

UNDERUTILIZATION OF CAPACITY

By Neal Schmidt

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Abstract: Focusing on results by individual department, line of business, classification or other segment of a company's book of business leads to a loss of capacity where large companies act as if they were smaller companies. Limiting exposure to control the variation in results for a department will lead to a smaller net line than is necessary from the company standpoint. Understanding of this phenomena can help explain some unusual intracorporate arrangements.

INTRODUCTION

Capacity is a topic that receives a lot of attention in both halves of the underwriting cycle. In the current 'hard' market agents, brokers and buyers bemoan the lack of capacity (when not complaining about high prices). During the 'soft' market insurance executives are likely to blame excess (and naive) capacity for their profitability woes.

Capacity refers to the amount of exposure to loss an entity is willing to assume from a source or sources. We may speak of the industry's capacity for a segment of the market, a company's aggregate capacity for all its insureds, or the capacity an underwriter can offer on one risk. All these elements of capacity are highly interdependent.

If all other variables remain the same we would expect per risk (or vertical) capacity to vary in the same direction as aggregate capacity. As the size of a company's book of business increases the stability of the results should increase. This increase in stability should allow the insurer to offer greater vertical capacity. Writing larger limits will have the opposite effect on stability and we might expect the willingness to expand vertical capacity to end when the previous level of stability is reached.

Limitations to aggregate capacity commonly take the form of maximum ratios of premiums written to policyholders' surplus. The fact that such an inappropriate measure, which penalizes capacity for an increase in premium adequacy, has seen such widespread application underlines the difficulty of determining practical capacity guidelines.

Often, procedures to determine internal capacity guidelines are very loosely defined and can rely on traditional, judgmentally determined

algorithms and 'seat of the pants wisdom'. Within a company's aggregate capacity for all risks the available capacity for certain segments of the book of business will be limited by the catastrophe potential. Limits placed on per risk capacity are more likely to be shaped by management's subjective perception of their effect on the stability of results.

EFFECTS OF MANAGEMENT ANALYSIS

As an organization becomes larger there is a tendency to separate it into more manageable departments. Each department's individual contribution to the whole is reviewed independently and may be broken up into still smaller pieces (line of business, classification, underwriter and policy). Analysis by definition, requires the subject be broken up in order to gain an understanding of the whole. In this process there is a clear danger relationships between the various pieces will be overlooked.

An example from the CAS Proceedings illustrates the potential pitfalls. Ferrari's method of portfolio selection for the individual lines of business focuses on returns for each line.¹ His analysis of line of business results leads to a recommended level of writings for each line. Both he and his reviewers point out the weakness of the technique lies in the assumption of independence of each line of business. Unlike selecting a stock portfolio, changes in a company's approach to one line of business can dramatically effect other lines of business. Significantly reducing personal automobile writings would be likely to have a negative impact on homeowners writings. When each line of business is placed in its setting within the total corporate book and the relationships between lines are accounted for the optimum course of action is not as clear. The whole is made up of more than the sum of the parts.

In a similar manner, by focusing on profits and stability of results by department, by underwriter and even by individual risk, management may be guilty of underutilizing its capacity and compromising the intent of insurance, the pooling of risk. Larger companies should be able to assume larger exposures to individual occurrences but this is not always the case. As previously noted in the actuarial literature (see L. Simon²), as companies get larger, departmentalization results in many units acting like small individual companies. The pooling of risk within department or other segment of the book is smaller than the whole. In behaving like a collection of smaller companies, the large company is overlooking one of its greatest strengths.

MEASUREMENT OF RISK

If we can assume that prices are adequate to cover expected losses and expenses, expected results should not vary for different limit profiles. The principles of economics require long run marginal cost to equal long run marginal revenue.

In contending that larger companies are more able to assume larger exposures, we are implicitly assuming the marginal risk a particular exposure presents to a larger company is less than that presented to a smaller company. This assumption has intuitive appeal and an attempt to define an appropriate parameter with which to measure marginal risk should be consistent with this view.

Efforts to determine a risk charge for an individual exposure usually follow the principle of multiplying a constant by some measure of inherent variation. Variance and standard deviation are the two most commonly proposed parameters. Following is a brief review of the parameters' characteristics in relation to sample size.

