

INSURANCE IN A CHANGING CLIMATE: CLARIFYING THE SECTOR'S ROLE IN SUPPORTING SUSTAINABLE BEHAVIOR

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KEY FINDINGS

1. There is evidence that certain behaviors simultaneously reduce risk while also generating sustainable outcomes such as lower greenhouse gas (GHG) emissions. Examples of this “halo effect”, however, are case and context specific – thereby limiting the learning that could help insurers play a more significant role.
2. Insurers have an opportunity to leverage premiums and other incentives to encourage green behaviour, but there is uncertainty about whether there are strong relationships between such behaviour and lower risk profiles.
3. More research is necessary to reduce this uncertainty by developing indicators of green behaviour (e.g. low GHG emissions) among policyholders and determining if there is a relationship to a lower risk profile that can be rewarded or incentivized through insurance.

1.0. Introduction

Traditionally, insurance has supported individual risk mitigation through incentives that allow customers to do so in a way that is proactive rather than reactive. For example, raising premiums can signal to a property owner that they should invest in risk mitigation to receive a lower premium. More recently, the sector has started to explore the role it can play in influencing behaviour beyond strict risk mitigation, such as the reduction of greenhouse gas (GHG) emissions. This behaviour that generates lower risk for insurers while promoting sustainability among customers has been described as the “halo effect” in insurance.

Although in behavioural economics the “halo effect” is about overall perceptions, in order to apply it to the insurance industry, the “halo effect” can be generally defined as an indirect relationship between a behaviour exhibited by the insured and lower risk for insurer (Mills et al, 2007). For example, a building that adopts smart technology (e.g. sensors that monitor indoor humidity levels) could also have a less risk of water damage (Mills, 2019). A critical indicator of the “halo effect” is the indirect nature of the relationship between a behaviour and lower risk profile. The motivation for the behaviour is not related to the benefits of lower risk, but other factors that are often highly context specific such as efficiency gains associated with the action, such as building design improvements (Mills, 2019) or the natural and financial value-add of organic farming (Knutson et al., 2011).

A more available and specific example involves a direct relationship between lower GHG emissions (used interchangeably with “green behaviour” in this brief) and lower risk. Examples of this include increasing building energy efficiency, adoption of greater clean technology or using alternative forms of transit (such as electrical vehicles) as well as reducing driving distances. Having customers be proactive in these areas can ultimately help reduce physical and economic risks for the insurer (Mills et al, 2018). It is unclear, however, whether this “green”

behaviour actually leads to lower risk for the insurance industry as a whole. This gap in knowledge and lack of empirical evidence showcases the significant opportunity to understand the relationship of lower GHG emissions from customers and their related risk exposure to climate change (Ummel, 2014).

The scope of this brief looks to explore whether there is evidence of a “halo effect” in the insurance industry involving both a narrow definition of an indirect relationship between behaviour and risk profile, as well as the direct relationship between “green behaviour” and risk. The brief finds that although there are certain specific examples of the “halo effect”, it is not a uniformly applicable phenomenon that can be generalized for the entire industry.

Key findings include the need for stakeholders (such as insurance brokers, financial institutions, residents in hazard-prone areas as well as public sector organizations at the local, provincial and federal levels) being involved in influencing some level of behaviour change (Kunreuther, 2015, p. 759). Furthermore, by identifying risk factors other than those that are purely economic, premiums that can be risk-reflective can help customers understand their risk exposure. Finally, given how individuals can be reactive rather than proactive, there is significant opportunity for insurers to tap into behavioural biases in order to mitigate risk stemming from climate change.

This brief concludes by highlighting there is uncertainty over the appropriate role that insurance industry plays in addressing sustainability and climate change. However, it recommends that future research is needed in the area of insurance-specific GHG footprints in order to analyze the effectiveness of green insurance initiatives and subsequent customer behaviour change in the context of climate risks.

