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WORLD REINSURANCE COMPANY: EXCESS-OF-LOSS REINSURANCE QUOTE

Jeffrey Wong and Kyle Maclean wrote this case solely to provide material for class discussion. The authors do not intend to illustrate either effective or ineffective handling of a managerial situation. The authors may have disguised certain names and other identifying information to protect confidentiality.

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Having returned to his desk after lunch, Jeffrey Wong, an actuarial intern at World Reinsurance Company, was casually checking his e-mail and noticed that he had received a request from his manager, Dominic Tate, to develop a quote for an upcoming request for proposal (RFP) from one of World Reinsurance Company’s larger clients, Ontario Life (see Exhibit 1). The RFP would have to contain a quote for an excess-of-loss policy to reinsure Ontario Life’s 10-year-term life insurance policy, consisting of 100 high-risk policyholders, for retention limits over CA$250,000[[1]](#footnote-1) on a per-loss basis. Since the quote was to be submitted for review by the end of the day, Wong knew he had to get started on it immediately.

BACKGROUND

Wong was a fourth-year undergraduate student pursuing a dual degree in honours specialization in actuarial science at the University of Western Ontario and honours business administration at the university’s Ivey Business School. He was also actively working towards the designation of Associate of the Society of Actuaries, which was offered by the Society of Actuaries, as he planned to pursue a career in the insurance industry. Given that this was his first actuarial internship at a large multinational company, he wanted to make a good impression and apply the actuarial and business skills he was learning at university.

LIFE INSURANCE

Life insurance was a contract sold by a direct insurer that guaranteed the insured’s beneficiaries received a specified sum of money when the insured passed away, in exchange for premiums that were paid by the policyholder.[[2]](#footnote-2) There were three types of life insurance: term life insurance, permanent (or whole) life insurance, and universal life insurance.

Term life insurance guaranteed a specified payment if the insured died within a specified time period.[[3]](#footnote-3) Permanent life insurance guaranteed a specified payment regardless of when the insured passed away.[[4]](#footnote-4) Universal life insurance combined whole life insurance with an investment component, paying out the death benefit plus the fund value upon the death of the insured.[[5]](#footnote-5) Universal Life was introduced to the insurance industry in the 1970s as a response to the high interest rate environment, as permanent life insurance policies were viewed at that time as uncompetitive.[[6]](#footnote-6)

In a universal life policy, the policyholder selected a premium schedule that involved paying an annual premium. A portion of these premiums went towards mortality costs and expenses, otherwise known as the cost of insurance, and the remainder went into a fund, which was chosen by the policyholder based on their risk tolerance. The difference between the premiums’ return in the fund and the cost of insurance was credited back to the policy as interest.[[7]](#footnote-7)

REINSURANCE

Unlike a direct insurer, a reinsurance company did not deal directly with policyholders or individuals. Instead, the reinsurance industry (a US$273 billion industry) served to help direct insurers reduce the likelihood of having to make large payouts.[[8]](#footnote-8) Reinsurance allowed direct insurers to reduce payout volatility and, in turn, provided a wider array of products, such as life, health, short-term, and long-term disability insurance. Due to the competitive reinsurance landscape, a direct insurer often put out RFPs to multiple reinsurance companies, and a reinsurer would have to win the bid to obtain that specific “block of business.”[[9]](#footnote-9)

Primary insurance companies were encouraged to have some form of reinsurance, as it helped to ensure a primary insurance company’s ability to stay solvent in extreme situations.[[10]](#footnote-10) For example, in 2005, Hurricane Katrina cost the insurance industry over US$41.1 billion in insured losses, leading to reinsurance companies having to make large payouts.[[11]](#footnote-11) Furthermore, in 2020, the COVID-19 pandemic cost the top 20 reinsurers over US$12 billion in reinsured losses within the first six months of the pandemic.[[12]](#footnote-12)

One specific reinsurance contract was excess-of-loss reinsurance, where all losses over a specified retention limit were covered by the reinsurer for the duration of the policy.[[13]](#footnote-13) For example, if an excess-of-loss reinsurance had a retention limit of $100,000 on a per-loss basis, all individual losses above $100,000 would be covered by the reinsurance company.

THE DECISION

Attached to Tate’s e-mail were the details of Ontario Life’s 10-year-term life insurance’s block of business, containing the names, gender, age, policy amount, and smoker status[[14]](#footnote-14) of each policyholder. Wong believed that using Statistics Canada’s most up-to-date mortality rates, where the rates for each respective year were conditional upon the individual surviving the prior years, would be an appropriate assumption in developing his excess-of-loss model (see Exhibit 2).[[15]](#footnote-15)

Wong gathered the necessary data and combined it with the data provided by his manager and started developing the model. He only had until the end of the day to determine the expected loss amount and recommend the proposed rate to charge Ontario Life. So, mindful of his future in the industry and wanting to impress upon his manager his diligence and analytical ability, he opened Microsoft Excel and got to work.

Exhibit 1: request for propoSal E-MAIL

FWD: Ontario Life RFP – 10-Year-Term Life Policy – High Risk

Hey Jeffrey,

Ontario Life sent us an RFP with regards to their high-risk 10-year-term life policy consisting of 100 members.

Attached below is the data for all 100 of their policyholders.

Typically, for mortality rates, we apply a multiplicative factor of 5% to smokers. Also, for the premium charged, we usually take the expected payout amount and apply a multiplicative factor of 2% for expenses and 4.5% for premium charges.

