Built-in Stabilizers and Risk Literacy: Protecting the Sustainability of the Insurance Industry

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Shigeyuki GOTO
General Manager of Corporate Risk Management Dept., MS&AD Insurance Group Holdings, Inc.

Abstract

Just as any chain is only as strong as its weakest link, any sophisticated, cutting edge assessment is only as good as the robustness of the underlying assumptions. This is increasingly true for tail-risks, where even the most advanced predictions and modelled outputs are not immune from judgement errors and/or statistical uncertainty. On the part of insurers, this warrants better pooling of risks by way of creation a better diversified portfolio and the building up of capital buffers for unforeseen/unpredicted events.

In this paper, I wish to touch on two approaches to achieve the above; the first is to have built-in stabilizers in place in the form of special systems and/or schemes; the second is to raise awareness of and have in place processes that address psychological biases behind the various assumptions and analysis we use in our day to day operations.

Key words
Tail risk, Built-in stabilizer, psychological biases, Risk literacy
1. Built-in stabilizers

*Japan’s experience*

The yield for 10-year Japanese government bonds that once exceeded 8% in the 1990s are currently below 1%. (See Graph 1) This is mainly due to the continuation of Bank of Japan’s very low interest rate monetary policy that was originally adopted in 1999. Additionally, the NIKKEI average peaked at 39,000 Yen in December 1989. It has since then dropped below 10,000 Yen after the bust of the bubble economy, and it hit rock bottom in 2008 at 7,000 Yen. It is currently at around 8,500 Yen. Interestingly, the Yen continued to appreciate against the U.S. Dollar (almost in a synchronized manner) during the same period. (See Graph 2)

Japanese insurers have had to continuously deal with difficult external factors and market conditions such as these, which by any measurement, could be deemed as statistically unlikely (‘unforeseeable events’).
Graph 1: 10 year bond yields

Bank of Japan - Government Bond Futures Listed Yield on TSE (10 years)

Graph 2: NIKKEI average and USD/JPY exchange rate
Insurers going bust due to such ‘unforeseeable events’

A total of seven small- and middle-sized life insurers went bust in Japan during 1997 to 2001. The main cause was that they sold savings-type products with guaranteed returns set at 1980 interest rate levels. (Life insurers ended up building up a portfolio that was overly prone to interest rate fluctuations.)

On the general insurance side, Daiichi Fire declared insolvency in 2000. They too were hindered by the excessive sales of long-term fire insurance products that had savings elements. Another general insurer, Taisei, failed in 2001 but his was mainly due to their involvement in Fortress Re.

The most recent insolvency case is Yamato Life in 2008 and this was triggered by the Lehman crisis. (See Graph 3)

These insurers failed to recognize, manage, and mitigate the inherent danger of their distorted and risky portfolio (which was interest rate risk ridden). This made their capital base vulnerable, and the absence of proper ALM ultimately led to the failure of these firms. The burst of the bubble economy, downturns in the financial market, and catastrophe losses may have all played a part in triggering the chain of events, but they were not the core cause in and of themselves. These cases were caused by failure of risk management (including ALM).
Life Insurance Companies

<table>
<thead>
<tr>
<th>Insurer</th>
<th>Governing procedure</th>
<th>Procedure commencement</th>
<th>Description</th>
<th>Amount of debts exceeding assets (million USD)</th>
<th>Financial assistance</th>
<th>Reduction in liability reserves</th>
<th>Assumed interest rate after reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chiyoda Life Insurance</td>
<td>Reorganization procedure</td>
<td>2000/11/19</td>
<td>The court approved and established the reorganization plan on March 31, 2001, in which AGI acts as a sponsor. This was the reorganization of AGI Life Insurance and stated operation on April 30.</td>
<td>597</td>
<td>0</td>
<td>10%</td>
<td>1.5%</td>
</tr>
<tr>
<td>Yonsei Life Insurance</td>
<td>Reorganization procedure</td>
<td>2000/12/20</td>
<td>The court approved and established the reorganization plan on April 2, 2001, in which IS Frontier acts as a sponsor. This was the reorganization of Yonsei Life Insurance and stated operation on April 30.</td>
<td>669</td>
<td>0</td>
<td>0%</td>
<td>1.75%</td>
</tr>
<tr>
<td>Toyo Life Insurance</td>
<td>Reorganization procedure</td>
<td>2001/10/23</td>
<td>The court approved and established the reorganization plan on November 4, 2001, in which T&amp;D Group acts as a sponsor. This was the reorganization of Toyo Life Insurance</td>
<td>75</td>
<td>0</td>
<td>None</td>
<td>2.0%</td>
</tr>
<tr>
<td>Yamanote Life Insurance</td>
<td>Reorganization procedure</td>
<td>2001/10/24</td>
<td>The court approved and established the reorganization plan on November 4, 2001, in which T&amp;D Group acts as a sponsor. This was the reorganization of Yamanote Life Insurance</td>
<td>648</td>
<td>0</td>
<td>0%</td>
<td>1.5%</td>
</tr>
</tbody>
</table>

