nature of market rates, it is worthwhile tracking the technical rates as a consistent benchmark against which to monitor. It is hard to infer anything from individual risks deviating from benchmark, but observing an entire portfolio moving up or down can be very instructive.<sup>12</sup>

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<sup>10</sup> Ibid

<sup>11</sup> Ibid

<sup>12</sup> Ibid

Due to the limited amount of data available, it is often quite difficult to accurately price a Clash cover. Actuarial judgment and market knowledge are necessary and so are discussions with the underwriter. Sometimes the source of a potential clash will be obvious (e.g. medical malpractice, where there are often several doctors and a hospital all named in the same lawsuit, a fire in building triggering multiple other insurances as well) and in other cases it might be less obvious (e.g. cat reinsurance in non-cat prone zones).

How does the insurer then monitor its accumulations? Sometimes this simply is not possible, for example Marine Hull and Cargo classes obviously clash but it isn't feasible to monitor the contents and exact whereabouts of every container throughout the year. If the accumulations are not properly monitored, we should not rely exclusively on the available information as it probably underestimates the risk. Building in a margin for the unreported accumulations can help reduce such potential accumulations.<sup>13</sup>

There are material differences even between distributions that are similar. For instance, data can be fit using Lognormal or Pareto distribution with similar moments and goodness of fit. Both of these can have similar aggregate expected losses but the recoveries on high level layers of excess of loss can be significantly different and hence will materially change the evaluation on the adequacy of the depth of aggregate reinsurance coverage.<sup>14</sup>

If there are no large losses above high excess layers, the Monte-Carlo or stochastic model should avail market knowledge that are deterministic such as using ILFs to assess these higher layers. While ILFs are mentioned in reports in developed countries and can be easily bought by insurers, there appears to be no market wide initiative for GCC markets to make ILF curves or yield curves that national insurers and reinsurers can avail.

Flat rates must be avoided as they are not sustainable for the relationship between reinsurer and insurer over the long term. If insurer has good loss ratios, it will resent the lower commissions given to reinsurer and will cite that most of the profit from the portfolio is being taken by the reinsurer and vice versa when loss ratios are high. Sliding scale commission and swing rates avoid this contention over equity and induces better sense of fairness in business relationship between insurer and reinsurer.

Insurance companies do not become insolvent due to having vulnerable balance sheets. As insurance is the business of risk taking so there are always vulnerabilities that have the potential to cascade and develop into a larger crisis. This vulnerability is kept in balance by risk management and market confidence.

This is why stress testing should be performed regularly by insurance and reinsurance companies. The realistic side of stress testing also shows that practically stakeholders do not withhold action until the entire share capital has evaporated to react to an insurance company under stress. Their actions are preemptive while they can still reclaim some of their investments. So, despite the stress testing showing insolvency in for example, 4 years, the realistic bankruptcy will usually likely occur much sooner.

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<sup>13</sup> Ibid

<sup>14</sup> Ibid

It must be emphasized that assumptions are not static quantitative undertakings that occur and impact in silos but rather they form an interesting pact with other assumptions and the broader economic and social context.

Based on stress testing assumptions, the company's management should understand the insurance business as the specificity of the insurance-related-reverse production cycle (collecting premiums first, paying out claims later and accumulating assets to cover future payouts) and the requirement to control and mitigate operational risks that are generated everywhere in the insurance value chain.<sup>15</sup> Future claims payments are effectively pre-funded by premium income.

The results of stress tests and the interpretation of associated findings are heavily influenced by data availability/granularity, the scope and calibration of macro-financial risks, and the assessment of vulnerabilities to these risks. In particular, these difficulties relate to the following issues:<sup>16</sup>

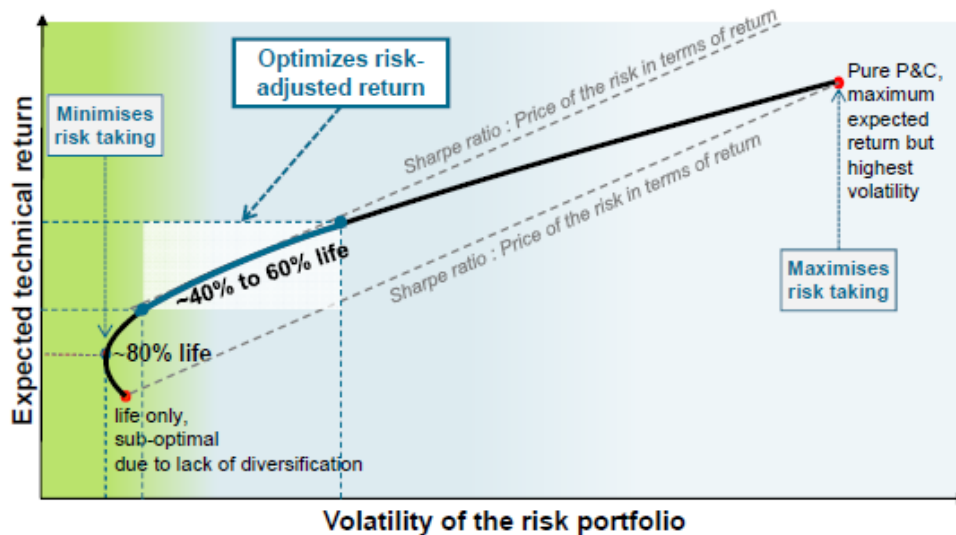
1. The risk factors are bound to change over time, which can affect the robustness of stress test results.
2. The impact of shocks depends on valuation methodologies, whose robustness may be undermined by the very stress events the methodologies are designed to measure. Systemic risks affecting financial stability generally arise from uncertainty, that is, rare and non-recurring events rather than repeated realizations of predictable outcomes. This reality might limit the usefulness of certain (quantitative) measures and actuarial valuation models based on robust statistics (which tend to rely on the convergence of prices and parameters to long-term expectations).
3. The interpretation of macro-financial shocks and their impact on capital adequacy involves a trade-off between accuracy and timeliness. The historical sensitivity of sample firms to macro-financial shocks is essential to assessing the combined impact of selected risk factors over a pre-defined forecast horizon of stress. While reliance on past experiences enhances confidence in the predictability of how shocks impact capital ex ante, it may also make it difficult to interpret signals and provide early warnings without hindsight bias.

