

Pennsylvania Insurance Department

Report on Actuarial Review of “One Beacon Insurance Group, LLC Stochastic Modeling of Run-Off Business Pro-Forma Balance Sheet as of June 30, 2014”, as Prepared by Towers Watson

Summary Report

June 20, 2014



June 20, 2014

Stephen J. Johnson
Deputy Commissioner
Bureau of Financial Examinations
Pennsylvania Insurance Department
1345 Strawberry Square
Harrisburg, PA 17120

Dear Mr. Johnson,

Please find enclosed Risk and Regulatory Consulting's Report on our review of the Towers Watson Report entitled "One Beacon Insurance Group LLC Stochastic Modeling of Run-Off Business Pro-Forma Balance Sheet as of June 30, 2014".

It was a pleasure to work with you and the Pennsylvania Insurance Department in preparing this Report.

Please do not hesitate to contact us should you have any questions or if we can be of further assistance in this matter.

Sincerely,

Risk & Regulatory Consulting, LLC

A handwritten signature in black ink that reads "Craig A. Moore".

Craig A. Moore, CFE
Partner

A handwritten signature in black ink that reads "Michael C. Dubin".

Michael C. Dubin, FCAS, MAAA, FCA
Senior Consulting Actuary

A handwritten signature in black ink that reads "Patrick Tracy".

Patrick Tracy, CFE, CPA
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A handwritten signature in black ink that reads "Anne Kelly".

Anne Kelly, FCAS, MAAA
Consulting Actuary

Enclosure

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EXECUTIVE SUMMARY

Risk & Regulatory Consulting, LLC (RRC) has been engaged by the Pennsylvania Insurance Department (the Department) to provide actuarial support in the review of a Form A filing and related materials regarding the acquisition of control of One Beacon Insurance Company and Potomac Insurance Company, both Pennsylvania domestic insurers, by Armour Group Holdings Limited (Armour), through its subsidiary Trebuchet US Holdings, Inc. Armour also plans to acquire OneBeacon America Insurance Company and The Employers' Fire Insurance Company, both Massachusetts domestics, and these insurers would be redomesticated to Pennsylvania. Collectively these four insurers are referred to as One Beacon or the Run-off Companies. The Department's primary objective is to determine whether or not the Run-off Companies, at the time of and following the acquisition by Armour, contain sufficient assets, including expected investment income and sufficient liquidity to pay out on a timely basis all amounts due to policyholders and claimants.

The scope of the overall engagement involved the following primary tasks:

1. Review and analyze the Analysis of Unpaid Loss and LAE of the Run-off Companies as of September 30, 2012 and December 31, 2012 (the Reserve Report), prepared by Towers Watson.
2. Analyze stochastic scenario modeling (the Stochastic Model Report) completed by Towers Watson on projected run-off outcomes under a large number of independent projection scenarios.

RRC conducted the analysis of Unpaid Loss and LAE of the Run-off Companies under a separate report. This report addresses the second task related to stochastic scenario modeling. We have reviewed Towers Watson's report dated June 10, 2014, entitled "Stochastic Modeling of Run-Off Business Pro Forma Balance Sheet as of June 30, 2014", from which we drew our conclusions.

With respect to the key question, "Will the transferred company contain sufficient assets and sufficient liquidity to pay out on a timely basis all amounts due to policyholders and claimants?", it appears that the Run-off Companies would be able to meet their collective obligations under most scenarios, including many of the significantly stressed scenarios. However, there are significant risks, some contemplated in the stochastic modeling and some not contemplated, that could result in the exhaustion of the Run-off Companies' assets before all claims were paid.

In this report, we define the words "fail" and "failure" to mean scenarios in the Towers Watson report, in which the modeled assets are below zero. We use the word "loss" to include LAE, unless indicated otherwise by the context.

Based upon the scope of our review and our approach, we have the following observations:

1. **We find that Towers Watson's (Towers) report, including output from its stochastic model was based on accepted assumptions and methodologies, meets applicable actuarial standards and practices and provides a reasonable basis for the purpose of determining whether the assets would be adequate under most circumstances to fund the obligations of the One Beacon Companies.** Towers' proprietary stochastic model and economic scenario generator, along with its

use of proprietary models for estimating asbestos and environmental loss payouts, are designed to estimate the likelihood of One Beacon having sufficient assets and liquidity to meet its obligations upon sale to Armour under a variety of economic conditions. These can be particularly complicated estimates to make, given the expected variability and correlations among the expected performance of Armour's assets, the impact of inflation, the possibility of adverse development on One Beacon's runoff book of traditional property/casualty losses, and the unpredictability of future claim activity in its book of asbestos and environmental losses. The model's results are especially useful in providing insight into the interrelationship of these risk factors as the underlying causes of possible failure scenarios over the next thirty years.

