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IBC BAC

The financial management of flood risk

An international review: Lessons learned from flood management programs in G8 countries

About Insurance Bureau of Canada

Established in 1964, Insurance Bureau of Canada (IBC) is the national industry association representing the Canadian private property and casualty (P&C) insurance industry. Our members account for more than 90% by premium volume of private auto, home and commercial insurance sold in Canada.

The P&C insurance industry employs more than 118, 000 Canadians, pays $6.7 billion in taxes and levies to the federal, provincial and municipal governments, and has a total premium base of $48 billion, approximately half of which is derived from automobile insurance.

IBC's role is to be active on behalf of its members. IBC does this by:

- Leading on issues of national importance to its members and all Canadians;
- Forecasting and responding to issues that arise in the industry;
- Anticipating opportunities to identify, shape and influence change in support of members' business needs; and
- Lobbying the federal and provincial governments to secure changes in public policy and in the business-operating environment that will benefit insurance companies and their customers.

IBC works on a number of fronts to increase public understanding of home, auto and business insurance. It also fosters public understanding through its five regional consumer centres, where trained personnel with many years of industry and government relations experience answer tens of thousands of consumer inquiries each year.

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Contents

Executive Summary

The purpose of this paper is to examine best practices and available models for managing the financial impact of floods. The paper (i) identifies key issues specific to flood risk management, (ii) evaluates international experience with public and private flood insurance programs, and (iii) draws out lessons for Canada's approach to the financial management of flood risk and the role of insurance.

Although the market is now starting to change, residential coverage for overland flooding has historically not been available in Canada. There are three key reasons explaining this fact.

First, flood risk does not lend itself to the economics of insurance. It inherently leads to adverse selection, which, in turn, hinders the basic insurance principle of diversification through risk pooling. As a result, flood insurance is hard to offer and, when available, it is naturally expensive.

Second, flood-related losses are often directly attributable to under-investment in public infrastructure, poor asset management, obsolete building codes and ineffective land-use planning. Unless governments fulfil their obligations to improve risk planning and mitigation, the widespread availability of residential flood insurance may remain commercially unviable.

Third, Canada lacks effective flood hazard maps, which are an essential risk-assessment tool. Insofar as the risk of flood cannot be adequately assessed, the financial management of this risk remains a challenge. Recent large-scale flooding has provided insurers with helpful flood risk information, but mapping allows for the assessment of risk prior to flooding occurring.

The limited insurability of flood risk, in turn, means that taxpayers are bearing a significant burden for flood damage across the country, as is evident by examining spending on the Disaster Financial Assistance Arrangements (DFAA) program. Since the 1970s, federal payments for flood assistance have totalled $6.2 billion – or 70% to 80% of total DFAA spending. These costs have more than quadrupled in 40 years, swelling from a cumulative $300 million in the 1970s, to $1.2 billion in the 2000s, to a staggering $3.7 billion in the first four years of this decade. While the recent restructuring of the DFAA has devolved more of these costs to provincial tiers of government, taxpayers still remain the ultimate funding source for flood loss compensation.

Despite the long-standing exclusion of overland flooding, insurers have often ended up paying for flood-related damage in the event of a major flood.

Payouts from extreme weather have more than doubled every five to 10 years since the 1980s. For each of the past six years, these payouts have been close to or above $1 billion in Canada. In 2012, losses hit $1.2 billion. In 2013, losses were a historic $3.4 billion, due to floods in Alberta and Toronto. In 2014, losses again approached $1 billion. By comparison, insured losses averaged $400 million a year over the 25-year period from 1983 to 2008. Water claims have become the number 1 cause of home insurance losses across the country.

IBC's examination of the flood management programs in G8 countries offers insights into solutions that may be applicable in Canada.

Every country has had to wrestle with the same issues. The approaches that have been developed span along a continuum that ranges from insurance-based to government relief solutions, including approaches that are fully private, fully public or in between.

Although none of these countries offer a template readily transferable to Canada, IBC has identified several best practices and lessons learned that can guide the financial management of flood risk here at home.

Whether residential flood insurance will ever become commercially viable in Canada, the international experience clearly points to four preconditions that are essential to establishing a strong flood risk management culture.

1. There must be accurate and up-to-date flood hazard mapping to allow all tiers of government – as well as insurers, developers and other key private-sector stakeholders – to make smart decisions about asset management, urban planning and flood risk management;
2. There must be ongoing and adequate investment in flood defences, and sewer and stormwater infrastructure;
3. There must be widespread awareness of flood risk and a sound understanding by all stakeholders – including governments, communities and individuals – of the physical and financial consequences of flood risk and the tools available to ensure Canadians are prepared; and
4. There must be limited recourse to government revenue to finance post-disaster compensation so that individuals face effective risk-mitigation incentives, and the financial burden on taxpayers is minimized.