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<sup>15</sup> Hans Willert; Dec 2014: The role of governance in Solvency II.

<sup>16</sup> IMF: July 2014; Macroprudential Solvency Stress Testing of the Insurance Sector.

An excellent illustration is given by SCOR Re that shows how it balances and optimizes diversification and expected returns with volatility when focusing on the portfolio composition between life and general/property & casualty insurance:<sup>17</sup>



On basis of this, SCOR optimizes returns in the 40%-60% range between P & C and life. This makes sense as having only life means lack of diversification and lower expected return but lower volatility as well. Property & Casualty reinsurance is far more volatile, erratic, heterogenous than life and has higher returns.

The balanced composition ensures good returns and controllable volatility.

For reinsurance pricing, we believe that Patrik’s 13-point program is comprehensive but not complicated enough that reinsurers in emerging markets decide not to opt for it. Briefly, these 13 points are:<sup>18</sup>

1. Gather and reconcile primary exposure, expense, and rate information segregated by major rating class groups.
2. Calculate an exposure expected loss cost, and, if desirable, a loss cost rate.
3. Gather and reconcile primary claims data segregated by major rating class groups.
4. Filter the major catastrophe claims out of the claims data.
5. Trend the claims data to the rating period.
6. Develop the claims data to settlement values.
7. Estimate the catastrophe loss potential
8. Adjust the historical exposures to the rating period.
9. Estimate an experience expected loss cost, and, if desirable, a loss cost rate.
10. Estimate a “credibility” loss cost or loss cost rate from the exposure and experience loss costs or loss cost rates
11. Estimate the probability distribution of the aggregate reinsurance loss, if desirable, and perhaps other distributions, such as for claims payment timing.

<sup>17</sup> The Reinsurance Industry in 2020: Denis Kessler SCOR Re.

<sup>18</sup> Reinsurance Pricing and Reserving CAS Foundations of Casualty Chapter 7: Reinsurance by Gary Patrik Summer 2001

12. Specify commission, internal expense, and profit loads.
13. Negotiate, reconcile opinions and estimates, alter terms and finalize.

Finally, since they are funded long term, insurers are essentially “deep-pocket” investors which can act counter-cyclically. This makes insurers react very differently to downward market pressure compared with a short-term bank and allows them to still maintain focus on the long term.<sup>19</sup>

Moving on, reinsurers are not first risk takers at the same level of front-line insurers but act as backstop. This means that they are not transmitters but absorbers of risk materialization. But as such they have their own limits to risk absorbing and this will determine the reinsurer credit risk level for the insurer.<sup>20</sup>

Insurers resemble financial corporations as they leverage themselves by issuing risky debt, i.e. insurance policies. Insurers have competitive advantage in creating value by borrowing in insurance (not capital) market. Also, Insurers are financed by their principals (shareholders).<sup>21</sup>

Analyzing reinsurance in such ‘financial market theory’ means that there is tradeoff between the purchase of reinsurance and the risk capital required to maximize shareholders’ value. Reinsurance creates an additional layer of synthetic equity capital to mitigate expected financial distress costs. Hence, the decision to reinsure can be treated as both a risk-management and a capital-structure tool for creating shareholders’ value.<sup>22</sup>

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<sup>19</sup> The Geneva Papers; 2015; Thimann; Systematic Features Of Insurance And Banking, And The Role Of Leverage, Capital And Loss Absorption.

<sup>20</sup> Ibid

<sup>21</sup> Enhancing Insurer Value Through Capital, Dividends And Reinsurance Optimization: Something Old, Something New: Yuriy Krvavych, PhD – Insurance Australia Group (IAG), Sydney. ASTIN Colloquium – Orlando FL, June 2007

<sup>22</sup> Ibid

#### **4. PRACTICAL GUIDANCE FOR SMALL AND NATIONAL REINSURERS**

This sub-section acknowledges that there is lack of technical expertise and data at small and national reinsurers in the GCC region. This sub-section is dedicated to such reinsurers that even when they cannot perform quantitative modeling, they should be aware of these basic qualitative and strategic paradigms.

The reinsurer's strategy with respect to risks ceded insurers can be to write good quality facultative business (as opposed to accepting shares in treaties and therefore having to accept risks which may not be appropriately underwritten). The reinsurer should, however, wary of accepting too many risks from any one country as a result of potential accumulation of risks and its limited capital base. Accordingly, its strategy should be to accept risks from a number of countries and thereby to have a diversified portfolio.

At the other end, is strategy to accept risks ceded in treaties. The treaties generated larger amount of revenues than facultative basis. The reinsurer must see whether it's main objective is top line to maximize revenues or bottom line to maximize profits. Realistically, reinsurers will use both treaties and facultative to generate both ample revenues and profits.

In selecting companies to participate in the risks, the reinsurer should assess the credibility and experience of both the broker and leader (reinsurer having lead share) involved in the arrangement. Such an assessment is usually based on qualitative features like the underwriters' experience and judgment.

The following process can be followed for renewing retrocession arrangements,

- the underwriters, estimate the volume of business that can be written from;
  - a) Different Countries and Regions; and
  - b) Different Brokers
- Underwriters estimate the volumes for each line of business, which they seek to write in future. The assessment should be made based on the underwriting expertise the reinsurer has for each line of business. For instance, currently the reinsurer is focusing on writing mainly Fire & Engineering, Marine Cargo, Motor and Accident.
- Both retention capacity and exposure limits must be set based on the capital available, and management has to set both retention and exposure limits on conservative basis.

In the case of reinsurance pricing is effectively a function of the decision as to whether to accept a risk or not, as a minor reinsurer does not really have an option to modify the price – only to decide as to whether or not to accept a share in the risk given the price at which it has been written. So, holding Premium Deficiency Reserves does not make sense for small reinsurers.

The reinsurer's strategy with respect to acceptance of business (by type of risk, structure of reinsurance acceptances, type of cedants [direct company/reinsurer], territory and amount of acceptance) should be documented in its business strategy. This can then drive the design of its outward retrocession program. The strategy may highlight the following aspects:

Territories: which countries to accept risks from

- Source: Both direct and through brokers.
- Cedant: Both insurance companies and reinsurance companies.
- Class of Business: For example, Fire & Allied Perils, Engineering, Marine Cargo and Hull, Accident. However, some other classes (aviation, energy and medical) can be accepted as part of bouquets although exposure in such cases is kept to a minimum as these risks are too large to reinsure by any one small/national reinsurer
- Type of cession:
  - Treaty: Proportional (quota share and surplus); Non-proportional (Excess of Loss).
  - Facultative
- Exposure: Within the capacity of retrocession arrangements so as not to expose the reinsurer's capital (the limit [stated as a proportion of the maximum retrocession capacity] which may be accepted by each underwriter should be defined in the Underwriting Guidelines.

