Assessing the Viability of Overland Flood Insurance: The Canadian Residential Property Market

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Forward

Images of this summer’s tragic flooding in southern Alberta and the Greater Toronto Area left Canadians across the country in disbelief. Many were further shocked to learn that private insurance against overland flooding is not available for Canadian homeowners.

Flooding is by far the most frequent type of natural hazard in Canada, and is only going to increase as the climate becomes less predictable and more destructive. We need to adapt to this new reality in order to adequately protect our communities, and our economy. This is an enormous challenge we face as a society; one that requires a multi-stakeholder solution. As experts in assessing, mitigating and transferring risk, the P&C insurance industry is clearly a key stakeholder.

There has been much discussion about the viability of overland flood insurance in Canada. The discourse re-entered the public sphere following this summer's catastrophes, but it has been going on for some time, particularly within the insurance and related sectors. There have not been, however, any significant studies engaging insurance executives directly to identify their opinions, concerns and hopes with regard to the viability of overland flood insurance.

To address this gap in the research, The Co-operators asked researchers with the Faculty of Environment at the University of Waterloo to undertake this study, which examines the thoughts of senior executives in the largest insurance companies in Canada. The interviews were conducted during the winter of 2013 – before the events in Alberta had become one of the largest natural disasters in Canadian history. We are thankful for the participation of the many insurance executives and others who gave of their time to contribute to this important research project.

The issues, challenges, risks and opportunities identified through this research will be invaluable as we work toward a broad-based approach to improving flood risk management for Canadian homeowners. The Co-operators is eager to play a constructive role in rising to this formidable challenge.

Kathy Bardswick
President and CEO
The Co-operators Group Limited
Executive Summary

The purpose of this report is to understand the viability of overland flood insurance in Canada by considering the risks and opportunities for the property & casualty insurance industry. Canada is the only G8 country where homeowner insurance for overland flood damage is not available. Consequently, the viability of flood insurance is often debated among insurers, consumers and government flood management authorities in the aftermath of major flood events. Research on the topic, however, remains quite scarce and has yet to directly engage senior executives of the insurance industry regarding their perspective towards flood insurance. Accordingly, this report addresses this gap utilizing structured interviews (that took place Winter 2012) with senior executives of Canada’s largest insurance companies. These companies collectively wrote 57% of all property premiums in Canada as of 2011.

The first finding of this study revealed that insurers are concerned about the lack of flood insurance in Canada, but their opinions are divided when asked whether they think flood insurance is viable. For the purposes of this study, flood insurance was considered viable if: (1) associated risks and losses can be predicted; (2) premiums are affordable; (3) premiums are sufficient to cover losses; and, (4) premiums are sufficient to incentivize investment in risk mitigation by policyholders.

Opponents argued that flooding was not an insurable peril, and the costs of adding an additional layer of risk onto existing property policies, which are already exposed to growing losses, outweighed the benefits. Proponents argued that a product could be designed in a way that made flooding insurable, with the potential to anticipate customer

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1 Throughout the report the “property & casualty insurance industry” will be referred to as “insurers”. “Overland flood insurance” will be referred to as “flood insurance”.

2 Senior executives of the following insurance companies agreed to participate in interviews: Aviva Canada, La Capitale, Chubb Insurance, The Co-operators, Desjardins, Dominion Insurance, Gore Mutual Insurance Company, Intact Financial Corporation, RBC Insurance, SGI Insurance, Swiss Re, TD Insurance, and Wawanesa Insurance. We also interviewed a senior member of the Institute for Catastrophic Loss Reduction (ICLR), and Toronto Region Conservation Authorities flood management team. Interviews are cited anonymously.


4 See section 1.1 Table 1 for a more thorough discussion on the requirements for flood insurance to be viable.
demands, generate additional revenue, and mitigate regulatory and reputational risk linked with the existing gap in coverage.

Second, data gaps on flood risk exposure and government and consumer preferences towards flood insurance are insufficient for making a clear determination on viability. Most insurers agreed that existing flood maps are inaccurate, outdated and inadequate for insurance purposes. This data gap poses a clear threat to the viability of flood insurance. But it also suggests that both opponents and proponents are making assumptions about viability without a clear understanding of flood risk exposure.

A similar finding was that insurers are uncertain about government and consumer perspectives towards flood insurance. Weak widespread demand for flood coverage, and skepticism that government cooperation to implement policies necessary to mitigate exposure in high risk areas were often identified as obstacles. At the same time, insurers argued that a product could be designed in a way that appealed to a wide consumer base, and government cooperation may not be necessary as long as insurers can dictate their own coverage.

Third, insurers expressed significant concern about the sustainability of the existing federal government flood recovery system, known as Disaster Financial Assistance Arrangements (DFAAs). In particular, weak investment in flood risk mitigation and protection was identified as a flaw with the existing system that is primarily reactive and focused on recovery. Without effective mitigation, flood risk was predicted to increase with climate change, which will add burden on taxpayers and potentially lead to reputational and regulatory risk for insurers. This increase in flooding could reduce the availability of existing property insurance coverage in some areas.

The fourth finding of this report was that insurers generally shared the same opinion on the major characteristics of flood insurance necessary to make it a viable product. Insurers agreed that they should administer the product, coverage should be excluded for high-risk areas and the government should be responsible for covering risk in these areas, and additional investments in flood defenses are necessary. Opinion was more divided on the characteristics of a viable product. But, some insurers did agree that insurance should be optional, and to avoid adverse selection, it could be bundled with existing sewer backup endorsements.
The fifth finding from the report was that insurers do not believe an industry consensus is a necessary precursor to the implementation of flood insurance, but cooperation to share costs associated with the development of flood maps would be beneficial. In addition to this cooperation, insurers also supported a wider consultation with stakeholders outside of the sector, including government officials, consumers, banks, investors and developers, to better understand their perceptions towards flood and disaster risks, more broadly.

Based on this analysis, the report has identified two practical recommendations that the industry, or individual insurers could implement to enhance the industry’s understanding of the issue in ways that advance mutual interests.

**Recommendation 1:** Initiate a broad-based discussion on the actions necessary to improve flood and disaster risk management with key stakeholders including government, property & casualty insurers, insurance brokers, banks, investors, developers and homeowners.

**Recommendation 2:** Conduct research on flood risk exposure levels across regions of Canada, prioritizing areas with high population densities.

It is important to note that this study was conducted before the devastating Southern Alberta and Toronto floods of Summer, 2013. This report provides an important benchmark of insurer opinion during a period where recent flooding had mostly avoided significant populations. Further analysis of insurer opinion as the recovery effort continues in Southern Alberta and Toronto may produce additional insights that help clarify whether opinions towards flood insurance are static or can change in response to significant events that affect populated areas. Analysis of government or consumer opinion in the aftermath of the flood could also reveal important evidence to clarify uncertainty about regulatory and reputational risk linked with the gap in flood coverage.
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1. Introduction

While most homeowner insurance policies in Canada cover water damage due to sewer back-ups, currently none of these policies specifically cover damage caused by overland flooding. In fact, Canada is the only G8 country in which overland flood insurance is not available in any form to homeowners.\(^5\) Under the current arrangement, the federal and provincial governments have created programs designed to pay for the recovery of homes and communities damaged by flooding. This government recovery system is fraught with several problems, including: the burden on governments and taxpayers to pay the costs of disaster recovery, a lack of incentives for pre-disaster mitigation investment in flood defences by governments or individuals, and, inadequate development and enforcement of flood plain maps.\(^6\)

Problems with the existing flood recovery system have garnered more attention in recent years after several significant flood disasters.\(^7\) Indeed, unprecedented flooding damage and its economic costs for taxpayers has emerged as an issue in the aftermath of the unprecedented flooding in Southern Alberta in the summer of 2013. This flood is estimated to cost insurers more than $2.25 billion even though the damage to residential homes is not covered in most cases.\(^8\) In 2011, floods in Manitoba and Quebec generated $1.1 billion and $78 million in costs, respectively.\(^9\) In response, the federal government


has started to explore options to increase pre-disaster flood mitigation investments in flood defences, but research has confirmed that flood damage costs are likely to increase as the climate changes and infrastructure reaches the end of its lifespan.¹⁰

In addition to these efforts by the federal government, provincial governments have also started to debate the viability of overland flood insurance as an alternative or supplement to government recovery strategies. For example, The Manitoba government approached the Insurance Brokers Association of Manitoba (IBAM) to discuss potential options for introducing a private flood insurance product.¹¹ A similar request was made by the Quebec government in the aftermath of the 2011 Richelieu flooding.¹²

To date, senior executives of the insurance industry have yet to be consulted for their perspective on the risks, opportunities and viability of flood insurance in Canada. This report provides the results of the first such consultation with senior executives of the Canadian insurance industry regarding overland flood insurance. The consultation involved a series of semi-structured interviews in addition to the completion of a short survey on major issues concerning flood insurance. Semi-structured interviewing involved asking each respondent a series of standard questions that focused on their opinion of the major risks and opportunities of flood insurance, the benefits and drawbacks of the government flood recovery system, and the challenges of developing a viable flood insurance product in Canada.