(Note) Financial assistance to the Aiko Life Insurance, which is a relief life insurance company for the Nissan Life Insurance, was made by the policymakers' protection fund.

Nonlife Insurance Companies

<table>
<thead>
<tr>
<th>Insurer</th>
<th>Governing procedure</th>
<th>Procedure commencement</th>
<th>Description</th>
<th>Amount of debts exceeding assets (million USD)</th>
<th>Financial assistance</th>
<th>Reduction in liability reserves</th>
<th>Assumed interest rate after reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dai-Ichi Kosen</td>
<td>Procedure of the Insurance Business Act</td>
<td>2000/3/1</td>
<td>The Dai-Ichi Kosen Insurance Payment Guarantee Mechanism took over the insurance contracts in August.</td>
<td>130</td>
<td>Transferred to the insurance special account</td>
<td>4</td>
<td>10%</td>
</tr>
<tr>
<td>Taiwei Kosen</td>
<td>Reorganization procedure</td>
<td>2001/11/22</td>
<td>The court approved and established the reorganization plan on August 13, 2002, in which CT&amp;Ko acts as a sponsor.</td>
<td>94</td>
<td>Financial assistance</td>
<td>5</td>
<td>10%</td>
</tr>
</tbody>
</table>

(Note) Financial assistance to the Aiko Life Insurance, which is a relief life insurance company for the Nissan Life Insurance, was made by the policymakers' protection fund.
Ways to overcome such extreme events

Given such turbulent and harsh conditions, how did the Japanese general insurance industry remain sustainable and robust over the course of so many decades? The Japanese general insurance industry has in place special-purpose systems and schemes in place to protect the financial stability of the industry. This consists of four pillars:

1st Pillar: Orderly underwriting by the private sector

NLIRO (Non-life Insurance Rating Organization)
The NLIRO was established in July 2002 as result of the merger of its two predecessor organizations. It has 38 member companies and its primary role is to calculate and provide burning cost based ‘reference rates’ and ‘basic rates’ for certain lines of business. This is an industry-wide effort to come up with accurate, sustainable and fair premium rates for lines of business with a particularly high degree of public interest such as fire, automobile, and personal accident. Its value-added is derived from its capacity to assess and monitor burning costs (i.e. pure rates) based on market-wide data and statistics. (Premium rates are more accurate and robust than ones calculated based on in-house data of any particular individual insurer.)

Prior regulatory approval of products and rates
Although Japanese insurers are now allowed to ‘file & use’ many products due to deregulation, products in certain lines of business (e.g. personal accident insurance; retail automobile insurance) are still subject to prior approval by the regulator. Even for ‘file & use’ products, insurers can further facilitate their application process by using NLIRO certified ‘reference rates’.

Both systems ensure that the quality, integrity and robustness of the general insurers’ reserves (which are based on an equitable premium method).

2nd Pillar: Policyholder protection

Non-life Insurers Policyholders Protection Corporation (NIPPC)
The NIPPC was established in December 1998 based on the revision of the Insurance Business Law that same year. It has 40 member companies and operates on ex-ante funding. Its primary role is to
provide capital (i.e. a lump sum) to the insurer taking over the portfolio of a failed insurer. Where there is no third party available, the NIPPC itself assumes the portfolio of the failed insurer and runs it off.

Retail insurance (i.e. personal lines) are protected in full (or at a level close to it in certain cases). The value of the insurance contract is preserved.