The reinsurer should document Underwriting Guidelines which sets out:

- Authority limits and the overall process
- Guidelines as to what types of risks can be accepted and under what structure.

Responsibility for various territories should be divided between the underwriters to allow them to become specialists in their territories and have understanding of the unique risk challenges and opportunities offered by the specific region. An analysis of country risk should be done to assess whether it is worth writing business in a country or not. The reinsurers are also in contact with reinsurance brokers and maintaining relationships with reinsurance brokers is foremost as this is the main source of business generation usually.

When offers are received for accepting shares in facultative risks or treaties the first step (before assessing the risk) should be to assess whether to do business with the ceding company/broker even where a broker offering a risk and provides his/her own assessment. Where the company and/or broker is not known then a more detailed and formal assessment (including credit assessment) of the company/broker should be carried out. The assessment can involve:

- Review of the lead reinsurer.
- In the case of treaties, review of the ceding companies' capital and top management
- Review of the company's underwriting results in recent years

In the case of facultative acceptances, a standard form should be used which documents details of the risk, which includes past experience. A decision has to then be made and the reason for accepting or declining the risk should be documented on the form. The impact of the risk on accumulation in the particular market/ class of business should also be calculated or at least assessed qualitatively. For offers to participate in treaties, a standard format should be prepared which sets out, for each class of business being offered, actual premiums and losses in previous periods along with expected premium



income and expected loss ratios for each class as well as in total. Based on this a decision has to be made by the appropriate underwriter.

Details of all risks accepted have to be entered in risk accumulation worksheets which must be maintained by the Underwriting Department in order to ensure that risks accepted are within the reinsurer's capacity to accept risks as provided by its own retrocession arrangements. There should be a worksheet for each country where each risk is entered and thereby the total number, total insured value and average insured value in respect of different insured value bands are computed. Country totals should be accumulated to regional totals and finally to a total for the reinsurer as a whole.

It is also recommended that the reinsurer should also maintain the Catastrophe profiles, where possible, which identifies the loss exposure written in the region exposed to earth quakes, flood, cyclones etc.

In our view, assessment of accumulation of risk should be done based on the following,

1. The reinsurer should identify, monitor, and measure any concentration of risk on the underlying lines of business and on the portfolio as a whole due to one and the same event.
2. It should set limits on the whole portfolio and, where appropriate, per line of business to limit the effect of a situation where several lines are hit by the same event or the same underlying cause.
3. Where necessary, there should be risk assessment method/models for catastrophes and to assess/analyze the catastrophe exposures.

### **Premium Recognition**

It is common practice by reinsurers to usually book premium for treaty acceptances based on Expected Premium Income (EPI). Offers for taking a share in treaties include an estimate of the premium which the ceding company expects will be ceded along with actual amounts written by the ceding company and ceded to reinsurers in previous years. Underwriters then normally scale down expected reinsurance premiums based on their own estimates and record the EPI based on their share of reinsurance premiums which they expect will be eventually received.

The EPI is then normally booked as "pipeline premiums" and recognized as revenues (the entry being to debit "Accrued Income Pipeline and credit Gross Written Premiums), As and when quarterly treaty accounts are received the Accrued Income Pipeline account is credited and the ceding company's or broker's account debited to record the receivable.

The reinsurers should monitor the extent to which pipeline premiums are converted to booked premiums. For treaties written on a calendar year risk basis premiums for portfolio transfers are recorded as booked premiums and claims reserves as claims.

Facultative premiums, although not subject to the same uncertainty as EPI, can be recorded in a similar manner to treaty premiums, going through the Accrued Income Pipeline account. The ceding company or broker is debited when the credit note is received (this entry being made by the Treaty Accounts department).

The reinsurers should regularly review premium recognition figures in order to avoid revenues being overstated. There can be considerable balances in the Accrued Income Pipeline account relating to previous periods which should, periodically be reviewed, and possibly reversed.

### **Claims Recording Process**

Claims on facultative acceptances are usually reported individually by the ceding company or broker. Claims have to be reviewed and approved by the Underwriting Department to ensure that

1. The claim reported is a valid claim
2. Proportion of the reinsurer in the reported claim amount is estimated properly
3. Amount reported is covered under the terms and condition of the coverage
4. Retro-portion of the claim is estimated properly

Treaty claims have to be settled as a part of settlement of the account which should be done quarterly at a minimum. The reinsurer should also write business based on the terms for providing 'sliding scale commission' (profit commission decided based on the loss ratio realized over the term of the contract).

Exposure accumulation should be assessed on individual branch level as Branch can be an identifier for location of exposures. MPL is estimated usually by small/national reinsurers based on intuition and experience, and also recorded in the systems with the insured value (sum assured).

Mostly for small/national reinsurers, in house underwriting report is available for each case, whereas for high insured value external expertise is acquired. Pricing is done on the business experience, risk profile (small or big risk) and exposure (mainly on underwriter's experience). For renewal clients, having experience more than five years, pricing is adjusted based on claim experience (but not done scientifically).

### **Reinsurance Review**

Some basic procedures that should be practically followed is as follows,

- Compile statistics and renewal information for existing Proportional and Non-Proportional Treaties
- Compile Risk Profiles for various classes of business
- Study the underwriting experience and portfolio content of each class of business with the help of Risk profiles, gross premium, loss experience, acquisition cost etc. and decide about the need for the revision in retention, treaty structure, limits terms etc.
- Prepare recommendatory note to Board of Directors on the change in the Reinsurance program proposed for the next year
- Submit renewal information and proposals for any changes in the Proportional and Non-proportional treaties to the lead reinsurers for commencing renewal negotiations.
- Scrutinize and approve the Treaty cover Notes, wordings and schedules received from the insurers.