2. Among other factors such as adverse development, the Run-off Companies' ability to meet their obligations is tied to adequate return on investments. The final version of the model in the Towers' report we reviewed assumes an initial 15% allocation of equities (out of \$279.8 million in invested assets), as stipulated by One Beacon. We note that Towers' report also included the results based on several preliminary versions of the model. One of those preliminary versions assumed an initial equity allocation of 26% of \$273 million in assets, with a projection of equities growing to as much as 46% of total assets over the first five years. The latest and final version of the proposed assets of the post transaction consolidated One Beacon entity limits equity investments to 15% throughout the first thirty years, whereby through an annual rebalancing, equities greater than this percentage of total assets would be liquidated and re-invested in BBB bonds. Some equity investment, according to One Beacon, is a key element of the transaction because much of the anticipated loss payments are not expected to be made for many years and long-term investment in equities is expected to produce a higher return than other investments. It can be difficult to find the appropriate balance between risk and conservatism in investments, and we are encouraged that, along with this more conservative investment assumption, additional capital has been added (\$6.7 million of additional surplus note capital) to achieve roughly the same success rate as a riskier investment strategy over various stress scenarios.

3. In response to a 2012 request from the Department, One Beacon engaged Towers Watson, an independent third party to perform an actuarial analysis of its Asbestos and Environmental (A & E) liabilities. The Towers Watson Reserve Report, also covering non A & E liabilities, is the result of that engagement. Relative to most other property and casualty insurance liabilities, A & E liabilities generally require more judgment to quantify. Significant reserve risk remains in One Beacon's A & E book which is reinsured under a retroactive treaty with National Indemnity Insurance Company (the NICO book). According to Towers' Stochastic Model Report, adverse development in this book is the most likely cause of failure going forward and there may be greater risk of loss beyond what the model predicts. Predicting future A & E losses has been a specialty for some actuaries for many years. Towers' ground-up review of One Beacon's historical loss payments, along with relevant industry benchmarks, is incorporated in the stochastic model's loss patterns. We note, however, that the actuarial method has not attempted to quantify entirely new events that are not part of the historical record. New causes of action may produce additional significant A & E losses in the future, as Towers acknowledges. If so, Towers' models, along with the industry's actuarial models may need to be recalibrated. Similarly, prediction of future pollution losses is made more complicated due to the uncertainty of predicting judicial outcomes. Actuaries who are A & E specialists have been working to improve reserve estimation techniques for these lines of business for many years, but no technique has become universally favored by the actuarial community and the extent of emerging A & E losses has continued to surprise the insurance community.

