

How Risk Averse Should an Insurer Be?

Two intertwining questions have beguiled insurer management for decades, maybe even centuries:

- How much capital is needed to support the business?
- What reinsurance program provides the best value?

The two questions are virtually the same, as capital and reinsurance are chiefly secured to back up insurers' promises to their customers. In general terms this then comes down to the question of what kind of value does financial stability add to an insurer, and in particular, when is it worth it to raise more capital or obtain more reinsurance?

Our recent studies of financial market response to insurer capital changes and volatility illuminate these issues in a new way. They find that company value is enhanced by having strong finances, but also suggest that there is a limit beyond which further financial strength is not worth the extra cost.

Before getting into the details of the studies, some background financial theory is covered, and the findings of earlier studies are summarized.

What financial theory says about risk aversion

Two paradigms of risk analysis dominated 20th century thought about risk. For the individual, utility theory served as the basis, and for corporations beta was the key.

Utility theory provides a mathematical way to handle the fact that individuals tend to prefer certainty to uncertainty. The utility to you of an amount of money represents how much you would like to have it. A million dollars is worth something, and two million is even better, but if you are risk averse, it's not twice as good. So if you win a lottery for a million, and have a chance at a coin flip for two million or zero, you would keep the million. Utility theory gets to this conclusion because the expected utility of taking the chance is less than the utility of one million certain, as the utility of two million is less than twice the utility of one million.

But this doesn't work for corporations. In the original financial theory, corporations' views of risk were taken to be the views of the owners. Since the owners can diversify their risk in the financial markets, they really only want one thing from the corporation – higher average earnings. Any risk due to fluctuation of earnings is taken care of by their diversification. But the market as a whole itself is subject to fluctuations, which diversification can't avoid. So the extent to which a corporation's earnings move with the overall market becomes a risk measure – indeed *the* risk measure – and this is what is measured by beta.

And what's wrong with that?

The corporate story is clearly problematic. Companies buy insurance for damage of facilities and for lawsuits, but not for beta. Either the whole corporate attitude toward risk is tremendously naïve, as some academics believe even today, or the theory has problems. In the late 20th century

a number of such problems did come to light, and now a different picture is emerging.

One line of attack was to find material flaws in the assumptions of the original theory. One of these was that lending and borrowing could be done at the same rate. A company could pay out all its profits because if it ever needed funds it could raise them again at the same cost. In fact companies rarely go back to the capital markets for more equity, and usually then only when distressed in some way. Retained earnings effectively come at a better price than new capital. This was the crucial finding of Ken Froot and his colleagues in a series of papers in the 1990's. It leads to the conclusion that companies with more growth opportunities will value retained capital more and will benefit from protecting it through risk management, even at a cost to current earnings. Subsequent empirical studies have supported this idea.

Another approach was to look at ways that risk reduction could actually enhance earnings. If it costs something to reduce risk, but higher earnings result, then risk management adds to value. This is not inconsistent with the premises of financial theory, but is not contemplated in beta.

Taxation is one example – stable average earnings can be taxed less than wildly fluctuating earnings that average the same. The frictional costs of financial distress are another. If a distressed firm is just taken over by a competitor, the diversified investor would barely notice. But if a good deal of cost is generated by lawsuits, regulation, etc., funds are drained out of the financial markets and economic efficiency is lost. The expected value of such costs are presumably imbedded in security values, and so risk management can improve value by reducing the chance of insolvency.

Looking at the firm as being just the shareholders ignores other critical stakeholders, most of whom are not able to diversify. Customers, suppliers, and employees would all be affected by firm financial distress. Many of these stakeholders are in a position to demand compensation in some form for the risks they are taking. Customers could be lost as well, especially for an insurer. Other companies have similar issues, however. Would you buy a car from a company that might not be there to supply parts?

Even the individual story – utility theory – has its problems. While it makes sense in the abstract, psychological studies of risk attitudes have found it incomplete. For one thing, typically risk averse people are often willing to make bets at less than even odds when the cost is small and the potential payout is significant. As the advertisement for the New York state lottery goes, “Hey – you never know.” More critically here, risk aversion at the extreme end of the scale is more extreme than most utility functions would project. Known as the “certainty effect,” the desire to remove the last vestiges of a major risk tend to be great. Studies have found, for instance, that when the risk is life altering, like losing your home, putting in a risk of insurer failure of as little as 0.1% is of concern. Homeowners seem to want a premium credit of 1% – 2% to accept such as risk, which is 10 to 20 times the expected value.

So what is the emerging consensus? Utility theory is not exactly right for individual risk attitudes, especially in getting to the value of the last bit of uncertainty. This clearly has implications for the value of insurer financial strength. Beta theory is not complete either. Besides not being the sole determinate of market risk – a feature not discussed here – beta ignores corporate risk that is

specific to the individual company. However this does not say that corporations are people after all – it does not suggest that utility functions will work for company risk management. Beta is still a risk that has to be addressed – it is just not the only risk. Company value from risk management depends on specific issues, like how close distress might be, and what needs there might be for future capital. In essence these all boil down to assessing the improved profit opportunities that come from risk management, which is quite different from saying that a firm prefers certainty to uncertainty in general. A particularly strong motivator when the company is selling insurance is the risk concerns of its customers, especially the certainty effect for personal lines customers.

Empirical findings prior to our study

Works that bear on these issues include studies of individual attitudes toward risk, corporate risk management, and insurance market impacts.