1.2. Method

This study provides the results of a systematic review of peer-reviewed and grey literature on the topic of insurance incentives and behavioural change. Searches were conducted in scholarly databases using a range of key words such as “halo effect”, “risk mitigation”, “incentives” before gradually refining the collection of articles captured for analysis. For this brief, three inter-disciplinary databases were identified as sources of relevant literature, namely Web of Science, Scopus and ABI/Inform. In total 50 articles and reports were chosen based on how relevant their abstracts and key words were to the topic.

1.3. The “Halo Effect”

Evidence for the “halo effect” was mostly found in specific examples with little evidence beyond spurious relationships between behavior and risk reduction. A prominent example of “halo effect” involves improvements in design through green roofs and improved insulation that can have an indirect impact on improving indoor environments and reducing heat-related mortality (Lee, Kim & Lee, 2014; Alexandri & Jones, 2008). The other building example occurs when installing sensor technology that can improve monitoring of humidity levels and therefore improve response time to address problems of water damage (Mills, 2019).

“Pay-as-you-drive” auto insurance policy is an example of the direct form of the “halo effect” where insurers strategically use premiums to incentivize behavioural change. Policyholders that drive less tend to have a lower risk profiles and therefore pay less in terms of premiums. However, this product is unique as it aligns driving risks with environmental benefits (reducing GHG emissions), with the former being a primary factor in calculating the premiums.

Other examples of insurer driven risk-based premiums also exist for hybrid or electric vehicles (TD Insurance, Sompo Japan Insurance, Tokio Marine Nichido, Farmers Insurance,

Travelers, AXA, Fortis and the Co-operators¹) as well as energy efficient buildings (Fireman's Fund's 'GreenGuard' policy, Chubb, The Hartford, Travelers, Farmers and the Co-operators) (Mills et al, 2018).

In the agricultural sector, the “halo effect” can also exist for organic farming, which seems to be more resilient in drought prone conditions (Knutson et al., 2011). However, insurance is not the motivating factor in inducing farmers to choose organic best practices rather there are benefits that organic farming brings, including following good farming practices such as soil rich in organic matter or diversification of crops. These products receive an economic premium in the marketplace as awareness about the benefits of organic food grows (Knutson et al., 2011).

2.0. What role does insurance play in supporting the “Halo Effect” and behavioural change?

Although examples of behavioural change that promote sustainable outcomes (e.g. GHG reduction) are quite specific, there is more analysis on the role insurance can play in generating the right incentives. As suggested by Kunreuther (2015) an interesting strategy for the industry may be to “return to its root” (p. 743) by meeting two key criteria; provide information to those residing in hazard-prone areas about the nature of risks they face, as well as incentivizing those policyholders to undertake loss reduction measures prior to a disaster.

Risk-based policies and products: Insurance policies can be used to incentivize prevention, adaptation and even recovery when it comes to risk. This can be done using pricing signals like premiums, deductibles and caps in the insurance policy. Some studies show that climate mitigation behaviour, such as improvements in energy efficiency, change can be best addressed through risk-based premiums, as they are the most tangible for the policy holder. In comparison, deductibles are more effective when tied in with property-level mitigation measures, whereas caps are least tangible as they only effect policy holders when losses occur (Seifert-Dähnn, 2018). However, climate risk is often not reflected in a single premium and therefore it might help to bundle climate-related risks within different insurance policies (Botzen, Aerts, & van den Bergh, 2009).

Increasing preparedness through risk perception: Risk perception is considered an important first step in facilitating behavioural change as there is evidence knowledge on risk creates an intention to take action. For example, awareness of flood risk has led to private precautionary measures being taken, which significantly limited future flood damage (Botzen et al., 2009). Several studies showcased that insurers were advocating such preventative measures, especially to those exposed to flood risk. However, by supplementing such advice with pricing signals, policy coverage and product structuring, the industry can strongly signal to the customer

