

2021 Student Research Case Study Challenge

Parametric Insurance

Executive Summary

Your actuarial firm has been hired by NEW·WORLD, a well-established, multinational insurance company located in the country of Ambernã. Your assignment is to develop a parametric insurance product that will focus on economic losses related to global health risks in Ambernã and Palòmñia, a neighboring country. In parametric insurance, a payout to the insured depends not on losses to the insured but on the occurrence of one or more “triggering events” of measurable health conditions. Examples of triggering events are increased incidences of cardiovascular disease, high blood pressure, and obesity.

Your consulting firm is tasked with producing a report about the new product which includes the following analysis:

- Objectives
- Design Provisions
- Implementation Plan
- Assumptions
- Risk and Risk Mitigation Strategies
- Sensitivity Analysis
- Data and Data Limitations

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The Case

Overview

Society is facing significant global challenges, including climate change, environmental sustainability, political risks and pandemics. While traditional insurance products indemnify policyholders after they incur a loss, many risks are either underinsured or not insured. To address this underinsurance and/or lack of insurance, a new concept of insurance has been developed called “parametric insurance.” Parametric Insurance products pay the policyholder when a “triggering event” occurs. Here is one definition used by the World Bank:

“Parametric insurance pays out benefits based on a pre-determined index for the loss of assets and investments because of weather or other catastrophe events. In contrast, traditional insurance relies on assessments of actual damages.”¹

This case study uses an expanded definition of parametric insurance. In parametric insurance, a triggering event can be *any* event or change in an index that triggers the loss of assets or investments or triggers a significant disruption in operations of an organization.

Some examples of parametric insurance, the corresponding triggering event(s) and possible motivations for offering the insurance are:

- Automobile sales are highly positively correlated with GDP. A manufacturer of automobile parts may purchase a parametric insurance policy that will pay proceeds if the country’s GDP falls below a pre-determined threshold. The GDP level is the triggering event.
- A tornado may disrupt the economy of a local community including damage to crops, thereby impacting agricultural output. A parametric insurance policy will pay proceeds to the community if a tornado is classified to be above a certain category. A tornado’s classification is the triggering event. This insurance and payout of proceeds does not depend upon any actual property damage caused by the tornado. In addition, the parametric insurance is paid immediately upon the occurrence of the triggering event; payment for property damage

¹ Pazarbasioglu, Ceyla. (2017, August 16). Index Insurance Is Having a Development Impact Where It’s Needed Most.” World Bank. <https://blogs.worldbank.org/voices/index-insurance-having-development-impact-where-it-s-needed-most>. A more detailed definition is available on page 6, “Parametric Transfer,” of World Bank’s January 2018 draft report, Indonesia: Developing Parametric Insurance for Weather Related Risks for Indonesia, <http://documents1.worldbank.org/curated/en/704171524632990898/pdf/Technical-Note.pdf>.

under a traditional insurance policy would require assessment of the damage and a longer time to payment for loss.

- A blizzard may disrupt airport operations, causing delays and miscellaneous expenses to airlines and the administration of the airport. A parametric insurance policy will pay proceeds to the airport if snowfall accumulation at the airport exceeds a stated level at the airport. The snowfall accumulation is the triggering event. As with the prior example, payout occurs even if there is no property damage.

Project Objectives

NEW-WORLD, a well-established, multinational insurance company located in the country of Ambernia, would like to develop a parametric insurance product that will focus on economic losses related to global health risks.

NEW-WORLD has identified several metrics related to health risks that it is considering using as triggering events for its parametric insurance product. These metrics are:

- Obesity
- Hypertension
- Tobacco use
- Lack of physical activity
- High cholesterol
- High blood glucose
- Insufficient sleep time and sleep time efficiency
- Air pollution

NEW-WORLD is open to expanding the definition of a triggering event to include a suite of triggers related to some broad conditions. Examples include, but are not limited to:

- Cardio-vascular disease
- Kidney disease
- Diabetes
- Malaria
- HIV/AIDS
- Asthma
- Chronic obstructive pulmonary disease

At present, there is very little competition in this segment of the parametric insurance market. NEW-WORLD would like to come to market as promptly as possible to get a first-mover advantage. The company's internal review of the market shows that several competitors will be bringing a product to market by Q4 2021.

NEW-WORLD's strategy is to begin selling this product in two countries: in Ambernia where it is headquartered and in Palominia, its less economically-developed neighbor. Ambernia is considered an advanced economy country and Palominia is considered an emerging market economy country. Both countries use a common currency, the silon(ψ).

