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P&C Insurance Capital Modeling for ORSA

By Jim McCreesh, Tom McIntyre and Pete Vuong

Introduction

Effective in 2015, insurers will be required to report to their regulators on their Own Risk and Solvency Assessment (ORSA). ORSA is an insurer's self-assessment of the material risks associated with its current business plan and the sufficiency of capital resources to support those risks. ORSA needs to be a component of an insurer's enterprise risk management (ERM) framework. The ORSA Summary Report (ORSA Report) must describe the insurer's risk management framework, provide a self-assessment of the insurer's risk exposure and provide an assessment of the group's risk capital and prospective solvency.

The NAIC completed its second ORSA pilot program in the latter half of 2013 and a final 2014 ORSA pilot will be completed before going live in 2015. Twenty-two insurers submitted ORSA Reports in 2013 and the pilot results were encouraging. The NAIC reported that among the companies participating in both the 2012 and 2013 pilots, their ORSA Reports "improved significantly." The news for first time pilot participants in 2013 was also positive, with ORSA Reports that "generally met expectations" and were "better than the reports submitted in 2012." The reviewers added that only three of the 22 ORSA Reports "could greatly benefit from material improvements" in their discussion of the company's ERM framework.

The NAIC's ORSA Subgroup provided its observations from these pilot programs in *Own Risk and Solvency Assessment*

Feedback Pilot Projects, which is a four page summary available at www.naic.org. The paper outlines more than two dozen observations for insurers' consideration as they develop their ORSA Reports. Several of these recommendations have been incorporated in the 2014 NAIC ORSA Guidance Manual (Guidance Manual). In particular, the updated Guidance Manual clarifies that "ORSA Summary Report...should be based upon reporting of ERM to the insurer's Board of Directors and should contain the same basic elements of what is reported to the Board of Directors."

Steady progress among ORSA pilot companies is encouraging, but work remains if ORSA is to fulfill its mission in 2015 and beyond. In particular, industry practices on the **group assessment of risk capital (Current Assessment)** are in the formative stages for many companies. This is especially true for the industry practices on the **prospective solvency assessment** (Prospective Assessment) required under ORSA. The Guidance Manual does not prescribe a specific approach for quantifying risk which leaves insurers a wide variety of paths, some of which are more beneficial than others. In our view, a successful ORSA will require practical transparent capital modeling that provides reliable decision-making insights to the Board.

For convenience, we refer to the ORSA requirements as the “Current Assessment” and “Prospective Assessment” throughout the article (excluding direct excerpts from the Guidance Manual). Current Assessment includes comparison of required capital for the current business to the existing capital. Prospective Assessment includes comparison of capital projections to projected required capital at a future point. The Prospective Assessment should include discussion of prospective risks, current risks likely to intensify as well as emerging risks, impacting the capital projections and requirements.

Engaging the Board

Insurers often struggle to achieve meaningful Board buy-in to their capital models. These models are often complex systems with numerous assumptions; the interdependencies that make the models powerful also render many capital models opaque. Consequently, when conditions change and assumptions are updated, counterintuitive results can sometimes undermine confidence in the model. Once confidence in the model is lost, the Board is unlikely to consider any risk and capital management insight from it. Errors, delays; and unexplainable results are potentially fatal outcomes in the eyes of the Board. Fortunately, under ORSA, insurers have the ability to tailor models to their unique needs, ideally in a manner that protects the models’ trust worthiness with the Board.

Dynamic Financial Analysis Models

Dynamic financial analysis (DFA) models are stochastic cash flow models that have been in use for nearly twenty years by some P&C insurers. Many companies use DFA software for economic capital modeling. The industry has a choice of several well-developed DFA software products that seemingly fit the bill for ORSA.

DFA software products typically have the ability to stochastically model a range of outcomes for several years of new business, including expected underwriting results, investment results, and associated cash flows. By combining ordinary business plan assumptions with calibrations of volatility and correlation, modelers can convert business plans from deterministic forecasts into stochastic ranges that allow for consideration of downside scenarios and required capital. Although DFA tools appear to be well suited to the requirement that “the insurer’s prospective solvency assessment should demonstrate it has the financial resources necessary to execute its multiyear business plan...,” insurers should consider alternatives to create more intuitive scenario analyses and avoid potential misunderstandings of multiyear models.



