Goldfarb

Economic Profit as Income Measure: change in market value assets and discounting of liability, adjustment to GAAP income

Problems:

* franchise value ignored,
* complicates the reconciliation which causes mgmt having difficulty interpreting,
* external party not familiar with the adjustment of basis

Capital not adjusted for risk: Actual committed and Market Value of Equity (future value, stock)

Risk-adjusted Capital: Regulatory, Rating Agency Required (credit rating),

**Economic Capital Definition: the capital required to ensure a specified probability that the firm can achieve a specified objective over a given time horizon**

\* Objective can be: solvency objective (meet policyholder’s obligation), capital adequacy (being able to pay dividends, maintain financial strength to maximize franchise value)

Economic Capital defined as differences between required financial sources less different sorts of liabilities, be it discounted/undiscounted/fair value

**Risk Capital: amount of capital that needs to be provided by SH to cover risk that liabilities may exceed the funds already provided in reserves and premiums.** Remove the assumption in Economic Capital that liability are already sufficiently funded.

\*MVE >> Risk Capital allocating risk-adjusted capital understate true costs ?? why page 7 of goldfarb;

Risk Measure:

Percentile – VaR : capital required to ensure the probability of ruin less than certain value

Conditional Tail Expectation: Reflect the average value of the profit/losses greater than certain percentile

EPD: Considers all shortfall situations—A expected shortfall of assets to liabilities.

Risk Measure Threshold:

Using Bond Default Rating Subtleties:

* Historical vs Current: stable vs more relevant
* Source of historical default stats: different time span has different rates
* Time Horizon: annual vs multiple years

Management:

* Not focused on probability of default, shareholder value may cause rating downgrade

Arbitrary Default Probability: relatively easy to measure, reliably estimated

**Risk Sources- See Exhibits comparing Roth**

Loss Reserve Risk- Three risks

Credit Risk includes three: Insured’s Premiums/Deductibles, Securities/Swap positions, and Reinsurance Recoveries 3 unique aspects:

* Default may refer to downgrading of reinsurers, which creates liquidity crisis and result in less than 100% recoveries to reinsureds.
* Reinsurance recoverable on balance sheet may be smaller than the real exposure.
* Reinsurance risks may be highly correlation with other underlying insurance risks.

**Underwriting Risk Definition: total claim and expense costs on new/renewal business exceed the premiums collected.**

Loss Reserve Distribution Model and FS Models Comparison:

* Former: Loss ratio distribution based on either empirical or industry
* Latter: Frequency and Severity based on detailed claims data.

Advantage of FS: Growth, Inflation, limits and deductible, Deductible on Frequency, Split of loss btw insured, insurer and reinsurer

Inference from Reserve Risk Models: careful that Reserve Risk Models reflect the amount of risk conditional on information available *after* policy was written. Conditional model versus underwriting loss reserve model, which is unconditional.

Why catastrophe risk hard to estimate: Rare events, Exposure change over time, Severities change over time due to building materials and design

Risk Aggregation: Dependency Measure and Aggregation of Different Risks

1. Dependency Methods:

Empirical Analysis of historical Data: no sufficient data, limited information on tail events

Subjective:

* A: can be made for tail events, but reflects intuition
* D: increase in number of estimation needed introduces inconsistency

Explicit Factor Model: Link variability to common factors, such that correlation can be derived from sensitivity.

* Intended to only account for correlations across lines of business

2. Aggregation of risks

Closed Form: Simplified case but not practical for variety of stand-alone risks

Approximation Methods: All normal or lognormal, simplify analytical formula

Simulation Methods: Brute force, run-time and stability concerns; copula

Square Root Rule: exact when risk is proportional to sigma

Allocation Methods:

Percentile, Co-Measure, Incremental, Meyers Read

Target Return: RAROC : Goldfarb doesn’t assume risk capital earning investment

Use Target return to calculate the risk margin needed to be charged in premiums

Multiple period risk capital commitment:

Target return originally R=15%, will be changed to reflect the decrease of capital over time.

Issue of using CAPM/FF3F model as Cost of Risk Capital:

CAPM- defines systematic risk associated with investment, marginal contribution the investment adds to a diversified portfolio. RAROC- relationship between cash flow’s expected value and tail of probability distribution

RAROC – denominator is not the actual capital invested, usually understated compared to the market value of equity shareholders committed. Thus the RAROC is inflated/leveraged artificially.

Allocation of capital by lines/risks is even more an arbitrary decision, causing RAROC by line being more artificial.

Practical Consideration:

Time horizon inconsistency:

* Market risk one year period
* Insurance risks usually based on ultimate liability

Two alternatives:

1. Look at all risks over lifetime. Disadvantage is harder to quantify long-term market risk, especially when investment strategy may be changing in response to market movements.
2. One-year insurance liability change of value. Problems are limited data available, smaller change over short time despite potential significant risk over long term, and inconsistent perspective for loss reserve change of value (best estimate) versus market risk (market value).

Practical Considerations:

* Stranded Capital- Actual Capital Committed
* Investment income earned over time, use PV
* GAAP/SAP profit, more familiar
* Taxes

Allocation using risk measures:

Risk measure based on consideration of extreme events may be more suitable for regulatory/rating application, but may not be appropriate for making business decision to increase shareholder’s value. Less extreme events are not in tail, but could impact rating, financial strength and ability to operate as a going concern.

Diversification Adjustment:

Estimation of correlation and dependency is hardly ever accurate. Assumption impact the total risk level. Management should not solely rely on numbers to derive decisions.