Chapter 6
Data Science for Green Insurance:
A Predictive Analytics Approach to Climate Risk Assessment

Piali Haldar
https://orcid.org/0000-0003-4729-6964
Brainware University, Kolkata, India

Dev Kumar Mandal
https://orcid.org/0009-0005-3740-6885
Brainware University, Kolkata, India

Utkarsh Gupta
https://orcid.org/0009-0004-1850-5258
Latent View Analytics, USA

ABSTRACT

The insurance sector faces enormous challenges from climate change, requiring sophisticated predictive models to gauge and mitigate the financial risks involved. Green insurance a concept is still not universally understood—takes the basic model of insurance and attempts to integrate sustainability principles into the practices of insuring and underwriting. This study investigates predictive analytics in green insurance, concentrating on how the exposure to climate risk sways the rates charged for insurance premiums. The research uses predictive analysis to lead toward better risk assessment and sustainable pricing decisions. The findings suggest that exposure to climate risk significantly boosts the rates of premium insurance, confirming that a greater climate risk leads to a higher cost of premiums. The results underscore that a commitment to sustainability serves as a partial buffer against the insurance premi-

DOI: 10.4018/979-8-3373-1882-0.ch006

um. Insurers with solid sustainability policies usually have fewer risky investments.

1. INTRODUCTION

1.1 Background and Rationale

Climate change is now a present-day reality affecting various sectors worldwide. The insurance industry finds itself at the heart of this impact, dealing directly with the rapidly intensifying and far more frequent climate-related disasters that so many of us now experience. Events like hurricanes, floods, and wildfires significantly elevate the insurers' total risk exposure; this increased exposure threatens to upend even the traditional actuarial methods that the industry has relied on for simple, straightforward pricing of the highly complex risk that their policies cover (Wang et al., 2019). Responding, the notion of "green insurance" has arisen, marrying sustainability principles with the essential functions of our sector (Nguyen et al., 2022). The insurance industry is inherently averse to risk and depends on historical data to forecast future losses (Lyubchich et al., 2019). Yet, climate change brings something else, too: an increased incidence of extreme weather events. That, in turn, is leading to heightened volatility not only in premium rates but also in the financial reports of McWet's coffers (Valverde & Convertino, 2019). For example, the past year has seen renewable energy project insurance premiums jump by 20% to 40% because of unanticipated claims from natural disasters. These claims include solar panels that were smashed by hailstones and wind turbines that were struck by lightning (Zhou, 2019). Furthermore, climate change presents comprehensive threats that go beyond geographic limits and reach global supply chains and the economic stability of nations (Ghadge, 2020). This new risk landscape demands that the insurance sector develop inventive products and strategies to cover the physical and transitional risks of climate change (Wang et al., 2019).

Green insurance comes in many forms. Unfortunately, most of them are seldom discussed. While few, the following are some of the common forms of environmental insurance: 1. General liability insurance 2. Personal accident insurance 3. Life insurance 4. Workers' compensation insurance 5. Directors' and officers' insurance (Ibrahim et al., 2021). According to Wang et al. (2019), Green insurance operates as an economically viable financial instrument to guarantee that the funds collected are administered in a manner that is friendly to the environment. It effectively manages risks to ecological systems. I see it as a bridge, from my perspective on sustainable development, between a traditional security financial sector that does not have an incentive to be environmentally responsible and one that does have such an incentive (Nguyen et al., 2022). On the micro scale, sustainable insurance is a key player in