Current Assessment

ORSA requires that insurers have “sound processes for assessing capital adequacy in relation to their risk profile.” The NAIC guidance is intentionally nonprescriptive and specifically states that insurers may consider a wide range of alternatives in fulfilling this mandate. Many P&C insurers’ DFA software model one-year of new business,¹ answering the question, “**How much capital is required to run the business this year?**” This is equivalent to asking, “**How much risk do we plan to take in the coming year?**” In practice, the insurer will carry more capital than is required according to the model and will typically express this capital position as a ratio of Actual Capital/Required Capital (Capital Ratio).

The Capital Ratio is a convenient expression of a firm’s capital position; a ratio greater than 1.00 shows that the insurer meets the primary objective of the Current Assessment. The ratio also shows the relative strength of the firm’s capital and is a useful metric for displaying the results of deterministic scenarios supporting both the Current and Prospective Assessments. Counterintuitively, we recommend *against* using the multi-year capabilities of a DFA tool to derive a two-year or three-year Capital Ratio in the discussion below. Instead, our focus is on Capital Ratios for discrete one-year increments.

Prospective Assessment

Although the multiyear modeling capabilities of DFA software packages appear to be ideally suited to the Prospective Assessment, a multiyear analysis changes the question in a subtle manner that may not be the most advantageous for creating buy-in from the Board. For example, a DFA model forecasting required capital based on three years of new

¹ Required capital may be based on either the run off of all associated liabilities or a one year change in value.

business answers a new question, that is **“How much capital is needed on average for the next three years?”** or equivalently **“How much risk do we plan to take on average over the next three years?”** Although the idea of a multiyear analysis may hold some initial intuitive appeal, the information gleaned from a multi-year DFA model is often less actionable than the one-year Capital Ratio derived in the Current Assessment above. A multiyear analysis requires consideration of short-term versus long-term risks, diversification of market and underwriting risks over longer periods of time, and other assumptions making interpretation of the results by the Board difficult. This complexity is a contributing factor in the slow adoption of DFA modeling over the last twenty years and is a significant complication for ORSA capital modeling.

Modelers can make their Prospective Assessments easier to follow and more effective by focusing on a simple question that ties back into the original Current Assessment, that is **“What do we expect our Capital Ratio to be next year?”** The modeler and Board member can think of this as a forward estimate of the Capital Ratio, in much the same manner as we think of forward interest rates. It is an estimate of the ratio of Actual Capital to Required Capital expected in next year’s Current Assessment. In practice, the forward estimate is easy to implement, understandable, and enables effective scenario analyses.

Estimating the Forward Capital Ratio

A forward Capital Ratio is our best estimate of next year’s Current Assessment. It requires an estimate of the next year’s Actual Capital (numerator) in addition to the estimate of Required Capital (denominator).

The numerator is simply the company’s best estimate of Actual Capital one year forward based on the business plan. Similarly, a Capital Ratio two years forward would use the business plan estimates from years 1 and 2 to derive the best estimate of Actual Capital two years hence.

The dominator of the Capital Ratio, Required Capital, is only slightly more challenging to compute. The Required Capital is estimated using the Current Assessment from year one. Required Capital is derived in the aggregate, but is routinely allocated to various risk factors and business segments that produce the capital requirement. The modeler expresses each segment’s required capital over a base such as premium volume, reserve levels, bond portfolio, etc., to derive a set of customized capital scaling factors which reflect the unique characteristics of the insurer’s business.

The capital scaling factors are multiplied by the base values in year two of the business plan (e.g., premium, bond holdings, etc.) to estimate the Required Capital one year forward, and so on. The modeler can think of the scale factors as a set of risk based capital factors, customized to their business.