Given n identical, independent risks each with mean μ and variance σ^2

the mean and variance of the sum of the risks is given by $n \cdot \mu$ and $n \cdot \sigma^2$ respectively. The standard deviation of the aggregate experience is given by $\sqrt{n} \cdot \sigma$. Both the variance and the standard deviation increase as n increases. If we examine the relation of the variance to the mean we see that it is constant as n increases. The relation of the standard deviation to the mean (the coefficient of variation or standard error) decreases as n increases. Though risks are neither identical nor completely independent, in general, we can expect the coefficient of variation to decrease as the pool of risks increases.

In Miccolis' paper on increased limits pricing,³ he rejects the use of the standard deviation in determining individual risk charges and instead advocates the use of the variance. He suggests a constant multiple of the variance based on its relation to the expected value.

Lange also advocates a variance based loading.⁴ Since an insured can not control the number of exposure in the risk pool a risk charge that varies by the size of the pool may be viewed as inappropriate. However, he does recognize the risk that the rate will not cover the costs varies by sample size and must be reflected in some way, though he does not suggest a method.

Practicality considerations in attempting to determine rating bureau risk charges may have influenced the above views. Any bureau risk loading procedure would have to be independent of the insuring carrier in order to be useful to the variety of insurers that depend on bureau ratemaking.

Rather than endorse the appropriateness of relying on a measure of risk that does not vary by the characteristics of the underwriting carrier, an economist would argue that a risk charge varying by company is proper and necessary to reflect the cost of capital. Unlike variance, risk is not a statistical measure internal to an individual exposure.

Risk is a subjective concept that can only be defined within the context of a stated goal. From the insurer's perspective, the risk to the return on investor's capital is the relevant view of risk. Individual exposures should be evaluated with respect to their contribution to that risk. While an individual exposure will have the same effect on the absolute dollar return, regardless of the size of the company, returns are considered in relation to the capital invested. A particular exposure will effect larger companies with larger capital bases to a proportionately lesser degree and a measure of risk should be inversely related to the size of the company.

Company management is most likely to express the concept of risk as maximum acceptable bounds around an expected loss ratio or as a desire for stability of results. The coefficient of variation coincides best with this perception and has the property of decreasing as the sample size increases.

Wiser has shown that the coefficient of variation increases as policy limits increase.⁵ If we accept that risk can be quantified as a multiple of the coefficient of variation, as a company gets larger and policy limits remain the same its risk decreases which allows it to offer higher policy limits and maintain the same level of risk.

PROFIT VERSUS RISK

Before examining the different ways in which capacity may be underutilized we should establish whether a company can expect any positive gains from increasing its per risk limits (or aggregate writings in a class subject to catastrophe). All other things being equal a portfolio with a better spread of exposure is preferable, given the reasonable assumption that corporate management is risk averse.

While a company should strive to reduce its risk it must, at the same time, strive to maximize profits. Efforts to realize each of these goals can conflict. Offering higher limits will require fewer policies

for a given premium volume. This should result in better underwriting selection and lower expense. With the ability to provide greater coverage should come an increased ability to dictate policy terms and conditions. As seems appropriate from the laws of economics, increased risk should bring increased profits. It is management's duty to define the point where the increase in profit no longer justifies the increase in risk.

CATASTROPHE

Exposure to catastrophe loss is a vital management concern. Catastrophe potential will influence the 'mix' of business. Exposure limitations are placed on certain segments of the book that are particularly susceptible to catastrophe loss. Property underwriters often speak of pursuing a good geographic spread of risk in order to minimize the effect of a catastrophe loss.

Gulf coast property risks is an example of a segment of business very exposed to hurricanes. The aggregate capacity available for all property risks is likely to be much greater than that available for gulf coast risks alone.

Before determining maximum capacity for each catastrophe geographic zone, management must first decide on the maximum loss it is willing to accept in the event of a catastrophe. Usually, some concept of maximum probable loss defines the limit on exposure and/or premiums written implemented to comply with management's acceptable risk.

When a company has many departments or subsidiaries care must be exercised to coordinate efforts to control catastrophe potential. Individuals with responsibility for a segment of the book may have independent ideas on maximum acceptable catastrophe loss. Accountability for department results (often including bonus plans) can have a powerful influence on a manager's perception of acceptable catastrophe loss

levels. It is not hard to imagine a department manager limiting premium writings in certain catastrophe prone areas to a greater extent than might be necessary from a company wide perspective. A loss penalizing the corporate loss ratio by 5 points could have a many times greater effect on a department's results. This year's raise and bonus may be at stake.

