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MANY MANAGERS ARE STRUGGLING WITH THE DAUNTING TASK OF DESIGNING A CONTROL ENVIRONMENT FOR THE ACTUARIAL ASPECTS OF AN INSURANCE COMPANY. BY MARK GRIFFIN

Behavioral finance (sometimes referred to as behavioral economics) represents a synthesis between psychology, neurology and anthropology. It demonstrates consistent economic biases and blind spots in the behavior of individuals and groups.

Insurance company managements are in the process of building the “control environment” for financial reporting envisioned by the Sarbanes-Oxley Act of 2002 and the 2013 COSO “Internal Control—Integrated Framework.” The risk management, actuarial, compliance and internal audit areas within an insurance

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company (sometimes referred to as the control functions), together with the finance function, will be critical in building this environment. This article will help the reader understand behavioral finance and its relevance in identifying analytics and processes suitable for a control environment. Three examples are provided. More broadly, the article will help any actuary involved in making and resetting assumptions to understand behavioral finance and thereby avoid some common biases.

THE PITFALLS

In 2002, Daniel Kahneman won a Nobel

Prize for his work in behavioral finance. Other authors in this field include Robert Shiller, Hersh Shefrin and Richard Thaler. In 1995, the Association for Investment Management and Research (AIMR) published “Behavioral Finance and Decision Theory in Investment Management.”

Their work and that of others has shown that behavioral finance demonstrates a number of decision-making traps:

- Endowment effect: We value the things we have, and the things we have invested time in, more than we should.
- Anchoring: People don’t make sufficient adjustments from an initial “anchor,” and give disproportionate weight to the first information they receive. In Kahneman’s words, this is “one of the most reliable and robust results of experimental psychology.”
- Confirmation bias: We tend to look for evidence that confirms our existing view and to disregard findings that contradict it. This is sometimes referred to as the “status quo bias.”
- Overconfidence:
 - The more expertise one has, the

- more overconfident one becomes.
 - We draw unfounded conclusions from small samples.
 - Experts see things in a much more differentiated form, and they may overlook other perspectives.
- Loss aversion: Investors are overly reluctant to sell their loss-making positions because that would force them to admit they had made a mistake. Instead, they hold on to these positions longer than positions with gains.

ASSUMPTION RESETTING EXAMPLE

Consider the following example. An insurance company enters the simplified issue term insurance market. A mortality table is carefully chosen. A couple of years into the new venture, the quarterly financials of the company contain a poor mortality result for this line of business. In preparing to describe the results to the board of directors and outside investors, the finance department “asks” the actuarial department if this result is merely noise or evidence that the mortality assumption is too aggressive.

In this case, for the actuaries involved in setting the assumption, the “endowment” is their investment in the actuarial designation, their stature within the organization and the assumption itself. For everyone within the organization who was not involved in setting the assumption, the assumption is the first information they receive and becomes the anchor. The confirmation bias suggests that

those who have the initial assumption as their “anchor” may not take the new information seriously or apply a disciplined process to its arrival. With respect to overconfidence, the simplified issue mortality assumption was probably either made by, or approved by, the ranking mortality “expert” within the company. In this situation, the expert status of the decision-maker(s) may cause the company to be too reliant on the initial data and on the initial assumption drawn from that data. The prospect of changing the mortality assumption may trigger loss aversion within the company, as the resulting reserve increase might be viewed as admitting a mistake. The temptation to hold off on the assumption change and pray silently for future reversion may be too strong.

In the example, there is a possibility that the company will not react promptly to experience that is more than noise. Delayed recognition increases the magnitude of the eventual corrective action and may result in the capital markets losing overall confidence in the company’s financials.

In his best-seller, *Emotional Intelligence: Why It Can Matter More Than IQ*, Daniel Goleman describes how initial reactions to unexpected events may be emotional rather than rational. The emergence of negative experience with respect to an insurance product may constitute such an unexpected event. Even apart from “control environment” considerations, the opportunity to replace what may be a rather awkward, emotional situation with a consistent process should be welcomed.

All actuaries must realize that, having made a large personal investment in actuarial training, we consciously or subconsciously feel empowered and entitled to make assumptions. Based on the findings of

behavioral finance, we should also recognize that, as soon as we devote time and attention to making an assumption, we lose our objectivity with respect to the possible future need to reset the assumption. Therefore, the company’s process should not rely on the assumption-making body or person to raise its hand proactively and identify an issue.

NERVOUS SYSTEM

In the December 2014/January 2015 edition of *The Actuary*, a “nervous system” for managing insurance product assumptions was proposed. Standard deviations are calculated to differentiate between variation in insurance product experience that represents noise and variation that indeed is an early warning on the need to change product assumptions. As an example, variation in experience beyond one standard deviation would automatically mandate an assumption review, and experience beyond two standard deviations would mandate a revision.

