KPMG

cutting through complexity

Institute for Catastrophic Loss Reduction
Friday Forums

CIA Water Damage Risk and Canadian Property Pricing Research Project

January 17, 2014

Jacqueline Friedland FCIA, FCAS, FSA, MAAA
Houston Cheng FCIA, FCAS
Adam Peleshok

Questions to Answer

Why are past water damage claims no longer predictive of future claims experience?

What would “good practices” include for actuaries pricing water damage for property products?

Agenda

Background Discussion

- Purpose
- Scope
- Approach

Statement of the Issue

- Significance of water damage claims
- Shortcomings of historic-based pricing methods
- Why is the past no longer predictive?
- Why is this issue crucial for water damage?

Current Canadian Practices

- Actuarial perspective
- Regulatory perspective
- Global company perspective
- Claims and underwriting perspective

Global Alternatives

- Global research papers
- Impact of climate change

Good Practices for Canadian P&C Actuaries

- Data identification
- MRAT
- Coding claims data
- Prioritization of property pricing
- Collective effort
- Emerging models

Background Discussion

- Purpose
- Scope
- Approach

Purpose

First Iteration (December 2011)

A. Measure risk at geographical level

- How can local conditions be measured?
- What information is currently available?
- What work is underway?
- How are the results formatted? How can they be formatted to be most useful to this audience?

B. Measure risk of individual exposures

- Key ways that insureds can limit or prevent losses?
- What is the influence of property characteristics?

C. Illustrate approaches to use (A) and (B) in pricing

- Project future water losses
- Allocate losses by geography and risk

Second Iteration (August 2012)

A. Statement of the issue

- Shortcomings of historic methods
- Why is the past no longer predictive?
- Why is this issue crucial for water damage?

B. Current Canadian practices

- Survey Canadian insurers regarding current practices

C. Global alternatives

- What are insurers in other countries doing?

D. Perform qualitative assessment of best practices

- How to make the most of current resources?
- Compare and contract different methods
- Describe methods that work best in various situations

Scope

Standard Coverage

Home insurance policy covers damage caused by:

- Water main breaks (aqueducts)
- Overflowing sanitary installations (i.e., washing machine that overflows, leaking hot water tank or broken water main).

Optional Above Ground Water

- Sudden and accidental leaking of rain or snow
- Sudden and accidental discharge, backing up or overflow of rain water gutters, eavestroughs or downspouts

Water Damage

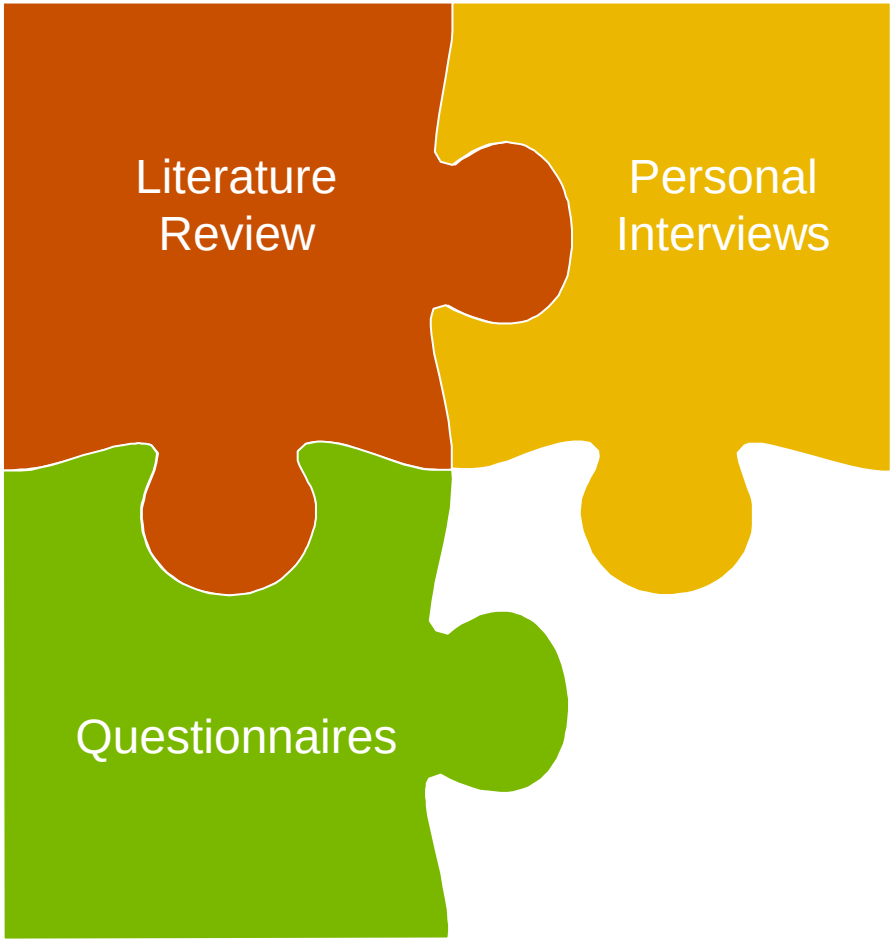
Optional Ground Water and Sewer

- Sudden and accidental seepage of underground or surface water
- Sudden and accidental discharge, backing up or overflow from sewer connections
- Rising of the water table

Not Covered

- Overland flooding

Approach



- 9 insurers
- 2 CAT modelling firms
- 2 provincial regulators
- 3 actuarial consulting firms
- 2 industry organizations

Statement of the Issue

- Significance of water damage claims
- Shortcomings of historic-based pricing methods
- Why is the past no longer predictive?
- Why is this issue crucial for water damage?