Efforts to coordinate company wide catastrophe control may take the form of assigning a portion of the corporate probable maximum loss to each department or subsidiary. Unless it is coordinated by catastrophe zone, exposure limitations may be too strict. An example illustrates this point.

Suppose a company has only two departments and has decided to limit its probable maximum loss in the event of a catastrophe to \$40 million. Both departments are considered to have equal catastrophe potential and are instructed to limit their exposure to \$20 million. One department determines its greatest exposure is in the gulf coast region and all other catastrophe zones are under \$15 million PML. The other department has a concentration of business on the west coast and is concerned about earthquake potential. It has no other exposure above \$15 million PML. Due to improper coordination by individual catastrophe the corporate PML is \$35 million instead of the intended \$40 million. Each department may be needlessly forced to pass over profitable business.

POLICY LIMITS

Similarly to the catastrophe phenomena, policy limit guidelines are often determined from the perspective of the individual departments. If we examine a typical company's net policy limits we are likely to find a variety of different retentions. Failure to view risk from a corporate perspective can result in unnecessarily restrictive limitations and a loss of underwriting selectivity. We should not imply it is always the fault of department management because it is often

corporate management that imposes maximum policy limit guidelines. Focusing attention on individual department experience can lead to expectations of stability beyond what is necessary from a corporate wide viewpoint.

It is not unreasonable to ask whether management fully understands the concept of risk when dealing with the question of appropriate policy limit guidelines. Faced with poor performance in a line of business it is common practice to lower maximum policy limits and eliminate writings in the most hazardous classifications. These areas are considered less desirable due to the higher risk. There may be little thought given to the relative adequacy of the premiums received for the desirable business versus the undesirable. Underwriters are likely to be impressed by large losses common to these severity areas and can come to believe that reducing exposure there will improve performance. Due to the reduction in risk they expect greater profits, though, as pointed out previously, just the opposite is true.

In the reinsurance broker market companies assume a percentage of a given contract. For a given excess layer the reinsurer shares proportionately in the premium and the losses to the layer. Changes in the reinsurer's share will not effect the profitability of the contract. Nevertheless, I have run into a number of underwriters who firmly believe that a reduction in average participations will improve results because the book is no longer subject to the large losses of the past. It is a lot easier to blame a few large losses than a universal underpricing of the business.

INDIVIDUAL RISKS

An extreme extension of the department phenoma is that of the individual risk. Unique exposures which may not fit into existing pools of risk within the insurer's book of business may be held to more demanding profit and stability standards. A policy submission may be declined because the exposure and the associated risk is viewed on its own and

and not as part of a class of exposures.

Assumed treaty excess reinsurance is an example of an area where individual risks are uniquely rated. Unlike primary business or facultative reinsurance each contract is expected to be profitable over a reasonable span of years. Continuity of the relationship between cedant and reinsurer is an important consideration and the payback of deficits incurred by the reinsurer is expected.

Due to the special nature of this reinsurance relationship there arises the concept of rate on line and payback periods. Rate on line refers to the ratio of premiums to limit. The payback period is the inverse of this ratio representing the number of years it would take, at the present rate, to pay reinsurers for one full loss to the layer. Underwriters often look at minimum rate on lines or payback periods. A typical minimum might be a 3% rate on line or a 33 year payback.

Due to the emphasis on the relationship of premium dollars to limit, smaller companies often find that the reinsurance market demands higher rates for their protections than is required from larger companies. Underwriters do not want to risk a loss to the cover where the smaller company will not be able to pay back reinsurers. Some small companies can end up paying 4 or 5 times the rate charged to larger companies for the same excess layer.

Premium for the cover may be more than adequate but underwriters will justify the rate by insisting anything less is insufficient to cover the risk of a loss (one can only wonder what would happen to the personal automobile liability market if underwriters there adopted this approach). Some companies will consider lower rates if there is enough similar business to write it on a class basis.

Small companies may respond to this perverse view of risk by getting together to form facilities whose main purpose is to purchase cheaper

reinsurance as a group than is available to each individually. Alternatively, a small company may be required to combine a number of lines of business into one treaty in order to increase the treaty's attractiveness to reinsurers.