¹ The Co-operators offer a hybrid or electric vehicle discount (5% on their auto-policy premiums). For home insurance, they offer premium discounts and coverage for using more eco-friendly and sustainable products (like Enviroguard, Envirowise Discount etc.). For business insurance, they offer special insurance coverages to non-profit, co-operatives and community-oriented organizations to help improve resilience and support among communities. In terms of solar energy, insurance is offered to cover solar panel installation and related equipment through its farm insurance program. Even through claims, The Co-operators are able to help clients find environmentally preferred solutions for repairs and donate salvaged property and building materials to Habitat for Humanity building projects in order to reduce waste (The Co-operators, 2019).

whether a risk is insurable or not. This is important as it can create new innovative products and services that enable mitigation or adaptation of climate impacts at the customer-level (Thistlethwaite, 2012).

3.0. Barriers to behavioural change

The following are some of the barriers to the insurance industry in terms of behaviour change:

Risk perception: One of the main barriers to behavioural change is the moral hazard issue – which occurs when actors like customers might anticipate lower urgency for prevention measures. This is especially evident in scenarios where they have purchased insurance coverage and therefore perceive their risk as being low. This type of bias is also seen as a charity hazard when people feel safe behind a structural protection measure, such as government intervention. For example, where there is higher market penetration or the availability of emergency funds (such as the European Solidarity Fund) it lowers the need or risk perception of the government to implement the prevention measure (Seifert-Dähnn, 2018, p. 2413). This perceived yet false sense of security is what prevents the right course of mitigation or adaptation action when addressing uncertainties from climate impacts.

Awareness levels and irrational behaviour: The other major barrier to behaviour change is the issue of awareness – wherein most policyholders lack awareness or knowledge of how their actions can lead to lower premiums. It seems that most insurers have not maximized their marketing or awareness raising campaigns on how green behaviour might be more beneficial to the customer in certain contexts. For example, risk communication of non-green behaviour can be done through mass media campaigns in newspapers, radio, TV and the internet, but also through compulsory information disclosures for rented or sold properties and through education programs for clients². Doing so not only helps raise interest among the public, but also makes policyholders more aware about their personal risks and the benefits of having insurance or risk reduction measures in place. Furthermore, as behavioural economics suggests, sometimes individuals behave irrationally perceiving the benefits of insurance as less valuable than vulnerability (Seifert-Dähnn, 2018).

Competition: Although some countries charge risk reflective premiums, there are very few international examples of incentivizing risk-reduction behaviour. One aspect of this is due to market competition that forces the insurance industry to keep premiums and other policy tools artificially low in order to attract more customers. For example, in the UK, although there are risk-reflective premiums, the competitiveness of the market is such that premium levels are kept low and reduce incentives for individual risk reduction measures (Priest, Penning-Roswell & Suykens, 2016).

Data uncertainty: One of the biggest barriers to behaviour change is insufficient data available on the impact of insurer policy changes on customer behaviour. This review also found this lack of empirical data constraining when trying to pinpoint the relationship between risk

² Evidence of benefits due to information campaigns is seen in Germany, where information about natural hazard insurance was run by several government agencies with support from the insurance association. These campaigns were successful in raising the insurance penetration to an average of 40% and have doubled the number of policies within the last 15 years (Seifert-Dähnn, 2018, p. 2415).

perception or behaviour change using insurer signals. Given the findings were context specific, it further suggests that need for rigorous research is examining the relationship between risk and sustainable changes in behaviour.

Information asymmetry and adverse selection: There is a problem of information asymmetry between policy holders and insurers, and this can also be a barrier for behaviour change. For example, when individuals who are at a higher risk for flooding seek more insurance coverage, and insurers charge too low a premium for this risk (Seifert-Dähnn, 2018). However, this type of barrier can be corrected by the insurer by allocating more internal resources towards understanding the correct level of risk using climate models, scenario analysis and other such tools.