Significance of water damage claims

Aviva media release

April 10, 2013

Approximately 40 per cent of all home insurance claims are the result of water damage… and the average cost of water damage claims rose 117%, from $7,192 in 2002 to over $15,500 in 2012, a year in which the company paid out over $111 million in property water damage claims.

"The majority of insurers indicated that water damage currently represents the principal source of claims, and some suggested that this is the result of an increase in the frequency and severity of precipitation."

AMF insurer survey on climate change 2011

Kind of Loss Distribution for Home Insurance Claims in 2011 (Quebec)

Kind of Loss	# of Claims	Paid Claims
Fire	4%	31%
Water	48%	47%
Theft	18%	7%
Other	30%	14%
Total	100%	100%

Source: IBC presentation delivered at a Fire Safety Forum.

Shortcomings of historic-based pricing methods

Fundamental Assumption

Past is predictive of the future

- Rely on historical relationships between claims and exposures/premiums
- Rely on historical reporting and payment relationships

Extraordinary Events

Does not consider extraordinary changes

- Assume no changes would result in future relationships that are different from those observed
- Changes to internal or external environments would invalidate fundamental assumption

Data Shifts

Trends change

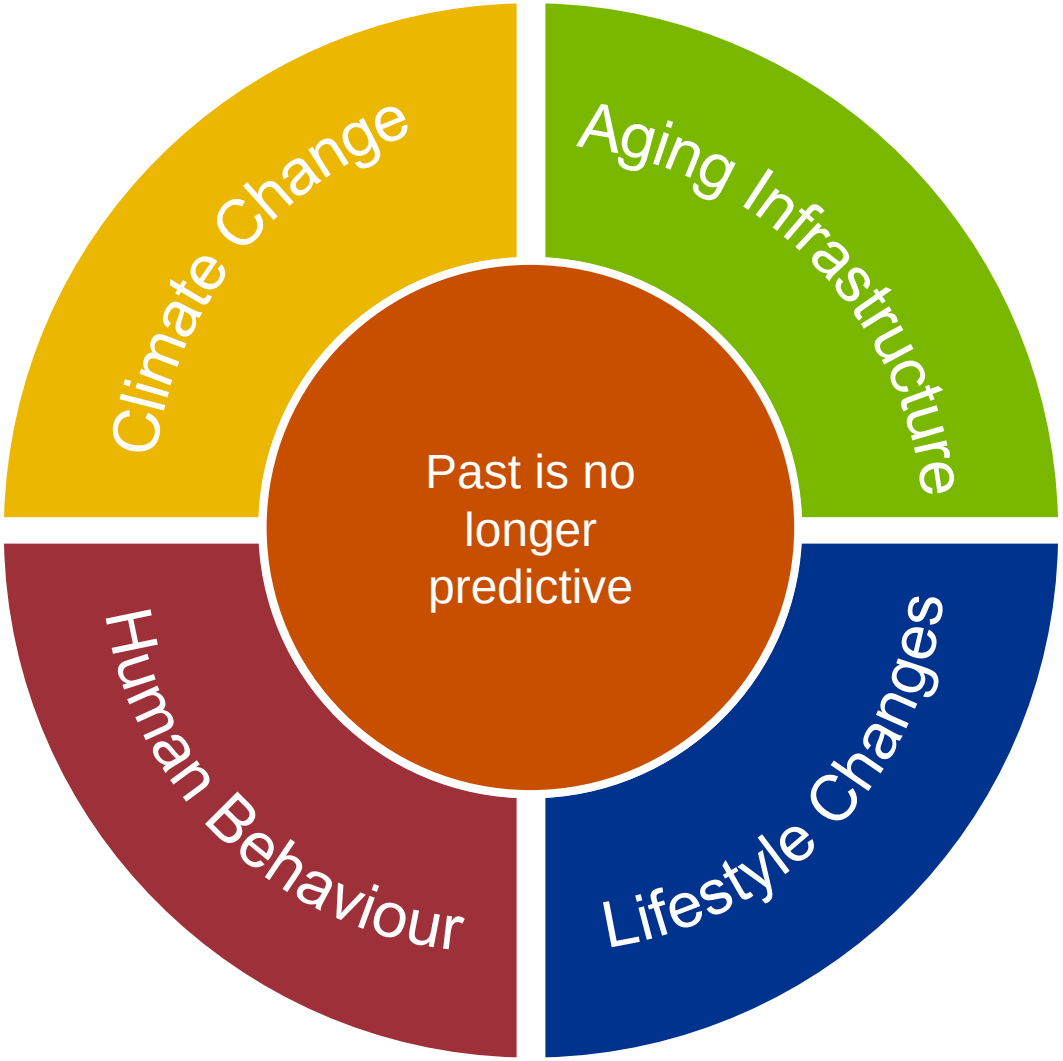
- Without adjustments, traditional methods will not capture increase in claim counts and costs that may result from climate change, aging/inadequate infrastructure, and changing lifestyles
- Policy language may change over time