The nervous system can be applied consistently within an organization as well as across life, health, property and casualty, and pension assumptions. It should be

applied, not just to assumptions such as mortality, withdrawals and morbidity, but also to other profitability drivers such as the distribution of business by age, policy size, etc. The nervous system can form an important part of a model governance policy within a control environment, as described earlier. The analytics can be made available to, and are easily understood by, the actuarial, risk, finance and internal audit teams. While



Reinsurance

THE RENEWAL PROCESS WITHIN A REINSURER is subject to the same challenges listed in the direct simplified issue example. Applying consistent “review and revise” triggers based on the original assumptions at the point of renewal will ensure a disciplined approach and represent an effective control.



the approach is not analytically elegant, it is understandable by those without deep statistical knowledge. Therefore, it will resonate with senior management, industry analysts, investors, auditors, regulators, etc.

THE FED'S PERSPECTIVE

This same need for an objective, transparent

process to review and revise assumptions is echoed by the Federal Reserve's "Supervisory Guidance on Model Risk Management,"¹

Validation also can reveal deterioration in model performance over time and can set thresholds for acceptable levels of error, through analysis of the distribution of outcomes around expected or predicted values. ...

The objective of the [back-testing] analysis is to determine whether differences stem from the omission of material factors from the model ... or whether they are purely random and thus consistent with acceptable model performance.

The traps listed earlier obviously all involve behavior. The use of a transparent, consistent process such as the nervous system removes the opportunities to fall into these traps. A company using the nervous system doesn't need to rely on the parties responsible for setting assumptions to raise their hand and identify the need for assumption changes, and there is no need for one party within the insurance company to challenge another party.

AN OUTSIDE VIEW

The example of the nervous system is a specific combination of processes and analytics that helps address the decision-making biases listed earlier. The second example, the outside review, can be thought of as a broad principle. It addresses the same set of decision-making tendencies as the nervous system.

An outsider is not as "endowed with," or "anchored to," the original assumption, and should be able to look more objectively on the assumption and on new evidence. The overconfidence finding suggests that the outside view is necessary and it may be best if it comes from someone who is less of an expert on the topic, and therefore less bound to traditional approaches.

Kahneman devotes a chapter to "The Outside View" in his behavioral finance best-seller, *Thinking Fast and Slow*. The value of an outside perspective is echoed by others.

The Fed makes explicit reference to outside perspectives:²

A guiding principle for managing model risk is "effective challenge" of models, that is, critical analysis by objective, informed parties who can identify model limitations and assumptions and produce appropriate changes. ...

Generally, validation should be done by people who are not responsible for development or use and do not have a stake in whether a model is determined to be valid.

One of the International Association of Insurance Supervisor's Insurance Core

Pensions

THE PROCESS OF SETTING PENSION PLAN ASSUMPTIONS is subject to the same behavioral tendencies as those described in the term insurance example. The analytical and process discipline of the nervous system can be applied to assumptions such as early retirement incidence, employment termination and mortality experience. It is important to discern what is noise and what is a genuine trend, and be prepared to change your initial assumptions when warranted.



Principles (ICPs)³ touches on this as well:

The control functions (other than internal audit) should be subject to periodic internal or external review by the insurer's internal auditor or an external reviewer.

When a corporate credit analyst first decides to approve a credit, it is similar in many ways to the actuary's choice of a new assumption. For all of the same

- Avoid the problems we cannot easily solve, often by substituting a problem we can solve; this is often referred to as substitution.
- "Choose not to choose." The recent best-seller, *Scarcity: Why Having Too Little Means so Much* by Eldar Shafir and Sendhil Mullainathan, describes how we tend to "tunnel" on the things that will impact us most immediately at

A tool known as a tornado chart can be used to rank and communicate a company's top risks, mitigating these behavioral inclinations.

reasons, the original analyst will find it hard to be objective on the credit if it subsequently starts to weaken. An insurance company's process for identifying and monitoring deteriorating credits should not rely solely on the original decision-maker raising their hand proactively and identifying an issue. Thankfully, views and metrics on corporate credits are available in the capital markets.

FOCUSING OUR TIME AND TOOLS

While the first two examples were based on the behavioral finance findings around decision-making, the third is based on behavioral finance findings regarding how we allocate our time and attention and how we as individuals, and groups, set priorities.

A wide range of studies have shown that we:

- Choose projects for their ease, not their importance.
- Spend too much time on small decisions and not enough on big ones.
- Use the information that is close at hand.
- Are more engaged by things we like than by things we dislike.

the expense of other, more important risks that pose a less immediate threat.