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¹² Interview D, Flood insurance in Canada, February 2013; Interview Q, Flood insurance in Canada, April 2013.
To understand the results of this consultation, the report will first provide some background on the debate about the viability of flood insurance in Canada. Accordingly, section one will examine the existing Canadian flood recovery system, the impacts of flooding in Canada, and challenges of developing a viable private flood insurance product. The second section is divided into three subsections that will discuss insurer opinion on: (1) the major risks to the viability of flood insurance and potential consequences for insurers; (2) opportunities associated with flood insurance; (3), and strategies used by other countries to ensure flood insurance remains viable. The fourth section will summarize the main findings of this analysis. The fifth section will offer some practical next steps to advance dialogue on the issue, followed by the conclusion.

1.1. Flooding in Canada and Private Insurance

Damage caused by overland, coastal, groundwater or riverine flooding is not covered by private insurance in Canada. Private insurance is, however, available for some forms of water damage, specifically sewer backup. Insurers either include this coverage with property insurance policies, or offer an endorsement that homeowner’s must purchase in addition to their property policy. In Quebec, it is important to note that insurers do include groundwater flooding damage generated by water pooling against a foundation that seeps into a basement with endorsements for water damage.

Outside of sewer backup damage, recovery from water damage caused by overland flooding is financed by provincial and federal governments. In Canada, flood risk management is addressed by a combination of physical defences and infrastructure, disaster relief programs, and flood plain mapping. Provincial governments provide much of the funding and administration for these key components. The federal government’s role is limited to disaster recovery financial assistance in the event of particularly severe disaster damages. Only damage that is not covered by insurance can qualify for

13 Sewer backup coverage can also be limited if there is evidence that the backup is related to an overland flood event.
15 Disaster Financial Assistance Arrangements (DFAA) set out the regulations for federal assistance in the event of disaster damages. To qualify for federal assistance, damage must exceed $1 CAD per capita. As damages increase, the share of the assistance grows for the
government disaster assistance. Since most other perils, such as extreme wind, hail, wildfire, and storm damage are covered by insurance, a disproportionate amount of disaster relief in Canada is diverted towards flood damage.

In Canada, floods are by far the most frequent natural disaster (see Figure 1). Between 1900 and 2013, 289 flood disasters occurred in Canada, which is more than the next three major disaster events combined. As a consequence, flooding represents the most significant fiscal threat to taxpayers that ultimately support federal and provincial DFAAs. In recent years, the costs of overland flooding has been particularly onerous. These costs and the subsequent burden on taxpayers are also predicted to increase with climate change. In response to these concerns, provincial governments, flood management officials, and insurers have started to discuss the viability of flood insurance as an alternative, or supplement to the existing government run system.

For example, if damage exceeds $5 per capita the federal government has agreed to finance 90% of the recovery, while the province is responsible for 10%. See Sandink et al., Making Flood Insurable for Canadian Homeowners: A Discussion Paper, 21.

From an insurance industry standpoint, the viability of flood insurance is determined by four standards (See Table 1). The first standard is that an insurer must be able to accurately price the probability of a flood event occurring, and the losses generated by the event. The second standard is that premiums can be priced at a level that is affordable but compensates the insurer for its costs, including damage losses, capital costs and taxes. While these first two standards constitute the “technical” requirements that a peril must meet, flooding must also address an additional standard based on the feedback from Canadian insurers. Given that insurers operate in a competitive market, this third standard requires that premiums are priced at a level that ensures a modest profit to compensate insurers for the additional assumed risk.

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17 Public Safety Canada, “Canadian Disaster Database.”
Flooding has distinctive qualities compared to other perils that make it difficult to insure in a private market based on these standards. Flooding is not random and tends to consistently impact the same areas (i.e. populations living in flood plains). This concentration of risk leads to adverse selection as only the most at-risk populations choose to buy coverage.\(^\text{19}\) As a consequence, flooding does not impact a broad enough risk community to generate a sufficient premium base to cover large loss events. Insurers could make up these losses by charging more in high-risk areas, but these rates would be mostly unaffordable to consumers.

But these considerations about viability are also impacted by the evolving benefits and drawbacks associated with the current “public” flood management system administered through the government DFAAs. Many proponents of flood insurance believe the risks involved are far less than those generated by the existing system if a product could be designed in a way that meets these standards, avoids adverse selection and therefore become viable as a new source of business.\(^\text{20}\) While insurers are protected from significant loss events under the public system, supporters of flood insurance argue that it fails to generate incentives that encourage homeowners to invest in the mitigation necessary to stem Canada’s exposure to flooding.

Insurance that signals risk exposure to homeowners through risk-adjusted premiums has been recognized as a much more effective tool for encouraging flood risk mitigation compared to government programs.\(^\text{21}\) Without mitigation, significant flood events could force insurers to raise rates or pull coverage for sewer backups, which often occurs during overland flooding events. For this reason, a fourth standard of insurability is that premiums incentivize investment or actions that promote risk-mitigation by policyholders to ensure flood losses over time do not become uninsurable. Existing research on the

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viability of flood insurance is quite scarce, but does suggest that despite the challenges of meeting the standards of viability, a product could be designed that is viable and generates additional revenue.\textsuperscript{22} To date, however, research has yet to directly engage senior executives of the insurance industry for their opinion on the viability of overland flood insurance. The next section will describe the results of this first such consultation.

Table 1: Standards necessary for flood insurance to be viable in Canada.

<table>
<thead>
<tr>
<th>Standards of Flood Insurability in Canada</th>
</tr>
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<tbody>
<tr>
<td>1. Flooding risk and losses can be accurately priced.</td>
</tr>
<tr>
<td>2. Premiums are affordable to consumers, while compensating insurer costs.</td>
</tr>
<tr>
<td>3. Premiums are sufficient to generate profit for assumed risk.</td>
</tr>
<tr>
<td>4. Premiums incentivize actions or investment in risk mitigation.</td>
</tr>
</tbody>
</table>

\textbf{2. The Viability of Flood Insurance}

Opinion among Canadian insurers about the risks, opportunities and ultimately, the viability of flood insurance was largely divided. Although most insurers agreed that insurers should provide flood insurance (See Figure 2), there was disagreement whether a product could be made viable. Some insurers thought the risks of developing flood insurance outweighed the benefits for their company, while others identified the continuing unavailability of flood insurance as a missed opportunity to generate new sources of revenue for their company. To better understand these opposing viewpoints, this section will compare the perspectives of insurers (i.e. which included both proponents vs. opponents of flood insurance programs) on the major risks and opportunities involved in taking action to establish flood insurance in Canada.

\textsuperscript{22} Sandink et al., \textit{Making Flood Insurable for Canadian Homeowners: A Discussion Paper.}
Figure 2: Private homeowner overland flood insurance (i.e., administered through insurance companies) should be provided in Canada.

The first section (2.1) will describe the risks insurers identified as key limitations in meeting the standards for viability and their consequences for the industry. The second section (2.2) will introduce some of the opportunities identified if flood insurance can be made viable. The third section (2.3) will discuss insurer perspectives on strategies used in other flood insurance programs to mitigate risks to viability. To provide context on these risks and opportunities, this analysis will also include insurer perspectives on the benefits and drawbacks of maintaining the status quo where government assistance remains the primary instrument for managing flood risk.

2.1. Risks

Canadian insurers identified two sets of risks associated with flood insurance. The first set of risks includes those that limit the viability of flood insurance. First, the availability of flood mapping data and ability to accurately price flood risk was identified as a significant obstacle that almost all insurers agreed limited their ability to introduce flood insurance. Second, the problem of adverse selection was identified as a risk and major limitation to the affordability and profitability of insurance. Third, insurers expressed concern that flood insurance could be exposed to moral hazard if policyholders forgo investments in mitigation aware that they are covered for damage. Insurers also identified a second set
of risks linked with the challenges of making flood insurance viable. First, if premiums become cost prohibitive to correct adverse selection, the industry could be exposed to reputational damage and excessive regulatory oversight. Second, insurers were concerned that flood insurance would add an additional layer of risk onto existing property policies that amplifies losses as climate change increases the frequency of flooding events.

2.1.1. Availability of Flood Mapping Data

When Canadian insurers were asked to rank the greatest risk to their company if they were to offer overland flood insurance, the “poor availability of reliable flood plain maps” emerged as the most significant risk. Eight out of the sixteen respondents ranked the poor availability of flood maps as the “number one” risk (See Figure 15 in appendix for full list of rankings). In addition, Canadian insurers confirmed that existing data on flood plain mapping is insufficient for underwriting flood coverage in most regions of the country (See Figure 3). Based on this perspective, flood risk and losses cannot be accurately priced, and fails to meet the first standard necessary for viability. Research by ICLR and Swiss Re has indeed confirmed this observation, citing several reasons for the inadequacy of existing maps.
First, Canadian flood maps are designed as “hazard maps” that are helpful in informing land-use planning, but are ineffective as “risk maps” that are needed to make actuarial decisions about risk exposure. More specifically, most hazard maps do not provide information on the risk of actual flood related damage, such as: where damage is likely to occur in the future, frequency of flood events, and the severity or monetary cost of flood related damages. In addition, flood maps in Canada apply different return periods depending on the province, location or authority where it was developed. Alberta applies a 1 in 100 year return period, British Columbia applies a 1 in 250 year period, and Ontario applies multiple return periods in different parts of the province. Most of these return periods are informed by the most extreme example of local historical flooding, such as Hurricane Hazel in the case of Ontario. Without a consistent application of return periods across Canadian flood maps, insurers would have to develop premiums that apply to different risk areas.