In the recent past, individual insurers have started taking steps to address this coverage gap, but it remains clear that, as an industry and as a country, a more comprehensive and institutionalized solution is needed to tackle the pressing challenges faced by high-risk properties.

Consequently, IBC welcomes the federal government's commitment to work with the industry to develop a national approach to flood insurance. The approach, from the industry's perspective, will need to address the preconditions listed above, and identify clear roles and responsibilities for all of the stakeholders.

Introduction

It is now widely established that the weather around the globe is changing, and Canada is feeling the effects of this trend first-hand.

Over the past 60 years, average temperatures in Canada have increased by more than 1.3°C – about twice the global average. During the same time period, the weather has also become wetter, with an average 12% increase in rainfall across the country. As a result, Canadians now cope with an additional 20 days of rain per year, compared to the 1950s. It is projected that for some regions in Canada, storms that used to strike every 40 years will occur every six years by 2050.[1]

The wetter, warmer environment has led to more violent, extreme weather patterns, including storms and floods. Over the past two decades, storms and floods have increased in frequency by a factor of 20, making overland flooding the most frequently occurring natural disaster that affects the most people worldwide. Between 1900 and 2012, there were 289 significant floods in Canada – the equivalent of more than two major floods every year – representing almost 40% of all natural disasters ever recorded in Canada. This means floods occur more than twice as often as the next most-common disaster.[2]

The changing weather, in turn, generates growing economic losses for Canadian families and governments. While the availability of insurance for water damage in Canada is limited, insurers are already shouldering much of the associated losses.

For six years in a row, Canadian P&C insurers have suffered losses of close to or at $1 billion every year. In 2013, that figure reached $3.4 billion.[3] Water-related damage caused the majority of these insured catastrophic losses, and was compounded by aging sewer and stormwater infrastructure that is increasingly unable to handle today's increased volume of precipitation. As a result, water damage has now surpassed fire as the number 1 cause of home insurance loss across the country.

The purpose of this paper is to examine best practices and available models for managing the financial impact of floods. The paper (i) identifies key issues specific to flood risk management, (ii) evaluates international experience with public and private flood-insurance programs, and (iii) draws out lessons for Canada's approach to the financial management of flood risk and the role of insurance.

Editorial Note

At the time of publishing, the G8 group of countries has effectively become the G7+1 due to the suspension of Russia from its membership.

Because most of the literature that IBC reviewed to prepare this report and the cited references refer to the G8, and solely for the purpose of maintaining clarity and consistency in our literature review, we continue to refer to this group as the G8 group of countries.

Issues with the Financial Management of Flood Risk

Of all natural disasters, floods are the most frequent, affect the most people worldwide and cause the largest number of fatalities and the largest economic losses.[4] Moreover, because of the challenge in insuring flood risk and the low rate of flood insurance take-up (even in countries where a national flood program does exist), most of these economic losses remain uninsured and, hence, are absorbed by governments and taxpayers.

The financial management of flood risk is increasingly problematic due to the combination of several trends: the growth in population and asset values, the concentration of urban and industrial development in flood-prone areas, the onset of more violent weather patterns, and the increase in the vulnerability of private structures and public infrastructure due to obsolete building codes and under-investment in risk mitigation measures. Taken together, these trends make adaptation to flood risk a priority.

What Insurers Mean by "Flood"

In Canada, there is no unequivocal definition of overland "flood," and the term is often used somewhat liberally. In principle, floods are best categorized based on their (a) causes and (b) locations.

There are five main underlying hazards that can generate overland floods:

Spring snow-melt runoff – the melting of the accumulated winter snowpack

Storm rainfall – localized, extreme rainfall that can generate, especially when combined with impervious soil and/or inadequate draining infrastructure, extreme stormwater runoff

Tidal flooding – a combination of low-pressure weather systems and peak high tides can raise water levels in rivers, lakes and oceans to the point where water defences are breached

Natural dam failure – the sudden release of water flow resulting from the failure of temporary natural dams caused by ice buildup (i.e., ice jams), landslides, moraines and glaciers

Structural failure – the sudden release of water flow resulting from the failure of man-made engineered flood defences and water control infrastructure (e.g., dams, levees, dikes)

There are three main types of floods based on location:

Fluvial (i.e., riverine) flooding – occurring when, in the flood plains of a river, a combination of the causes noted above result in the capacity of watercourses being exceeded, with consequential river overflow

Urban (i.e., pluvial) flooding – occurring when, in an urban centre, surface and underground infrastructure is unable to drain excess water flow generated by a combination of spring snow-melt runoff and stormwater runoff

Coastal flooding (i.e., storm surge) – generated by the combined action of wind, waves and high tides – including the effect of tsunamis – along the coast of large lakes and oceans

Compensation through insurance

In Canada, while there is insurance to cover water-related damage, comprehensive residential coverage for overland flooding is not yet available across the country and for all water-related risks.