Limitation due to institutional settings: Insurer incentives may be dependent on the distribution of responsibilities between insurers and the government. For example, governmental actors can decide on a country's insurance schemes, regulate the market, set and enforce climate-resilient building codes, provide warnings and emergency services as well as incentivize and implement large-scale protection measures at the regional level (Seifert-Dähnn, 2018, p. 2410). Therefore, the ability of an insurer to proactively act is especially dependent on how policy factors as well as supply-demand can hamper or support their engagement in risk adaptation as well as risk reduction in such new and uncertain contexts (Seifert-Dähnn, 2018).

4.0. Analysis

Insurance alone is insufficient for changing behaviour: In some cases, it was mentioned that behaviour change mechanisms work better when a public sector actor is involved (Aerts & Botzen, 2011). For example, for low-income policyholders, the National Flood Insurance Program in the US is able to grant property-level protection measures for adaptation. In other countries like the UK, they have the "Repair and Renew Grants", whereas in France they have the Barnier Fund which allows households to apply for property-level protection measures and funds for relocation (Mills, 2007). Nonetheless, they can be major stakeholders when it comes to influencing major economic or policy decisions based on their resources and skills in risk management (Mills et al., 2018). For example, insurers can partner with banks or governments to provide premium-linked mortgages that allow the evaluation of the property and its risk level (building efficiency, property-level protection measures etc.) rather than insuring the individual itself.

Individuals are more reactive than proactive: Behaviour change is more evident in cases where a disaster has already occurred – such as the flood in Dresden, Germany in 2002, after which individuals that undertook more private precautionary measures were able to limit future flood damage significantly (Botzen et al., 2009). Survey results in Canada confirm experience with a natural disaster is the most significant predictor of behavioural change. However, it is important to note here that insurers can be in the unique position of having personalized contact with many property owners and this may positively influence the property owner's risk reduction behaviour (Seifert-Dähnn, 2018, p. 2424) before a disaster occurs. If individuals are able to show their proactive approach can mitigate their greenhouse gas

emissions or undertake mitigation measures, it will reduce overall climate impacts and catastrophes as well as improve insurer's loss ratios.

Regulation and market competition can influence insurance signals: Regulation and market competition are two significant variables that can interrupt the economic signal generated through premiums. In some jurisdictions, regulators have forced insurers to reduce their premiums under pressure from political constituencies. These interventions vary in severity, but governments have forced insurers to reduce rates and even started public insurers to compete with the private market. Market competition is a constant source of pressure to reduce rates from actuarial determinations (Thistlethwaite, 2017).

Role of insurance in affecting risk perception: Insurance plays an important social role other than purely risk transfer (Hoyt & Khang, 2000). It ensures that those residing in hazard-prone areas are aware of the risks and incentivizes these individuals to undertake appropriate loss-reduction measures prior to a disaster (Kunreuther, 2015). Risk sharing is also affected by factors like household informal resource-sharing networks or social networks within the community. For example, a study looking at the impact of a cyclone on Bangladesh showed that in order to cope with climate impacts, insurance could help with risk-sharing by introducing options of group-based insurance, especially in communities that are defined by their social or informal ties (Islam & Nguyen, 2018). Furthermore, by framing the risk better, insurers can provide individuals with familiar contexts. For example, individuals may not understand the probability of a one-in-a-million risk but can more accurately relate when it is compared to annual chance of dying in an automobile accident (Kunreuther, 2015, p. 752). These studies show that by comparing risks rather than just mentioning the probability of a loss or an insurance premium, insurers are more likely to help decision-makers assess the need or perception for purchasing the insurance (Kunreuther, 2015).

Opportunity to tap into behavioural biases: Studies looking at behavioural economics and insurance suggests that individuals are more likely to stick to the default option when it comes to their insurance policy (Kousky & Michel-Kerjan, 2017), pick policies that have shorter time frames (2 years vs. 5 years) (Seifert-Dähnn, 2018), opt to insure high-probability-low-loss events (Brody, Highfield, Wilson, Lindell, & Blessing, 2017), respond to climate risk based on whether it aligns with their worldviews (Mills et al, 2016; Botzen, Michel-Kerjan, Kunreuther, de Moel, & Aerts, 2016) and is relatable to them in their local environments (Kunreuther & Weber, 2014).