Second, access to Canadian flood map data, and the quality of the data is highly variable. Flood maps have been developed by a fractured group of Canadian agencies.

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23 Ibid., 33.
24 Ibid., 32.
including local conservation authorities, provincial ministries, flood management agencies and municipal bodies. While some of these groups make the data available, others do not, or require an application process. Furthermore, many of these maps are not up-to-date and fail to reflect changes in land-use, such as urbanization and climate change impacts on the frequency and intensity of flooding. Canadian insurers expressed significant concern about the existing quality of these maps, and the need for coordination or the development of standards that would help govern the quality and consistency of map data.\textsuperscript{25} Recent major flooding events in Southern Alberta and Toronto in 2013 have further justified these concerns about Canada’s flood maps.\textsuperscript{26}

\subsection{2.1.2. Adverse Selection}

Insurers identified the “inability to charge adequate premiums” as the second most significant risk associated with the implementation of overland flood insurance (see Figure 4). Without affordable and adequate premiums, insurers argued that the business case to implement flood insurance lacks credibility. The inability to charge adequate premiums was linked with the problem of adverse selection. Because flooding only happens in specific locations in Canada, insurers argued that premiums would have to be priced at levels that are too expensive for consumers in these areas to ensure an adequate premium base to cover losses. If premiums cannot be priced at affordable levels that adequately compensate insurers, flood insurance fails to meet a key standard for viability.

\textsuperscript{25} Interview A, Flood insurance in Canada; Interview B, Flood insurance in Canada, March 2013; Interview D, Flood insurance in Canada; Interview H, Flood insurance in Canada, March 2013. 
\textsuperscript{26} Canadian Press, “Alberta Flood Victims Mostly Out of Luck with Insurance.”
To improve the affordability of these premiums, the market penetration would have to expand by offering coverage in lower risk areas. Yet, insurers were skeptical whether lower risk populations would even accept these premiums, since the lower risk group would effectively be subsidizing the cost for those living in the higher risk areas. An attempt by a Manitoba insurer to introduce flood insurance coverage for areas of Winnipeg in the 1990s corroborates this argument. High premiums limited market penetration in high flood risk areas, and demand for this coverage was weak or non-existent in low risk areas.

Other insurers were optimistic that if the product was designed properly it could result in a profitable opportunity, expand their existing market share, while reducing flood risk to homeowners. This optimism was cautiously expressed by a number of insurers who suggested they were “neutral” or did not know whether a product could be profitable. These insurers argued that they could not determine whether flood insurance would be profitably offered.

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28 Gambrill, “Is Overland Flood Insurance Viable in Canada?”.
profitable without first determining the model used to provide the product. As one interviewee suggested, the probability that flood insurance could be profitable under these conditions is “no more or less than any other property coverage if done properly.” A more thorough discussion of the conditions necessary for viability can be found in section 2.3.

2.1.3. Risk Mitigation and Moral Hazard

Insurers were also unsure about the effectiveness of flood insurance as an incentive for policyholders to take mitigative actions to reduce flood risk. Indeed, research has confirmed “in practice many people do not make rational trade-offs between the costs of insurance and its expected benefits in terms of reduced risk.” Some respondents argued that flood insurance had little chance of incentivizing actions that would mitigate flood risk based on evidence that existing property insurance policies often struggle to create incentives towards flood risk mitigation (see Figure 5). This position suggests that insurers question whether flood insurance could meet the fourth standard needed for viability.

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31 Interview A, Flood insurance in Canada.
Insurers that doubted the effectiveness of flood insurance as a tool for mitigation often pointed to the problem of moral hazard. Flood coverage may limit the incentives for policyholders to invest in mitigation knowing that they do not have to pay for flood damage. There is evidence that moral hazard is a significant problem in the U.S. NFIP. Coverage is mandatory for homeowners who live in high-risk areas, which limits the incentives to move or invest in mitigation. This weakness is common within “public” flood insurance schemes such as the NFIP and even Canada’s flood recovery system, but is less problematic in private systems where insurers can set risk-adjusted rates. This analysis suggests that while Canadian insurers are concerned about the risks of moral hazard created by flood insurance, there is equal frustration about the same risks with the government-run DFAA flood risk management system.

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33 Interview G, Flood insurance in Canada; Interview H, Flood insurance in Canada; Interview M, Flood insurance in Canada, February 2013.
34 See Michel-Kerjan and Kunreuther, “Redesigning Flood Insurance.”
36 Insurers often mentioned that due to poor policy language in their own or competitor contracts they had to cover damage generated by overland flooding, specifically urban flooding (See section 2.1.2).
2.1.4. Regulatory and Reputational Risks

In addition to concerns that flood insurance does not meet the requirements to be viable, insurers also argued that reputational and regulatory risks could emerge for the sector if a product struggled to maintain viability. Concern that customers in low risk areas would object to higher premiums through the implementation of flood insurance emerged as the third most significant risk associated with flood insurance. More specifically, insurers were concerned that flood coverage would involve “cross-subsidization” where those in low-risk areas would end up contributing premiums to offset higher costs for those in high-risk areas.37

Cost-prohibitive rates for homeowners that choose to pay for coverage in high-risk areas was also identified as a potential reputational risk.38 There is evidence from other countries that these reputational risks can emerge even though insurers implement actuarially sound premiums for high-risk areas. Australian insurers, for example, have recently had to defend rate increases for homeowners located in these areas.39 U.S. insurers have also experienced significant reputational risks linked with the implementation of actuarially sound rates for hurricane insurance in the Gulf Coast area.40 Reputational risk linked with these rate levels can also lead to regulatory interventions and artificial rate suppression.41

Regulatory risk associated with flood insurance was often identified as a significant concern among Canadian insurers. Although property insurance rates are not regulated, automobile insurance, which is a larger source of business than property insurance, is

37 Interview H, Flood insurance in Canada.
38 Interview M, Flood insurance in Canada; Interview H, Flood insurance in Canada.
heavily regulated in many provinces. Several insurers argued that a flood insurance product, unlike traditional property policies that cover weather perils, is particularly exposed to regulatory risk similar to automobile insurance. Floods are less random but are high impact and costly natural hazards. As a consequence, these costs would raise rates for both high and low risk flood areas to recuperate significant losses. Governments could respond to these rate increases with some form of intervention, as evidenced in Canada and the U.S.

While the opponents of flood insurance pointed out the above-mentioned reputational and regulatory risks linked with flood insurance, supporters argued that the industry could be exposed to these same risks under the current government-run DFAA system. Reputational risk was identified as a significant concern among the interviewees, particularly with respect to the unavailability of flood insurance (see Figure 6). Research by ICLR and Swiss Re suggests that as much as 70% of Canadians believe they are insured for overland flood damage. Almost all insurers were concerned about this perception among policyholders and agreed that they should provide transparency about coverage limitations related to flooding (see Figure 7).

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42 IBC, *IBC Facts 2013*
43 Interview A, Flood insurance in Canada; Interview O, Flood insurance in Canada, April 2013.
As previously stated, reputational risks can often lead to regulatory intervention by governments if consumers collectively confront politicians with concerns about their insurance services. Canadian insurers were concerned about the link between the unavailability of flood insurance and the potential risk that the government could decide to impose a flood insurance system in the aftermath of significant flooding (see Figure 8). There is evidence that this concern is warranted given the outcome of the 2011 Queensland floods in Australia. Reputational risk for insurers increased as policyholders realized that they were not covered for flood damage. The Australian government...
responded by launching a National Disaster Insurance Review (NDIR) that recommended clarifying the definition of flood in insurance contracts to include river and creek flooding. This regulatory intervention has led to an expansion of flood insurance according to the Insurance Council of Australia. From this perspective, the 2011 Queensland floods serve as a useful case to understand how significant and unprecedented flood damage can lead to regulatory intervention in insurance markets and an expansion of flood insurance.

Figure 8: In the absence of private insurers offering flood insurance, government may decide to impose regulations that require insurers to provide flood insurance.

A similar number of Canadian insurers, however, expressed significant doubt that governments would devote resources to an imposed flood insurance program. These insurers argued that concern about regulatory risk in the absence of flood insurance was exaggerated given that any imposed flood insurance system creates significant trade-offs for both provincial and federal governments that made any change unlikely. For example, governments would suffer politically among voters located in high-risk areas that had to pay high premiums, or did not qualify for coverage. In addition, in exchange

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46 Elaine Collins and Lucy Simpson, “Insuring Flood Risk - the Australian and UK Perspective” (Deloitte Global Services Limited, 2011); There is some debate about these penetration calculations. Some experts argue that this growth reflects an increase in policies purchased to cover sewer backups, but not riverine flood damage. See Schlesinger, “Most Home Owners Can’t Afford $8,200 Flood Insurance Premiums as Claims Rise.”
for developing a private insurance system, the federal government could reduce or eliminate disaster financial assistance arrangements that provinces use to recover losses after big events.\textsuperscript{47}

However, proponents often argued that that despite the trade-offs for provinces and federal government, increasing flood losses will create pressure to engage insurers on alternative flood risk management systems that limit exposure to taxpayers. After major flood events in Quebec and Manitoba, both provincial governments approached insurers to engage in a discussion of this nature.\textsuperscript{48} The recent 2013 flooding in Southern Alberta represents a similar case to the unprecedented Queenslands flooding and could help generate evidence on potential regulatory and reputational risks linked with the gap in overland flood insurance. It will be important to observe whether policyholders or politicians raise concerns about the gap as compensation is delivered during the recovery from the flooding.