<table>
<thead>
<tr>
<th>Insurance Type</th>
<th>Claim Payment</th>
<th>Refund due to cancellation or Return due to maturity of savings-type contracts</th>
</tr>
</thead>
<tbody>
<tr>
<td>CALI</td>
<td>Guaranteed 100%</td>
<td>Guaranteed 100%</td>
</tr>
<tr>
<td>Residential earthquake insurance</td>
<td>Guaranteed 100%</td>
<td>Guaranteed 100%</td>
</tr>
<tr>
<td>Automobile insurance</td>
<td>Guaranteed 100% up till 3 months after the failure of the original insurer, guaranteed 90% after that</td>
<td>Guaranteed 90%</td>
</tr>
<tr>
<td>Fire insurance</td>
<td>Guaranteed 100% up till 9 months after the failure of the original insurer, guaranteed 90% after that</td>
<td>Guaranteed 90%</td>
</tr>
<tr>
<td>Other insurance</td>
<td>Guaranteed 95%</td>
<td>Guaranteed 90%</td>
</tr>
<tr>
<td>Short-term accident insurance, Overseas Travel Insurance</td>
<td>Guaranteed 100% up till 9 months after the failure of the original insurer, guaranteed 90% after that</td>
<td>Guaranteed 90%</td>
</tr>
<tr>
<td>Other Medical and Accident Insurance</td>
<td>Guaranteed 90%</td>
<td>Guaranteed 90%</td>
</tr>
</tbody>
</table>

3rd Pillar: Providing peace of mind and security to the public

**CALI and CALI Pool**

CALI (compulsory automobile liability insurance) is based on the Automobile Liability Security Law and is compulsory for all drivers. CALI is operated via an industry-wide pool (i.e. CALI pool) where insurers pool all CALI premiums and re-distribute it amongst members companies. Paid claims are proportionally re-distributed as well.

CALI premium rates are calibrated based on a ‘no-loss, no-profit’ principle. Its indemnity limits are for instance JPY 30 mil for death; JPY 40 mil for permanent disabilities; and JPY 1.2 mil for injuries. For cases involving non-insured vehicles (i.e. drivers that did not take out CALI) or hit & run accidents (i.e. the accused vehicle can not be determined), the state compensates the victim under its government compensation programme.

Pooling is the best way to run this line of business (which carries high public interest). This ensures the scheme’s sustainability.
4th Pillar: Being viable to deal with national disasters and emergencies

Residential earthquake insurance (and corresponding reinsurance scheme)

Residential earthquake insurance is based on the Earthquake Insurance Law and is packaged together with residential fire insurance policies. (Policyholders must opt-out if they do not wish to take out this cover.) The insured sum for earthquake insurance can be fixed between 30 to 50% of the sum insured of the fire policy (but is capped at JPY 50 mil for property and JPY 30 mil for household goods). There is no impact to the profit and loss of the private sector (i.e. this is run on a No loss No profit basis).

The reinsurance programme for residential earthquake insurance is run on a tripartite scheme supported by: the industry; the Japan Earthquake Reinsurance Company (JERC: capitalized and owned by the industry); and the state.

This is one solution based on the collective wisdom and experience of Japan, an earthquake ridden market. The premise is that the private sector (i.e. the general insurance industry) remains the primary risk carrier first and foremost, but the corresponding reinsurance programme also provides for the state to carry a proportional burden via a phase-in scheme linked to the overall loss amount. This ensures the scheme’s sustainability and thus contributes to protecting the public in times of significant distress.
Nuclear energy insurance is based on the Liability for Nuclear Energy Related Losses Law and is operated via an insurance pool: Premiums (written by 15 co-insurers) are pooled and then re-distributed amongst 23 pool member companies. Reinsurance is then arranged by the Japan Nuclear Energy Pool.

Its indemnity limit is JPY 122.1 bil for liability and JPY 190 bil for property. (This is the pool’s total limit: Indemnity limit for liability per power plant is set at JPY 120 bil.) Losses due to earthquake and tsunamis are excluded. Those are covered by the state.

Providing commercial cover to nuclear power plants, a major energy source in Japan, is one the public roles expected of the general insurance industry. Pooling is the best way to allow risk carriers to provide cover for certain large and isolated risks that are immune from the law of large numbers It is also worth noting that nuclear energy risks need to be pooled and managed globally (as opposed to just domestically). This is a manifestation of the insurance market’s response to so-called ‘beyond assumption risks’. For cases where national interest is at stake, these types of joint efforts by the government and the private sector are warranted. (This also highlights one of the differences between insurers and banks.)