We suggest that strategically, at a minimum reinsurer need to;

- review the involvement of reinsurance brokers in structuring the reinsurance arrangement (including the expertise and experience of the brokers used, as well as the period of engagement)
- evaluate the selection criteria for brokers and list the top brokers used
- understand the types of information supplied by the brokers to the insurer in arranging reinsurance protection (e.g. names and security ratings of reinsurers)
- Reinsurers should also perform cost benefit analysis, assessment of risk profiles for the business underwritten and check whether the reinsurance arrangements are in line with the reinsurer's philosophy of writing business and retaining risk.

The small/national reinsurers in the GCC region usually do maintain 'loss profiles' for each line of business, fire, engineering, motor, accident etc., but normally no reports are available to facilitate the analysis for accumulation of losses in respect of facultative and treaty business separately. Moreover, MPL (Maximum possible loss) is generally estimated based on the underwriter's judgment and experience. However, in our view the reinsurer should also consider the analysis of 'claim/sum assured' ratio with frequency of claims and needs to re-evaluate what was estimated as MPL, and for the cases where claim occurred, what actually was paid. Such an analysis will also help to set the retention and exposure acceptance capacity.

### **Risk management Strategy**

The purpose of this section is not to list out all the possible risks faced by the reinsurers but to chiefly highlight the specifically vital risks that are faced by reinsurers in the GCC region. Only property/fire line of business has been taken as a case study. The risks include, but are not limited to:

- Premium Risk
- Concentration Risk

**Premium Risk** is the risk that the premium charged may not be a true indicator of the exposure promised to the insurer/policyholder and the subsequent higher claims might lead to losses. It is also known as pricing risk.

As per MENA Insurance Barometer of 2014, property is recognized as the slowest growing line since at-least 2012. This was attributed to 'rock-bottom' premium rates<sup>23</sup>.

Underwriting criteria and strategy for facultative should be revised to reflect the adverse loss experience of reinsurers. Rating factors should be taken as guidelines by country, by amount of loss, by insurance company, by type of loss and so on. A successful underwriting strategy integrates local and recent experience with overall best company practices.

While facultative is based upon whether the underwriting function accepts or declines the risk, it is important to note that even overall property premiums in Middle East are very low compared to the

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<sup>23</sup> MENA Insurance Barometer 2014

risk exposure that they take on<sup>24</sup>. Hence, premiums might be increased for overall property line so that extra premium collected from the portfolio might help to offset the high losses from facultative reinsurance when considered on an overall basis for property portfolio. Alternatively, a margin for adverse deviation can be built into IBNR reserves so as to compensate the losses.

Consistent high loss ratios may also be an indication of premium deficiency. This means that premium that is being charged is not adequate to cover the losses and negatively impact the underwriting results and hence a Premium Deficiency Reserve (PDR) be kept to sufficiently cover up the losses, assuming that the reinsurer is influential enough to control pricing (which it hardly is).

Concentration Risk is particularly relevant as most of the premium is written through Property portfolio and it is continuously resulting in very high loss ratios.

In this regards, Standard & Poor's makes a remarkable observation as shown in this para: *“Unlike rated European (re)insurers, GCC-based companies are generally limited in terms of geographic diversity. This is because for a non-domestic company, it's generally difficult to break through into profitable lines that are repeatedly renewed by established local players. Over the past few years we've seen a number of GCC insurance companies starting up takaful operations, notably in Kuwait and Bahrain, but note that they've found it difficult to avoid underwriting the fiercely competitive compulsory retail lines, such as medical and motor insurance, at a loss”*<sup>25</sup>.

When insurance companies seek reinsurance, they choose the top-rated reinsurer. Likewise, Reinsurance companies should be cautious before entering into reinsurance arrangements with the insurance companies. They should choose those insurance companies who have strong financial position, well documented risk management strategy and stable loss ratios.

Most of the companies (both reinsurers and insurers) in Middle East do not seek rigorous pricing practice. The rate is determined as a certain percentage of the Sum Assured. The rates are loaded for commission and profit margin to derive the final premium offered to the client. In order to maximize revenues, both insurers and reinsurers may provide cover to highly risky companies which would further hamper the profits to gain more market share.

Our analysis arrives at a conclusion in line with the following remark:

***“Today, many insured (property) losses in the MENA region are total losses. In order to rectify this situation, the underlying notion of underwriting risk needs to evolve: From a primarily quantity-driven view to more emphasis on the quality of risk.”***

*Salvatore Orlando, Head of High Growth Markets, PartnerRe (Source: MENA insurance barometer 2014)*

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<sup>24</sup> MENA Insurance Barometer 2014

<sup>25</sup> S&P explores credit characteristics of GCC (re)insurers (2014) : <http://www.gulfbase.com/news/s-p-explores-credit-characteristics-of-gcc-re-insurers/256851>

## 5. REINSURANCE OPTIMIZATION MODEL

Please note that this section is written from an insurer's point of view (not from a reinsurer's perspective). The basic purpose of modeling should be to help develop an appropriate cession strategy that will maximize achievement of the reinsurance goals. This involves modeling a variety of mixes of reinsurance coverage at various limits and retentions and with various loss-sensitive features in order to achieve an optimal program. It should be noted though that even this basic reinsurance optimization cannot be performed if an insurance company does not have required technical expertise and suffers from having no or very scarce data.

The model can be developed, which use the loss data to evaluate recoveries by mapping treaty / facultative cession arrangements on the claim distribution data. The model has to take into account the various layers of reinsurance cover as well as the premium paid for each layer.

The "what if" reinsurance arrangements modeled includes quota share, surplus and excess of loss. For each alternative arrangement, the results of the model can be produced in terms of underwriting profit and loss gross and net of reinsurance with appropriate ratios.

For each class of business, the approach should be to analyze complete five years' data, in order to achieve the following.

- Develop an understanding of the pattern of risks underwritten in terms of a distribution of the claims and insured values (for those policies on which there had been a claim along with the associate premium).
- Develop an understanding of the pattern of losses in terms of a distribution of claims by size of individual loss.

