Impact of Climate Risk on Insurance Industry in Singapore

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Abstract. Singapore has firmly established itself as a preeminent hub for specialty insurance and reinsurance in Asia. Current strategic initiatives aim to metamorphose Singapore's reinsurance sector from a conventional, mainstream paradigm into a sophisticated and comprehensive global capital for Asian risk transfer. This report aim at luxuriating how climate change influence the Singapore Insurance Company , Through practice and after the deliberate , this report adopt the methodology of literature review that reference the report and data from the official website from MAS and Singapore climate bureau to make precise analysis of the climate change influence insurance company, This research according to these separate parts, introduce climate change, emphasize the relationship between climate change and insurance company , the strategy of alleviate the loss of insurance company, suggestion and conclusion, report also describe the prospective of the insurance company to be precaution the climate change .This research proffers invaluable insights into the realm of insurance, potentially enriching future scholarship and practice.

Keywords: Climate Risk, Insurance Industry, Singapore.

1 Introduction

Climate change is a globally significant challenge, creating stress for countries worldwide, particularly for Singapore. Recent endeavors have concentrated on augmenting the existing array The content of the reinsurance and finance risk solutions conclude the abnormal risk transferring institution, example as Insurance -Linked Securities, also named as ILS, Commitment of Singapore to regional leadership is exemplified by the establishment of the Global-Asia Insurance Partnership (GAIP). This initiative addresses. Among the structure of the protection gap system and emergency risks domain, initially focusing on the challenges posed. Among the structure of the protection gap system and emergency risks GAIP aspires to generate actionable research insights, formulate the region of the proposal policies and the suspension for the co-create solving , it is anticipated Launching , academic circles, and global institution probably maltreat the contemporary of the Singapore numeral marketing to insurrection and transfer latest methodologies and emerging threats.

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The increasing focus on the insurance sector necessitates a rigorous examination of the ramifications of climate change on Singaporean insurance companies, a topic of considerable contemporary significance.

The primary objective of this study is to investigate the impact of climate change on Singapore's insurance industry, concentrating on: First, the contemporary manifestations of climate change in Singapore; second, the interplay between climate change and insurance companies; third, potential policy responses to climate change; and fourth, future prospects for the evolution of Singapore's insurance sector. This study employs a literature review methodology to discern underlying factors. Research data were meticulously gathered from official statistical sources available online. The findings indicate a correlational relationship between climate change and the insurance industry.

This report summarizes the background of climate change as it pertains to Singapore, illustrating the threats posed by climate change and exploring how the insurance industry in Singapore can adapt and thrive. It also discusses implemented strategies to address climate risks and outlines potential future developments [1].

2 Climate Change and the Insurance Industry in Singapore

Building upon the introduction's overview of climate change and its influence on the insurance value chain, this section provides a detailed exploration of the relationship between the two. The impact of climate change on the insurance industry is increasingly significant, primarily manifesting as an increase in insurance claims due to the heightened frequency of extreme weather events. This trend presents challenges for insurance pricing and risk management models and underscores the growing need for the insurance sector to enhance its capacity to mitigate climate risks. This enhancement involves improving risk assessment capabilities, developing adaptive products, and strengthening cooperation with diverse stakeholders.

Following specific impacts warrant emphasis. Increased Physical Risk. Climate change has led to a rise in the frequency and intensity of extreme weather events, such as typhoons, floods, and droughts [1]. These natural disasters directly escalate claims expenses for insurance companies. For instance, in recent years, payouts for insurance claims related to climate events have surged, placing pressure on both the assets and liabilities of insurance firms. Stranded Assets and Investment Portfolio Impacts. Climate change policies, regulations, and technological changes may result in the depreciation of fossil-fuel-related assets, which in turn affects the investment portfolios of insurance companies [2]. For example, restrictions on carbon emissions may slow the valuation of related industries, thereby impacting the investment returns of insurance companies. Pricing and Risk Management Challenges. Traditional risk assessment methods and pricing models of insurance companies are often based on historical data [3]. Singaporean insurers face a multifaceted array of climate risks, which can be broadly categorized into physical, transitional, and liability risks. Physical Risks is the Increased Frequency and Severity of Natural Catastrophes: Climate change is expected to increase the intensity of extreme weather events, such as floods and storms, which can lead to higher claims and underwriting losses for general insurers. For example,

increased rainfall intensity can cause surface water flooding, impacting properties and infrastructure, W2Flooding is the Climate change has a significant impact on flood risks, particularly intense rainfall, which can lead to surface water flooding. The response of river flooding to precipitation depends on factors like soil moisture and temperature, making predictions harder and highly regional.

Business Disruption shows that severe weather phenomenon could be the lead fuse caused by the disruption of the business, that impacting insures systems, process and Transition Risks. The shift toward a low-carbon economy entails regulatory, technological, and market transitions that can impact insurers. With governments worldwide implementing stricter emissions regulations, companies may face increased compliance costs, impacting on their profitability and subsequent insurance coverage. Insurers must adapt by understanding these transition risks, which may also present opportunities to develop new insurance products that cater to businesses seeking to transition sustainably [4].