4. We note that the mean scenario of the Towers model is scaled to equal the actuarial central estimate of its Reserve Report (rolled forward to June 30, 2014). One Beacon has provided the initial invested asset input of \$279.8 million (\$273 million in a preliminary version). According to the model, this level of assets is sufficient to achieve the 90.1% success rate (over thirty years), with success defined as One Beacon having sufficient assets to pay all policyholder claims and associated expenses.
5. Towers Watson's use of stochastic modeling (including the bootstrapping statistical techniques for the non-NICO book) is based on accepted actuarial methodologies, which are becoming more common as insurers prepare to meet regulatory requirements for dynamic methods to test their fiscal soundness. However, based on our review of the actuarial literature, we believe the user should be cautioned that statistical estimation of the variance that exists in a book of loss reserves is difficult to measure and may not be captured completely. Towers Watson has concluded that One Beacon "fails" (exhausts its assets) in 1,172 (11.7%) of 10,000 scenarios over seventy years. To the extent that there may be more uncertainty or more correlation between business lines in One Beacon's book than has been modeled, the failure rate may actually be higher than 11.7% over the 70 year projection. There is also the potential uncertainty resulting from the possibility that the models used are not appropriate (model risk), as also disclosed in the Towers report. Towers' use of bootstrapping for creating reserve variability ranges for a significant portion of the non-NICO book of liabilities appears to be appropriate. Because this is a run-off book of business that has been around for many years, there are many years of data from which to extract the development "diagonals" for the analysis. We agree that one approach is to adjust the diagonals for the impact of inflation and to model this impact separately, as Towers did, in order to avoid the distortion that would occur if inflationary impacts were left in the diagonals. There is some risk however, that in removing estimated actual inflationary changes, and in reinserting simulated changes, another source of distortion may be introduced.
6. We find that the underlying causes of the failure outcomes in the stochastic model appear reasonable and in line with what we would expect for this book of business. These key risk factors are NICO losses, non-NICO losses, and equity returns (in addition, the speed at which losses are paid affects the failure rate). 65% of the failure scenarios occur when NICO losses are at or above the 90th percentile of the distribution in the Stochastic Model Reports. 45% of all failures occur when NICO losses are above the 90th percentile and other key risk factors are below the 90th percentile. We urge caution that there could be more risk in the NICO book than these results indicate but we must also point out that Towers Watson has already modeled significant potential adverse development.
7. The current set of assumptions, which adds \$6.7 million of additional capital and limits equity investments to 15% in the first thirty years, has significantly reduced the probability of failure due to poor equity performance from the initial One Beacon investment allocation assumptions used by Towers in its model. In the mean scenario of Towers' current version of the model, the return on equities over a fifteen year period was 8.5%. As noted, equities in the first version made up 26% of the initial asset mix. Utilizing the current version of assumptions provided by One Beacon, 19.1% of the scenarios with equity returns within the worst decile (lowest 1,000 scenarios) of Towers' simulations resulted in failure. 16.3% of all failures had equity performance in the worst decile. These 191 failure scenarios with equities performing in the bottom 10 percent of all modeled scenarios represent only 1.9% of all modeled scenarios.

8. We note that the Towers Watson ground-up reserve study was conducted using data through September 30, 2012 and December 31, 2012 for the NICO and Non-NICO books, respectively. These results were rolled forward to March 31, 2013 for purpose of the Towers' Reserve Report by adjusting for actual emerged losses through that date. In addition, the losses have also been rolled forward to September 30, 2013 using actual emerged losses through that date, and then to June 30, 2014 as inputs for the stochastic model by adjusting for losses expected to emerge between September 30, 2013, and June 30, 2014. We have reviewed the roll forward and found it to be appropriately done. While we believe that the Towers analysis is appropriate for financial reporting, we expect that a thorough study of A & E liabilities will continue to be conducted every two years, as has been the case for Potomac. We have discussed the roll forward calculations with Towers and we understand that they performed a review of payments and other claim activity during the intervening months (from September 30, 2012 and December 31, 2012 to September 30, 2013), and increased their central estimate for pollution by \$10 million to reflect unexpected claim activity during the roll forward period. Towers noted that this approach, covering a relatively short time for long tail liabilities, should produce a reliable result. Although we see some risk of undetected adverse development in relying on older data, we note that One Beacon itself performs actuarial reviews of its data each year and the data should be adequate for use in the stochastic modeling process.

RELIANCES AND LIMITATIONS

Purpose

This Report was prepared for the Pennsylvania Insurance Department to assist in its review of the Form A filing submitted by Armour.

Variability of Results

Estimates of future financial results for insurance companies providing property casualty insurance coverage are subject to certain assumptions about the future and to the occurrence or non-occurrence of future contingent events. In particular, a significant portion of our work involved review of analyses prepared by Towers Watson concerning ultimate payments under various scenarios for a book of A & E losses which are highly unpredictable. We share the caveats already noted in the Towers Stochastic Model Report for this book of business.

Nature of Review

The scope of our review was limited to reviewing the two reports produced by Towers Watson, and holding numerous meetings and conference calls with Towers and One Beacon in order to increase our understanding of their analyses and conclusions. We did not attempt to independently reproduce their results, and in fact would not have been able to do so, primarily due to the proprietary nature of the models used.

Reliance on the Work of Others

During this engagement, we relied on a number of reports and exhibits provided to us by Towers Watson and One Beacon. In addition, we had numerous meetings, telephone conversations, and email exchanges to understand model inputs, assumptions, methodology, and output. Although we reviewed the various data, analyses, and information provided to us for reasonableness, we have not performed any audit or verification. Unless otherwise stated in our Report, we have assumed that the data, analyses and information provided to us in the reports was complete and accurate.