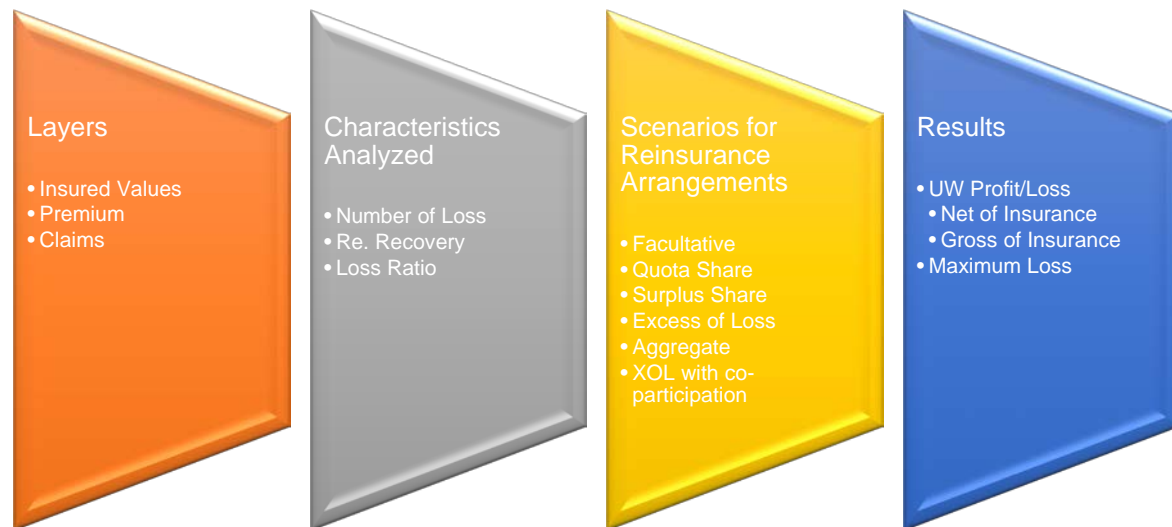
Based on the above analysis which we carried out we then sought to develop an appropriate cession strategy that will maximize the changes of achievement of reinsurance goals.

The key steps for the basic optimization of reinsurance arrangement is as follows:

- Selecting appropriate retention levels and validating the current retention
- Adjusting the existing layers and limits
- Estimating the net claim cost in each layer
- Testing the underwriting results with co-participation feature and aggregate layering arrangement

In the case of catastrophe excess of loss programs, these should be analyzed at a minimum by developing loss scenarios based on historical loss simulations. This is so as to give a baseline for developing possible future occurrences and should elaborate on the details of frequency and severity characteristics of subjects insured, as it requires detail understanding of underlying risk attached with the subject insured.

The following parameters and characteristics should be analyzed and modeled for the purpose of reinsurance optimization:



The simulation exercise for an insurance company can be thought of as a ‘pure loss simulation’ or a ‘simulation for mapping re-insurance arrangement’

Pure loss simulation: Major simulation approaches,

-Historical Simulation

- Involves random projection of historical losses

-Monte-Carlo (Based on assumed loss distribution) Simulation

- Involves random projection of historical losses based on assumed pattern of loss. Assumption could be based on loss ratio, certain pattern and statistically known distributions

Simulation for mapping re-insurance arrangement: Based on projected loss (either on historical or monte-Carlo) reinsurance arrangements are mapped to test the underwriting results. It also involves the projection of volumes.

As a practical matter, having a very slow development pattern (long tailed) will often produce results showing either zero or very high projected ultimate layer losses by year. The actuary will often need to use smoothing techniques, such as a Bornhuetter-Ferguson approach or Cape Cod (aka Stanard-Bühlmann), to produce a final experience rate.<sup>26</sup>

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<sup>26</sup> Basics of Reinsurance Pricing. Actuarial Study Note. David R Clark, FCAS: Revised 2014

A very useful methodology for reinsurance optimization is described as follows:<sup>27</sup>

Phase 1 – Set goals and constraints of the optimization

Phase 2 – Create gross of reinsurance model and validate results

Phase 3 – Create net of reinsurance model, validate results and verify limit and retentions are adequate

Phase 4 – Evaluate current contracts

Phase 5 – Set initial analysis as current structure and determine capital savings

Phase 6 – Determine efficacy of each contract and adjust as needed

Phase 7 – Determine efficacy of the revised structure and adjust as needed

Phase 1: The goals and constraints of the optimization will be based around the risk appetite or the risk that the company has the capacity to undertake. This can be for instance, Value at Risk of no more than 20% capital erosion in 1 year, Value at Risk of surplus over regulatory capital must be maintained at 2.5 times at all times, maximize return on revenue and capital, minimize the required capital and so on. As multiple goals, will be frequently used, a weighed ranking of these goals will have to be made.

Once phase 2, 3 and 4 have been done, the next stages 5 and 6 are to evaluate the net capital savings due to reinsurance. This can be done through simple equations like:

Net return = net underwriting profit – expected return on capital%\*risk adjusted capital on net basis.

Expected return on capital is the return that shareholders in insurance and reinsurance companies expect. The risk adjusted capital is usually derived from capital models like UAE's Insurance Authority's E-forms or A.M Best's BCAR model etc. If the net return is positive, then it means reinsurance is beneficial and is acting as a capital relief. Another way to evaluate reinsurance is to see that costs of Reinsurance should be lower than costs of capital saved with Reinsurance.

Effectiveness of each contract is measured by looking at cost of capital for that contract. Cost is the difference in the mean underwriting profit with and without the contract. Capital savings can also be seen as the difference in net required capital with and without the reinsurance contract.

Gross loss ratios should also be compared to Net loss ratios by lines of business. This will usually present a tradeoff to the insurance company as when loss ratios are reasonable, net loss ratios will tend to be higher than gross loss ratios because most of the proportion of profitable business will be shifted to reinsurers. But when loss ratios are very high, net loss ratios will be lower than gross loss ratios as reinsurers will bear significant portion of those losses.

To elaborate further on the impact of reinsurance treaties, particularly non-proportional arrangements, proportion of claims greater than some reasonably large claim amount like AED 1 million as proportion of total gross and net claims paid. The proportion of claims greater than AED 1 million on net claims should be far lower than that of gross claims in order to show that the insurance company is being protected from large losses significantly by non-proportional reinsurance arrangements.

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<sup>27</sup> Reinsurance Structures and "Optimization" CAMAR Meeting October 10, 2012. Guy Carpenter

Another way is to compare a) expense ratio as proportion of gross premium for the line of business to its b) reinsurance commission received as a proportion of gross premium. If a is greater than b, it indicates sub-optimal reinsurance usually but this consideration should be seen holistically with other metrics before arriving to any decision.

