February 2011

## Economic (in)solvency is different from actual (in)solvency

Economic Capital Models ("ECMs") are a hot topic of discussion within the insurance industry, especially for companies preparing for Solvency II. Of course, one of the key objectives of these ECMs is to determine the amount of capital that is needed to support the business. What is the target level of confidence?

There are many variations of models but the growing standard appears to be 1-year Value at Risk (VAR) models where the capital requirement is set to maintain a certain level of confidence that the company will be economically solvent at the end of one year.

For company internal models, the target is set in order to maintain a certain claims paying rating from rating agencies such as A.M. Best, S&P, Moody's and Fitch. For regulatory models, regulators tend to set the confidence level at least in part considering what the implied financial strength ratings would be at that level. For regulatory models, this target confidence level essentially sets a minimum claims paying rating that companies should have to remain a going concern. For example, the Standard Formula within Solvency II is such a model where the capital requirements are calibrated to a 99.5% 1-year VAR confidence level. But what is the implied rating?

### How do companies and regulators link the likelihood of economic insolvency in one-year VAR system to implied ratings?

The usual answer is that they use historical default studies from the rating agencies. Below are the annual default probability tables and mean recovery rates from S&P[1] and Moody's[2]:

[1] Source: Annual 2009 Global Corporate Default Study And Rating Transitions; Default rates based on 1981-2009 data, recovery rates on 1987-2009 data

[2] Source: Study "Corporate Default And Recovery Rates 1920 – 2009", Default rates in table 1 are based on 1970-2009 data, recovery rates on 1987-2009 data

| Table 1: 1-year Default rates | | |
|---|---|---|
| | S&P | Moody's |
| AAA | 0.00% | 0.00% |
| AA | 0.02% | 0.02% |
| A | 0.08% | 0.05% |
| BBB | 0.28% | 0.18% |
| BB | 1.08% | 1.24% |
| B | 5.59% | 4.88% |

| Table 2: Mean Recovery | | |
|---|---|---|
| | S&P | Moody's |
| | | |
| Senior secured | 57.2% | 66.9% |
| Senior unsecured | 43.0% | 44.6% |
| Senior Subordinated | 28.3% | 30.7% |
| Subordinated bonds | N/A | 31.0% |
| Junior subordinate | N/A | 21.3% |

The most common approach is to read the probability of defaulting from either S&P or Moody's in Table 1 to establish the level of confidence needed in their ECM to support the company's target claims paying rating. For example, using the S&P and Moody's data, a company that targets an AA credit rating would ascertain the probability of a company defaulting in one year to be 0.02%. This means that an AA company would default once in every 5,000 years or said differently, 2 in every 10,000 companies rated AA would default by the end of the year. Translating this to capital requirements within their ECM would target setting capital at the 99.8 percentile. If the AAA requirement were to be strived for, the capital requirement would be infinite if we blindly use the data in the same way.

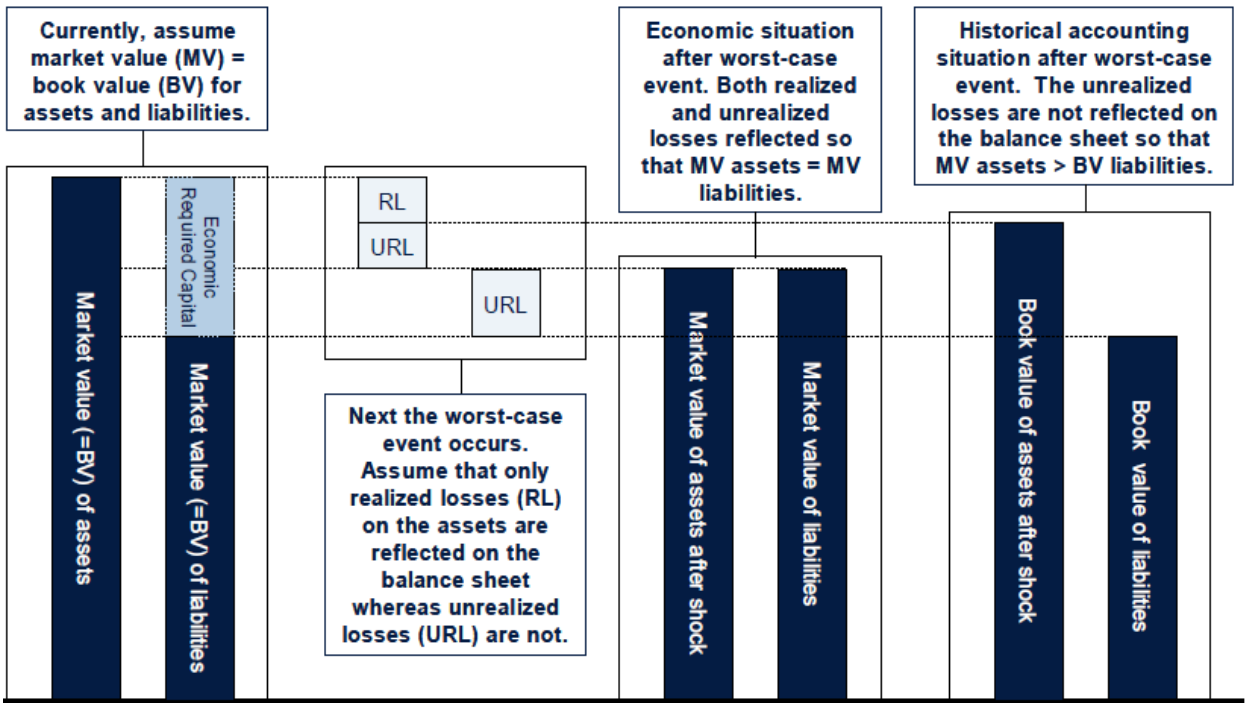
More and more, regulators have often been targeting a confidence level of 99.5 percentile in setting capital requirements. In setting this level, they use a table similar to Table 1 to infer this supports a BBB rating.