Data Quality

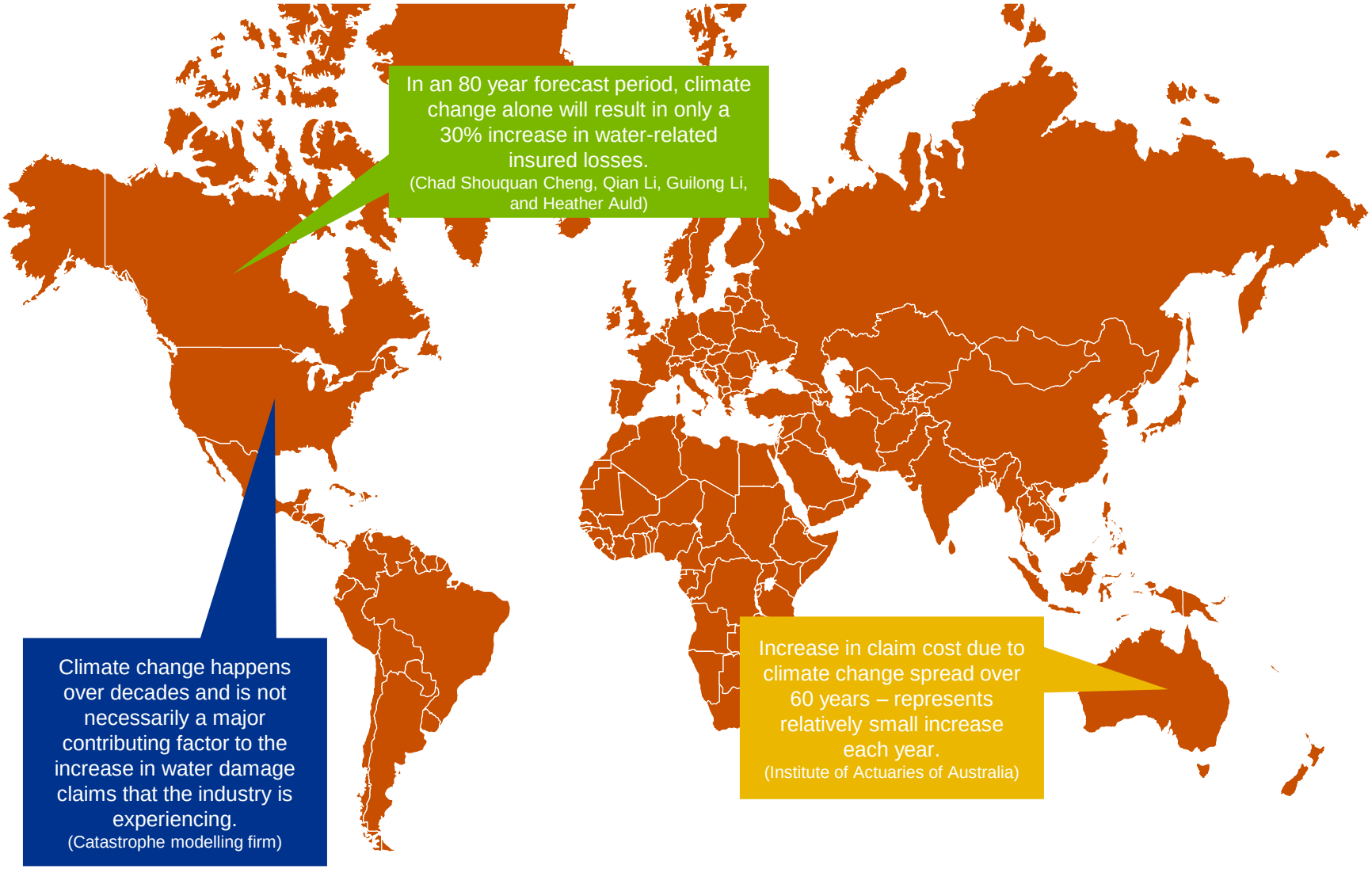
Sufficient and reliable data not available

- Detail and accuracy of internal data vary from insurer to insurer
- Lack of available external data

Why is the past no longer predictive?



Climate change



Aging infrastructure

"[Infrastructure] being operated beyond [its] intended design life and capacity"
(Institute for Catastrophic Loss Reduction)

"In older subdivisions, infrastructure capacity may be designed to a lower standard."
(Institute for Catastrophic Loss Reduction)

"The cost of identifying and addressing infrastructure vulnerability to a future climate during construction is much cheaper than the cost of restoring infrastructure after it has been damaged."
(Climate Change Adaptation Project)

"Design safety margins may not last through the full operational life of an infrastructure system."
(Nodelcorp Consulting Inc.)