Phase 7 is then to compare benefit of New structure to the Current structure based on cost and capital savings. If new is better than current, then current structure should be replaced with the new one and if not so changes in new structure must be made until reinsurance optimization has been achieved.

It is also vital to test a number of structural changes for the new structure instead of only few. For instance, different proportions for quota limits should be tested, is the claim basis on loss occurring or claims made or risk attaching basis, different attachment points should be evaluated for excess of loss, top and drop, number and size of reinstatements, terms, benefits and conditions of the reinsurance contracts can be expanded or contracted to see its impact. Insurance issues around counterparties and other reinsurers should be assessed as well.

The advantage of this methodology is that it is broken down into many steps and hence is transparent for the management to evaluate. It also allows us to see the effects from multiple angles and goals simultaneously. It is however time consuming and the number of different structures and variations chosen still require deep understanding of constraints, risk appetite and market pricing of treaty terms and conditions. It is basic enough to be widely understood and be computable and not complex enough to require too many sophisticated tools and models that by pass the capacity of management in emerging markets completely.<sup>28</sup>

Data interpretation is crucial when making a basic reinsurance optimization model. Are we using the right time period for our analysis? For long tail casualty lines, it is important to observe and measure trends over short as well as a longer period of time. Short term measurements could be ‘noise’ and long term measurements could be ‘signal’. Also, do we fully understand actual reported activity? Is the actual reported activity overly influenced by large loss activity; conversely has there been a slowdown in claims reporting?<sup>29</sup>

Moreover, is there a systematic and observable trend over a period of accident years? This is a strong signal of changes in the market dynamics. Is the observed trend consistent over a period of time? If it is consistent it might mean that change in reinsurance cycle is about to happen.<sup>30</sup>

A range of outputs should be produced to communicate the results of the Reinsurance Optimization Model to the business. These include:<sup>31</sup>

- Trade-off between risk and return of various reinsurance options
- Breakeven return periods between reinsurance premium and reinsurance recoveries
- Breakdown of claims and recoveries by return period and claim type
- Penetration by claims layer and by number of reinstatements

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<sup>28</sup> Ibid

<sup>29</sup> Spotting trends in loss emergence. Casualty Loss reserve seminar sep 2012. Patel

<sup>30</sup> Ibid

<sup>31</sup> The institute of risk management 2015; internal model advanced uses; supporting reinsurance business decisions



- Impact on company's risk appetite/risk profile
- Impact on economic profit/risk-adjusted profit.
- Key performance indicators like retention ratios, loss ratios and ceded reinsurance leverage ratios

Ceded Reinsurance Leverage is the ratio of ceded insurance balances to policyholders' surplus. Ceded reinsurance leverage represents the extent to which an insurance company relies on ceding risk to reinsurers. Ceded insurance balances include ceded premiums, net balances for unpaid losses and unearned premiums.<sup>32</sup>

Ceded reinsurance leverage is used as a barometer on how much an insurance relies on shifting policy risks to others. A high ratio indicates that the company relies heavily on others to help defray risk, a situation that carries with it its own risks. If reinsurance companies demand more money for assuming risks, the insurance company may find itself exposed to a larger risk than usual.

Another threat to the future health of an insurance company relates to how many reinsurers a company uses when transferring risk. A heavy concentration of ceded insurance in a small group of insurers can lead to a situation in which companies may be unable to collect from reinsurance companies, either because those companies are unwilling to fulfill their obligations or because they are unable to. If the insurance company only offers policies in a single state and in a single line, it could face serious risks. Having a high ceded reinsurance leverage does not mean that an insurance company is headed to impairment. While there is a risk that the reinsurance companies used could find themselves unable to fulfill their obligations, using reinsurance companies that have either good credit ratings or can provide letters of credit may keep underwriting risks low.

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<sup>32</sup> Ceded Reinsurance Leverage Definition at Investopedia available at: [www.investopedia.com/terms/c/ceded-reinsurance-leverage.asp](http://www.investopedia.com/terms/c/ceded-reinsurance-leverage.asp) (last accessed 27th Nov 2016)

## 6. BASIS FOR DESIGN OF REINSURANCE PROGRAM

Please note that this section is written from an insurer's point of view (not from a reinsurer's perspective). There are several factors which affect the reinsurance program and strategy of which some of the more important ones have been discussed below.

**Growth:** The loss experiences for both new classes as well as for new business obtained for existing classes is likely to be less stable than for established business which the company can have on its books for some time. Growth often requires expanding into the market with greater coverage requirements. To compete effectively in the market, a company may have to offer coverage limits higher than those it would otherwise be comfortable with. If the company is targeting rapid premium growth, the company can book less liability (surplus relief) by having a proportional reinsurance agreement.

**Insurance Size/ Financial Strength:** The company always wants to maintain this rating; increasing its retention may impact its financial rating. If the company is graded at borderline, it should be more conscious in retaining more risk.

**Diversification of Business:** Volatility in loss ratios decreases as numbers of cases underwritten increase, as insurance principles are based on the law of large numbers. The standard deviation of losses increases at a slower pace than the number of losses and that of the loss ratio actually decreases as numbers increase. The losses also diversify across the line of businesses.

**Spread/Concentration of Loss Exposures:** A wide geographic spread of loss exposures may stabilize the loss experience and minimize the reinsurance needs as this lowers the possibility of accumulation of losses from a single event. Although the company can have exposure to risks all over a specified geographical territory like state, country etc., these may not be distributed uniformly, with most of the coverage in specific concentrations like industrial cities, away from contentious borders, away from natural catastrophe prone areas and so on. We understand that the spread of the risks which companies accepts will always be such that it will be exposed to catastrophic risk and reinsurance cover for this would always be needed. The company should start determining the concentration of losses so that the coverage limit of catastrophic cover can be determined.

**Risk Tolerance:** Calculation in numerical terms should be made that investigate the tradeoff between earning more returns and transferring risk and profit to reinsurer. The company should also start measuring the capital required to keep the company's probability of ruin within a defined (and very low) level. This would be very helpful in determining the reinsurance sought and retention levels. The reinsurance arrangement can be accurately determined with capital modeling. The practical effect of any proposed change on reinsurance program can give the picture of required capital immediately.