**Pre-event cat reserves**

In Japan, both financial and regulatory accounting rules allow insurers to put up pre-event cat reserves to cover catastrophe losses with a return period of over a year. This is set out in Enforcement Regulations under the Insurance Business Law. Essentially, insurers build up the reserve by putting up a certain percentage (e.g. 2%) of their net premium income every year. Tax laws put a cap on ‘tax exempt’ pre-event cat reserves.

This is a necessary system for Japanese general insurers to sustain their financial strength in a natural-catastrophe ridden market. One must remain aware of the timing element in profit recognition (especially when ‘yearly premiums’ covers catastrophes with a return period of over a year). This reserving system reflects the nature and reality of the underlying business

Individually building up capital buffers during good times so that we can draw down on them during severe times absolutely makes sense. Having such a firm specific counter-cyclical buffer in place - or at least structuring one’s capital strategy around that concept – is vital in modern-day insurance financing.
2. Risk literacy

Recent lessons

In the run-up to the 2007-09 financial crisis, market participants often echoed the refrain ‘this time it’s different’. But most aspects of the crisis, particularly sub-prime lending and over-leveraging, turned out to be well known risks. Even the sudden rise in correlations between markets that are usually non (or less) correlated was something that was experienced within the previous decade (e.g. the collapse of Long Term Capital Management (LTCM) in 1998).

The underlying causal human factors of financial crises have been widely discussed for decades by social scientists, and described for even longer by historians. (Galbraith, 1994; Kindleberger, 2002) There is a good understanding of how frames, heuristics, and other psychological biases can lead to bad judgement even amongst some of most experienced business experts.

These cases reflect how senior management usually looks at results (or outcomes) on a ‘point in time’ basis. However, what they actually should be looking at is the ‘process’ from which such outcomes are produced from. Too often, managers ignore the possibility of biases (whether on the part of individual employees or the organization as a whole) exacerbating a firm’s risk exposure in an undetectable manner. Furthermore, over-confidence or optimism at successful companies, and myopia or inertia under changing circumstances, often clouds a manager’s eyes, leading him/her to overlook the true nature of the risks and levels of uncertainty.

The financial crisis has understandably sparked significant regulatory action. The G20, Financial Stability Board (FSB) and Joint Forum have been active in reviewing the regulatory framework for banks, and such analysis has invariably flowed across to insurance.

As markets evolve and their uniformity gradually increases, regulatory regimes look set for greater convergence, over time. In addition to global capital requirements, many regulatory frameworks are beginning to include an enhanced ERM framework that considers the organizational structure of risk management, governance, reporting, disclosure and transparency requirements, as well as consideration for group risks. Increasingly risk-based capital regimes are also employing scenario and stress testing requirements.

However we should pay equal if not more attention to why financial institutions rushed to
engage in risky transactions that would eventually wipe out their capital and result in the near-collapse of the global financial system. When we observe the details of the previous financial crisis, it becomes clear that the players involved in sub-prime loan related transactions more or less genuinely believed that they would be missing out on a sure thing if they did not put their money in those markets. I have no intention to deny or undermine the value of the financial engineering technology that lies behind the advanced securitization and diversification of risk. But we should nevertheless be mindful of the fact that all the big and sophisticated firms were on the brink of collapse (if not already insolvent) as it turned out they had a very poor view of their risk against capital position. In fact, the promises of the new market turned out to be nothing more than an illusion and to this day it reminds us that people and firms fall in the same trap over and over again.

In the hope that the next time will really be different, processes to enforce rational decision making against a backdrop of unforeseeable risk and uncertainty is attracting more and more attention.

‘Risk literacy’ is usually defined as knowledge of probability and statistics. But to be truly useful in practice, the concept also needs to address the psychological biases that lead to judgmental risk.