NEW·WORLD’s actuarial team has retained your consulting firm to assist them with developing and bringing this new product to market. In particular, your consulting firm is tasked with producing a report which includes the following analysis:

- Objectives
- Design Provisions
- Implementation Plan
- Assumptions
- Risk and Risk Mitigation Strategies
- Sensitivity Analysis
- Data and Data Limitations

NEW·WORLD’s actuarial team has outlined the deliverable tasks and considerations for your firm. They have made it clear that your firm’s report and analysis must address all the “TASKS;” however, your firm has broad flexibility to include or exclude the “CONSIDERATIONS” listed in the items outlined in the [Deliverables](#) section below.

Deliverables

NEW·WORLD requests your consulting firm to deliver a high-level report, informed by your research and analysis, that addresses each of the following items:

1. Objectives

TASK: Discuss the objectives of the new product for NEW·WORLD, including but not limited to:

- Target Market
- Protection gaps of current products
- Insurability

CONSIDERATIONS: Sample considerations may include, but are not limited to:

- Advantages and disadvantages of this product relative to traditional insurance
- Product audience for the target market (e.g., individual, organizations, governments, etc.)
- Insurability and assessment of individual vs. community risk

2. Design Considerations

TASK: Recommend a product design that includes but is not limited to the following elements:

- A comprehensive list of design elements, including (but not limited to):
 - Triggering event(s)
 - Index measure(s)
 - Payout provisions, including timing and frequency of payout
 - Other relevant design provisions as you and your team see fit
- Detailed definitions of each provision, including the measurability of each triggering event and the manner in which each provision is to be quantified and/or developed
- Your team’s rationale for each design provision

CONSIDERATIONS: Sample considerations may include, but are not limited to:

- Discuss the method for measuring triggering events and/or loss indices (for example, the use of a data point in time compared to a multi-period average).
- Is the triggering event or measure of loss indices based on a suite of metrics or on individual metric? If a suite of metrics is used, the consequences of correlation should be discussed and analyzed.
- Does the design satisfy the requirement for insurability?

3. Implementation Plan

TASK: Recommend an implementation plan for the recommended design that includes, but is not limited to the following elements:

- Provide detailed analysis of premium, revenue and expenses, including a multi-year profit/loss projection.
 - Premium and revenue should be analyzed in terms of distributions including expectations, standard deviations, percentiles and tails.
 - Expenses should be formulated in terms of percentage of assets of NEW-WORLD devoted to the new product over the time horizon and expected resulting distributions.
 - Revenue analysis should include estimates of ranges of premiums, purchase frequency and likelihoods of purchase during the defined time horizon.
- Provide a marketing plan for NEW-WORLD to roll out in the initial stages of the parametric insurance's availability.

CONSIDERATIONS: Sample considerations may include, but are not limited to:

- Partnerships with other companies (for example, proprietary medical databases, medical device companies)
- Distribution channels and possible overlap with existing products
- Key metrics to be used to measure product's success and possible losses

4. Assumptions

TASK: Provide an analysis of assumptions that includes, but is not limited to the following elements:

- List all the assumptions used in the analysis. Your report should include, in its body, a summary of the assumptions your firm used. The Appendix of your report should describe these assumptions in more detail.
- Identify the key assumptions that have the most significant impact on the recommended product design and premium/revenue projections.
- Provide rationale and analysis for each key assumption.
- Provide ranges for which the assumption will result in an outcome that is within a specified percent of the profit projection. You should decide the appropriate level of the specified percent based on your professional judgment.

CONSIDERATIONS: Sample considerations may include, but are not limited to the following assumptions:

- Interest rate
- Mortality
- Inflation
- Likelihood of event(s)

5. Risk and Risk Mitigation Strategies

TASK: Provide a risk analysis that discusses potential risks and unforeseen events which may have a material impact on NEW·WORLD's finances, operations, or reputation that result from the launch of this parametric insurance product. Your analysis should include, but is not limited to the following elements:

- Identify both quantifiable and qualitative key risks.
- Rank these key risks using appropriate metrics such as likelihood and severity estimates for the quantifiable risks.
- For these key risks, suggest possible risk mitigation techniques.

CONSIDERATIONS: Sample considerations may include, but are not limited to:

- In quantifying risk categories in terms of rank, your team may consider describing the key risks' likelihood and severity. The use of appropriate graphs and tables demonstrating critical regions and probability distributions is encouraged.
- Analyze the possibility of fraud and discuss provisions of the parametric insurance that would help minimize any such possibilities.
- Identify risk factors that could result in NEW·WORLD's default. Your analysis should include scenarios that would render payout of all covered losses impossible.
- Consider other risks, for example, weather catastrophe, new technology, pandemics and others.
- Discuss the possible impact of regulatory requirements.