**Retention Cost:** Although the selection of retention is based on the financial needs and the type of products sold, the cost is a major factor in determining retention levels. The cost of a reinsurance treaty usually increases as the company's internal limit of the retention decreases. It is also worthwhile that as the risk become less probable, the reinsurer would charge a higher premium above the burning cost for retaining the risk. We would recommend the management of an insurance company to consider following factors for selecting retention for their portfolio:

- Maximum amount that can be retained

- Minimum retention sought by the reinsurer
- Co-participation provision

The maximum amount to be retained can be assessed based on the loss experience and financial strength, while sometimes, regulatory requirements also influence the selection of maximum retention. After the appropriate assessment of retention, the final decision (which may include adjustments reflecting a conservative attitude) will rest with the management of the company.

Reinsurers also demand a minimum retention as a condition of providing reinsurance so that the insurers may have a skin in the game as well and avoid causing moral hazard and set retention levels based on the following aspects of each insurance company:

- Loss control practices & loss experience
- Underwriting practice
- Risk management practice

The management may also consider the co-participation in losses above retention, as it also provides underwriting and loss experiencing capabilities above retention, as well assist in negotiating with the reinsurers.

**Selection of Reinsurance Limit:** Major factors in selection of reinsurance limits based on the kind of non-proportional treaty involved are:

- Maximum Policy Limit (MPL)
- Extra-contractual obligations(ECO)/Excess of policy coverage(XPL)
- Loss adjustment expenses
- Catastrophe exposure

The company should select Maximum Policy Limit (MPL) such that the greater chunk of the business with respect to number of policies can be written internally. The reinsurer allows for MPL in such a way that the loss ratio in the upper layer is good enough to sustain losses. It might be also feasible to rely on facultative reinsurance for cases above that certain limit as reinsurer is responsible more for claims.

The limit for a stop loss treaty is stated as ‘a Loss Ratio’. Ideally, the limit could be set at the highest loss ratio that the company can bear in-house. Stop loss treaties are rare as reinsurers have been historically having negative results from such arrangements.

While selecting the reinsurance, the potential exposure to extra-contractual obligations (ECO) should also be considered. If reinsurers are providing ECO, then the reinsurance limit might exceed the maximum possible loss under company’s policy limits. Even if given the market conditions, ECO is not directly relevant for the company currently, this might become important in future. However, the issue of ex-gratia and the payment in certain circumstances to the losses where policy coverage is not strictly applicable is a major concern.

The potential magnitude of loss adjustment expenses (payment to surveyors, lawyers etc.) should also be considered while selecting treaty limits. Depending on the type of underlying policy, loss adjustment expense can be a significant loss component in per risk and per occurrence excess of loss treaties.

Selection of reinsurance limits for catastrophe coverage is a complex task. Catastrophe losses involve an accumulation of losses arising from a single occurrence. The effective limit is set by the number of face amount of policies subject to losses by a single catastrophic occurrence in a particular geographic area. However, in case of earthquake or flood, the area affected may cover hundreds of square miles.

It would be helpful for the assessment of cat-exposure if the company keeps the record of the data on the loss exposures that it has assumed in earthquake/flood/storm area and to carry analysis of losses due to rain/storm/flood/earthquake.

A sophisticated approach to estimate catastrophe losses is to use models based on the following three major components

- Science Component (Meteorological, geological etc.)
- Engineering Component
- Actuarial Component

This might be irrelevant for the company in current circumstances, however it might be useful in future for assessing not only the reinsurance needs but can also in assisting the management to estimate the capital needs derived from the underlying risk involved with the business.

It is necessary to maintain Catastrophe Profiles against relevant lines of business and maintain accumulation of exposure in respect of territories etc.

**Credit Risk:** One of the factor which often been ignored is the fact that the concentration of reinsurance protection may also increase credit risk (i.e., the possibility of a reinsurer defaulting on payments due from them). Fewer reinsurance providers with correspondingly larger exposures to single reinsurance entities would increase the severity of possible loss in case of default by a single reinsurer.

The main factors impacting credit risk is the financial strength of each provider, the nature of the coverage involved and general reinsurance market conditions. Under prolonged soft market conditions (financial crises, multiple catastrophic events, etc.) in the reinsurance sector, multiple insolvencies could occur. In that case, even the increased number of participants may not necessarily reduce the credit risk to which the company is exposed. Reinsurance bankruptcies are quite rare but even then, deteriorating conditions of reinsurers might mean less acceptance of facultative, more disputes in claims processes and so on.

## **7. REINSURANCE STRATEGY**

Please note that this section is written from an insurer's point of view (not from a reinsurer's perspective). One of the most important risk management tools that can be used by an insurer is Reinsurance. The insurer can utilize reinsurance in order to reduce its insurance risks and the volatility of its financial results, stabilize its solvency, use its available capital more efficiently, improve its ability to withstand disasters, increase its underwriting capacity and draw on the reinsurer's expertise with respect to product development.

It should be recognized that reinsurance exposes the insurer to other risks, including residual insurance risks, legal risks, counterparty risks and liquidity risks. These risks are interrelated and can make reinsurance a complex matter. Consequently, the insurer should emphasize on adequate reinsurance management through robust systems and controls to protect its financial soundness and reputation.

The following are the core aims of a Reinsurance program:

1. To protect its Capital and its Shareholders,
2. To stabilize its results from year-to-year by leveling claims fluctuations,
3. To increase its capacity to handle larger and more complex risks of various classes,
4. To maintain any statutory minimum solvency requirements and provide security,
5. To spread risks throughout world markets, not just locally, to lessen financial impact on any single economy,
6. Limit concentration of risk,
7. Take advantage of risk expertise of reinsurers who have greater experience of business (territory and class),
8. Achieve consistent overall underwriting surplus through prudent underwriting controls,
9. Implement a Reinsurance program that is operationally sound and based on robust systems and controls,
10. To protect its net exposure.

The insurer should adopt the following principles in the oversight of its Reinsurance Risks.

- Principle 1: Roles and responsibilities of Board of Directors and Senior Management in Reinsurance.
- Principle 2: Incorporation of Reinsurance Risk Management in integrated risk management process on an enterprise wide and group wide basis including those of parent entity, if any.
- Principle 3: Reinsurance risk management policy.
- Principle 4: Reinsurance process management.

Furthermore, reinsurance strategy should take the following into consideration:

- Anticipated reinsurance needs and the nature and adequacy of the reinsurance offered.
- Reinsurance not only as a risk management tool, but also as an additional source of risk, in the scenarios used and stress tests performed when quantifying risks.