Examples of the role of these biases in the run-up to the 2007-09 financial crisis are given in Table 1.
TABLE 1  Role of Psychological biases in the run-up to the 2007-09 financial crisis

<table>
<thead>
<tr>
<th>Psychological Biases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inertia</td>
</tr>
<tr>
<td>The belief that real estate prices would continue to rise.</td>
</tr>
<tr>
<td>Under-estimation of systemic risk</td>
</tr>
<tr>
<td>The possibility that historic correlations could change was largely ignored. So were the consequences of too much leverage. Historical experience was largely overlooked.</td>
</tr>
<tr>
<td>Pattern seeking, Simplification</td>
</tr>
<tr>
<td>Risk evaluation models assumed risks were well-diversified and that historic default data was applicable.</td>
</tr>
<tr>
<td>Over-confidence and information cascade</td>
</tr>
<tr>
<td>According to the study of Kahneman, D. and Finkelstein, S., Whitehead, J. and Campbell, A.</td>
</tr>
</tbody>
</table>

In short, our actual decision making has a tendency to start with heuristics based on past experiences (System 1) and in cases where we feel it had failed, we then move on to analytical consideration (System 2). [See Diagram below.]
Both System 1 and 2 involves judgemental risk. As mentioned already in Table 1, several common psychological biases are inherent in our intuition (System 1). As mentioned earlier, over-confidence or optimism at seemingly successful companies, and myopia or inertia under changing circumstances, often clouds a manager’s eyes, leading him/her to overlook the true nature of the risks and levels of uncertainty.

There is also a judgemental risk trap in System 2 as well. In setting out strategies, we make use of the effective theory like Competitive Position model (Porter, 1980, 1985) and Resource Based View theory (Barney, 1991; Mata, Fuerst, & Barney, 1995; Barney & Clark, 2007; Peteraf, 1993; Wernerfert, 1984). However this theory in general is based on assumptions which reflect a simplified version of the real world. Therefore, when setting out a strategy, we need to monitor whether the competitive environment has changed or not and whether the strategy would still apply in practice. When we recognize the substantial gap between the initial assumption and reality, we tend to question (or doubt) the observed changes in the environment or consider we have adopted a wrong
theory, when in fact, faced with symptoms of mis-matches, we should actually consider the revision and/or reinforcement of the strategy itself. This is why it is dangerous to rely on or apply techniques or strategies that have worked in the past; what may have worked in a previous case does not necessarily work in another. We should closely examine the assumptions underlying the ideas, opinions, and models being used.

To be successful, risk management must address the behaviour - the biases, attitudes, and habits - of those making risk-related decisions. In particular, controlling psychological biases in the risk management process is important. If management ignores such biases, at best, the firm’s capital allocation will be far from optimal (i.e. will be poor and inefficient), which means losing opportunities to increase the value of the firm. At worst, ignoring biases will lead to huge losses and even bankruptcy.

Conclusion

The insurance industry, quite naturally, hinges on its skills and know-how to deal with risk and uncertainty. However this is proving to be increasingly difficult and complicated due to rapid globalization, technological development, and changes in nature (particularly in terms of climate change and crustal movement).

In order for firms to advance their risk management processes, the concept of ‘risk literacy’ should be broadened and include psychological biases against risk that ultimately lead to what I call ‘judgemental risk’. Improving risk literacy in every organization is becoming increasingly critical.

Secondly, we, as the industry, need to finance operations in a way that allows us to build-up a capital base that is much more resilient to significant stress scenarios. (Our financing needs to be dynamic.)

• In practice, insurers need to set aside a capital buffer to cover losses arising from extreme events that may not necessarily be modelled or even foreseen.

• Need to constantly look at our portfolio using a total balance sheet approach and assess how our assets and liabilities fluctuate under severe stress scenarios. How we prepare for tail-events is what defines us as insurers. (Our financing strategies need to be shaped on this premise.)
• Given that we are unable to foresee/predict the future, in order to make better and more rational decisions (around risk management and financing needs), we need to:
  - Draw on the lessons of the past (i.e. look to history for guidance) for better risk management
  - Build up and maintain stress-buffers for ‘uncertainties’ regarding tail events
  - Introduce built-in stabilizers as a counter-cyclical tool

End
References


Also used statistics and information publicly available on the following organisations’ websites or presentation materials:
- Financial Services Agency (Japan)
- Bank of Japan
- General Insurance Association of Japan
- Non-life Insurers Policyholders Protection Corporation (NIPPC)
- NLIRO (Non-life Insurance Rating Organization)