Liability Risks shown that as climate change effects become more pronounced, insurers may face rising liability claims from parties seeking compensation for climate-related damages. This legal risk can stem from various sectors, including real estate and manufacturing, as stakeholders increasingly hold companies accountable for their contributions to climate change. Insurers must navigate the complexities of liability exposures while adjusting their policies to reflect a shifting landscape of public opinion and legal accountability.

Market Opportunities show that the increasing awareness and urgency surrounding climate change open avenues for innovative insurance products tailored to emerging needs. Products like parametric insurance—offering payouts based on predefined triggers, such as weather metrics—can effectively address climate uncertainties. This approach enables insurers to diversify their offerings and potentially penetrate new markets focused on sustainability [5].

Collaboration with Stakeholders shown that Insurers must foster broader partnerships with government agencies, Non-Governmental Organizations (NGOs), and the private sector. Collaborating with these stakeholders facilitates knowledge sharing, enhances risk assessment, and spurs the development of climate-resilient infrastructure. By uniting efforts, the insurance industry can bolster its resilience against the changing climate while promoting sustainable practices across various sectors [6].

Transition Risks belong to the Decline in asset valuation. Climate change policies, regulations, and technological changes may result in the depreciation of fossil-fuel-related assets, affecting the investment portfolios of insurance companies. Restrictions on carbon emissions may slow the valuation of related industries, impacting investment returns.

For the market risk insurance face, a rapid descent in valuation and rising volatility in investing, especially for carbon -intensive sectors, impose to shifting for the investor preferences. Liability Risks are the Environmental-related claims. However, Insurers occupy high probability to suffer pressures from directors and officer policies, that the insurers would not premediate the policies, stem or respond the impact of climate change and environmental risk [7].

The content of the Increased Morbidity and mortality risks. Environmental changes, such as higher water/air temperatures and increased carbon dioxide levels, can impact life insurers through climate change effects on morbidity and mortality risks. Financial and reputational risks demonstrate the Fluidity risk, which can be named as Natural disaster, that lead to ubiquitous damages, this leads to a surge in the need of funds and exacerbates liquidity stresses for insures, Insurers may also experience difficulties in liquidating assets affected by weather events.

The last risk of challenge is Reputational Risk. To avoid providing coverage for customers whose business activities have a negative environmental impact, perceptions of such underwriting activities can adversely affect an insurer's ability to maintain or establish business relationships [8].

3 Strategies of Singaporean Insurance Companies in Addressing Climate Risks

Climate change poses a significant threat to global sustainability, affecting business, politics, and finance. Singapore, which is an island nation located in East Asia at the southern tip of the Malay Archipelago, is particularly vulnerable due to its geographic location, tropical rainy climate, and high rainfall, with recorded annual precipitation reaching 2,345 millimeters. According to a 2024 financial analysis of Singapore, the insurance industry has been incurring annual losses estimated at US$566 million to US$1.2 billion.

The Monetary Authority of Singapore (MAS) offers several specific tools and initiatives to support the insurance industry in managing risks and promoting growth of the profit, particularly in the context of climate and other emerging risks. These include regulatory guidance, grant schemes, and collaborative platforms [9].

Regulatory and Supervisory Framework demonstrate that MAS integrates environmental risk into its supervisory framework and processes to ensure insurers manage these risks effectively. This involves: Uplifting insurers' environmental risk management practices through ongoing supervision and industry partnerships and developing climate-related risk assessment capabilities by featuring thematic climate scenarios in industry-wide stress tests. That Enhancing climate-related disclosure standards to promote market transparency.

MAS supports the evolvement of the ILS market in Singapore through a grant scheme that funds up to 100% of the upfront issuance costs of ILS catastrophe bonds in Singapore. This scheme aims to attract ILS issuers to domicile in Singapore by reducing the financial burden of initial setup costs. The scheme was launched in February 2018 and has been extended to December 2022 [10].

Nat Cat DAX was launched Addressing the scarcity of integration and high-grade data of natural disaster risk in Asia country, means the contribution of the crack of protection growth. It is a public-private partnership led by the Institute for Catastrophe Risk Management (ICRM) of Nanyang Technological University of Singapore (NTU), in collaboration with the insurance industry and supported by MAS.

GAIP is a center of excellence for the global insurance industry, regulators, and academia to collaborate and deepen capabilities in risk management and insurance, with a focus on Asia. It operates through three pillars, first one is Living Lab that Incubates innovative insurance solutions for key risks, including climate change and Industry 4.0 risks. Second, it belongs to the Policy Think Tank: Conducts independent research to support policy decisions in assessing and mitigating emerging risks. Turn into third point is Talent Development Growth which is a pipeline of skilled insurance talent with expertise in areas like big data and AI.