Individual attitudes towards risk

The classical study in this area is “Probabilistic Insurance” by Wakker, Thaler, and Tversky, which was published in 1997 in the *Journal of Risk and Uncertainty*. It tests people’s reactions to insurance policies that are subject to a fairly small probability of default, using methods that get people to reveal their risk attitudes. The finding is that a reduction in premium of over 20 times the expected value of default is needed for people to feel this is equivalent to a no-default cover. They use the result to show that utility theory has difficulty explaining this, but that an alternative form of risk analysis called prospect theory explains it very well.

A growing number of studies supports prospect theory in general. A paper that discusses implications for insurance companies, including the resulting need for strong financials, is “The Loss Of The Certainty Effect” by Stewart & Stewart, in *Risk Management and Insurance Review*, 2001.

Corporate Risk Management

The effect derived by Froot and others (as in Froot, Scharfstein, and Stein, 1993, "Risk Management: Coordinating Investment and Financing Policies," *Journal of Finance* 48, 1629-1658) that retained earnings is a more economical source of capital than is external financing implies that firms with greater capital needs will gain more from risk management. Testing this requires a proxy for risk management activities, and engaging in hedging transactions is often used for this, even though it is typically only a small part of most companies’ risk management activities. Firms with greater capital needs are generally those with better growth prospects, which might be indicated by a higher market-to-book ratio or by higher research and development expenditures. Higher liquidity constraints would also indicate potential capital needs. Several studies have found differences in the use of hedging among firms in the directions predicted. These include:

- Geczy, C., B.A. Minton, and C. Schrand, "Why Firms Use Currency Derivatives," *Journal of Finance* Vol. 52, 1997, pp. 1323-1354.
- Nance, Smith, and Smithson., “On the Determinants of Corporate Hedging,” *Journal of Finance*, Vol. 48, 1993, pp. 267-284.
- He and Ng, “The Foreign Exchange Exposure of Japanese Multinational Corporations,” *Journal of Finance*, Vol. 53, 1998, pp. 733-753.

- Dolde, "Hedging, Leverage, and Primitive Risk," *Journal of Financial Engineering*, Vol. 4, 1995, pp. 187-216.

These studies are part of a growing body of support for the existence of value in risk management that relates to external financing costs.

Other aspects of the value of hedging specific risk are also finding support. The Dolde study above reports a positive relationship between tax loss carry forwards and the use of risk management instruments, indicating that taxes provide an incentive for risk management. It also finds a significantly positive relationship between the use of risk management and leverage, as suggested by the expected frictional costs of financial distress, which would usually be higher for more leveraged firms. A similar outcome is found by the He and Ng study, as well as by Samant, "An Empirical Study of Interest Rate Swap Usage by Nonfinancial Corporate Business," *Journal of Financial Services Research*, Vol. 10, 1996, pp. 43-57.

Thus tax effects and financial distress, in addition to capital costs, appear to influence corporate risk management behavior, as indicated by the idea that corporations will spend money on risk management when doing so increases profit opportunities.

Insurance specific studies

Finance researchers find the insurance industry a good field for studying corporate risk management, as the extent of reinsurance purchases is available. An initial paper from this perspective is Mayers and Smith "On the Corporate Demand for Insurance: Evidence from the Reinsurance Market," *Journal of Business*, Vol. 63 (1) 1990 pp. 19-40. They find tax effects and financial distress costs to be important drivers of reinsurance purchases. Corporate form is also important, with closely held corporations and mutuals buying more than widely traded stocks. The costs of financial distress can be great for insurance companies, leading to loss of business well before solvency is threatened. Another paper that finds that avoiding financial distress is an important motivator for insurer hedging is Cummins, Phillips and Smith "Derivatives and Corporate Risk Management: Participation and Volume Decisions in the Insurance Industry," Federal Reserve Bank of Atlanta Working Paper 97-12, 1997. They also find that reinsurance and financial hedges are to some extent replacements for each other, and identify other determinants of insurer hedging. Another paper that finds an increase in market value from using risk management to avoid financial distress is Staking and Babbel, "The Relationship between Capital Structure, Interest Rate Sensitivity, and Market Value in the Property-Liability Insurance Industry," *The Journal of Risk and Insurance* Vol. 62 No. 4, 1995 pp. 670-718.

Several studies have found pricing and growth benefits from insurer financial strength:

Phillips, Cummins and Allen "Financial Pricing of Insurance in the Multiple-Line Insurance Company," *The Journal of Risk and Insurance*, vol. 65 no. 4, 1998 pp. 597-636, estimate the price discount that insureds demand for accepting a higher probability of insurer default. They find the discount is about 10 times the economic value of the default probability for long-tailed lines and 20 times for short-tailed lines. This is roughly consistent with the predictions of prospect theory and the certainty effect.

Sommer “The Impact of Firm Risk on Property-Liability Insurance Prices,” *The Journal of Risk and Insurance*, vol. 63 no. 3, 1996, pp. 501-514 finds that the profit load insureds are willing to pay decreases as the ratio of surplus to assets declines, and also decreases as the volatility of that ratio increases. This reinforces the impact of strong capitalization on pricing.

Grace, Klein and Kleindorfer “The Demand for Homeowners Insurance with Bundled Catastrophe Coverages,” Wharton Project on Managing Catastrophic Risks, 2001, find indications that higher rated homeowners insurers get higher premiums, but with state variations having to do with insolvency funds.

Epermani and Harrington “Market Discipline and Reaction to Rating Changes in U.S. Property-Liability Insurance Markets,” University of South Carolina, March 2001 find that growth rates are higher for higher rated insurers, and that the growth rate of a company moves and down with rating changes.

All these results lead to the conclusion that having a strong balance sheet, with capital strength and good reinsurance, add value to the insurer.

Our recent studies