5.0. Conclusion and Next Steps

There is growing demand for insurers to expand their role in climate change beyond adaptation towards behavioural change supporting mitigation. There is, however, significant uncertainty about the role that insurers can play in supporting this objective. Most critically, insurers need to develop a better understanding of what behaviours are the biggest determinants of sustainable behaviour, specifically GHG reduction. Some of these behaviours are obvious (e.g. driving less) but others are far more uncertain such as property size or relationships between property maintenance (to avoid damage) and emissions.

This brief concludes that more focused research is needed in order to understand how exactly the insurance industry in Canada can play a role in promoting sustainable behaviour

change, especially given how institutional and cultural factors can be important when determining behaviour trends. By examining the relationship between GHG emissions and risk profiles using primary Canadian insurance data, this brief suggests that further research can contribute towards developing insurance-specific GHG indicators. In doing so, it can contribute to better analyzing a customer’s risk profile as well as help address any risk mitigation and behavioural challenges created in the process of internalizing climate-related risks for the insurance industry.

Annexure

Systematic Review Results

Insurer Strategy	Type of Behavioural Change (Risk Mitigation or Adaptation)	Evidence of Influencing Behavioural Change (Low - described in theory, Medium – case and context specific, High – is generalizable throughout multiple studies)
Risk-based Policies and Products	Risk Mitigation (using premiums, deductibles and caps)	Medium to High <ul style="list-style-type: none"> • Climate risk is often not reflected in a single premium and therefore it might help to bundle several climate-related risks with home or farm insurance policies. • Deductibles are more effective in risk reduction, if made at the similar magnitude of costs for property-level mitigation measures. However, premiums are more tangible than deductibles. • Caps are least tangible as they only affect policy holders when the losses occur.
Influencing Risk Perception	Risk Mitigation & Adaptation (targeting customer risk perception)	Medium <ul style="list-style-type: none"> • In some studies, increased awareness of flood risk leads to private precautionary measures being taken, which significantly limits flood damage (Botzen et al., 2009)
Improving Institutional Settings	Adaptation (through risk knowledge sharing)	Low to Medium <ul style="list-style-type: none"> • Even after being impacted by an extreme event, adaptation was

		<p>moderate (58%) and personal as well as environmental factors influence the likelihood of adaptation (Mills et al., 2016). This is a result of most respondents considering large flood events to be rare and of limited impact and anticipating future government aid to overcome flooding damage costs (Mills et al., 2016).</p> <ul style="list-style-type: none"> • However, there is a stakeholder and advocacy role for insurers to play in improving such institutional frameworks within a country.
Prevention (Improving Planning and Building Codes)	Risk Mitigation (especially for flood and hurricane risk)	<p>Medium</p> <ul style="list-style-type: none"> • Theoretically structural resilience can be effectively enhanced by providing insurance premium discounts for mitigation measures (see Florida example in Annex table) • However, on the flood risk side, several studies showcased these preventative measures being advocated by insurer.
Behavioural Change Using Biases	Risk Mitigation & Adaptation (addressing moral hazard, loss aversion, discounting and charity hazard biases)	<p>Medium</p> <ul style="list-style-type: none"> • Aspects of behaviour like sticking with the default option (for example, when it comes to choosing a policy), policy length (2 year policy most likely to be adopted over a 5 year one), sense of loss aversion (more likely to opt to insure high-probability low-loss events), framing of risk based on individual's worldview (political spectrum beliefs) and awareness using mass media narrative of the local/relatable context - can be useful in influencing customer behaviour.
Increasing Preparedness (Awareness and Response)	Adaptation (post-event recovery and resilience)	<p>Medium</p> <ul style="list-style-type: none"> • Some insurers provide monitoring, early warning and emergency response right after disaster events. For example, Swiss cantons' monopoly insurance offers a mobile phone

		application that warns users of approaching natural hazards and how to reduce losses.
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References