\textbf{2.1.5. Climate Change Risks}

Many insurers identified climate change as another significant risk if flood insurance struggled to meet the standards required to be a viable insurable peril. Insurers were in unanimous agreement that “climate change will cause a material future change in the frequency and magnitude of overland flooding” (see Figure 9). This argument is supported by climate change science that predicts an increase in flooding linked with more frequent and intense rain events as one of the major risks facing Canada.\textsuperscript{49} Opponents argued that climate change is already threatening the insurability of existing property and the resources devoted towards the development of flood insurance would be more effective if allocated towards climate change adaptation and extreme weather risk mitigation.\textsuperscript{50}

\textsuperscript{47} Interview I, Flood insurance in Canada; Interview Q, Flood insurance in Canada.


\textsuperscript{50} Interview B, Flood insurance in Canada; Interview H, Flood insurance in Canada.
Proponents took the opposite position and argued that climate change and its link to more frequent flooding events justified an effort to start developing a strategy on flood insurance. Insurers justified this position by arguing that existing Canadian disaster management strategies are ineffective at climate change adaptation and some form of price signal is necessary to incentivize risk mitigation. More specifically, existing disaster management strategies expose Canadian taxpayers to a moral hazard because they are “reactive” and focus on the recovery, rather than promoting “proactive” incentives for investing in prevention. Without an incentive to invest in adaptation, Canadians will continue to increase their exposure to climate change risk. Private insurance represents a recognized tool for encouraging risk adverse behavior that promotes climate change adaptation.

Analysis in the previous section reveals that insurers are concerned about two sets of risks. First, they are worried that flood insurance would struggle to be a viable product for the industry. Gaps in flood mapping data, adverse selection (and its impact on profitability), and moral hazard were all discussed as risks to the viability of flood

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51 Interview O, Flood insurance in Canada.
52 Sandink and McGillivray, “Insurance: Adaptation for Existing Homes”; Interview O, Flood insurance in Canada; Interview Q, Flood insurance in Canada.
insurance. Second, insurers discussed the consequences of introducing a product that struggled to be viable for the industry. Reputational and regulatory risks could emerge if prices cannot be made affordable for consumers, and climate change risks expose flood coverage to increases in losses.

### 2.2. Opportunities

Despite the risks involved with flood insurance, proponents made the argument that many of these concerns could be mitigated if a product can be made viable. In addition, a viable product could also generate important opportunities. When asked directly about the potential opportunities generated by flood insurance, insurers identified “anticipating customer needs and maintaining a positive brand” as the most significant benefit, followed by “decreasing probability that government will regulate” and a “new source of revenue generation” as secondary and tertiary benefits (see Figure 16 in appendix).

#### 2.2.1. Anticipating Customer Needs

When asked to elaborate on their justification for choosing “anticipating customer needs”, interviewees argued that flood risk is increasing, and so will demand for flood insurance.54 The potential for an increase in demand was also linked with opportunities around additional revenue generation. High-levels of flood risk perception among homeowners have been identified as a major factor behind demand for flood insurance, but evidence from other countries remains mixed.55 For example, in Australia demand for flood insurance is increasing after the 2011 Queensland floods particularly among new

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54 Interview D, Flood insurance in Canada; Interview E, Flood insurance in Canada; Interview Q, Flood insurance in Canada.
55 See for analysis on risk perception and insurance demand Kunreuther et al., *At War with the Weather: Managing Large-Scale Risks in a New Era of Catastrophes*. 
policies.\textsuperscript{56} But, in the U.S., demand remains low in areas with frequent flooding despite the high-risk exposure.\textsuperscript{57}

Almost all insurers argued that they recognized a “societal” need for an alternative system to Canada’s existing flood recovery program, and private insurance offers a more economically efficient system for consumers. The economic benefits of private insurance compared to government disaster recovery systems were recently the subject of a study by the Bank for International Settlements (BIS). The paper asserts that private insurance plays a significant role in mitigating the macroeconomic impacts of large disasters and can even stimulate economic growth.\textsuperscript{58} Canadian insurers recognized that the implementation of flood insurance could help produce this important economic function, but only if a product met the conditions needed for viability.

\textbf{2.2.2. New Revenue Generation}

The implementation of a viable product could also increase revenue for Canadian insurers. Additional coverage for flood could represent an additional incentive for consumers to purchase insurance over a competitor. Furthermore, coverage could help offset increasing damage claims from sewer backups. Several insurers argued that they were already paying a share of overland flood damage through sewer backup claims as a consequence of policies that are too vague or include pluvial flooding (ie. Quebec).\textsuperscript{59} Flood coverage could generate alternative revenue by formally pricing this risk and subsequent damage.


\textsuperscript{57} Seifert et al., “Influence of Flood Risk Characteristics on Flood Insurance Demand: a Comparison Between Germany and Netherlands,” 1692; Michel-Kerjan and Kunreuther, “Redesigning Flood Insurance.”

\textsuperscript{58} The paper reviewed the economic impacts and recovery to “2476 major natural catastrophes of four different types”. The availability of private insurance was correlated to an increase of 1% of GDP after a natural disaster in developed countries. See Goetz von Peter, Sebastian von Dahlen, and Sweta Saxena, \textit{Unmitigated Disasters? New Evidence on the Macroeconomic Cost of Natural Catastrophes}. BIS Working Papers (Bank for International Settlements, 2012).

\textsuperscript{59} Interview D, Flood insurance in Canada.
One interviewee made a broader argument that regardless of flood risk perception, the innovation necessary to develop viable flood insurance could provide useful insights into the process and resources required to address demand generated by new weather risk markets. Indeed, traditional risks such as fire and theft are decreasing, while new weather related risks are increasing. If insurers are to maintain their credibility and business as risk managers, it will be important to provide products that address the changing demand, such as expanding extreme weather and climate change risks. Indeed, over time, the process involved in developing the data, expertise and government relations to price a risk as complex as flood could help develop a framework for innovation necessary to cover similar, but more dynamic risks such as climate change. It is clear that this type of innovation will be critical to preserving the affordability and availability of insurance as climate change risks increase.

2.2.3. Reducing Reputational and Regulatory Risks

In terms of a more immediate benefit to insurers, some respondents argued that flood insurance could reduce the potential that the government imposes a flood insurance program. Section 2.4 provides much more detail on this discussion among insurers. Supporters did note that they felt flood insurance provided an important opportunity to reduce reputational risks inked with ambiguity amongst homeowners about the types of water damage that are covered. Efforts to reduce these reputational risks would also reduce the probability that governments choose to intervene.

60 Interview Q, Flood insurance in Canada.
64 Interview B, Flood insurance in Canada; Interview O, Flood insurance in Canada.
2.3. Conditions for Viable Insurance

According to proponents of flood insurance, opportunities are contingent on a flood insurance product that is viable as a tool that incentivizes risk-mitigation among the insured while generating a sufficient premium base to cover for significant loss events. Insurers and governments in other countries (See Table 4 in appendix) have developed a range of strategies to meet this condition for viability. The following analysis will assess these strategies and corresponding opportunities from the perspective of Canadian insurers.

2.3.1. Filling in the Data Gap

Canadian insurers supported the idea that the development of flood maps represented an important opportunity for expanding risk data available to the industry and governments. Insurers identified several justifications for this position. First, updated flood map data could significantly improve the insurance industry’s decision-making on flood risk issues regardless of whether insurers decided to offer flood insurance. For example, a clear delineation of areas where flood risks are too significant to provide coverage can help insurers decide if they would like to provide flood insurance, or inform negotiations with government on the flood protection or policies required to reduce risks in these areas. Without this data, insurers expressed concern that if approached by government or consumers, they lack a coherent and defined position on the viability of flood insurance, specifically in high-risk areas.\(^{65}\)

Second, insurers identified flood mapping as an important opportunity to partner with governments in a broader effort to reduce flood risk exposure that could improve mitigation for perils that are insurable. For example, this effort could help inform contract language that delineates between overland flooding and sewer backups at the property lot-level. Insurers demonstrated clear support for improvements in clear and unambiguous policy language (see Figure 7). Due to poor policy language (often by their competitors) insurers often end up covering overland flood damage. Data indicating that

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\(^{65}\) Interview A, Flood insurance in Canada; Interview P, Flood insurance in Canada; Interview Q, Flood insurance in Canada.
a property is located near or within a flood fringe or zone would be useful in clarifying this ambiguity for the homeowner and insurers.66

Third, aggregating flood map risk data into a central database at the provincial or federal level that offers open access could help improve government and homeowner decision-making towards mitigation by making them aware of their own exposure to flooding. The government run DFAA system is highly exposed to continuing liability without improved data to inform land-use decisions. Without improved flood mapping data that is integrated into land-use policy, municipal governments will continue to develop areas that expose Canadian DFAAs, and consequently, taxpayers to economic costs.67 Climate change is also predicted to increase these losses, further justifying the urgency to develop improved flood maps.

