

# Allocating Capital in Insurance Companies

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Practically all large corporations face decisions on capital allocations. By correctly allocating capital to each line of business, a company is greatly empowered to make strategic decisions. Once a business knows that one line of business is producing, say, a 50 percent rate of return, versus another with a 5 percent rate of return, then it can seek to increase its position in the former versus the latter.

Given the importance of capital allocation, the critical question then becomes: How? In property/casualty insurance, insurers have used fairly straightforward measures, such as allocation by premium volume. If personal auto insurance constitutes 70 percent of an insurance book of business as measured by net written premiums, then the company allocates 70 percent of its capital to this line, and calculates indicators needed for policy guidance, including rate on return, based on this allocation.

The method, however, has serious drawbacks. The capital needed to be allocated to a line of insurance is designed to act as a cushion against unexpected losses. This means that for a stable line of insurance like personal auto versus a volatile line of business like medical malpractice, less capital needs to be allocated to the auto line for each dollar of

insurance premium. Given this problem, analysts have proposed other means to address the risk nature of capital allocation. The following describes some of the key measures.

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## **Risk Measures**

There are a wide number of risk measures that could be used in capital allocation. Each risk measure provides a different way of characterizing the probability distribution of outcomes of some financial measure (returns, profit, losses, etc.) and representing it with a single number. It should be remembered that the full information is contained in the probability distribution and that a risk measure collapses this information down to one number by taking a particular perspective on what is important about the distribution.

Two risk measures in common use are Variance and Value at Risk (VaR) or Probable Maximum Loss (PML).

**Variance:** The variance is the sum of the squared deviations from the mean. It measures how far the possible outcomes spread out from the mean. Consider an example of the height distribution of 1,000 males. If the average height of males is 68 inches, then the deviation of a man who is 70 inches is 2 inches. The formula for the variance squares these deviations (to account for negatives, heights below 68 inches) and adds up the numbers. If many of the men in this example are close to 68 inches, then the variance will be relatively low. If their heights are widely dispersed from 68 inches the variance

will be high. Among lines of insurance, auto insurance tends to have a low variance, whereas lines like medical malpractice tend to have a high variance.

**Value at Risk (VaR) or Probable Maximum Loss (PML):** VaR is very familiar to the banking industry because of its endorsement by the banking regulators. It is equivalent to PML, which is more familiar to property-casualty insurers. PML specifies a probability and measures the corresponding threshold value. For instance, the value at risk for a company's losses might be the losses it would experience in the worst year in 250.

PML or VaR could be considered to reflect a shareholder's viewpoint, because once capital is exhausted, the amount by which it has been exhausted is of no concern.

### **Allocation Methods**

Often when allocating capital with a risk measure, the total capital is expressed as the risk measure for the entire company. For instance, the probability level can be found so that the VaR for the company at that probability level is equal to the capital carried. The capital could also be expressed as some multiple of the risk measure. For instance, the company could have a goal that the average loss in the 1-in-100 year or worse not use up more than premium plus  $\frac{1}{3}$  of capital. This is consistent with the idea that renewal business has a value, so the goal should be to have enough capital to continue operating even in the identified adverse situation. Also, some amount of capital might be set aside as not being risk capital – it could be for acquisitions perhaps – and the remainder used to calibrate the risk measure. In any case, once the total capital has been associated with a risk measure, an allocation method can be applied to get that capital split to the business

unit level by allocating the risk measurement. Several possible allocation methods are given in the table below. Not all of these work with all of the risk measures.

### **Allocation Methods**

Proportional Spread

Equalize Relative Risk

Incremental Risk

Marginal Risk

**Proportional spread:** This is the most direct method – apply the risk measure to each business unit and then allocate the total capital by the ratio of business unit risk measure to the sum of all the units' risk measures. Usually the sum of the individual risks will be greater than the total risk, so this method is crediting each unit with a diversification benefit.

**Equalizing relative risk:** This involves allocating capital so that each unit, when viewed as a separate company, has the same risk relative to expected losses.

**Incremental Risk:** This measures the risk of the company with and without a specified business unit. The difference in required total capital is the incremental capital for the business unit. The total capital can then be allocated by the ratio of the business unit incremental capital to the sum of the incremental capital of all the units. This usually allocates more than the incremental capital to each unit.

**Marginal Risk:** The marginal method is similar to the incremental method, but the change in capital is calculated for just the last small increment of expected loss for the unit, say the last dollar. Whatever reduction that is produced in the risk measure by eliminating one dollar of expected loss from the business unit is expressed as a capital reduction ratio (capital saved per dollar of expected loss). This ratio is applied to the entire unit to get its implied marginal capital to use in the allocation.

The allocation method in the end depends on why you are allocating capital. Allocating by a risk measure is straightforward but subjective. It appears to be appropriate for allocating frictional capital costs, which are proportional to capital, but not for return on risk bearing, which might not be proportional. If it also allocates fixed costs, it could produce misleading indications of actual profitability prospects. If the key issue is comparing profitability across lines, there are also alternative methods that do not allocate capital, such as directly quantifying the market value of the risk assumed, using market pricing models, or computing the cost of the capital used up by the risk the line is taking.

*Note: An extended discussion of these and related issues written by Gary Venter will be published as part of the 2003 Bowles Symposium papers in the North American Actuarial Journal in January. It is also available on-line at*