Insurers provide residential coverage by endorsement for damages caused by sewer backup (in Quebec, the endorsement coverage also includes seepage and rising of the water table). Moreover, overland flooding is covered through automobile insurance as well as through commercial property policies.

As a result, although flood is typically not covered under residential insurance, insurers often end up paying for a significant portion of associated losses. The reason for this is twofold.

First, often two different perils – one covered by the policy (e.g., sewer backup) and one excluded from coverage (e.g., overland flooding) – can act together to cause damage or loss. In these cases, it has been difficult to ascertain to what extent the resulting losses were caused by the (un)insured peril, leading insurers to compensate damages that would not have otherwise been covered under the policy.

Second, in the event of a major flood or other natural disaster, it is not uncommon for insurers to lift certain policy exclusions and offer policyholders ex-gratia compensation, above what would be required by the insurance contract, to avoid reputational damage and potential political pressures.

The flood events of 2013 have made these challenges apparent, and insurers have since taken steps to further clarify the distinction between the types of water damage that are and aren't covered by a homeowner's policy.

Despite this, losses suffered by homeowners from overland flooding are not, technically, deemed insurable for several reasons.

The key issue is that, unlike most other perils, flooding does not lend itself to the economics of insurance. Insurance, by its very nature, works well for random, uncertain risks that are not correlated. Flood risk is the opposite: it is easily predictable because the same properties on the same floodplain tend to flood at periodic, recurrent intervals. And when it happens, flooding affects a large pool of properties at the same time.

This, in turn, has three negative consequences.

First, predictability leads to adverse selection, meaning that only high-risk individuals, knowing that they are likely to suffer flood losses, will seek out insurance. As a result, the basic insurance principle of diversification through risk pooling no longer applies. Moreover, frequent repeat claims affecting a large portion of the pool would occur, which would necessarily lead to high – often unaffordable or non-commercially-viable – premiums.

In other words, flood insurance is hard to offer and, when it is available, it is naturally expensive and only purchased by a few individuals.[5] Under these circumstances, insurers can only choose between charging actuarially sound but unaffordable premiums, or not offering flood coverage at all.[6]

Second, a significant portion of flood-related losses is directly attributable to under-investment in public infrastructure, poor asset management plans, obsolete building codes and ineffective land use planning. Unless governments address these basic issues, the current environment in Canada is not conducive to widespread availability of overland flood insurance coverage.

Fortunately, one of the main obstacles to the insurability of flood risk – namely, the predictability of flooding – is also key to the success of public infrastructure investment and land use planning. That is, the fact that floods reoccur periodically in the same places means that targeting these locations with risk mitigation investment is effective in reducing the frequency of flooding and its associated financial cost.

Third, the current state of flood mapping in Canada is inadequate. Governments and insurers need to have an advanced understanding of flood risk, albeit for different purposes and to different degrees of accuracy. They need to identify risk zones for zoning and urban planning purposes, evaluate the vulnerability of critical infrastructure, and be able to quantify and price the flood risk that individual policyholders are exposed to.

Flood hazard maps represent the minimum requirement for establishing a sound risk management culture. In Canada, mapping data is available across the country from conservation authorities; municipal, provincial and federal governments; and a selection of commercial vendors. However, available maps are often not up to date and not of sufficient resolution and quality. These maps haven't been developed to a common and consistent standard across the country, typically exclude urban (i.e., pluvial) flood risk and often assess only a single return period. For all of these reasons, the current state of flood mapping in Canada is inadequate for the assessment of flood risk except at anything more than an aggregate level. Accurate flood maps need to be developed as the first step in any serious government strategy for the management of flood risk.

The Arithmetic of Flood Insurance Premiums

Individual insurers have their own approach to pricing flood risk based on different methodologies, risk assessment tools and commercial strategies. However, the basic arithmetic of insurance still holds. Here is a stylized example of the constraints within which flood risk typically needs to be assessed.