Government authorities often partner with insurers to help develop flood maps that provide these benefits to the public. The U.S. NFIP develops standard 1 in 100 year probability flood maps that are used to calculate insurance rates, as well as to inform additional flood mitigation actions by local governments. The German Insurance Association (GDV) has taken the lead in developing a flood mapping system called ZURS that differentiates between four actuarially defined risk zones.68 The U.K. government has developed a standard 1 in 100 year map for riverine flooding, and a 1 in 200 year map for coastal flooding. The U.K. Government makes these maps freely available to the public and insurers through an online portal.69 Australia is currently developing its own standards for flood maps with an emphasis on information that would be pertinent for both insurers and homeowners, to assess the risk profile of individual properties.70 Furthermore, the Australian government seeks to provide a coordinated and open database for flood maps, to help reduce ambiguity and confusion over coverage

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66 Interview A, Flood insurance in Canada; Interview Q, Flood insurance in Canada; Interview D, Flood insurance in Canada; Interview O, Flood insurance in Canada.
67 Interview A, Flood insurance in Canada.
and rates amongst homeowners, and to help insurers in developing their own maps based on this data.\textsuperscript{71}

It is important to note that while insurers do recognize opportunities for their companies through the development of flood maps, they are also concerned about the costs of this effort.\textsuperscript{72} In particular, generating or collecting the data inputs necessary for map generation could be quite expensive given Canada’s expansive geography. For this reason, the Australian flood map project could serve as an example to understand how a large geographic region might be mapped. Technology, such as “Lidar” could also help reduce potential costs. Some Canadian insurers suggested that provincial governments could take the lead in developing maps since they may have more useful topographical and hydrological data.\textsuperscript{73}

In addition to the costs, insurers were also significantly concerned about the political implications of a flood-mapping project.\textsuperscript{74} Municipal land-use decisions in Canada ultimately involve a trade-off between flood risk management and economic growth created by development. For this reason, any effort to develop flood maps must be an independent and scientific process that is immune from political interference. Insurers could then have the option to use this data and develop their own maps. This position suggests that an industry-wide initiative in partnership with the federal government to develop a Canadian flood risk database represents an important opportunity.\textsuperscript{75}

\section*{2.3.2. Limiting Adverse Selection}

Insurers and governments in other countries have employed a number of strategies to reduce problems with adverse selection and improve risk mitigation. To simply this


\textsuperscript{72} Interview H, Flood insurance in Canada; Interview B, Flood insurance in Canada.

\textsuperscript{73} Interview H, Flood insurance in Canada; Interview B, Flood insurance in Canada.

\textsuperscript{74} Interview B, Flood insurance in Canada; Interview Q, Flood insurance in Canada.

\textsuperscript{75} Interview A, Flood insurance in Canada.
discussion, these strategies were grouped into one of two categories including the type of coverage (i.e. “bundling”), and the management of high risk areas (i.e. risk-pooling). The following analysis will break down the risks and opportunities involved in these strategies from the perspective of Canadian insurers.

2.3.2.1. Type of Coverage

The UK model of an optional policy that is bundled with the standard property insurance contract (i.e. fire and theft) has been identified as a solution to adverse selection and weak market penetration. Because Canadian homeowners require property insurance to own a home, market penetration should be sufficient to generate a wide premium base. Despite this potential, Canadian insurers remain divided over whether this approach could in fact avoid the problem of adverse selection (see Figure 10).

Figure 10: Adverse-selection could be overcome in Canada if flood insurance was bundled into homeowner insurance policies that cover other perils (e.g., fire and theft)?

Divisions in opinion about the “bundling” model were driven by a number of concerns. First, many insurers shared the concern that the addition of flood insurance to a standard property contract would decrease affordability, and thus availability as consumers choose to forgo renewal due to cost concerns. The price of coverage would also be

prohibitive in high-risk locations, where demand would also presumably be the most robust.\(^77\)

In addition to affordability, a second concern was related to the nature of competition in the Canadian insurance industry. Canada has one of the most competitive insurance industries in the world with over 200 insurance companies offering property coverage.\(^78\)

The bundling of insurance in existing property insurance contracts creates incentives for insurers to engage in “risk-selection” or “segmentation” where they offer coverage to certain low-risk locations, while excluding coverage to high-risk locales where damage is more likely to occur. Similarly, insurers could offset the potential liability of offering coverage to those most at risk by raising rates on other aspects of their coverage, such as fire and theft. Several interviewees confirmed that insurers “know too much” about the location where flooding is most likely and could easily manipulate coverage to reduce exposure.\(^79\)

A third concern expressed about bundling is that it reverses a market trend designed to reduce exposure to growing sewer backup water damage claims.\(^80\) As the most significant source of claims, Canadian insurers are starting to segment coverage by offering endorsements for sewer backup damage, and increase deductibles and rates.\(^81\) This strategy is designed to provide a more comprehensive price signal that encourages the insured to adopt mitigation strategies.

For some insurers, however, the idea of segmenting sewer backup coverage represented a potential opportunity as an alternative approach to offering a viable flood insurance product. In Quebec, for example, optional sewer backup endorsements include coverage for “pluvial flooding” that enters a home from the surface through a wall or window, but excludes coastal flooding. Several insurers suggested that bundling coverage with a more frequent peril, such as sewer backup, could help overcome the

\(^{77}\) Interview B, Flood insurance in Canada; Interview C, Flood insurance in Canada.
\(^{79}\) Interview H, Flood insurance in Canada.
\(^{80}\) Interview B, Flood insurance in Canada.
problems of adverse selection and weak market penetration that are often associated with optional approaches.\footnote{82 Interview A, Flood insurance in Canada; Interview D, Flood insurance in Canada.}

In Quebec, sewer backup coverage has a high level of market penetration, which could automatically contribute to a sufficient premium base that would cover flood damage costs. In addition, this approach would clarify confusion among policyholders when damage from a storm water surcharge is not covered due to a lack of evidence that it was related to sewer backup.\footnote{83 Interview A, Flood insurance in Canada; Interview E, Flood insurance in Canada; Interview Q, Flood insurance in Canada.} Although providing an optional policy that bundled flood with sewer backup coverage was deemed a viable solution to Canada’s flood insurance gap, most insurers confirmed that it would only be suitable in a province like Quebec where sewer backup coverage has a high market penetration.\footnote{84 Interview B, Flood insurance in Canada; Interview D, Flood insurance in Canada.}

German insurers have adopted this “optional, bundled” approach by offering optional flood coverage that bundled with coverage for other natural disasters and separate from the standard property policy. These insurers do not provide coverage in areas where there is a greater than 1 in 10 year probability of a flood and require mitigation actions for areas where there is a greater than 1 in 50 to 1 in 200 year probability.\footnote{85 Sandink et al., \textit{Making Flood Insurable for Canadian Homeowners: A Discussion Paper}, 48.} There is evidence that this system has in part protected the sector from the significant losses generated by the spring 2013 floods.\footnote{86 AP, “Floods in Germany Could Lead to $4b in Insured Losses,” \textit{Top Canadian Insurance Broker}, June 11, 2013, http://www.citopbroker.com/news/floods-in-germany-could-lead-to-4b-in-insured-losses-5264.} Because coverage is optional, market penetration is relatively low, but growing according to some interviewees with knowledge of the system.\footnote{87 Interview A, Flood insurance in Canada; Interview Q, Flood insurance in Canada.} As a consequence of limited market penetration, the German government has been forced to provide significant disaster relief after flooding events.\footnote{88 Paudel, “A Comparative Study of Public-private Catastrophe Insurance Systems: Lessons from Current Practices,” 265.}

Australian insurers have adopted a particularly flexible approach to flood coverage. Insurers determine individually where they will provide coverage, the type of coverage and price risk based their own actuarial data. There are four different types of policies
currently sold by Australian insurers according to the Insurance Council of Australia (ICA). These policies include: (1) bundling with the property contract (i.e. the UK approach); (2) bundling with the property contract but with an opt-out for the homeowner; (3) optional coverage that is not included with the property contract; and, (4) no flood coverage option. In some situations, this means coverage can be quite expensive or is not offered.\textsuperscript{89} Despite the high cost in some areas, the ICA argued that market penetration is increasing and has now surpassed 50\%.\textsuperscript{90}

This analysis suggests that there is not yet a clear consensus among Canadian insurers whether any type of coverage could address adverse selection associated with flood insurance and subsequent affordability. Some Canadian insurers are, however, optimistic that an “optional, and bundled with sewer back-up” approach might help improve market penetration beyond homeowners that are the most at risk. Insurers were most concerned that even with an expanded risk pool, premiums in high-risk areas may still be too cost prohibitive for the consumer. Insurers and governments in other countries face a similar challenge. The following analysis will explore strategies used in other flood insurance programs to reduce exposure to high-risk areas.

### 2.3.2.2. Management of High Risk Flood Areas

Management of flooding in high-risk areas is critical to reducing adverse selection in flood insurance programs. Almost all Canadian insurers expressed significant concern that insurance in these areas would be unaffordable. To address this problem, insurers and governments have adopted a number of strategies that include infrastructure investment commitments in exchange for coverage, government insurance, risk-pooling, and policy exclusions. Government infrastructure spending on flood defenses represents the most effective approach to reducing risk in these areas according to Canadian insurers. In fact, insurers largely agreed that significant investments would be required before they could offer affordable policies in Canada (see Figure 11).