The Southeast Asia Disaster Risk Insurance Facility, in partnership with the Japan Ministry of Finance and supported by the World Bank, the SEA DR IF is an ASEAN+3 initiative that provides climate and disaster resilience solutions for ASEAN member states. The SEA DR IF is domiciled in Singapore and offers catastrophe risk insurance policies, such as flood risk insurance, to provide quick response and immediate financing in the event of a disaster.

Other Initiatives belong to the Cyber Risk Management (CyRiM): A pre-competitive research project focusing on cyber risk management in Singapore and Asia, led by NTU's Insurance Risk and Financial Research Centre (IRFRC). Belt & Road Initiative (BRI) Insurance Consortium: provides specialized insurance coverage for BRI projects in the Asia-Pacific region, excluding China.

Through these tools and initiatives, MAS aims to enhance the insurance industry's capacity to manage risks, promote innovation, and support sustainable economic growth in Singapore and the broader Asian region.

4 Emerging Technologies in Risk Assessment and Management

With the increasing threats posed by climate change, Singaporean insurance companies are exploring the integration of emerging technologies to enhance their risk assessment and management capabilities. First part is Data analytics and Machine learning display the exploiting progressive analyzation and arithmetic of machine learning to recognize swatch and predict potential climate-related risks, thereby improving underwriting processes and pricing strategies. Second process is Blockchain Technology Implementing blockchain solutions that is to enhance transparency and traceability in policy issuance and claims processes, which can significantly reduce fraud and administrative costs. Third content is Remote Sensing Technologies which is a Leveraging satellite imagery and drone technology to gather real-time data on environmental conditions, aiding insurers in accurately assessing risks associated with natural disasters.

The last two views are Collaboration with International departments; Singapore’s insurance sector recognizes the importance of collaborating with international organizations and consortia to share knowledge and resources in tackling climate risks. It also includes two extra views, Partnership with the United Nations Engagement in UN-driven initiatives to promote sustainable finance and insurance practices that address climate change impacts and Participation in the Geneva Association: Involvement in research and advocacy efforts aimed at developing effective insurance solutions for climate-related events on a global scale.

Educational and Awareness Programs is to foster a culture of resilience and preparedness within the community, insurance companies in Singapore are actively investing in educational initiatives. Public Awareness Campaigns is Launching campaigns to educate the public about climate risks and the importance of insurance, encouraging proactive risk management behaviors among individuals and businesses. Workshops and Seminars talk about Organizing workshops aimed at assisting businesses in understanding their exposure to climate risks and exploring suitable insurance solutions tailored to their needs. Through these innovative approaches and collaborative efforts, Singaporean insurance companies aim to solidify their position as leaders in climate risk management, ensuring financial stability while addressing the growing challenges posed by climate change.

5 Contents of the Singapore Government to be Improved on Addressing Climate Risk

Singapore, while proactive in addressing climate change, faces specific climate risks for which it needs to enhance preparedness. These include ambitious emissions reduction targets, reducing reliance on fossil fuels, and addressing social equity. There are two related point shown there, first is the ambitious emissions reduction targets. Singapore has pledged to reduce its greenhouse gas emissions intensity by 36% compared to 2005 levels by 2030 and aims to stabilize emissions with the goal of peaking around 2030. However, current policies may not be sufficient to meet the Paris Agreement goals. Second is reducing reliance on Fossil Fuels, Singapore's economy relies heavily on fossil fuels, with a significant oil and gas sector. Shifting away from this dependence is crucial for long-term sustainability. In addition, it is important to ensure that climate adaptation measures do not disproportionately affect vulnerable populations. Policies should mitigate impacts on low-income households and ensure equitable benefits from the transition to a low-carbon economy.

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Key Climate Change Impacts, Singapore is particularly vulnerable to several impacts of climate change, the important part is Sea Level Rise, For the part of the low hallow island, arising sea level becomes the main threaten, most of the nation is just 15 meters above the Singapore Height Datum, with 30% less than 5 meters above it.

6 Conclusion

This study overall around the topic of how climate change influence the Singapore Insurance company , The methodology of this report using Literature Review , this report reference reports from the MAS and Weather Bureau to make deep analysis , Climate change is the tough problem that not only make climate disaster but also influence the profit of Insurance Company , Climate change is the tough problem , threaten surround

global countries , especially for Singapore , The height of the sea level only above 15m above the Singapore standard height , The annual precipitation rise to 2166 mm per year , it seriously threaten the earnings of Insurance company annual year , To be alleviate the loss of Insurance company , The relevant department formulate sets of strategies , The MAS set up specialty tool , it include regulatory guidance , grant schemes , and collaborative platforms, to be arrange specialist to be monitor , However , These strategies have insufficient, Although the Climate Bureau researcher invent the monitor tool that reflect the phenomenon of the changing of climate , but merely depend on the supervise instrument, it unable to resurge the latest data , so it should combine with instrument and On-site testing ,make connection between these , Despite of these , the prospective of the future considerable , gaining a more comprehensive understanding of the dynamic interplay between climate change and the insurance industry, leading to improved risk management strategies and enhanced consumer protection.

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