In the January 2014 Health Section newsletter, an article by John Stark addressed insights from behavioral finance with respect to the buying and selling of health insurance. The article referred to substitution, as well as the endowment effect and loss aversion. Also included is prospect theory, which is not addressed here.

These behavioral finance observations on resource allocation strongly suggest the need for a disciplined process to both broadly set the agendas of the various control functions and more narrowly to ensure the modeling agenda is set objectively. The 2014 publication "Model Validation for Insurance Enterprise Risk and Capital Models," sponsored by the Society of Actuaries, Canadian Institute of Actuaries and Casualty Actuarial Society, suggests that the reader "check whether a process is in place to determine which risks need to be modeled."

TORNADO CHARTING

A tool known as a tornado chart can be used to rank and communicate a company's top risks, mitigating these behavioral inclinations. To prepare a tornado chart, all assumptions are shocked in both directions by an arbitrary percentage. For each shock, the severity is calculated (leaving all other assumptions at the best estimate) in the risk "currency" of the institution (such as embedded value, risk-based capital (RBC), GAAP earnings). Most insurance companies have the ability to analyze such shocks, and this type of exercise will almost certainly be familiar for insurers subject to the European Union's Solvency II Directive. These stress test results are ranked in order of their negative impact and might appear as shown on page 26.

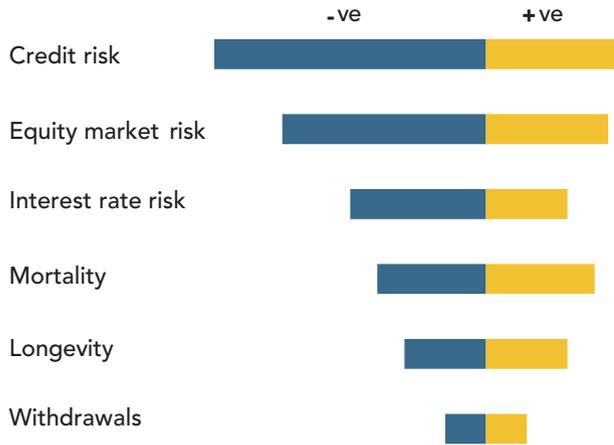
Given the behavioral observations listed above, it is important that there be no "view" imparted on the shocks to be applied, just a calculation of the severity of the arbitrary shocks. Hence, a better name may be the Murphy's law tornado chart. Most historical financial surprises have resulted from a misestimation of frequency, not an inability to calculate severity.

If historic data is available for each major risk, the shocks can be calibrated to represent a specific frequency. As an example, the shocks could represent a historical one-in-every-10-year "event." In this "historic" tornado chart, as in the Murphy's law version of the tornado chart, it is critical to ensure there is no "view" involved in the shocks that are used.

The tornado chart can be held up against the risk team's agenda and resources to ensure that economic risks are the prime determinant, and that people's expertise or interest, or the availability of analytic tools



Stress Test Results



or data, has not had an undue influence. The same biases on resource allocation listed earlier should be considered in setting the agenda for the other control functions, actuarial, internal audit and compliance. As an example, the tornado chart might

trade-offs. If one can attribute sources of return to various risks and can measure the costs of mitigating the risks symmetrically or asymmetrically as well as measuring the capital (economic or regulatory) of combinations (recognizing that the risks are

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indicate that the risk team's plan to develop a state-of-the-art elliptical copula formula within the economic capital model should be reconsidered relative to a longevity risk analysis and possible risk transfer. Perhaps some other risk activity can be deferred in favor of a corporate credit deep dive into a sector (for example, energy) that is undergoing structural changes with possible knock-on effects across other sectors.

RISK, RETURN AND CAPITAL

The tornado chart can also be an effective framework for presenting risk/return

not necessarily additive), the tool can be used for risk budgeting or strategizing.

As time passes, changes in the impact of shocks are a gauge of the institution's changing exposure. It is also enlightening over time to compare the attribution between actual and expected results of the institution to the elements and magnitudes calculated in tornado charting.

SUMMARY

Behavioral finance reveals a number of consistent biases in both decision-making

and resource allocation. Many managers are struggling with the daunting task of designing a control environment for the actuarial aspects of an insurance company (or pension valuations). Insights from behavioral finance can provide a helpful perspective on processes and analytics such as a nervous system, an outside view and tornado charting that help form a control environment. **A**

END NOTES

¹ Board of Governors of the Federal Reserve System, Office of the Comptroller of the Currency, "Supervisory Guidance on Model Risk Management," OCC 2011-12 (April 4, 2011), www.occ.treas.gov/news-issuances/bulletins/2011/bulletin-2011-12a.pdf.

² Ibid.

³ International Association of Insurance Supervisors, "Insurance Core Principles, Standards, Guidance and Assessment Methodology," Oct. 1, 2011, ICP 8.2.6.

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