"[Safety] margins may be consumed by day-to-day uses/activities."
(Nodelcorp Consulting Inc.)

Many believe that the aging and inadequate infrastructure contributes substantially to the rising frequency and severity of water damage claims for the Canadian P&C industry.

Lifestyle changes and human behaviour

Lifestyle Changes

Increased number of people living in condominiums

- More appliances in units
- Quality of construction materials

Increased number of finished basements

- Basements used as entertainment centres
- Rental properties

Extended periods of time away from home

- Less time and attention paid to dwellings

Busy lives and attitudes towards prevention

- Leaky faucet is household problem with greatest proportion of ‘longer than one month’ repair time

Human Behaviour

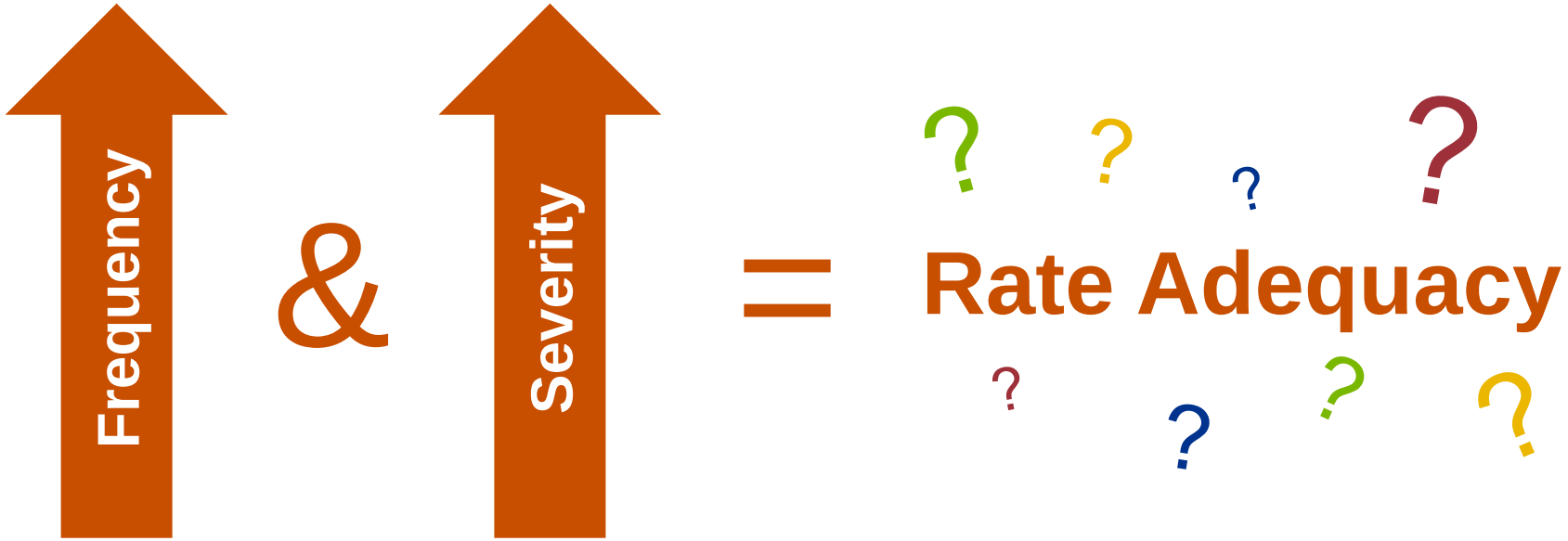
Construction

- Age/quality of construction
- Pace of construction
- Building codes
- Urban sprawl

Human Behaviour

- Budgeting heuristics
- Safety-first behaviour
- Under-weighting the future
- Myopic behaviour
- Procrastination
- Underestimation of risk

Why is this issue crucial for the peril of water?



Current Canadian Practices

- Actuarial perspective
- Regulatory perspective
- Global company perspective
- Claims and underwriting perspective

Actuarial perspective

Current Water Damage Practices

Describe your current processes for quantifying the effect of water damage loss potential for the purpose of ratemaking. Strengths and weaknesses?

- General linear models (GLMs) and traditional techniques
- Reliance on historical experience is reducing the predictive power
- Lack of industry data for benchmarking and modelling purposes

Actuarial Skill Set and Tools

Do you believe that actuaries have the requisite skill set and tools to be able to address the issue of water damage risk?

- Resources dedicated to pricing of water damage risk lag behind automobile
- Lacking the credible data necessary to conduct such analyses
- Tools need better data to be effective. Rethink water damage modelling similar to catastrophe models

Regulatory perspective

Water Damage Claims vs. Financial Health

Are you concerned about the potential effect of water damage claims to the financial health of P&C companies?

- Not as much as hail and windstorm
- Not in terms of strain on capital, but do consider impact on annual net income
- Believe insurers are being vigilant in water damage exposure

Management of Water Damage Risk

Do you see water damage risk addressed specifically in the risk management procedures of the companies you regulate?