BACKGROUND

In response to a 2012 request from the Department, One Beacon engaged Towers Watson, an independent third party to perform an actuarial analysis of its A & E liabilities. The Towers Watson Reserve Report, also covering non A & E liabilities, is the result of that engagement. In 2013, One Beacon agreed to supplement the captioned Form A filing with a stochastic model of sufficient possible outcomes to determine if the proposed level and type of assets would be adequate under most circumstances to meet One Beacon's liabilities. The Towers Watson Stochastic Model report, dated June 10, 2014, is the result of that engagement. The Towers Watson reserve study is the starting point for the stochastic model.

RRC and the Department held a conference call with One Beacon and Towers Watson on January 24, 2014, at the beginning of the engagement. Subsequently, meetings were held in Philadelphia on January 31 and March 6, and telephone conferences were held on March 24 and 26. In response to RRC's requests for additional information, a WebEx meeting was held on April 4. Additional information provided by One Beacon included ten years of pro forma balance sheets (2014 through 2023) for three different scenarios: the held loss reserves, the mean reserves from the stochastic model and a severely stressed scenario (or average failure scenario, which assumes loss reserves equal to the average of all failure scenarios from the stochastic model). In response to our request for more information on the failure scenarios, Towers produced a graphic presentation on the principal causes of failure under the modeled scenarios and their interaction. A meeting of all participants was held at the offices of the Department on May 1, 2014. Numerous communications took place subsequent to that meeting.

The purpose of the stochastic model is to predict whether One Beacon will have sufficient assets to pay its claims under a variety of possible scenarios. This dynamic approach demonstrates to company management and to regulators the risk factors most likely to threaten One Beacon's viability over the long term. Such models are increasingly used in Enterprise Risk Management (ERM) applications and to meet regulatory requirements internationally. In the United States, new requirements for Own Risk and Solvency Assessments (ORSA) are likely to be met with some form of stochastic modeling.

KEY RESULTS OF THE STOCHASTIC MODEL REPORT

We believe the following are the most important results of the Stochastic Model Report for the Department to consider with respect to whether there are sufficient assets to pay claims.

1. NICO losses are the biggest driver of failure. 76.5% of the simulations in the stochastic model with NICO losses over the 90th percentile result in failure. 65% of all failures have NICO losses over the 90th percentile. However, 23.5% of simulations with NICO losses over the 90th percentile do not fail. This indicates to us that the model incorporates NICO loss scenarios that are severe enough to cause failure (within the caveats mentioned) and that the Run-off Companies would be capitalized well enough to withstand significant stress scenarios. We note that the capital being contributed by One Beacon in the form of surplus notes does cover the difference between current held NICO reserves and Towers midpoint for fully developed NICO losses.
2. Non-NICO losses have the potential to cause failure, although it is less likely. 34.6% of the simulations with non-NICO losses over the 90th percentile are failures. (29.5% of the total failures have non-NICO losses over the 90th percentile).
3. Because of the reduced exposure to equities along with an increased capital base, poor equity return is less likely to result in failure than in one of the preliminary versions in the Towers report provided by One Beacon. Only 19.1% of the simulations in the final version of the Stochastic Model Report with equity returns in the bottom 10% result in failure, and most of these have another key loss variable above the 90th percentile. Poor equity returns alone do not appear to significantly drive failure.
4. Failure is possible with no key loss variable above the 90th percentile. This occurs in 12.9% of all failure scenarios. 144 of these 151 scenarios were in the 70-90th percentile of Gross NICO losses.
5. Simulations were extended over seventy years into the future, at which point paid losses were considered as ultimate.
6. The final version of the model shows a failure rate of just under 10% within the first thirty years. If a lower failure rate were desired, additional capital would be required.

The table below shows ultimate paid losses at the 90th, 95th, and 99th percentiles from the stochastic model output. As noted above the main driver of failure in the model is NICO or non-NICO losses (above the 90th percentile) In the 90th percentile outcome, with net losses of \$635.3 million, losses would be paid many years in the future. The opening balance sheet prepared by One Beacon includes \$156 million in net reserves or \$479 million less than the ultimate losses at the 90th percentile. Some scenarios do not fail despite losses above the 90th percentile because assets remain positive, driven by investment returns and the \$41.5 million of equity investments on the beginning balance sheet. At the 99th percentile the \$995.5 million in net reserves exceeds the beginning reserves by \$839 million and failure is imminent. These high loss scenarios show that the Towers modeling incorporates loss scenarios that are high enough to cause failure. We note that at these high stress levels many companies in the property-casualty industry with significant A & E exposure might have solvency problems.