6. Sensitivity Analysis

TASK: Provide a sensitivity analysis that examines the financial impact on NEW·WORLD of the difference between expected performance of key assumptions for the parametric insurance to actual experience. This sensitivity analysis should demonstrate both favorable and unfavorable sensitivities.

CONSIDERATIONS: Sample considerations may include, but are not limited to:

- Assumptions to consider may include interest rates, inflation and number of policies sold.
- Provide a discussion of the significance and loss of value if the triggering event causes significant variation between countries.
- Discuss the likelihood that NEW·WORLD will miss its projected revenues.

7. Data and Data Limitations

TASK: Provide Identify any data limitations and the impact of any such limitations on your team's analysis. Within your team's report, identify the limitations where any such limitations are relevant.

- Identify any data sources used.
- Identify the data elements that NEW·WORLD should monitor and regularly analyze.
- Identify a reporting schedule (including frequency) and the reporting metrics for NEW·WORLD's senior management.

Data

NEW·WORLD has provided your firm with the following data, which can be found with the [2021 Student Research Case Study Challenge Materials](#).

- Data on triggering events
- Financial and economic data for the last 10 years for both Ambernia and Palöminia
- Population and education data for both Ambernia and Palöminia
- NEW·WORLD net income statement and balance sheet (all financial figures are reported in silons[ψ])

Report Specifications and Evaluation Criteria

Submission Requirements

Your team's submission must include a written report that meets all of the criteria outlined below. If your team submits supporting analysis, the analysis must meet the requirements outlined below. Please refer to the 2021 Student Research Case Study Challenge [official rules](#) for further information.

Written Report Requirements

Your written report should be addressed to NEW·WORLD's Executive Committee, most of whom are not actuaries. The Executive Committee is made up of NEW·WORLD's CEO, CFO, CMO and CIO (none of whom are actuaries) and its Chief Actuary.

The report format must meet all the following criteria. If you fail to meet each of these items, NEW·WORLD will not consider your report.

- Your report must be in Adobe (pdf) format and must not be password protected.
- The filename of your report must be the team name and a brief description of content for quick identification (example: "WassamattaU NEW·WORLD parametric insurance Report.pdf").
- Your report must be written in English.
- On the cover of your report, state your team's university affiliation and each member's name, but do not include email addresses or phone numbers.²
- Your report must be readable and formatted to professional standards.

² Winning reports will be posted on the Society of Actuaries website. For privacy, the Society of Actuaries does not recommend showing email addresses or phone numbers on your report.

- All elements of your report that are not original must be cited in a bibliography addendum to your report. This requirement applies to written material, tables, graphs, charts and other visuals.
- The report's length cannot exceed 2,500 words (roughly five single spaced pages). If your report exceeds this length, NEW·WORLD will consider only the first 2,500 words. The following items will not count toward this 2,500-word limit:
 - Graphs, charts and other infographics including their captions of graphs and charts
 - Citations of external research
 - Reference list of cited sources in the Bibliography
 - An optional appendix that contains supporting calculations, programming, or both, including any detailed explanations of these supporting items
- The report must address every TASK identified in the [Deliverables](#) section.
- The report and its supporting calculations must be original work of your team for this case study. Previously published work should not be repurposed or submitted. Any materials found to be previously published or repurposed without proper citation may disqualify your report.

Supporting Analysis Requirements

You may optionally support your project with calculations done in any programming language. However, any original code optionally submitted must be submitted in a file or files that are not password protected and in Adobe pdf, for example as an appendix to your main report, or Microsoft Excel format. NEW·WORLD's Executive Committee will not read formats other than Adobe pdf and Microsoft Excel.

Evaluation Criteria

NEW·WORLD and its actuarial team will review your firm's report, using the following criteria:

- Organization, form, clarity and cohesiveness of the report,
- Clear and complete responses to all items that are requested to be addressed,
- Detailed mathematical analysis, with explanations of any formulas, models and other aspects to the analysis that you use,
- Creative and strategic recommendations,
- Consideration of secondary research including, as necessary, an appendix showing a reference list of all sources cited throughout the report,
- Consideration of the provided data, including documentation of data limitations,
- Documentation of assumptions,
- Adherence to all [Submission Requirements](#) and [Written Report Requirements](#), and
- If you submit supporting analysis, adherence to all [Supporting Analysis Requirements](#).

When and Where to Submit

Email your final submission to research@soa.org by 11:59 pm U.S. Central Standard Time on Friday, March 12, 2021. In your submission email, *include your university affiliation as well as the names and email addresses of each team member.*