- Water damage is in its “infancy stage of risk management procedures”
- Insurers are sensitive to this risk and are taking specific actions to mitigate the impact of water-related claims and of future water events

Global company perspective

Organizational Collaboration

No significant collaboration

- Very little sharing of intelligence
- Irrelevant global data to Canadian market
- Coverage of water damage very different in Canada than the international market

Sharing of Actuarial and Other Resources

Does not appear to be topic of discussion

- Water damage risk not a topic at inter-firm global meetings
- No real tools that can help better assess water damage in Canada

Claims and underwriting perspective

Prevention and Mitigation Efforts

What current prevention and mitigation efforts are in place to address water damage risk?

- Insurers may require certain preventive actions before providing coverage
- Offer discounts for applying a wide range of adaptation practices
- Human behaviour limits effectiveness

Role of Government

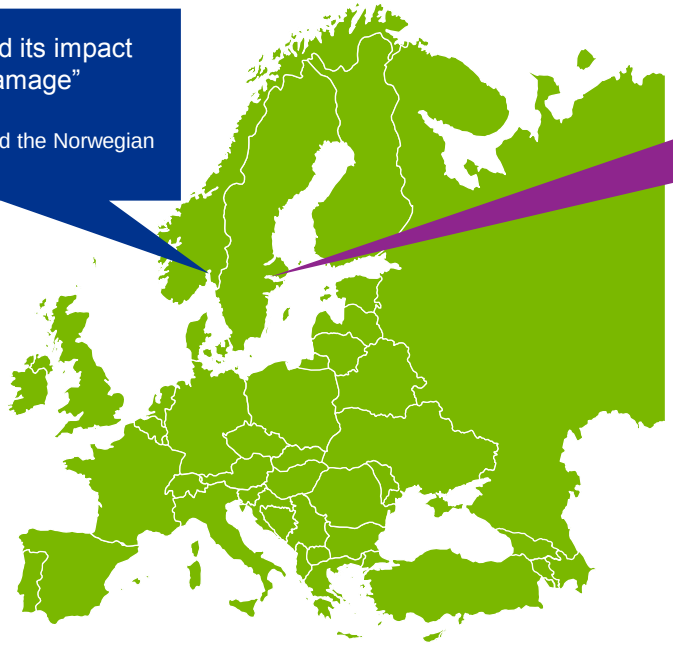
Do you believe that the government has a role to play in addressing the factors giving rise to increased water damage?

- Threat of regulatory intervention is low, but could increase overall costs due to compliance
- Building code standards
- Addressing aging municipal infrastructure

Global Alternatives

- Global research papers
- Impact of climate change

Global research papers

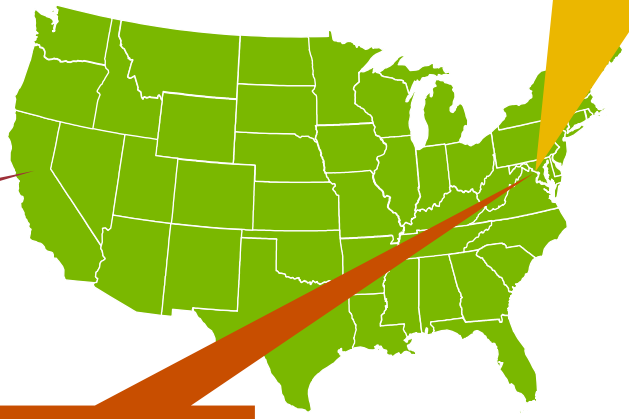


“Climate change and its impact on building water damage”

Gjensidige Forsikring and the Norwegian Computing Centre

“Construction of rating territories for water-damage claims”

Stockholm University



“Predictive Modeling of Multi-Peril Homeowners Insurance”

Variance Journal (Volume 6 Issue 1)

“Spatial Analysis of Frequency and Severity for Water versus Non-water Homeowners Claims in California”

California Department of Insurance

“Quantifying the Impact of Non-Modeled Catastrophes on Homeowners Experience”

CAS Forum (Winter 2003)

Impact of climate change

Who & What

Paper: Climate change and its impact on building water damage

Collaboration between:

- Gjensidige Forsikring
- Norwegian Computing Centre

Authors:

- Ola Haug
- Xeni K. Dimakos
- Jofrid F. Vårdal
- Magne Aldrin

Abstract:

Establish claims model linking water damage from external sources on private buildings with selected weather data

Data

Insurance Data:

- Insurance claims and exposure data from Gjensidige Forsikring between 1997 and 2006
- Excludes catastrophes

Climate Data:

- Observed data (1961-2006)
- Modelled data (1961-1990) and (2071-2100)
- Precipitation, temperature, runoff, and snow water equivalent

Method

Generalized Linear Models

- Claim frequency
- Claim severity
- Climate data
- Geographical data

Scenarios

- Based on two CO_2 scenarios
- High population growth and economic development
- Environmental conservation and sustainable growth

Conclusion

Output

Combine claim and climate data and project future claim payments under both scenarios