Could you create an excess-of-loss model with the data by end of day?

Thanks,

Dominic Tate

POLICYHOLDER DATA

| **First Name** | **Last Name** | **Sex** | **Age** | **Claim Amount** | **Smoker** |
| --- | --- | --- | --- | --- | --- |
| Cesaro | Groves | M | 44 | $ 460,000 | Y |
| Engracia | Carty | F | 38 | $ 250,000 | Y |
| Elisha | Wadesworth | F | 51 | $ 480,000 | N |
| . . . | . . . | . . . | . . . | . . . | . . . |
| . . . | . . . | . . . | . . . | . . . | . . . |
| Adina | Manilow | F | 43 | $ 320,000 | Y |

Note: RFP = request for proposal; M = male; F = female; Y = yes; N = no

Source: Company documents.

Exhibit 2: MORTALITY RATES

|  | **Conditional Probability of Death in [x,x + 1] Years** | |
| --- | --- | --- |
| **Age (x)** | **Male** | **Female** |
| 0 year | 0.00477 | 0.00427 |
| 1 year | 0.00028 | 0.00023 |
| 2 years | 0.00020 | 0.00017 |
| 3 years | 0.00015 | 0.00013 |
| 4 years | 0.00012 | 0.00011 |
| 5 years | 0.00010 | 0.00009 |
| … | … | … |
| 109 years | 0.51765 | 0.49074 |
| 110 years and over | 1.00000 | 1.00000 |

Source: “Table 13-10-0114-01: Life Expectancy and Other Elements of the Life Table, Canada, All Provinces except Prince Edward Island,” Statistics Canada, November 26, 2020, accessed March 1, 2021, https://www150.statcan.gc.ca/n1/pub/84-537-x/2019002/xls/2016-2018\_Tbl-eng.xlsx.

1. All currency amounts are in CA$ unless otherwise specified. [↑](#footnote-ref-1)
2. A policyholder was not necessarily the person insured but rather simply the individual who owned the life insurance policy. [↑](#footnote-ref-2)
3. “Term Life Insurance,” Sun Life, accessed March 1, 2021, https://www.sunlife.ca/en/explore-products/insurance/life-insurance/term-life-insurance/. [↑](#footnote-ref-3)
4. “Permanent Life Insurance,” Sun Life, accessed March 1, 2021, https://www.sunlife.ca/en/explore-products/insurance/life-insurance/permanent-life-insurance/. [↑](#footnote-ref-4)
5. “Universal Life Insurance,” Sun Life, accessed March 1, 2021, https://www.sunlife.ca/en/explore-products/insurance/life-insurance/universal-life-insurance/. [↑](#footnote-ref-5)
6. Douglas C. Doll, “Chapter VI: A Brief History of Universal Life,” Society of Actuaries, accessed March 1, 2021, https://www.soa.org/globalassets/assets/library/monographs/50th-anniversary/product-development-section/1999/january/m-as99-3-06.pdf. [↑](#footnote-ref-6)
7. “Universal Life Insurance,” Canada Life, accessed March 1, 2021, https://www.canadalife.com/insurance/life-insurance/permanent-life-insurance/universal-life-insurance.html. [↑](#footnote-ref-7)
8. “Global Reinsurance Carriers Industry – Market Research Report,” IBISWorld, July 20, 2020, accessed March 1, 2021, https://www.ibisworld.com/global/market-research-reports/global-reinsurance-carriers-industry/. [↑](#footnote-ref-8)
9. L.S. Howard, “Here’s How Aon’s New Reinsurance Auction Works,” *Insurance Journal*, September 17, 2019, accessed March 1, 2021, https://www.insurancejournal.com/news/international/2019/09/17/540214.htm. [↑](#footnote-ref-9)
10. Caroline Banton, “What Is Reinsurance?,” Investopedia, November 10, 2020, accessed March 1, 2021, https://www.investopedia.com/ask/answers/08/reinsurance.asp. [↑](#footnote-ref-10)
11. Robert P. Hartwig and Claire Wilkinson, *Hurricane Katrina: The Five Year Anniversary*, Insurance Formation Institute, July 2010, accessed March 1, 2021, https://www.iii.org/sites/default/files/1007Katrina5Anniversary.pdf. [↑](#footnote-ref-11)
12. Taoufik Gharib, “Black Swan or Not, COVID-19 Is Disrupting Global Reinsurers’ Profitability,” S&P Global Ratings, September 8, 2020, accessed March 1, 2021, https://www.spglobal.com/ratings/en/research/articles/200908-black-swan-or-not-covid-19-is-disrupting-global-reinsurers-profitability-11639467. [↑](#footnote-ref-12)
13. “Excess Loss (XL),” Society of Actuaries, accessed March 1, 2021, https://actuarialtoolkit.soa.org/tool/glossary/excess-loss-xl. [↑](#footnote-ref-13)
14. Smokers were assumed to have a 5 per cent higher mortality rate. [↑](#footnote-ref-14)
15. “Table 13-10-0114-01: Life Expectancy and Other Elements of the Life Table, Canada, All Provinces except Prince Edward Island,” Statistics Canada, November 26, 2020, accessed March 1, 2021, https://www150.statcan.gc.ca/n1/pub/84-537-x/2019002/xls/2016-2018\_Tbl-eng.xlsx. [↑](#footnote-ref-15)