Property value
$500,000

1-in-50
year floodplain

⋮

$500,000
x 0.25
=125,000
÷ 50
=**$2,500**
a year
for flood
coverage

Imagine a property that is worth $500,000 and located within a 1-in-50 year floodplain. Assume that a typical flood – given the characteristics of the floodplain and the vulnerability of the property being insured – would cause damage worth approximately 25% of the property value. The expected loss from this policy, when the flooding event occurs, is therefore $125,000, which translates into an annualized best estimate of loss of $2,500 (given that each year there is a 1/50 probability of a $125,000 loss).

As a result, even if the insurer set premiums equal to the best estimate of loss (i.e., without incorporating any margin for administrative/operating expenses or profit) the homeowner would have to be charged a premium of at least $2,500 a year just for flood coverage, in addition to the "base" home insurance premium charged for standard coverage.

For other perils, the insurer is typically able to pool together several properties within the same portfolio, under the assumption that not all properties would suffer a loss at the same time, which allows for risk diversification and hence for a reduction in the required average premium. However, when a floodplain floods, all properties are affected at the same time, reducing the diversification benefit. This explains why risk-based premiums for properties in floodplains are, by nature, expensive.

Compensation through government programs

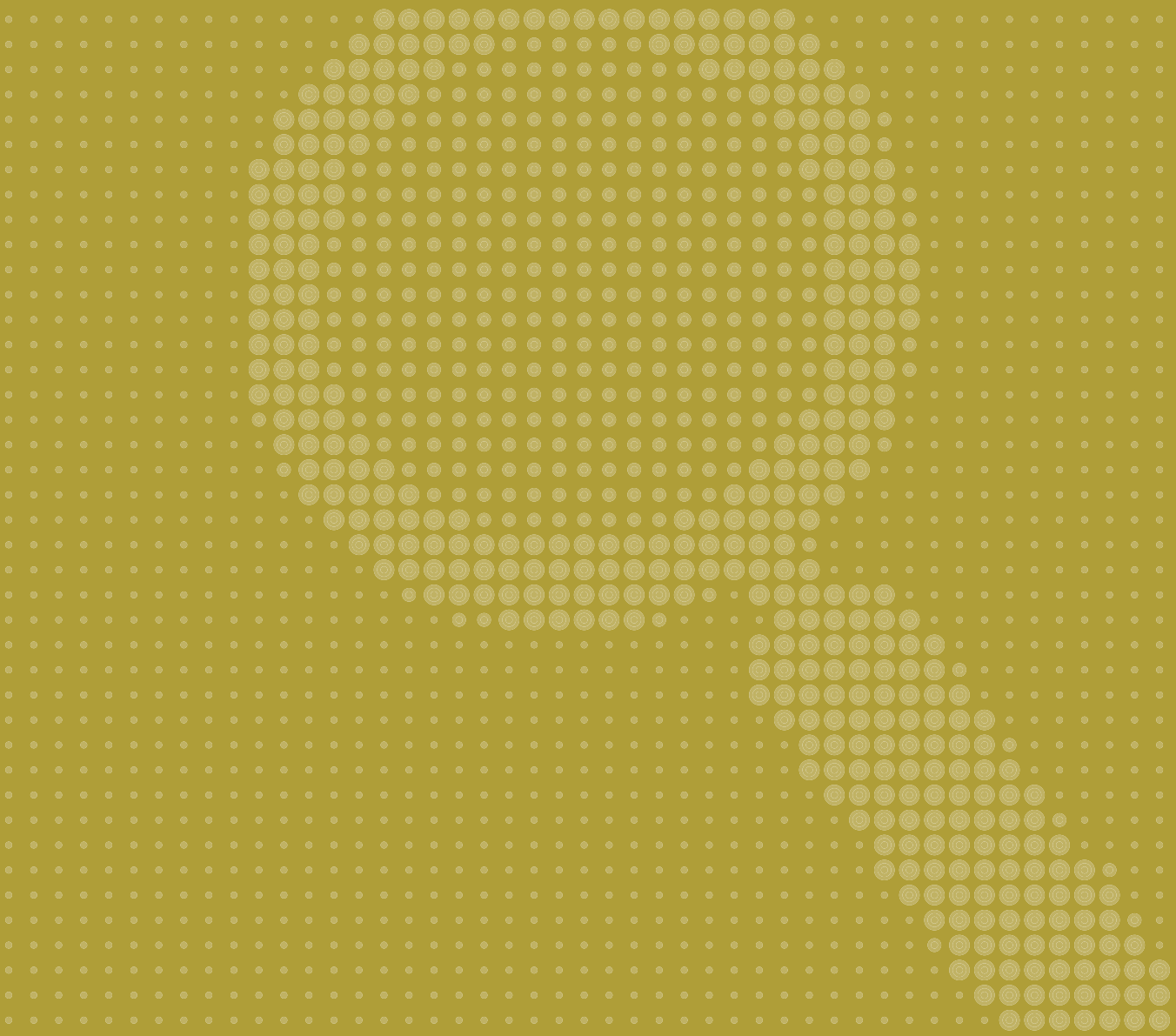
The limited insurability of flood risk in Canada places the burden for post-disaster reconstruction and recovery on homeowners and taxpayers who are funding disaster relief spending from federal, provincial and municipal governments.