Result

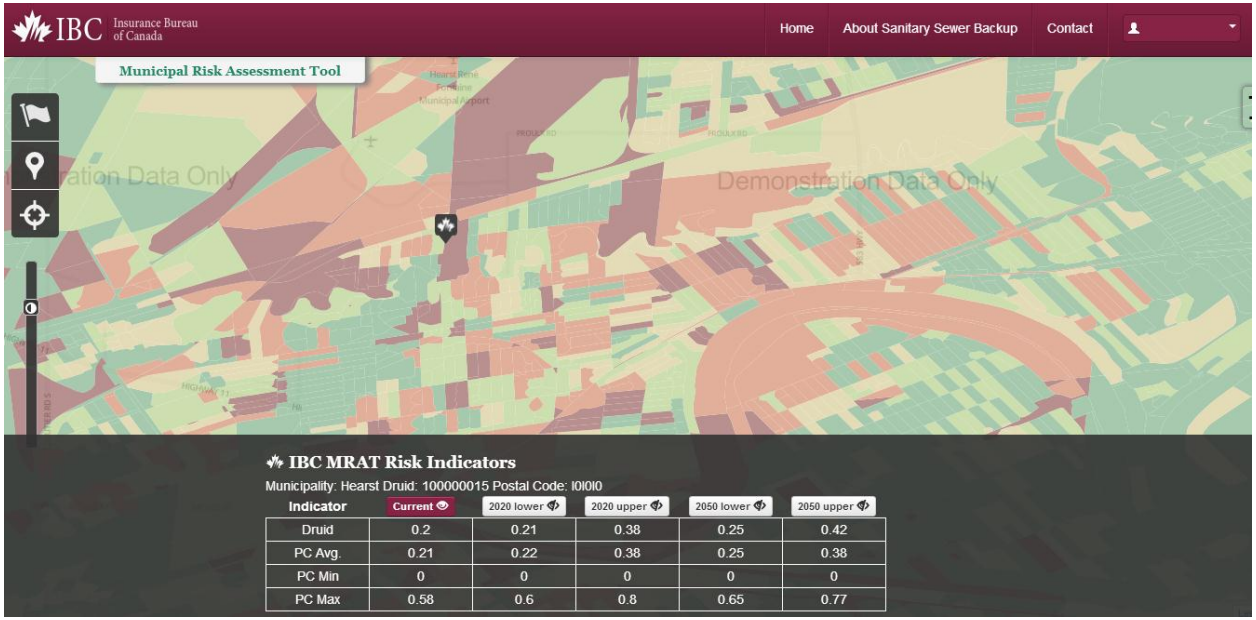
- Claims increase under both scenarios
- Expected payments increase 20% under high growth scenario and 15% under sustainable growth scenario
- Subject to regional variability and differences

Good Practices for Canadian P&C Actuaries

- Data identification
- MRAT
- Coding claims data
- Prioritization of property pricing
- Collective effort
- Emerging models

Identification of and access to data required for pricing

Municipal Risk Assessment Tool (MRAT)