Distribution of Paid Loss and LAE (\$ in millions) – as reported in Towers Watson Stochastic Model Report

	90 th percentile	95 th percentile	99 th percentile
NICO - Gross	1096.6	1189.0	1405.1
NICO - Net	282.1	374.5	590.6
NON-NICO Gross	714.3	754.3	851.1
Non- NICO - Net	428.7	471.2	565.8
Total- Gross	1740.3	1839.3	2104.2
Total - Net	635.3	738.7	995.5

KEY COMPONENTS OF THE STOCHASTIC MODEL REPORT

In order to perform the stochastic modeling, Towers used financial models built in its Igloo proprietary financial modeling platform. Igloo appears well suited for this project. Information on the Towers website indicates that Igloo’s customers use the product for both internal uses (ERM, capital modeling, and the like) and regulatory requirements (in particular, Solvency II). It is important to note that Towers informed us that they worked closely with One Beacon on the project, and relied on the accuracy and completeness of the data and information provided by One Beacon. Towers stands behind the methods and assumptions in this project.

10,000 potential future financial scenarios for 70 future calendar year periods were simulated. One Beacon provided a starting balance sheet which Towers used for the starting asset portfolio and future administrative expenses. As previously mentioned, Towers use its central estimate from its Reserve Report, rolled forward to June 30, 2014 as the mean of the distribution of the total future loss and loss adjustment expense payments for the stochastic modeling.

Towers Watson’s Economic Scenario Generator

The key components of Towers Watson’s proprietary Economic Scenario Generator (ESG) include interest rates, credit spreads, equity returns, and wage and price inflation for the US economy. For each of the 10,000 simulations, there is a specific economic scenario which is applied to both the assets and the liabilities. Inflation assumptions are a key component of these economic scenarios, and have an impact on both assets and liabilities. For the purpose of this review, assumptions made with regard to asset returns and inflation are the most significant.

Asset Return Assumptions Within the ESG

Although we have not examined the details of how the ESG operates, its assumptions appear to be well-founded on a strong base of historical data. Towers’ brochure notes:

“Quarterly ESG calibrations for over 15 economies are used for capital modeling, business planning, ALM and asset optimization”.

We did note, however, that Towers made judgmental adjustments to the ESG regarding interest rates, equity returns, and BBB defaults, based on input from Towers' investment consulting practice. We concluded that the adjustments made by Towers to the economic scenario generator inputs are not unreasonable. However, we view these adjustments, as adding somewhat to the riskiness of the model results. Success relies on the ability of assets to grow for an extended period of time, particularly in view of the likelihood that significant NICO losses will not be paid for many years. The current model has a failure rate of just under 10% over a thirty year period. If these adjustments prove optimistic, then the failure rate is greater than 10%. Without the adjustments, the overall failure rate would be higher than currently included in the model output.

Modeling Inflation

As noted, each scenario in the ESG utilizes consistent assumptions for both liabilities and assets with regard to inflation. It should be noted that this approach may overlook scenarios in which claims inflation significantly exceeds returns on assets. Towers has devoted a significant part of its analysis to the impact of inflation in general and medical inflation in particular. This is the case for both the bootstrapped non-NICO reserves and the NICO book, which was not bootstrapped. The model projects claims inflation for each line of business according to a mix of price inflation, wage inflation, medical inflation and a form of social inflation assumptions.

Medical inflation is a key component of claims inflation. Towers considered three different possible medical inflation models, representing different potential relationships between future medical inflation and future price and wage inflation. Overall we find that the three medical inflation models are reasonable, although we recognize that medical costs are subject to many conditions which are inherently difficult to model, and therefore may vary more from historical data than the model's results indicate.

Liability lines and Personal Injury Protection (PIP) also were projected using a "superimposed" component that was separately modeled. For liability, for instance, the mean superimposed inflation was 2%.

As noted below (and with considerable more detail in the report concerning the stochastic modeling of inflation assumptions and resulting claim severity), Towers' internal asbestos model assumes a long term ground-up severity trend that reflects future medical inflation partially offset by the favorable impact of the aging of the claimant population. We observe that this offset may have the effect of underestimating the true impact of claim severity. For pollution as well, claims inflation is expected to be lower than general inflation, due to a belief that technology improvements will offset "expected" future price inflation.