- The impact of reinsurance on capital management, such as decisions regarding the allocation of capital and analyses with respect to the issuance or repayment of capital.

Reinsurance arrangements should take the following issues into account when selecting and reviewing reinsurers' panel:

- The relative financial strength and claims payment record of the reinsurers in question, both in normal and stressed conditions;
- The soundness of the risk and capital management strategy;
- The appropriateness of the reinsurance strategy given the underlying insurance portfolios;
- The structure of the reinsurance program;
- The extent to which relevant functions are outsourced, either externally or within the same group of companies;
- The levels of aggregate exposure to a single reinsurer or different reinsurers being part of the same group;
- The proportion of business ceded so that the net risks retained are proportionate with the insurer's financial resources;
- The level of effective risk transfer;
- The resilience of the reinsurance program in stressed claims situations;
- The extent of any credit risk mitigation in place.

Main tenets regarding Communication, Monitoring and Controlling of the Reinsurance Program can be highlighted as follows:

1. Reinsurance Program information to underwriters: On conclusion of reinsurance contract, the reinsurance department should inform the underwriting department of any changes effected in the contract, wherein underwriting that has an impact and communicate the limits on the amount and type of insurance that is automatically covered by reinsurance.
2. Monthly Review & Closings: Every month at the time of financial-closings, the reinsurance accountant should run the reinsurance reports including but not limited to Premium Register, Claims Paid Register, and Claims Outstanding Register wherein the distribution is re-checked before submitting the same for Technical Accounts closure.
3. Quarterly Review & Closings: Every Quarter ceded values (inclusive of Premium & Commission and/or Claims Paid) by underwriting year by reinsurer should be drawn by the reinsurance accountant and reviewed for the ceded sum insured values included in the reports such as Premium Register, Claims Paid Register and Claims Outstanding Register wherein the distribution is re-checked before submitting the same for Technical Accounts closure.

4. Excess of Loss Review: The Reinsurance department should generate relevant Claims Paid and Outstanding Report and reviews the exposure to treaty based on the priority set for each Claims Year. In case of recovery which might arise due to the incurred position of the claims, it is notified to the reinsurer. The review should be done every month, quarter and at the time of financial closing and Submission of Statement of Account to the reinsurer. The specific loss year continues to be notified with the claim run-offs completely.
5. Reinsurance Control: As per the treaty arrangements, the reinsurance program is set up in the software system which automatically monitors the flow of data as entered by underwriting and claims. The reinsurance program should be then attached to the specific line of business and participation distribution is automated with minimum manual involvement.
6. Claims Reporting: Reinsurance department should ensure that claims are reported to the appropriate reinsurer and that reinsurance claims payments are being promptly collected. This assessment may also include a review of the reinsurance contracts. The Board of Directors receives reports on the effectiveness and performance of the reinsurance protection regularly.

Segregation of Duties between Reinsurance, Underwriting and Claims: All communications with reinsurers and reinsurance brokers is done by the Reinsurance Department. Claim processing related communications are made to the Claims Department with a copy being marked to the Reinsurance Department. However, necessary coordination is maintained between the Reinsurance Department, Underwriting Departments, Claims Departments and the Finance Department for Reinsurance related transactions and requirements.

The choice of reinsurance strategy is often a result of several factors, such as asset mix, product mix, the amount of equity capital, owner situation, and risk aversion, price of reinsurance and market conditions. The choice of reinsurance strategy by an insurer is made such that the return on equity is potentially maximized.

Reinsurance risk management policy can include procedures for selecting risk transfer methods and reinsurers as well as procedures for implementing, monitoring, reviewing, amending and documenting reinsurance contracts. Reinsurance strategy should also take into account the particular nature, size and complexity of an insurer's activities and its risk profile, the reinsurance risk management policy and related procedures.

The risk management policy for reinsurance can be explained as follows:

1. Retention Limits are defined in light of insurer's risk appetite and its risk tolerance levels set out in the reinsurance strategy. The types of reinsurance contracts that are most suitable for managing risks are specified in light of its risk tolerance levels.

2. The conditions for using Alternative Risk Transfer mechanisms are defined, including their intended use, their anticipated impact on profitability, solvency and capital requirements as well as the specific controls to which they are subjected.
3. The possible use of intermediaries is addressed, such as reinsurance brokers. The reinsurance risk management policy discusses the criteria for selecting intermediaries, such as experience and expertise, the tasks to be handled by intermediaries and the important contractual terms, such as the duration of intermediary contracts.
4. The reinsurers' selection process is determined, including selection criteria. The process generally considers diversification of reinsurance sources as well as the financial position of the reinsurers.
5. Limits are established on the amounts and types of insured risks that are automatically covered by reinsurance. The conditions and criteria for use of facultative reinsurance are also defined.
6. The conditions that must be included in reinsurance contracts are mentioned, such as insolvency clause (which defines the applicable terms and conditions in the event of the reinsurer bankruptcy) or an offset clause (pursuant to which the reciprocal debts of the insurer and the reinsurer cancel each other in certain circumstances) or a clause whereby the contract constitutes the final or entire understanding between the parties (the contract is not subject to collateral agreements).
7. The process for monitoring the application of this reinsurance risk management policy should also be outlined. The process is intended to see to it that the insurer complies with its own policy. It addresses the following, among other things:
  - assessing compliance with the established retention limits,
  - assessing the financial position of reinsurers,
  - monitoring concentration limits for single counterparty exposure per reinsurer,
  - monitoring reinsurance claims recoveries,
  - ensuring that actual risk transfers are as expected,
  - the availability, accuracy and adequacy of reinsurance documents to satisfy insurer's needs.



## **8. CONCLUSION**

The key takeaway from this report is that we should strive to find the balance between model complexity and realism. Advantage of simple mathematical models is that it focuses on trends detection and calibration, there is economic interpretation (and control of assumptions) and is easier to communicate to other key stakeholders. Mixing simple models ensures accuracy and ease of interpretation.

In conclusion, it is hoped that this review was able to lead to a better understanding of the inherent realities and trends in optimization reinsurance and ratemaking for reinsurance liabilities, and compels us to view this exercise holistically so as to bear more fruitful results. It is also meant to contribute fruitfully to the current existing dialogue on optimizing and pricing reinsurance in the emerging markets.

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