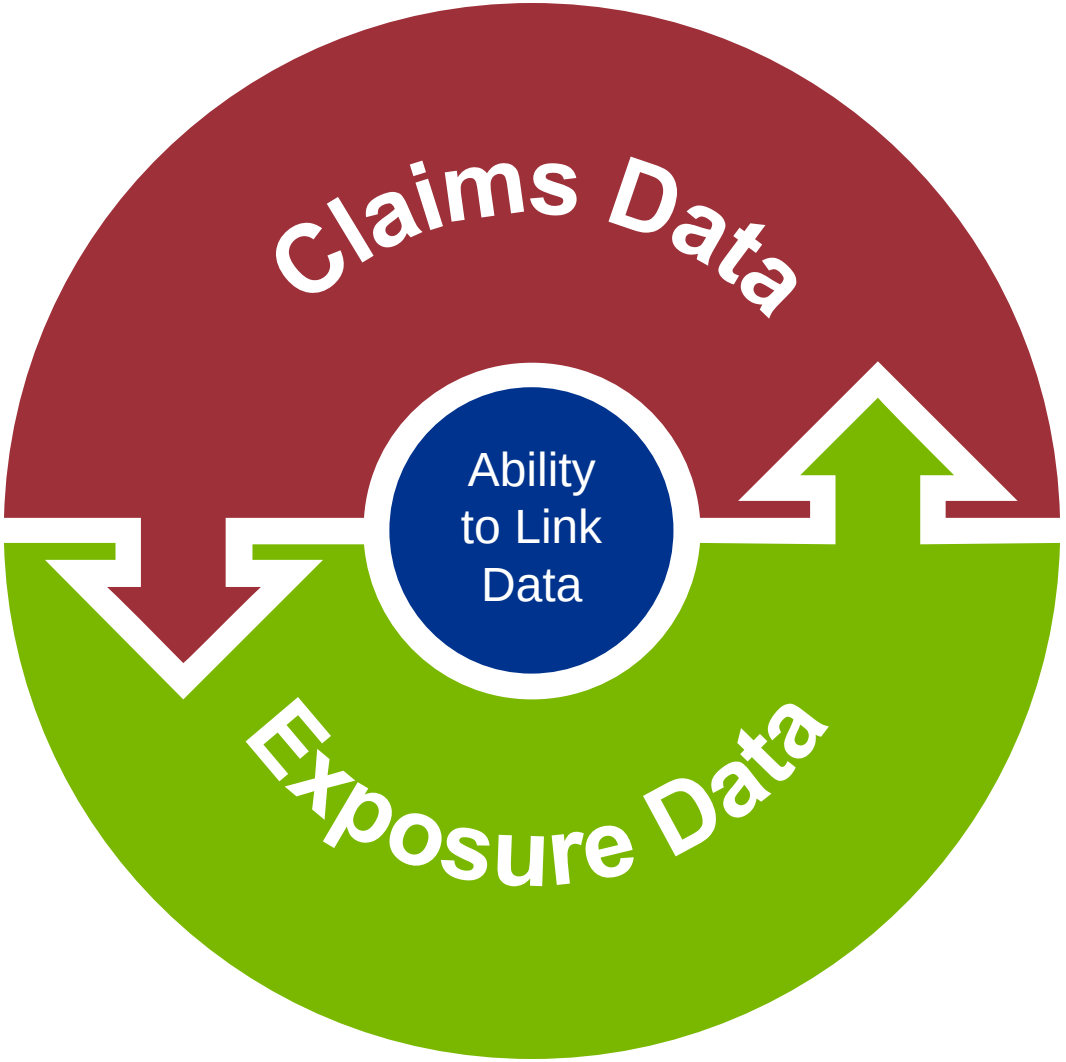


Indicator	Current	2020 lower	2020 upper	2050 lower	2050 upper
Druid	0.2	0.21	0.38	0.25	0.42
PC Avg.	0.21	0.22	0.38	0.25	0.38
PC Min	0	0	0	0	0
PC Max	0.58	0.6	0.8	0.65	0.77

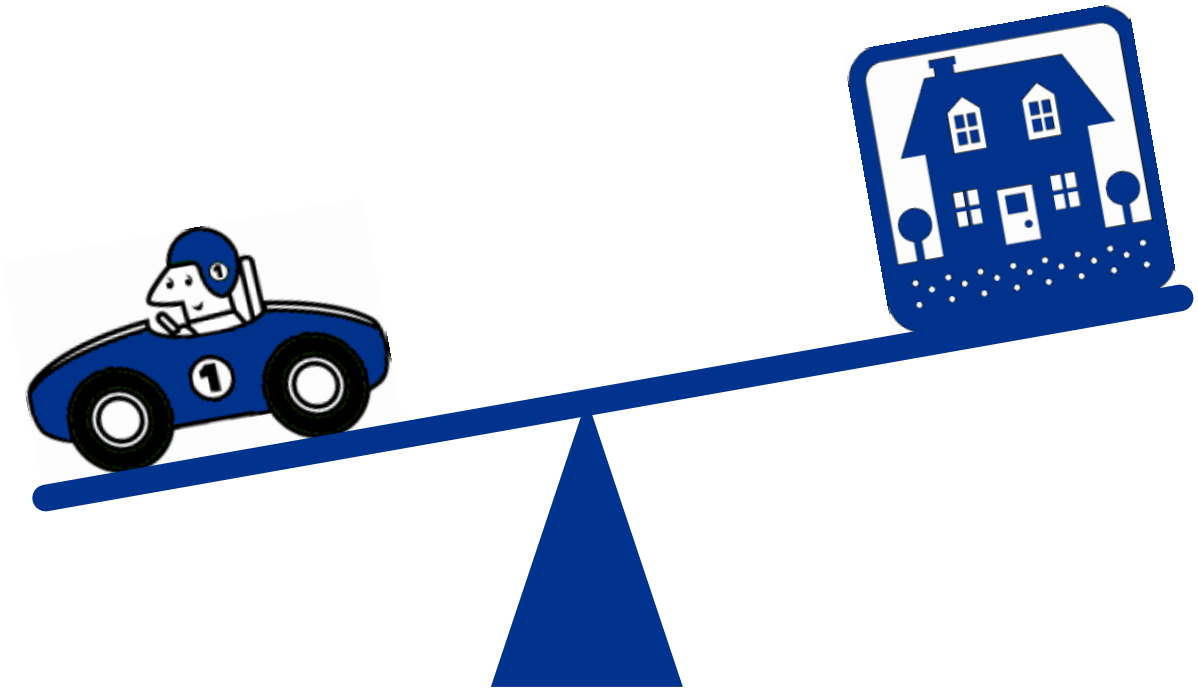
May enable insurers to identify relevant variables for decision-making in pricing and underwriting. Insurers' claims data could be matched with municipal infrastructure data in models such as GLMs.

May improve availability of insurance coverage for sanitary sewer backups.