- Aerts, J. C. J. H., & Botzen, W. J. W. (2011). Climate change impacts on pricing long-term flood insurance: A comprehensive study for the Netherlands. *Global Environmental Change*, 21(3), 1045–1060. <https://doi.org/10.1016/j.gloenvcha.2011.04.005>
- Alexandri, E., & Jones, P. (2008). Temperature decreases in an urban canyon due to green walls and green roofs in diverse climates. *Building and Environment*, 43(4), 480–493. <https://doi.org/10.1016/j.buildenv.2006.10.055>
- Botzen, W. J. Wouter, Michel-Kerjan, E., Kunreuther, H., de Moel, H., & Aerts, J. C. J. H. (2016). Political affiliation affects adaptation to climate risks: Evidence from New York City. *Climatic Change*, 138(1–2), 353–360. <https://doi.org/10.1007/s10584-016-1735-9>
- Botzen, W.J.W., Aerts, J. C. J. H., & van den Bergh, J. C. J. M. (2009). Willingness of homeowners to mitigate climate risk through insurance. *Ecological Economics*, 68(8–9), 2265–2277. <https://doi.org/10.1016/j.ecolecon.2009.02.019>
- Brody, S. D., Highfield, W. E., Wilson, M., Lindell, M. K., & Blessing, R. (2017). Understanding the motivations of coastal residents to voluntarily purchase federal flood insurance. *Journal of Risk Research*, 20(6), 760–775. <https://doi.org/10.1080/13669877.2015.1119179>
- Hoyt, R., & Khang, H. (2000). *On the demand for corporate property insurance*. 67(1), 91–107.

- Islam, A., & Nguyen, C. (2018). Do networks matter after a natural disaster? A study of resource sharing within an informal network after Cyclone Aila. *Journal of Environmental Economics and Management*, 90, 249–268. <https://doi.org/10.1016/j.jeem.2018.06.007>
- Knutson, C. L., Haigh, T., Hayes, M. J., Widhalm, M., Nothwehr, J., Kleinschmidt, M., & Graf, L. (2011). Farmer perceptions of sustainable agriculture practices and drought risk reduction in Nebraska, USA. *Renewable Agriculture and Food Systems*, 26(03), 255–266. <https://doi.org/10.1017/S174217051100010X>
- Kousky, C., & Michel-Kerjan, E. (2017). Examining Flood Insurance Claims in the United States: Six Key Findings: Examining Flood Insurance Claims in the United States. *Journal of Risk and Insurance*, 84(3), 819–850. <https://doi.org/10.1111/jori.12106>
- Kunreuther, H. (2015). The Role of Insurance in Reducing Losses from Extreme Events: The Need for Public–Private Partnerships. *The Geneva Papers on Risk and Insurance - Issues and Practice*, 40(4), 741–762. <https://doi.org/10.1057/gpp.2015.14>
- Kunreuther, H., & Weber, E. U. (2014). Aiding Decision Making to Reduce the Impacts of Climate Change. *Journal of Consumer Policy*, 37(3), 397–411. <https://doi.org/10.1007/s10603-013-9251-z>
- Priest, S. J., Penning-Rowsell, E. C., & Suykens, C. (2016). Promoting adaptive flood risk management: the role and potential of flood recovery mechanisms. European Conference on Flood Risk Management, E3S Web of Conferences, 7, 17005. DOI: 10.1051/e3sconf/20160717005
- Thistlethwaite, J. (2017). The Emergence of Flood Insurance in Canada: Navigating Institutional Uncertainty: Navigating Institutional Uncertainty. *Risk Analysis*, 37(4), 744–755. <https://doi.org/10.1111/risa.12659>

The Co-operators. (2019). Sustainable Insurance Products. Retrieved from

<https://www.cooperators.ca/en/about-us/sustainable-communities/sustainable-business-practices/client-solutions.aspx>

Ummel, K. (2014). Who Pollutes? A Household-Level Database of America's Greenhouse Gas

Footprint. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.2622751>