\textsuperscript{89} Schlesinger, “Most Home Owners Can’t Afford $8,200 Flood Insurance Premiums as Claims Rise.”
\textsuperscript{90} ICA, Insurance Council of Australia - Response to 2011 Natural Disaster Insurance Review; See also Ma et al., “Australian Floods and Their Impact on Insurance.”
The U.K. government has made a formal commitment with its insurance industry to fund adequate flood protection and defences. In its current form, insurers have agreed to provide coverage to locations with less than 1/75 year return period for flood events, in addition to areas that may have a higher risk but will have flood defences constructed to lower this risk probability below the 1/75 return period. New developments are not included in this agreement, and must be located in areas with a less than 1/75 return period to receive coverage. The UK government has also implemented Planning Policy Statement 25 (PPS), which integrates flood protection considerations into land-use decision-making. The U.K. agreement has merit according to some insurers because it provides a formal agreement that insurers could leverage to increase flood protection if rates became too expensive.

Interviewees, were however, quick to point out that in practice, commitments to infrastructure spending are exposed to short-term fiscal constraints, which governments often use to justify a re-allocation of resources away from flood defenses. In the absence of effective flood defenses for high-risk areas, governments often develop their own insurance programs, or in partnership with insurers facilitate risk-pools that help

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93 Interview Q, Flood insurance in Canada.
subsidize coverage. In the U.S., coverage for homeowners in high-risk locations must be purchased by the publicly funded NFIP, which also sets risk-adjusted premiums. The French government subsidizes the cost of reinsurance to encourage insurers to offer coverage in the most high-risk areas.\(^5\)

Among Canadian insurers, there was little support towards the idea of government intervention as it exists in the U.S. and French models. In fact, Canadian insurers almost unanimously agree that they should be the sole administrators of any flood insurance program (see Figure 12). This position reflects a common concern among Canadian insurers that any government participation in an insurance program is a precursor to regulation or a more significant intervention. Recent discussions in Manitoba between the provincial government and Insurance Brokers Association of Manitoba (IBAM), have however, raised the idea of the government providing reinsurance in the event of significant claims. This approach is similar to the French model and reflects a concern among insurers that reinsurance rates could increase if flood insurance is implemented.

\(^4\) Interview A, Flood insurance in Canada; Interview B, Flood insurance in Canada; Interview H, Flood insurance in Canada.
The creation of a risk-pool or reserve that helps subsidize rates for homeowners in high-risk areas is another strategy employed by some governments and insurers. Risk-pools are designed to help expand the premium base necessary to cover for large loss events in high-risk areas without charging prohibitive rates. Usually, a small levy contributed by each insurer provides funding for the pool. The cost of this levy is often passed onto policyholders in lower-risk areas. In simpler terms, those living in low-risk areas “cross-subsidize” risk for those in higher-risk areas by contributing a share of their premium to offset high premiums.

In 2013, the U.K. government and the Association of British Insurers (ABI) announced the creation of a risk pool called “Flood Re” designed to reduce the costs of insurance in high-risk areas without reducing the premium base for insurers. Flood Re is a risk-pool funded by a small levy that insurers collect from each of their policyholders. In the event of a significant claim from high-risk areas, insurers can access the fund in addition to premiums collected from homeowners in these areas. In the event of a significant flood loss that exceeds the reserves, the government has agreed to cover these losses. According to U.K. insurers, the creation of the pool will not lead to an increase in

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premiums in low-risk areas because this form of cross-subsidization was already taking place. 97

Canadian insurers were skeptical about the use of a risk-pool to subsidize coverage for high-risk locations based on their experience employing similar pools in automobile insurance. Australian insurers are equally skeptical and argue that these pools “further government bureaucracy and complexity and will increase the cost of living for ordinary Australians.” 98 In addition, Canadian insurers noted that cross-subsidization limits incentives for investments in flood mitigation in high-risk areas by the insured or by governments.

Instead of government insurance or risk-pooling, German and Australian insurers choose whether to offer insurance to high-risk areas and price risk using actuarially analysis. The Insurance Council of Australia argues that since the government is responsible for flood protection and mitigation it should provide direct subsidies to policyholders paying cost prohibitive premiums. Insurers would agree to help governments by providing data to calculate the subsidies and administer their delivery. 99 Most Canadian insurers agreed with their Australian counterpart that high-risk areas, such as those in the 1/100 flood plain or fringe, are a government responsibility, and coverage should be excluded. This recommendation was also identified in the ICLR-Swiss Re paper as a key condition for the implementation of flood insurance. 100

Even with coverage exclusions for high-risk areas, several Canadian insurers doubted the effectiveness of this approach as a strategy to address adverse selection arguing that low-risk homeowners would have few incentives to purchase coverage to generate a sufficient premium base. 101 Research from Germany supports this position. According to one paper, market penetration in Germany is between 5-10% for flood insurance. 102

99 Ibid.
100 Sandink et al., Making Flood Insurable for Canadian Homeowners: A Discussion Paper, 52.
101 Interview G, Flood insurance in Canada; Interview H, Flood insurance in Canada.
number was contested by a number of interviewees who argued that penetration was much higher and a growing number of new policies sold include the flood insurance endorsement.\textsuperscript{103} Recent research from the Insurance Council of Australia confirms this position. Despite significant costs and outright coverage exclusions in high-risk areas, market penetration now exceeds 50\%.\textsuperscript{104} Several insurers pointed to these examples as evidence that in Quebec existing sewer backup endorsement penetration rates could be leveraged to generate a similar premium base for overland flood damage.\textsuperscript{105}

\subsection*{2.3.3. Risk-based pricing as incentive for mitigation}

Opponents argued that flood insurance would likely suffer from moral hazard and fail to generate sufficient incentives for policyholders to invest in risk mitigation. On the other hand, an almost equal number of insurers believed that flood insurance might in fact reduce flood risk, or were undecided. Many of the insurers in the “undecided” group agreed that if designed properly, a flood insurance product could be just as effective as existing policies for mitigating risk (see Figure 5). Proponents argued that as long as premiums are risk-adjusted based on actuarially sound calculations, incentives would be sufficient to encourage risk-mitigation at similar levels as existing property insurance. Much of the evidence for moral hazard comes from research on publicly run flood insurance programs, such as the U.S. and France, that often fail to charge risk-adjusted rates.\textsuperscript{106} More research on systems that strive to charge risk-adjusted rates, such as Australia or Germany, could help clarify whether incentives are strong enough to encourage mitigation.

\subsection*{2.3.4. Consensus is not a precursor to implementation}

This above analysis reveals that some Canadian insurers share consensus that if a product is actuarially informed, bundled with an optional endorsement and excluded from

\begin{thebibliography}{99}
\bibitem{103} Interview A, Flood insurance in Canada; Interview Q, Flood insurance in Canada.
\bibitem{104} ICA, \textit{Insurance Council of Australia - Response to 2011 Natural Disaster Insurance Review}; See also Ma et al., “Australian Floods and Their Impact on Insurance.”
\bibitem{105} Interview A, Flood insurance in Canada; Interview D, Flood insurance in Canada.
\end{thebibliography}
high-risk areas, flood insurance represents a potential opportunity for the sector. If these insurers wanted to move forward with the development of flood insurance, their counterparts in the sector would not object. Indeed, division among insurers was not identified as a significant obstacle towards the implementation of overland flood insurance if an individual insurer wanted to start offering a product (see Figure 13). Most insurers argued that ultimately each company must decide their own appetite for risk, and they would be curious to see whether such an effort would be effective. At the same time, most respondents argued that they would be hesitant to offer a product without additional flood risk and map information and collaboration within the industry or with government could reduce these costs. In addition, most insurers thought that in the long-term a clear industry-wide consensus on flood insurance would be more beneficial for the sector if ever engaged by government or other stakeholders about existing gaps in coverage.

Figure 13: If a mid-to-large size insurer was to offer the first overland flood insurance in Canada, how would this be perceived by your company?

3. Main Findings:

Analysis of Canadian insurer opinion on the viability of overland flood insurance, and its risks and opportunities compared to the existing public-run flood recovery system, reveals a number of important findings. These major findings are outlined below.
1. Senior executives of Canada’s largest property & casualty companies are concerned about the lack of flood insurance in Canada, but support for the development of flood insurance is divided (See Table 2).

Opponents identified two sets of risks. First, these insurers identified a number of risks to the viability of flood insurance including gaps in flood mapping data availability, adverse selection, and moral hazard. Second, insurers also spoke about the risks of implementing a flood insurance product that struggles to maintain viability. These risks included high costs for policyholders (which could increase reputational and regulatory risks), and climate change impacts that could expose flood insurance to increasing losses. Despite these risks, proponents identified a number of opportunities linked with a viable flood insurance product. These opportunities include anticipating customer demands, reducing reputational and regulatory risks linked with the coverage gap, and generating an additional source of revenue.