Figure 1: One-Year Forward Estimate of the Capital Ratio with Capital Scaling Factors

	Year 1					Year 2		
	Actual Beginning Balances (1)	Business Plan Assumptions (2)	Modeled Required Capital (3)	Modeling Comment (4)	Capital Scale Factor (5) = (3)/(1) or (3)/(2)	Business Plan Estimated Balances (6)	Business Plan Assumptions (7)	Modeled Required Capital (8) = (5)x(6) or (5)x(7)
Bonds	35,000,000		4,000,000	Investment Risk	11.4%	37,500,000		4,275,000
Stocks	5,000,000		1,500,000	Investment Risk	30.0%	5,000,000		1,500,000
Reserves	25,000,000		3,000,000	Reserve Volatility	12.0%	26,000,000		3,120,000
Premium		20,000,000	4,000,000	Current Yr U/W Risk	20.0%		21,000,000	4,200,000
	15,000,000 Actual Capital		12,500,000 Required Capital			16,500,000 Est. Actual Capital		13,105,714 Required Capital
	Capital Ratio = Actual/Required = 1.20					Est. Capital Ratio One Year Forward = 1.26		

Notes:

(3) – Model results based on tail events after all diversification.

(6) – Baseline business plan assumptions for Year 2, assuming that the Year 1 plan is met in full.

**ORSA Current
Assessment**

**ORSA Prospective
Assessment**

The scale factor procedure creates a connection between this year’s Prospective Assessment and next year’s Current Assessment requirements of ORSA. Both methods seek answers to the same question only at different points in time, **“How much capital do we need to run the business this year?”** In addition to fulfilling the Prospective Assessment

requirement of ORSA, this connection across years should help insurers to understand sources of change in their capital positions as required by ORSA.² A robust attribution of change is likely to be important to maintaining the Board’s confidence in the capital models as well.

² “The group capital assessment should include a comparative view of risk capital from the prior year, including an explanation of the changes, if not already explained in another section of the ORSA Summary Report.” NAIC 2014 ORSA Guidance Manual, page 8.

Lastly, capital scaling factors offer a practical approach to fulfill ORSA's Prospective Assessment requirements without additional detailed modeling. This should allow insurers to compress the time needed for ORSA capital modeling and meet the regulator's request to use the most current quarterly data in their ORSA submissions.³

Scenario Analysis

Deterministic scenario analyses offer several benefits in most capital analyses, often because of the focus on a limited number of assumptions. Consequently, they are often more transparent than stochastic capital models. Transparency is an important consideration for maximizing engagement of the Board and in fulfilling the ORSA requirement that the Prospective Assessment "consider the prospect of operating in both normal and stressed environments."

Scenario analysis can be easily implemented as part of the capital scale factor procedure outlined above for the Prospective Assessment. Scenarios can take a variety of forms affecting either the Actual Capital, Required Capital or both. Insurers may want to consider both preevent and postevent scenarios to supplement their stochastic capital models.

Preevent scenarios are those in which the beginning actual capital is unaltered and the scenario is a deterministic outcome for a specific set of assumptions. For example, the impact of an isolated assumption on the required capital could be a shift in interest rates from initial levels. These scenarios are often helpful to understand the impact of key assumptions on the required capital and are based on the company's initial capital position. Preevent scenarios can help to assess potential events when developing the business plan.

Postevent scenarios differ in that the initial capital position first changes as a result of the event. For example, the insurer could test a +/- 200 basis point shift in interest rates or a hurricane that would result in the firm missing its business plan; thus there would be a new starting position from which management assesses the firm's capital position for year two. The required capital under the new conditions is estimated with the capital scaling factors applied to the new postevent starting conditions. By reducing planned premium volume, reducing investment risk, or other actions, management can solve for a revised business plan under hypothetical stressed conditions that achieves a desired Capital Ratio.

This is important because the Prospective Assessment must "pertain to both known and potential future risk." These scenarios fulfill the ORSA requirement to consider stressed conditions and provide valuable insight to the Board in setting the overall risk appetite of the firm.

Conclusion

ORSA poses many new challenges for insurers to improve their approach to risk and capital management. Capital modeling with practical transparent methods and a sharp focus on asking the right questions will help insurers to provide their Boards with reliable decision-making insights and fulfill the intent of ORSA. Deterministic scenarios can supplement stochastic methods to satisfy ORSA stress testing requirements in a clear transparent way that Boards can relate to. Capital Ratios provide a measure by which stochastic and deterministic method results can be compared to each other and for current and prospective evaluations. Developing Capital Ratios for discrete one-year increments as opposed to multiyear DFA modeling should help insurers to better understand sources of change in their capital positions and more readily allow for usage of current data.