Using this approach to arrive at a link between target confidence levels in ECMs and implied claims paying ratings makes sense at first glance. It is unclear where this methodology started but it is likely within the banking and consulting industry where ECMs first developed. However this approach has startling shortcomings and we believe significantly over estimates the targeted confidence level under an economic solvency model that should be needed for a targeted claims paying rating when comparing to historical evidence of default history.

### What is wrong with this approach?

The main problem with this approach is in the definition of insolvency itself. Rating agency historical default statistics do not reflect economic insolvency; they typically reflect a collection of approaches such as book value (statutory accounting) and cash flow or financing shortfalls resulting in declaration of insolvency. Management action and typically slow recognition of economic loss in financial reporting combine to produce a lower incidence of default, which creates an artificially high standard under an economic capital model. Management of the companies or the company's regulator (for industries that are regulated) declare insolvency or file for bankruptcy only after considering and acting upon all possible actions to avoid it. The decision to declare insolvency is not based on an economic assessment.

Under an economic framework, after a worst-case event has occurred, the market value of assets is still enough to support the market value of liabilities. The intent is that the business can be transferred to a third party at zero cost. This concept is illustrated below.




After a worst-case event, the realised losses (RL) and unrealised losses (URL) on the assets reduce the market value of assets while the realised and unrealised losses on the liabilities increase the market value of liabilities. In the above illustration, the company would be on the breach of economic insolvency whereas on a book value[3] basis, the picture would be much more positive. Since the historical default loss data of rating agencies spans many years, it also spans several accounting regimes – including amortised cost accounting. Amortised cost accounting would have allowed the situation to deteriorate further past the worst-case event before the book value of assets would be less than the book value of liabilities. After declaration of default, the assets and liabilities would be liquidated. It is this liquidation that would force the recognition of the unrealised losses that are imbedded in the business. This helps to explain why recovery rates after declared default are well below 100% in Table 2. If defaults actually followed economic insolvency, one would expect that recovery would sometimes be higher and sometimes lower than full value and on average 100%. This supports that historical default loss data from rating agencies is not directly applicable to an economic solvency framework, as under historical accounting, an economic insolvency threshold would most often have been breached considerably sooner. In summary, this helps explain why recovery rates based on actual insolvencies (not economic) are on average well below 100%.

[3] With book value we assume amortized cost accounting for assets and statutory accounting for insurance liabilities.

We also know that there are many companies and almost entire industries in some countries that have been technically economically insolvent at some point in the past (telecoms, banks in the crisis, airlines, autos, steel, etc) ... just as some are still technically insolvent on an economic basis today. Most of these companies have not in the past and will not in the future actually default. Investors are still willing to support these companies because a belief in management's ability to improve the situation. The point is that economic insolvency occurs at a significantly higher rate than what is represented in the actual declared insolvency situations[4] measured by the rating agencies.

Some additional support for an alternative to this direct use of the historical probability of default approach can be seen from S&P's Risk Based Capital Model[5]. In S&P's 2010 version, they give various levels of confidence by rating level as can be seen in the following table.

**Table 3 Targeted Statistical Level of Confidence for Rating Categories**

| Rating Category | Target (%) | Implied std. Dev. movement | Assessment |
|---|---|---|---|
| AAA | 99.9 | 3.09 | Extremely strong |
| AA | 99.7 | 2.75 | Very strong |
| A | 99.4 | 2.51 | Strong |
| BBB | 97.2 | 1.91 | Good |

Statistical level of confidence is based on assumed normal distribution

In other words, S&P captures the present value of expected economic losses (change in shareholder equity/policyholder surplus) experienced over a year, to a degree of certainty that is commensurate with the rating. From this table, we can see that a confidence level of 99.5% coincides with a rating between A and AA over a one-year time horizon.

## Conclusions

It is not our intent to describe a complete objective process for the link between confidence levels in ECMs to claims paying ratings. However there are sound arguments against using the historical default probabilities directly for establishing this link – it is simply wrong to infer this link. This short paper is

[4] S&P calibrations are based on a 5-year default assessment which the CRO Forum believes is closer to an economic solvency assessment likelihood. The main reason for this is that an economic insolvency will result in an actual default only after years of management actions that prove inadequate given the circumstances the company at question is facing. In many cases, as history has proved, management action is often adequate to result in a rebound for the company in question.

[5] Source: "Refined Methodology And Assumptions For Analyzing Insurer Capital Adequacy Using The Risk-Based Insurance Capital Model", June 7, 2010

intended to promote awareness on this issue as many companies and regulators continue to follow the same logic. Declared insolvency does not occur at the same frequency of economic insolvency.

Requiring an artificially higher standard for economic insolvency could raise capital requirements in the market and prices of insurance products. If the rating agencies were to use the same approach, the industry would not even enjoy the benefits the higher confidence level should afford them – higher ratings. In other words, it is dangerous to suggest that economic solvency should be held to the same incidence of default standard that is demonstrated in the past. Without this reality check, it could become a self-fulfilling prophecy in that rating agencies could make the same mistake when assessing capital adequacy for declaring insolvency going forward.