At the present time, inflation rates have been historically low for several years. We do not know when inflation will rise above these low levels. However, over a thirty year period of time, it seems likely that this will occur. It appears to us that the resulting impact on claim inflation for these important lines may be low.

Modeling Liabilities: NICO and Non-NICO

The NICO Treaty

In 2001, Potomac purchased a reinsurance contract from NICO covering \$2.5 billion on paid loss and ALAE subsequent to January 1, 2000 on its asbestos claims arising from business written in 1992 and prior, all

environmental claims arising from business written in 1987 and prior, and certain other latent exposures. The Towers Stochastic Modeling Report projects \$814.5 million of limit remaining on a paid basis as of June 30, 2014.

Estimation of Ultimate Losses from Towers Watson Reserve Study

The Towers Watson Reserve Report entitled “Analysis of Unpaid Loss and LAE as of September 30, 2012, December 31, 2012, and March 31, 2013” provides the basis for the central estimate of unpaid losses and for the loss payout patterns used in the stochastic model. Because of the close link between the work in the Reserve Report and in the Stochastic Model Report, we are summarizing here some of our findings from our reserve report. We note that Towers Watson has performed ground-up, exposure-based reviews of One Beacon’s A & E liabilities and has used its proprietary models for asbestos and for pollution, along with industry benchmarks, to estimate One Beacon’s ultimate losses for those liabilities covered by the NICO treaty. According to Towers, the considerations reflected in the exposure-based study include: the long latency period between asbestos exposure and emergence of disease, changes in the litigation environment and the potential for involvement of multiple policy periods on an individual claim.

We consider the work done on asbestos liabilities to be “state of the art” and we have additional confidence with the IBNR loads applied to these estimates. However, events which do not exist in the historical data (e.g. new causes of action, additional asbestos claims) are not explicitly contemplated and results of other methodologies have not been included.

We are less sure of the pollution liabilities, however. In the Reserve Report, the use of Towers’ proprietary model is supplemented with the results of an aggregate loss development approach. Towers notes that One Beacon had engaged in significant settlement activity prior to the issuance of the report, and that this activity lent credence to a lower survival ratio than the industry average. We agree that such settlements should be taken into account, but we observe that, as Towers itself notes, new judicial precedents or other unforeseeable actions could adversely impact this book. Given the number of such claims already filed and potentially to be filed in the future, there is very little credibility that should be attached to any one outcome. As Towers notes, “We observe that unexpected outcomes in coverage litigation or settlement negotiations are more often negative than positive.”¹

Inherent Uncertainty in Estimating Unpaid A & E Losses

It is important to note that Towers’ high estimate of One Beacon’s A & E liabilities net of the NICO cover is more than \$200 million above its central estimate as of June 30, 2014. The model shows that 65% of the scenarios in which NICO losses are above the 90th percentile result in failure of One Beacon. This is an important observation, not just because of the rate of failure above the 90th percentile, but because of possible additional claim activity or new causes of action in this book that cannot be quantified with certainty at this time and are not explicitly contemplated in the model. According to Towers:

“There is significant uncertainty with respect to the estimated distribution of asbestos and pollution outcomes. The statistical techniques used to estimate the distribution of future payments for the non-NICO lines are not applicable to the NICO lines. While we have utilized techniques for the

¹ Page 42 of Reserve Report

NICO lines that we believe to be reasonable, considerable professional judgment has been incorporated”.

We understand that the model does not consider such speculative future events, but nevertheless there is a real possibility that something of this nature may occur. In answering our key question, “Will One Beacon have sufficient assets to pay all of its claims?” we recognize that, unlike an ongoing insurer, there will be no opportunity years from now to provide additional capital to strengthen reserves

On Page 28 of the Stochastic Model Report, Towers cautions:

“For higher percentiles we have not explicitly incorporated any additional losses due to changes in the litigation environment, however, it is unclear as to whether the loss distribution utilized for asbestos and pollution builds in implicit provisions for potential changes in the future litigation environment“.

We are unable to predict the future of A & E losses, but if history is any guide, it would be prudent to expect further adverse development. If in fact there is a “third wave” of asbestos claims, this may well be considered a change in the litigation environment not explicitly incorporated in the modeling. If so, then it would be prudent to consider the 90th percentile point to be in reality somewhat lower than that.