Alternatives to Traditional DFA Models

A DFA tool with market assumptions from Economic Scenario Generators (ESGs) is the most common platform for P&C economic capital modeling. DFA models provide functionality to track premium, losses, and cash flows across multiple years and ESGs provide essential macroeconomic and capital market assumptions. These tools follow the logical progression of the business from writing and earning premium, to investing assets, paying claims and taxes, and issuing dividends. Although logical, models built in these tools often obscure the impact of assumptions and become black box solutions understood in their entirety by only a few people in the organization. The challenges are sometimes exacerbated by complex organizational structures requiring multiple layers of modeling.

Some large P&C insurers are borrowing concepts from life insurance to adopt alternative models that are orders of magnitude faster and more transparent than traditional DFA models. Processing speed allows management to interrogate the model results by testing the impact of alternative assumptions. Speed also enables more granular analysis to improve allocations to line of business and tailor the capital analysis to preexisting management reporting structures.

Eliminating the reliance upon ESGs is a significant benefit of DFA alternatives. Dimension reducing techniques, such as Principal Component Analysis (PCA), enables modeling of the full yield curve without reliance on prepackaged ESG assumptions. Formerly opaque ESG market assumptions are replaced with easily understood interest rate, credit spread, and equity models with transparent return, volatility, and correlation characteristics. These capital market models maintain all of the rigor required for stochastic capital models and also fit nicely with deterministic scenarios that help to drive understanding of current and prospective capital positions.

³ NAIC 2012-13 ORSA Pilot Feedback Report, Item 20.

Salvage/Subrogation Is Manageable Revenue

By George Levine, and John Ray

“Subrogate – To put into the place of another.”

Subrogation is the practice of insurance companies recovering payments from liable parties, in most cases other insurers, which ultimately have the responsibility for payment of a claim. Insurance companies, pursuant to their rights under policies, can recover indemnity payments they have paid on behalf of their policyholders. By definition, after paying a claim, the insurer takes the place of the policyholder with the right to pursue liable parties for payments made under contract.

On property and casualty (P&C) insurance company financial statements, subrogation and other recoveries, including salvage for physical damage claims, are not reported as separate line items. Generally, loss payments are reported net of all recoveries. However, statutory filings, specifically Schedule P, report recoveries (salvage and subrogation combined) as a separate line item. Losses in Schedule P are reported net of salvage and subrogation recoveries.

Actuarial Considerations

P&C insurance companies have the option of whether or not they choose to carry reserves with consideration of the impact (net benefit) of salvage and subrogation. If insurance companies choose not to carry those ultimate recoveries, ultimate loss reserves are carried gross of salvage and subrogation. Alternatively, if the insurance company chooses to carry the ultimate reserves for recoveries, ultimate loss reserves are carried net of salvage and subrogation recoveries. Actuaries use generally accepted actuarial methodologies, examining the history of paid salvage and subrogation through triangles, to estimate the ultimate salvage and subrogation recoveries.

If companies are carrying loss reserves gross of salvage and subrogation recoveries, loss triangles can be compiled with paid losses plus the salvage and subrogation recoveries. This compilation requires accessing additional reports from insurance companies to add the salvage and subrogation to the historical loss data. Alternatively, loss triangles which are compiled net of salvage and subrogation triangles will produce reserve estimates net of salvage and subrogation. If the salvage and subrogation recoverable reserve is to be calculated, and shown in Schedule P, a separate estimate of salvage and subrogation reserves can be calculated and isolated based upon a triangle of salvage and subrogation recoveries.

Claims Management Considerations – Estimating and Benchmarking Subrogation

Estimating subrogation recoveries presents some challenges due to the dependency on the *type* of losses an insurance company experiences in a given year. For example, if an insurer

has a book of business where most losses occur on liability policies, then the opportunity for subrogation is severely diminished since most recoveries are derived from first-party losses. However, even a high number of first-party claims do not always present greater subrogation potential. A year marked by natural disasters (hurricanes, fires, etc.) generally have low subrogation recoveries.

What is more challenging for claims managers is benchmarking performance against their peers. Industry information is very limited and data often is only available through pay services like insurance bureaus and professional associations. Even these services have their shortcomings. Both rely on voluntary participation, which are reported anonymously, have inconsistent turnout, and are not produced annually. For example, a recent association report for workers compensation was published in 2011, using 2010 data for 15 respondents.