The interviews revealed that the division between proponents and opponents was largely shaped by their perspective towards the effort to achieve the requirements necessary to make flood insurance viable (See Table 3). Opponents believe this effort would generate more costs for the sector than benefits. Indeed, all insurers expressed significant concern that the viability of Canadian property insurance markets is under threat from increases in existing insurable perils driven by extreme weather and climate change. Opponents believed that the resources necessary to develop a viable flood insurance market would be more beneficial if focused on reducing existing insurable perils.
<table>
<thead>
<tr>
<th>Risks</th>
<th>Level of Consensus</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flood mapping data is insufficient</td>
<td>High</td>
<td>Proponents and opponents agreed that data gaps in flood mapping constitute a significant risk to the industry.</td>
</tr>
<tr>
<td>Adverse selection impacts on profitability</td>
<td>Low</td>
<td>Opponents worried that profitability would be limited as only those facing high flood risk would purchase coverage. Proponents argued adverse selection could be managed through product design and excluding high risk areas from coverage.</td>
</tr>
<tr>
<td>Moral hazard</td>
<td>Low</td>
<td>Opponents argued flood insurance was exposed to moral hazard and would fail to encourage risk mitigation among policyholders. Proponents argued levels of risk mitigation would be no different than existing products if implemented.</td>
</tr>
<tr>
<td>Reputational and regulatory risks linked with high costs</td>
<td>Low</td>
<td>Opponents expressed significant concern about the reputational risks linked with higher insurance costs, and potential regulatory intervention if costs become prohibitive. Proponents made the argument that these risks already exist due to the gap in flood coverage, and an effective product could mitigate these risks.</td>
</tr>
<tr>
<td>Climate change could increase flooding risks</td>
<td>High</td>
<td>Proponents and opponents were confident that climate change would lead to a material increase in flood damage. Opponents argued this could increase losses if flood insurance was implemented, whereas proponents suggested that insurance would improve incentives for flood risk mitigation, which could improve adaptation and reduce exposure to climate change.</td>
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<thead>
<tr>
<th>Opportunities</th>
<th>Level of Consensus</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anticipate consumer demand for enhanced coverage</td>
<td>High</td>
<td>Proponents and opponents agreed that there is a societal demand for improve flood risk mitigation services, but disagreed that private insurance represented the most optimal approach.</td>
</tr>
<tr>
<td>Reduce exposure to reputational and regulatory risk</td>
<td>Low</td>
<td>Proponents viewed flood insurance as a tool that would reduce reputational and regulatory risks linked to the gap in insurance. Opponents took the opposite position and worried flood insurance would increase these risks for their firm.</td>
</tr>
<tr>
<td>Generate additional source of revenue</td>
<td>Low</td>
<td>Proponents and opponents were divided whether flood insurance could be a profitable product. Opponents worried about adverse selection, whereas proponents were optimistic an effective product could be designed.</td>
</tr>
</tbody>
</table>
Several opponents also raised concern that any effort to develop flood insurance would involve negotiations with the government at all levels and consumers, and viewed the chances of a successful outcome for the industry as minimal. Without sufficient evidence to guarantee that flood insurance could be viable, opponents believed they would simply add an additional layer of risk on top of existing property coverage that would only amplify losses.

Table 3: Debate on potential success of developing flood insurance

<table>
<thead>
<tr>
<th>Standards of viability</th>
<th>Risk to viability</th>
<th>Solution</th>
<th>Opponent</th>
<th>Proponent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flooding risk and losses can be accurately priced.</td>
<td>Data gaps</td>
<td>Develop comprehensive risk exposure and mapping project.</td>
<td>Developing accurate flood maps is costly, and politically sensitive if municipalities ignore flood plain restrictions.</td>
<td>Developing flood maps would help inform industry decision-making on flood insurance and provide an opportunity to work with government on flood risk mitigation.</td>
</tr>
<tr>
<td>Premiums are affordable to consumers, while compensating insurer costs and generating modest profit.</td>
<td>Adverse selection</td>
<td>Bundle coverage with optional endorsement</td>
<td>Any bundling would increase rates for even low-risk areas and increase reputational risks.</td>
<td>Bundling could expand market penetration if included with a sewer-backup endorsement.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Government must agree to insure high-risk areas</td>
<td>Government negotiations would have a minimal chance of success, resources better allocated to mitigating existing insurable risks.</td>
<td>Governments could be willing to agree to insurer conditions given taxpayer costs of flooding will increase, and could forgo DFAA payments in areas covered by insurance.</td>
</tr>
<tr>
<td>Premiums incentivize actions or investment in risk mitigation.</td>
<td>Moral hazard</td>
<td>Risk-based pricing</td>
<td>Prices would be unaffordable in some areas, and cause reputational risks through increases in other areas.</td>
<td>Other countries employ risk-based pricing to ensure flood insurance remains viable.</td>
</tr>
</tbody>
</table>

Proponents were also concerned about the costs to the industry of implementing flood insurance, but expressed more urgency about establishing a process to understand whether a product could be developed that is viable. Governments could view these negotiations as an opportunity to reduce their exposure to DFAA payments and could be willing to maintain insurance for high-risk areas. In addition, flood insurance could generate alternative revenue that replaces shrinking markets for traditional risks such as fire and theft. The process and resources to develop flood insurance could also help reduce the costs of existing insurable perils. Indeed, insurers suggested that they are...
already covering overland flooding damage through sewer backup claims. A formal price for this risk in property contracts could help reduce these costs. Lastly, the process to develop flood insurance mirrors the innovation required to develop other weather-specific types of coverage or endorsements that may be necessary as extreme weather increases in frequency.

2. Insurers do not know enough about flood risk exposure, or government and consumer preferences towards flood insurance to generate a consensus on viability.

Divisions between insurers about the costs and benefits linked with an effort to implement flood insurance is largely a consequence of a data and research gap on flood risk exposure, and government and consumer preferences. Every insurer that participated in the study expressed significant concern about the availability and quality of existing flood maps. Without this data, any discussion on flood insurance is prone to assumptions that tend to rely on anecdotal evidence from other countries, or existing analysis from previous Canadian overland flooding events. Research by insurers to build evidence and data that could inform a decision-useful discussion on the viability of flood insurance also remains scarce (see Figure 14).

**Figure 14: Your company has engaged research to determine the viability of overland flood insurance as an insurance offering.**
While insurers did offer opinions on anticipated government responses to a private flood insurance product, there has yet to be any broad-based consultation to confirm these assumptions within the industry. Indeed, insurers offered contradictory accounts of a government response with some suggesting that any cooperation, such as investment in flood defenses for high-risk areas, was unlikely, while others noted that governments are interested in alternatives to the fiscal burden created by disaster financial assistance. Insurer perceptions about consumer behaviour with regards to flood insurance were also divided. Some insurers argued that only those most at risk would buy flood insurance leading to adverse selection, while others argued that as long as a product was affordable, consumers even in low-risk areas would purchase insurance. Proponents noted that the type of flood insurance offered could help address issues generated by adverse selection, such as bundling coverage with sewer backup endorsements.

3. Insurers shared a consensus that the existing government flood recovery system is not sustainable.

Federal and provincial emergency management and disaster assistance programs are reactive and focus on recovery, rather than proactive mitigation. As a consequence, taxpayers will continue to bear the burden of flood damage, which could expose the insurance industry to reputational and regulatory risks. Insurers were quick to argue, however, that these risks have yet to materialize in Canada. The response of policyholders to the 2013 Southern Alberta floods, however, could help clarify whether reputational and regulatory risk generated by the gap in flood coverage is a material concern for Canadian insurers. The 2011 Queensland Australia floods should serve as an important demonstration that unprecedented flood events could lead to regulatory changes that encourage insurers to expand coverage. Insurers also agreed that climate change would contribute to a significant increase in flooding placing additional strain on the public flood insurance system, which could spillover into additional risks for the industry.

4. Insurers expressed some agreement on the requirements for the implementation of a viable flood insurance product.
Proponents and even some opponents did share some opinion on the major characteristics necessary for viable flood insurance in Canada. First, all insurers argued that coverage should not be extended to high-risk areas located within the flood plain. Since governments allowed development in these areas, insurers argued that they should be responsible for managing the liabilities caused by flood damage. Second, most insurers argued that flood insurance should be an optional purchase for the policyholder. Consensus on this point was more fragmented compared to others. Third, several insurers also suggested that any effort to introduce a product should first occur in Quebec, where flood coverage could be bundled with sewer backup coverage, which is already optional.

5. An industry consensus is not a necessary precursor for the implementation of flood insurance, but would be beneficial.

Although this study assessed major areas of agreement and disagreement among insurers on the viability flood insurance, insurers do not believe a consensus is a necessary precursor for implementation. Cooperation, however, was identified as beneficial to reduce the costs associated with flood mapping, or engaging with the government on negotiations to revise the existing flood recovery system.
4. Next Steps and Recommendations:

The results of this study show that there is a clear division of opinion among senior executives of Canada’s largest P&C insurers regarding the viability of flood insurance in Canada. This division is largely informed by uncertainty over whether the resources allocated towards the development of a flood insurance product are worth the benefits. Below are two recommendations based on the study’s major findings that can help reduce this division and better understand whether flood insurance is worth an investment.

**Recommendation 1:** Initiate a broad-based discussion on the actions necessary to improve flood and disaster risk management with key stakeholders including government, property & casualty insurers, insurance brokers, banks, investors, developers and homeowners.