Significant Elements of A & E Stochastic Modeling

As noted, inflation assumptions play a significant role in modeling A & E loss payouts. This process includes the following elements:

- ground up asbestos claims inflation is estimated based on medical inflation less an annual offset due to the aging of the claimant population
- The ground up inflation is run through OneBeacon’s exposure profile (considering policy limits and attachments) to estimate inflation on OneBeacon’s book
- A model is parameterized to estimate future inflated payments as a function of uninflated future payments and medical inflation.
- For pollution it is estimated that technology improvements will offset “expected” future price inflation

- For each scenario, the ESG output is used to project the impact of inflation on future paid losses and expenses, as well as the impact of various economic scenarios on asset returns and the market value of the assets being held at each point in time.

On balance, we think this approach to stochastic modeling for asbestos and pollution is well designed and informative. We note that the range of inflation assumptions allows for a significant amount of stress from this important variable. We have commented that we have some concerns over the mean scenario, however, with the otherwise-indicated inflation rates because of aging claimants (asbestos) and technological improvements (pollution). The use of the lognormal distribution along with three industry benchmark payment patterns is a reasonable approach. We caution that historical data may fall short in simulating future claim activity that is unprecedented and Towers modeling of the variability does not attempt to include this explicitly.

Bootstrapping (Non-NICO Lines)

Bootstrapping is a statistical technique which has come into use in recent years for estimating variability in property-casualty loss reserves. It is generally consistent with the results of the commonly-used chain-ladder method (age-to-age development factors) used to produce liability point estimates. By performing statistical sampling of the historical age-to-age factors used in the chain ladder method (with several statistical adjustments) simulated age-to-age factors are used to project ultimate losses. These simulated ultimate loss projections, taken together, form a predictive liability distribution for each line of business. According to bootstrapping literature, it is not a method unto itself, but rather a technique that can be utilized along with the chain ladder method and the statistical adjustments which are required for a reliable bootstrapping projection. The reasonableness of this technique can only be viewed in combination with the chain ladder method and the required statistical adjustments.

The bootstrapping calculations were based on quarterly paid and reported loss triangles from Towers' September 30, 2012 loss reserve review. One criticism of bootstrapping in the professional literature is that calendar year effects (inflation, among other things) may not be properly accounted for. Towers has made extensive inflation adjustments to these triangles to remove historic inflation and to model inflation separately. While these adjustments appear to mitigate common criticisms of the technique, and are necessary for the desired outcome of modeling the effects of inflation separately, we have some concern that inflation is not so easily removed from historical data and that the resulting triangles may contain some distortions. There is some risk that in removing estimated actual inflationary changes, and in reinserting simulated changes, another source of distortion may be introduced.

Towers used its proprietary ResQ software to produce the bootstrap estimates. In the selection of the model to which bootstrapping is applied Towers chose a model based on the Mack method (extensively explained in the Stochastic Model Report). Towers notes that part of the process is to exclude outliers in the age-to-age data being sampled. We asked for further information on these outliers, and this was provided by Towers.

We note that the actuarial literature, which is generally supportive of the use of bootstrapping for estimating casualty loss distributions, cautions that there may be more variability than bootstrapping captures. We questioned Towers about this concern, and they asserted that this has been adequately addressed. Towers noted several strengths of their approach in taking into account the shortcomings mentioned in the literature, notably: (1) the separation of the inflation component. (2) significant tail volatility is included, particularly for the WC segments and (3) the data (which has been in runoff for some time) does not include very immature Accident years where a chain ladder model would likely be inappropriate for long tailed lines.

In our review of the actuarial literature, we have found that some actuaries prefer using other techniques, such as the information matrix from the Maximum Likelihood Estimate technique, to bootstrapping for measuring process and parameter risk in the loss reserves. Towers is aware of the potential pitfalls of the application of bootstrapping and have considered these in how they have applied the bootstrapping procedure. Although there are other actuarial techniques for quantifying reserve variability, bootstrapping appears to be the most widely accepted statistical technique at the present time. All statistical techniques have the potential to underestimate reserve variability, and each technique has different strengths and weaknesses. Just as is true for deriving an actuarial central estimate of reserves, in estimating the variability of reserves it is necessary to be aware of the strengths and weaknesses of different techniques in different circumstances and to derive the parameters that drive the results in an unbiased manner. This

last point has been a major focus of our review, namely, whether the inputs have been derived in an unbiased way.

We agree that bootstrapping is a reasonable choice of technique to use for estimating the volatility of One Beacon's non-NICO modeled reserves, and it has been appropriately used in this analysis.