While these resources provide some insights into industry statistics for baseline results, claims managers can also look to regulatory filings for standardized data for any number of competitors. As noted, the Schedule P Part 1 Summary reports the salvage and subrogation received on an accident year basis, with the exception of workers compensation, which carries minimal to no salvage recoveries. Using loss triangles, claims managers can calculate the annual total recoveries for salvage and subrogation. Although the two figures are combined, the reports allow claims managers to gauge their recovery program's overall performance against their peers. Comparing recoveries as a percent of losses paid reduces the impact of claims volumes on the analysis.

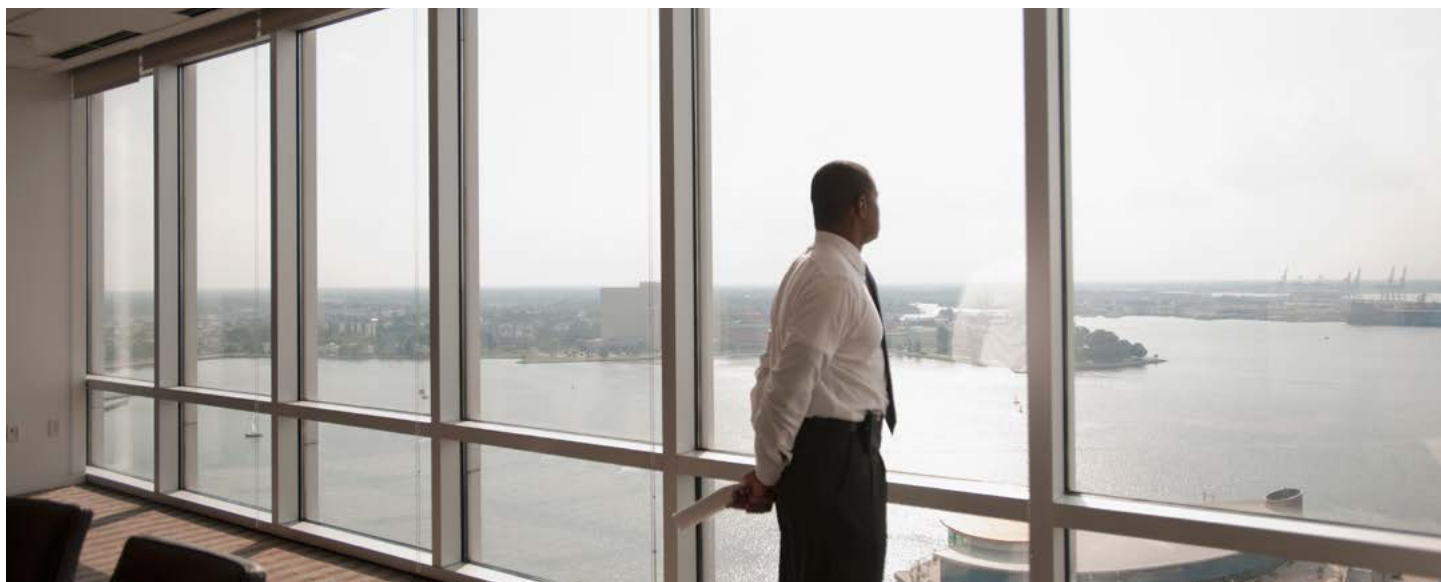
Carriers opting to use Schedule P data for peer benchmarking should consider several factors and potential limitations to the data. To make the most direct comparisons, business composition must be reviewed and assessed. A carrier with a diverse set of coverages (i.e., workers compensation, liability, commercial) would not compare against a carrier with heavy personal lines auto coverage as its recovery figures will be higher due to the greater potential for salvage recovery. Ceded reinsurance can alter the data and recovery composition; the lower the amount of reinsurance, the higher amount of recoveries retained by the carrier. Regional composition can play a role in peer benchmarking. Rights to recovery under subrogation are governed by state-level case and statutory law. Accordingly, companies with concentrated business in restrictive states (including short time frame statutes of limitation) may have different recovery results annually than states where carriers have longer to let claims develop and pursue recovery.

With any use of data, carriers should also consider the limits of inference from raw data. Different internal reporting mechanisms may result in variances in reported results between different companies. When using the data, an industry average view should be used to remove any outliers from peer benchmark groups.