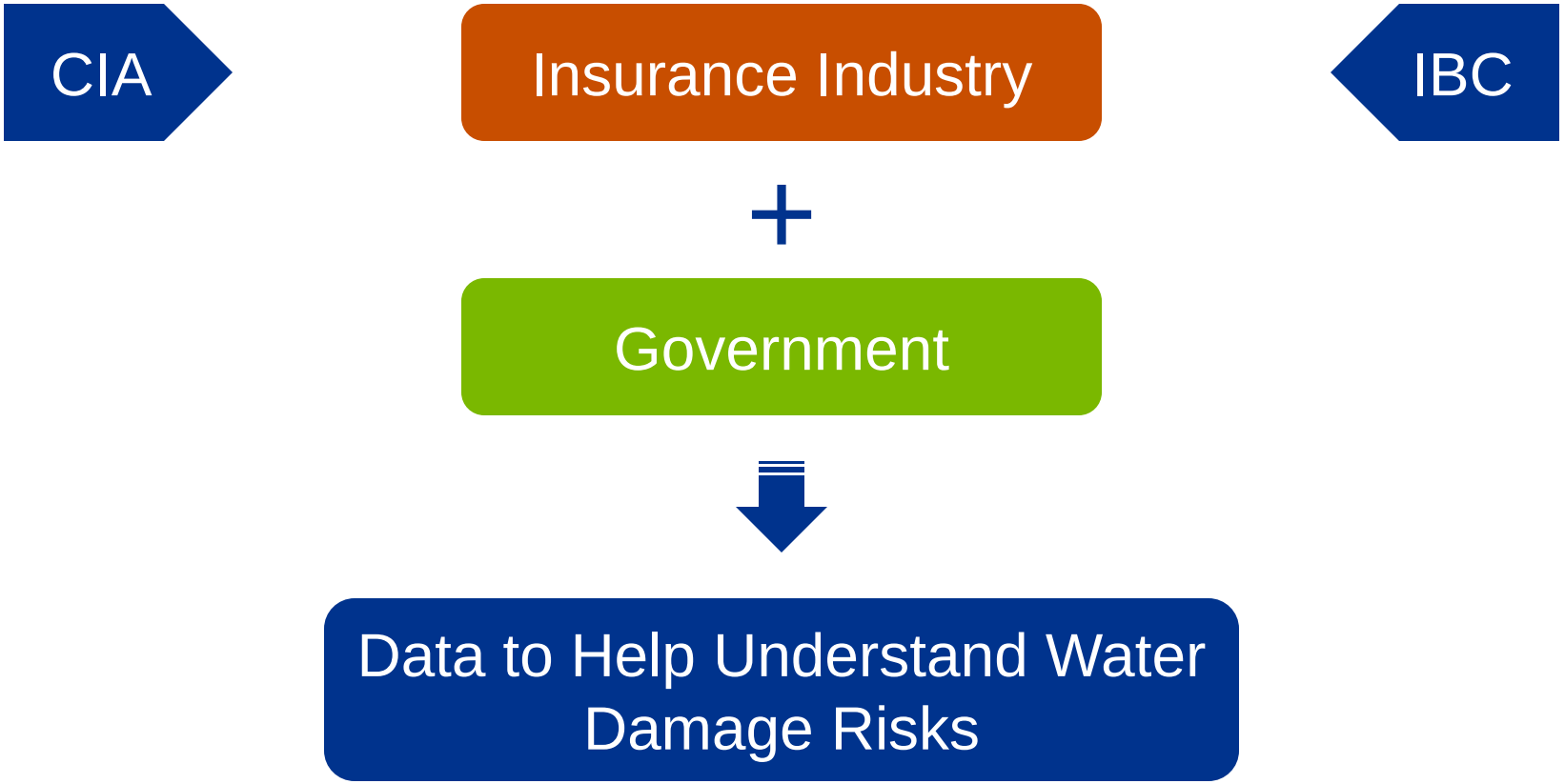
Coding claims data



Prioritization of property pricing



Collective effort



Emerging Models

Oasis Loss Modelling Framework

Description
- Open architecture framework
- Catastrophe modelling
- Not-for-profit

Primary Objectives
- Encourage transparency
- Build community of resources
- Stimulate innovation
- Create viable environment

Use for Water Damage
Plug-and-play nature of model facilitates water damage module to be added to framework.

Computational Hydraulics International

Description
- Software for storm water, sanitary water, and watershed modelling
- Currently used exclusively by engineering firms and municipalities
- Relies on detailed infrastructure data to analyze water-related events

Use for Water Damage
This is a foundation for a water damage model that incorporates infrastructure data to provide frequency and severity projections.

Implementation Challenges
- Tremendous data requirements
- Municipal data restrictions
- High cost to produce model
- No current insurance module

Ambiential

Description
- Flood risk assessment
- Considers geographical and building structural data
- Uses input from weather experts to model extreme weather events

Assistant to Insurer
- Flood risk mapping
- Exposure mapping
- Catastrophe modelling
- Building vulnerability test
- Loss estimation

Questions?

Thank you

Jacqueline Friedland FCIA, FCAS, FSA, MAAA
(416) 777-8320
jfriedland@kpmg.ca

Houston Cheng FCIA, FCAS
(416) 777-8364
hhcheng@kpmg.ca

Adam Peleshok
(416) 777-3771
apeleshok@kpmg.ca

cutting through complexity