Roll Forward of Outstanding Liabilities

An important part of the Stochastic Model Report consists of a "roll forward" of the results of Towers Watson's reserve review to the anticipated date of the transfer of ownership to Armour. We have discussed the roll forward calculations with Towers. Towers notes:

"This is done in two steps. Estimates of unpaid loss and loss adjustment expense (as of March 31 2013 for the non-NICO lines and December 31, 2012 for the NICO lines) are rolled forward to September 30, 2013 using One Beacon's data through that date. The resulting liabilities are then rolled forward to June 30, 2014 (the anticipated date of the sale of the companies to Armour)."

In other words, the first step of the roll forward adjusts the reserves for the impact of actual losses which have emerged since the data evaluation data. And, the second adjustment adjusts the reserves for expected payments through the anticipated date of sale.

Towers notes further:

"To the extent that any of the actual emergence of paid and reported losses varied materially from expectations we updated our central estimate ultimate projections as of March 31, 2013... In general, ultimate losses remained stable from March 31, 2013 to Sept 30, 2013 with the exception of NICO pollution where we increased projected ultimate losses by \$10 million due to unexpected claims activity".

The roll forward calculation relies on One Beacon's payment data for the six months in question and on Towers' payout patterns from the Reserve Report. We asked Towers for additional information concerning the roll forward calculation and whether any review of individual claims had taken place. They replied:

"For the rollforward of the Environmental book, we viewed aggregate paid losses from 12/31/2012 – 9/30/13 and compared them to our estimate of expected paid losses during that time-frame. Since the actual paid losses were greater than the expected for Environmental, we drilled down to see where the increase was coming from. It appears that there were large settlements for two cases that were not fully contemplated by our ultimate loss selections so we increased our net ultimate loss estimates (and subsequent reserves) by \$10M. For Asbestos, the aggregate actual v expected losses looked reasonable so we did not change our ultimate loss estimates."

We note that this unexpected \$10 million activity took place in a relatively short time frame after completion of the reserve study, and represents a sizable increase in ultimates for a line with a central estimate of unpaid losses of \$119.9 million as of March 31, 2013. It is one indication of the unpredictable nature of A & E exposure.

Towers noted that this approach, covering a relatively short time for long tail liabilities, should produce a reliable result. We note that nearly 18 months has passed since the valuation date of the NICO book. Although we see some risk of undetected adverse development since the data evaluation date, we note that One Beacon itself reviews its data each year and on balance using more recent data in the stochastic modeling process should not yield a materially different result.

Towers appears to have made a reasonable rollforward calculation. Given the long-tail nature of these liabilities and the degree of detail in estimating future payout patterns, we accept Towers' comparison of actual to expected payouts as an acceptable way to adjust the stochastic modeling process for loss emergence since the data evaluation date of the reserve study.

DIVERSIFICATION

An important element in the estimation of ultimate liabilities under the high reasonable scenario of Towers' Reserve Report is the impact of diversification. In essence, this factor reflects the fact that for a reserve book of many different property-casualty segments, adverse development is not likely for all segments at once. In the Reserve Report, this factor was derived through a combination of statistical analysis and judgment. The stochastic model results indicate that the impact of diversification is even greater than the judgmental selections. This is the case even within the non-NICO book. We note that this finding from the stochastic model gives us additional confidence in the reasonable range of reserves set forth in the Reserve Report. We agree that, under this stochastic model of the possible outcomes for One Beacon (and with the model's limitations), adverse outcomes for multiple risk elements are not likely to occur simultaneously. However, within the failure scenarios, both adverse equity performance and adverse A & E loss development are capable of triggering failure independently.

CONCLUSION

We find that Towers Watson did a thorough and professional job in estimating One Beacon's liabilities and in stressing the payment patterns and inflation assumptions. However, we caution that considerable uncertainty exists both with respect to the ultimate cost of these liabilities, and to the ability of the assets to perform as needed. A & E liabilities may have a particularly wide range of reasonable estimates due to greater uncertainty. The Towers Stochastic Model Report (or the companion Reserve Report) is not expected to contemplate all potential adverse or positive outcomes. We observe that the final version of the pro forma balance sheet as of June 30, 2014, with a smaller equity allocation and an overall a greater capital base, has appropriately shifted some of the risk of failure from poor equity performance to adverse loss development. Overall, we concur that the Run-off Companies are likely to meet their obligations even when under considerable stress.