Measuring Subrogation Performance

While peer benchmarking provides a snapshot of an insurance company's performance against industry competitors, claims managers may focus on internal metrics to identify improvement opportunities. All performance measures can be calculated on accident, calendar, or report year basis.

- 1. Gross Recovery Rate:** Calculated as a ratio of gross recoveries to gross claims paid. This is the simplest measure used by subrogation managers to measure performance as it demonstrates the impact of recoveries on claims payments, and the results will vary widely across lines of business. The Gross Recovery Rate may be tracked year over year to identify any trends, including macro-economic fluctuations.
- 2. Expense Ratio:** Calculated as the percent of subrogation expenses to total recoveries. The metric provides the cost of recovering each dollar of subrogation and can be analyzed on an allocated (per claim) and unallocated (general operating expense) basis. A lower ratio indicates that the subrogation department is maximizing internal capabilities to obtain recoveries versus the use of outside vendors. Expenses should include the use of collection agencies, attorneys in litigation, arbitration costs and experts to determine proximate cause and liability of a third party. While a lower ratio tends to indicate higher efficiency in the subrogation department, this measurement may be broken down further to identify areas where increased expenditures can lead to improved recoveries.
- 3. Net Recovery Rate:** Calculated as gross recoveries less expenses, divided by total claim payouts. This metric provides the true percentage of losses recovered through subrogation by deducting the cost of obtaining those recoveries.
- 4. Modified Recovery Rates:** The two previous recovery rates show the impact on the overall loss experience of an insurer, but they may not show the true effectiveness of the recovery program. The Modified Recovery Rates use a similar methodology as the Gross Recovery Rate and Net Recovery Rate, but the denominator changes to the potential subrogation. This metric allows claims managers to view how much of potential subrogation (i.e., claims assigned to the recovery unit) is actually recovered. Similar to the other ratios, it should be calculated gross and net of expenses.
- 5. Percentage of Files Closed without Recovery:** On an annual basis, claims managers can calculate the number of files closed without a recovery as a percentage of subrogation files closed. This metric allows claims managers to determine the success rate of their pursuits, but also gives insight into the effectiveness of the referral program.
- 6. Turnaround Time:** Claims managers can calculate different measures of performance through turnaround times. They can perform a deeper analysis comparing the amount of rate of recoveries against the time frames to identify possible correlations between reporting time and successful subrogation recoveries.
 - a. *Open to Report:* Time from the initial notice of loss to the opening of a subrogation claim.
 - b. *Report to Recovery:* Time lapse between the opening of the subrogation claim to the first and/or final recovery.
 - c. *Report to Close:* Total time the subrogation file was open.



Performance metrics should not be viewed as mutually exclusive and should be used with qualitative analysis of subrogation performance. While each illustrates different aspects on the subrogation program, they should be analyzed in concert to identify causal relationships between timeliness, efficiency, and effectiveness of subrogation activities. For example, there can be a causal relationship between a low Modified Recovery Rate and a high Percent of Files Closed Without Recovery. Claims managers can infer a few things: the subrogation department is receiving low quality referrals, the subrogation department is lacking in its pursuit efforts, or a combination of both. These measures can assist management in determine the proper course of action for detailed root cause analysis through file and process reviews with the ultimate goal to maximize recoveries efficiently.

With any performance measurement program, claims managers should continuously monitor the departmental performance and the individual performances of its subrogation analysts and selected vendors against internal and external benchmarks and targets.