This type of discussion can help to further understanding of the current and projected demand for flood insurance (i.e. the market for flood insurance), the levels of flood risk exposure, and the problems with the current flood recovery system from the perspective of government and consumers. Insurers can then take the lessons from this discussion to better understand whether the conditions necessary for viable flood insurance can in fact be achieved given existing government and consumer preferences.

In the event an insurer would like to provide flood insurance, engagement with government will also generate important transparency on coverage decisions that could mitigate reputational risks generated by policyholders in high-risk areas. More broadly, engagement with the government about the state of disaster-risk management in Canada is inevitable given the effects of climate change. Insurers and governments will have to combine their efforts through the creation of insurance products that incentive risk-adjusted adaptation among homeowners in addition to sustained government commitments to finance infrastructure renewal and improvements.
**Recommendation 2:** Conduct research on flood risk exposure levels across regions of Canada, prioritizing areas with high population densities.

Risk exposure research will significantly improve decision-making among insurers about the viability of overland flood insurance and existing problems with the government flood recovery system in several ways. First, without effective risk exposure data, insurers cannot have an effective discussion of costs and benefits of private overland flood insurance. In addition, existing data needs to be updated with topographical data on changes in urbanization and the impacts of climate change on hydrology. Insurers need to determine their own appetite for risk, but they cannot do this without first addressing these gaps in existing flood risk data.

Second, insurers can present new research to better assess whether the government will be cooperative in supporting the conditions necessary for viable flood insurance. For example, research will help the industry develop a consensus on the areas of Canada where flood insurance is simply too expensive to provide. A clear benchmark for insurability among insurers is critical so that governments are clearly informed about the policies that may be required to improve defenses in high-risk areas.

There are three main aspects to improving research and data for the purposes of developing flood insurance. First, insurers could partner with the government and share the costs involved in developing accurate risk maps in major population centres. Several respondents suggested this might be more cost-effective than mapping larger areas, and statistical approaches could fill in gaps generated by low-density population areas. Second, insurers could partner with flood management officials at the federal, provincial and municipal level to evaluate whether data can be made available that would allow insurers to better assess risk exposure. This data could then be aggregated and evaluated to determine if it is useful for the development of flood insurance. Third, existing flood maps must be updated with current data and climate change projections to better understand how flood risk is likely to change as the climate changes.
5. Conclusion

The purpose of this report was to assess the viability of private overland flood insurance in Canada by understanding the risks and opportunities associated with developing and introducing such a product into the Canadian residential property market. Currently, homeowners cannot purchase insurance for overland flood damage in Canada, but can purchase coverage for water damage created by sewer backups. In the aftermath of several significant flooding events in recent years (up to 2013), this coverage arrangement has emerged as a source of debate among insurers, governments and policyholders. To understand the viability of flood insurance, the report provides the first such feedback from a series of structured interviews with senior executives of Canada’s largest insurers.

The first section of the report described the current government run flood recovery system in Canada, the impacts of flooding in Canada, and the challenges of providing insurance for flooding. This section revealed that while flooding has distinctive qualities that make it difficult to insure in private markets, government recovery systems fail to invest in the risk mitigation necessary to reduce flood damage. For this reason, there is an interest in exploring private insurance, which employs risk-adjusted premiums as an incentive for risk mitigation as a more effective risk management tool than the existing government-run system.

Despite this interest, section two revealed that insurers have clear reservations about implementing flood insurance. Insurers raised a number of concerns including the poor availability of flood risk exposure and maps, the impact of adverse selection on profitability, moral hazard (weak incentives to invest in mitigation), reputational and regulatory risks, and climate change impacts that could increase flooding. Insurers did, however, argue that a viable flood insurance product could generate opportunities for the industry, including anticipating customer needs and reducing reputational and regulatory risk associated with the existing gap. Furthermore, this analysis revealed that some Canadian insurers share consensus on the necessary conditions for flood insurance to be a viable product for the industry. The conditions include the development of flood maps that are decision-useful to insurers, government investment in flood defenses,
coverage exclusions for high-risk areas, and to reduce adverse selection, a policy that is optional but bundled with sewer-backup coverage.

Section four described the five major findings of the report. First, there is a clear division among senior executives of Canada’s largest insurers when asked if flood insurance is viable. Second, data gaps on flood maps and risk exposure and government and consumer preferences towards flood insurance represent an important limitation when assessing questions about viability. Third, insurers are extremely concerned about the sustainability of the existing government-run flood recovery program, specifically its lack of pre-disaster mitigation investment. Fourth, as noted above, some insurers do share opinion on strategies adopted in other countries that could make insurance viable in Canada. The fifth finding is that insurers do not believe an industry consensus is necessary to implement flood insurance, but coordination would be beneficial.

Section five identified two recommendations based on these findings. The first recommendation suggested that insurers initiative a discussion on flood risk management among a broad base of stakeholders, including government, insurance brokers, banks and homeowners. The second recommendation suggested that insurers conduct research on flood risk exposure levels across regions of Canada, particularly areas that are highly populated.
6. APPENDIX

Figure 15: Rank the factors below that represent the greatest risk to your company if you were to offer overland flood insurance? (1 = greatest risk, 2 = second greatest risk... 9 = least risk). The vertical axis tracks the number of respondents who identified each risk as a number 1, 2, 3 and so on priority.

- Poor availability of reliable flood plan maps in areas where your company provides coverage
- Poor availability of reliable flood plan maps in potential future areas where your company might provide coverage in the future
- Exposure of capital/liquidity
- Inability to charge adequate premiums relative to overland flood insurance risk
- Impact on re-insurance contracts
- It would be difficult to convince your customer base that overland flood insurance is necessary
- Customers in non-flood prone areas would object to higher premiums to offset losses of customers in flood prone areas
- Excluding home owners in high flood prone areas as customers would reflect negatively on your company
Figure 16: Rank the top three positive consequences for your company associated with the provision of overland flood insurance in Canada (1 = greatest benefit, 2 = second greatest benefit, 3 = third greatest benefit): Vertical axis tracks the number of respondents who identified each opportunity as a number 1, 2, 3 and so on priority.
Table 4: Comparison of international flood insurance programs

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Canada</th>
<th>U.S.</th>
<th>U.K</th>
<th>Germany</th>
<th>France</th>
<th>Australia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of coverage</td>
<td>None</td>
<td>Public, optional, separate</td>
<td>Private, optional, bundled</td>
<td>Private, optional, separate (but bundled as a policy for natural disasters)</td>
<td>Public, compulsory, bundled</td>
<td>Private, optional, separate and bundled</td>
</tr>
<tr>
<td>Private-sector role</td>
<td>None</td>
<td>Administers, sells policies</td>
<td>Covers risk, administers, sells policies</td>
<td>Administers, sells policies</td>
<td>Administers, sells policies</td>
<td>Covers risk, administers, sells policies</td>
</tr>
<tr>
<td>Public-sector role</td>
<td>Funds disaster assistance recovery, flood protection, mitigation.</td>
<td>Covers risk, funds mitigation, protection, and disaster assistance</td>
<td>Funds flood mitigation, protection, disaster assistance</td>
<td>Funds flood mitigation, protection, disaster assistance</td>
<td>Covers risk, funds mitigation, protection, disaster assistance</td>
<td>Covers risk, funds mitigation, protection, disaster assistance</td>
</tr>
<tr>
<td>Premium setting/type</td>
<td>None</td>
<td>National Flood Insurance Program (NFIP)/risk-adjusted</td>
<td>Private/risk-adjusted</td>
<td>Private/risk-adjusted</td>
<td>Government/flat</td>
<td>Private/risk-adjusted</td>
</tr>
<tr>
<td>Reinsurance</td>
<td>None</td>
<td>None</td>
<td>Private</td>
<td>Private</td>
<td>Government, or private market</td>
<td>Private</td>
</tr>
<tr>
<td>Reserves</td>
<td>None</td>
<td>None</td>
<td>Private</td>
<td>Private</td>
<td>Government</td>
<td>Private (discussion about government ongoing)</td>
</tr>
<tr>
<td>Flood mapping</td>
<td>Provincial governments, flood management authorities</td>
<td>NFIP (government)</td>
<td>Private</td>
<td>Private</td>
<td>Local governments, flood authorities</td>
<td>Insurers are developing maps, data comes from local governments, flood authorities</td>
</tr>
</tbody>
</table>
ABI. “ABI and Government Agree Memorandum of Understanding on Scheme to Safeguard UK Flood Insurance.” Association of British Insurers, July 2013.


Canadian Underwriter. “40% of All Home Insurance Claims Are Due to Water Damage, Insurer Says.” Canadian Underwriter, April 10, 2013.


Interview A. Flood insurance in Canada, April 2013.
Interview B. Flood insurance in Canada, March 2013.
Interview C. Flood insurance in Canada, April 2013.
Interview D. Flood insurance in Canada, February 2013.
Interview E. Flood insurance in Canada, March 2013.
Interview G. Flood insurance in Canada, March 2013.
Interview I. Flood insurance in Canada, March 2013.
Interview J. Flood insurance in Canada, March 2013.
Interview M. Flood insurance in Canada, February 2013.
Interview P. Flood insurance in Canada, April 2013.
Interview Q. Flood insurance in Canada, April 2013.