When the focus switches from the individual exposure to a pool of exposures the perception of risk associated with the individual exposure appears less. Because facultative reinsurance is viewed on a class basis a company may agree to reinsure an exposure facultatively but ask for a significantly higher rate for a similar treaty exposure.

It seems that a small group of similar exposures may be more relevant to the perception of risk than the remainder of the book of business which may contain hundreds of millions of dollars worth of exposure. We are used to looking at rates and performance by groups of exposures (line of business, classifications, etc.) and we may be tempted to approach risk in the same manner. But while the adequacy of rates for an exposure is independent of the remainder of the book, the risk presented by an individual exposure can only be properly viewed in the context of the entire book of business.

When contemplating a particular exposure from the standpoint of risk, a large company's \$1 billion book of business has greater relevance than whether or not it has a \$10 million book of similar exposures. Considerations, such as the proper experience and expertise to adequately rate an unusual exposure, should determine the desirability of writing such a policy.

REINSURANCE PROTECTION

In the above cited instances of underutilization of capacity the relation of the amount of acceptable exposure to the capacity offered to the marketplace is dependent on the availability of reinsurance protection. An overabundance of reinsurance capacity and the resultant underpricing of reinsurance covers induces primary companies to

purchase more reinsurance and increase gross capacity and decrease net retentions. At the other end of the cycle, a shortage of reinsurance will entice companies to reduce gross limits and increase retained exposure. Properly priced reinsurance should result in an appropriate net retention and gross limits written. But if the net retention is too low reinsurance costs are higher than they need be and the excess expense must be borne by the insurer or the insured. Large companies with low retentions cause economic inefficiency.

If larger companies act with economic propriety their ability to absorb greater exposures endows them with a competitive advantage. In order to compete smaller companies can utilize reinsurance to reduce their retained exposure and offer competitive policy limits on a gross basis, effectively reducing their risk to the level of larger companies. Of course, the risk reduction benefits of reinsurance are not free. These costs must be passed onto the insureds. Because of these costs economically viable, smaller companies must outperform their larger cousins in other areas such as service, specialization, underwriting selection and efficiency.

SUBSIDIARY REINSURERS

A reinsurance subsidiary or department assuming business from another company within the same corporate group is not a very unusual phenomena. Since the transaction has a positive cost and the net loss to the corporate entity is not changed we might rightfully question the benefit of such an arrangement (sometimes the net loss may improve due to retrocessional protections but retrocessionaries frown on this activity). If an insurance group has a broker market reinsurance entity it may end up paying a 10% brokerage fee for the privilege of assuming its own business. While there may be legitimate reasons for this phenomena, often it is the lack of a comprehensive corporate policy on acceptable levels of risk retention that leads to the internal inconsistencies mentioned previously and can result in this absurd type of arrangement. If it was truly necessary to cede this business

to meet corporatewide risk guidelines this accomplishes nothing. More likely, the ceding department wants the reinsurance and needs some help to complete the placement.

INTERNAL FUNDING

Despite the overall corporate benefit of maximizing retentions within the constraints of acceptable risk, managers of departments or subsidiaries may be resistant to the idea of increasing the variability of the loss ratio on their segment of the book. As long as appraisal of their performance still depends on department or individual results managers may not want to risk raises and bonuses. This conflict of interests can become especially noticeable during times of limited reinsurance capacity.

In an effort to serve both interests an internal funding of excess layers can be instituted. A separate profit center within the corporate group can be established on a treaty or facultative basis. Exposure excess of the desired retention can be 'ceded' to the facility and an appropriate premium charged to the ceding department. The benefit to the department is the same it would receive from external treaty or facultative support. The reinsurers' profit and expense and the brokers' commission is avoided and becomes bottom line profit to the corporation. In this manner corporate management is satisfied that business is not being unnecessarily ceded and department managers maintain a comfortable retention.

CONCLUSION

Capacity is effected by differing perceptions of risk within one organization. It is common to see widely differing net retentions within one company. Small departments within a large company may retain little risk, acting as if they were small companies. The capacity of the large company is not fully utilized.

Decisions on risk by individual department leads to inefficient use of the available pool of risk. It is corporate management's responsibility to convey a consistent philosophy on acceptable risk based on companywide capacity. Only when risk is viewed from a companywide perspective can we be assured that economic efficiency is maximized.

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