A Note About Salvage

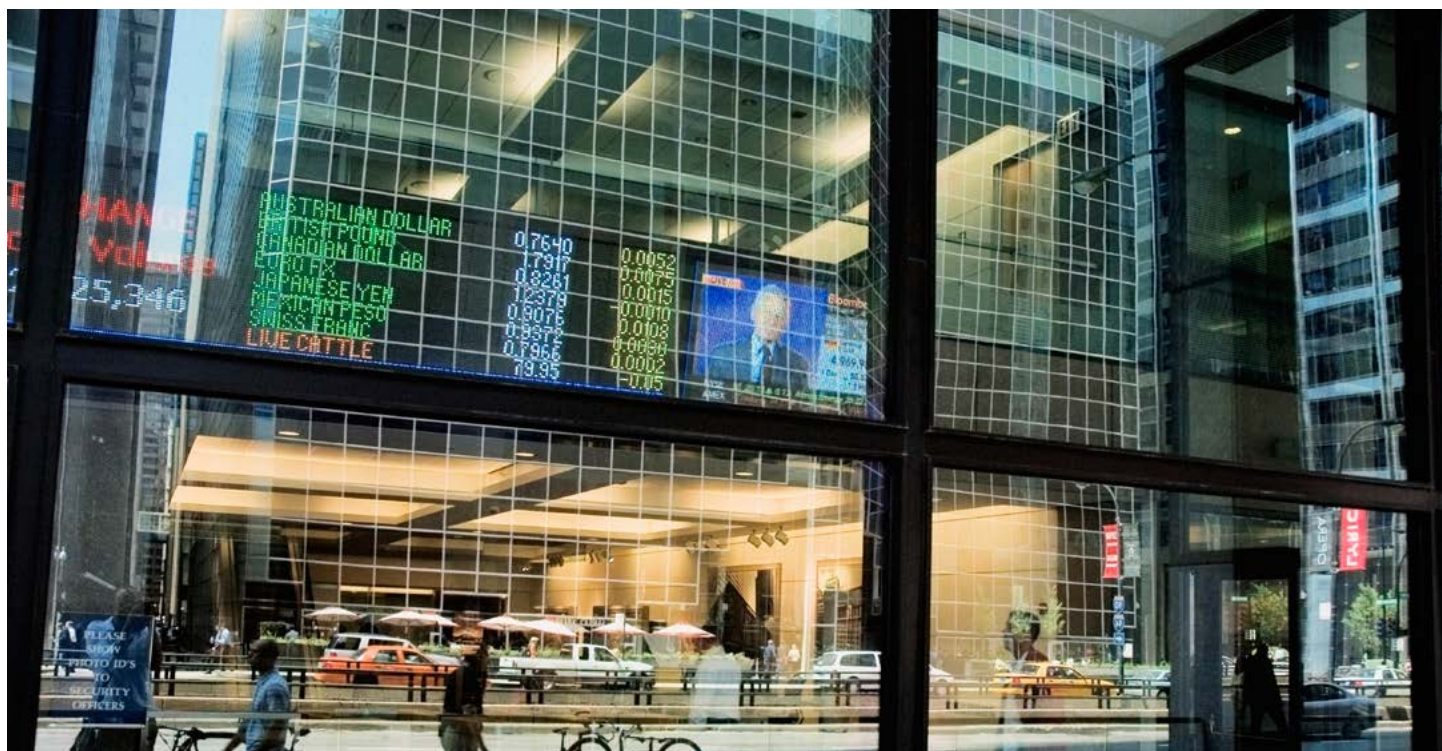
Most of the discussion has focused on subrogation with little mention of salvage. While salvage can be managed and tracked similar to subrogation, market forces can play a more significant role on salvage recoveries than they do on subrogation. Most insurers rely on auctions to manage salvage recoveries. Depending on the type of salvage (whether an automobile or a complex piece of industrial machinery), the auction market for that product dictates the price, based on location, condition, and age of the salvaged property.

Claims managers can set controls in place to manage the volatility of salvage recoveries. Insurers have taken on different strategies including internal auctions, direct oversight of the auction process by setting minimum reserves, and contract rates with vendors based on the type of salvage recovered.

One key differentiator between salvage and subrogation is timing, which is a critical reason for the additional focus on subrogation strategy and performance. Subrogation claims tend to have a life cycle much longer than salvage. Generally, salvage recoveries can be pursued as soon as the insurer pays the property loss and takes possession. Alternatively, the total amount of the subrogation may not be determined until all damages on the claim have been paid, which can range from weeks to years on long-tailed claim. Pursuit of subrogation requires a great deal of collaboration and coordination between the recovery team and the claims adjuster.

Conclusion

In summary, insurance professionals should understand that salvage and subrogation are manageable revenues and know some methods on how to manage them. Claims managers and professionals, with the proper training and experience, can institute strategies, processes, and systems to enhance salvage and subrogation recoveries for insurance companies. The use of benchmarking and performance measurements allows claims managers to identify opportunities for improvement and better manage the volatility of recovery amounts. If volatility can be effectively reduced, actuaries may be better positioned to include salvage and subrogation recoveries in loss triangles.



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