The role of taxpayers becomes clear when examining spending on the Disaster Financial Assistance Arrangements (DFAA) program. Between 1970 and 2013, there were 208 disasters that triggered federal financial assistance under DFAA. Of these, 116 were due to overland flooding (generally, fluvial/riverine flooding) and an additional 60 to 70 (depending on definitions) events were due to storms that are likely to have caused water-related damage associated with flooding.[7]

During these 43 years, the average number of DFAA events has increased threefold – from three disasters per year in the 1970s, to nine disasters per year in the first four years of this decade. And the cost of flood disasters to the federal government has increased by an even greater magnitude. Since the 1970s, federal payments on flood assistance total $6.2 billion – or 70 to 80% of total DFAA spending. These costs have more than quadrupled in 40 years, swelling from a cumulative $300 million in the 1970s, to $1.2 billion in the 2000s, and a staggering $3.7 billion in the first four years of this decade. Annual DFAA spending on flood recovery has also followed a similar trend, jumping from an average of $30 million a year in the 1970s, to $124 million in the 2000s, and almost $1 billion a year during the past four years.[8]

The recent restructuring of the DFAA program has partially redistributed the responsibility for disaster financial assistance by devolving more of these costs to provincial tiers of government. However, taxpayers still remain the primary source of finance for these costs, and the very same trends that are increasing insured losses will also increase economic, uninsured losses borne by governments and taxpayers. That's why federal and provincial governments across Canada have recognized that there needs to be a change in the way Canadians prepare for flooding events and other disasters, and that a partnership with the insurance industry is critical to implement a national solution to the flood problem.

Case Studies



Every country around the world has had to wrestle with the issues discussed above that make providing flood insurance problematic. The approaches developed by Canada's international counterparts involve various combinations of insurance and government relief. There are approaches that are fully private, fully public or in between; that make flood insurance voluntary or mandatory; and that offer flood insurance on its own or as part of a bundle of several types of coverage.

This section focuses on other G8 countries' provisions for flood insurance to gain insights into ways flood coverage could be offered in Canada. Many different financial management models have been developed – with varying degrees of success. Each model provides important lessons for how Canada can adapt its response to flood management.

In general, the approach to the financial management of flood risk can be categorized based on six variables:

1. Private vs. publicly administered programs
2. Voluntary vs. mandatory insurance take-up
3. Optional vs. bundled coverage
4. Risk-based vs. government-mandated pricing
5. Policyholder-funded vs. taxpayer-funded subsidization of high-risk properties (or neither)
6. Government as insurer vs. enabler of insurance

These variables, in turn, have direct implications for insurance take-up rates and will affect which stakeholders will ultimately bear the lion's share of flood-related financial losses.

Private models are market-based, with government intervention typically being limited to investment in risk assessment and risk mitigation initiatives and with insurance pricing typically being risk-based. Public models are characterized by a strong government involvement in the provision, funding and design of flood insurance. In these cases, governments typically set prices and terms of coverage, making these systems more akin to a social assistance program than to insurance.

In some cases, flood coverage is optional and available as an additional endorsement on a standard (i.e., fire and theft) homeowner's policy on payment of a separate premium. In other cases, coverage is bundled as part of a package inclusive of other perils. There are also instances in which coverage can be both optional and bundled. Indeed, it may be automatically included in a standard homeowner's policy (making it virtually mandatory), or it may be bundled with other optional perils (e.g., earthquake and other natural disasters).

International Flood Insurance Programs at a Glance
G8 countries other than Canada

	Model	Purchase	Packaging	Take-up (residential)	Pricing	Subsidization	Government focus	Financial impact mainly borne by
France	Public	Mandatory	Bundled (with other catastrophes)	100%	Government-set	Both taxpayers and policyholders	Insurance Funding	Taxpayers
U.S.	Public	Voluntary	Optional (add-on)	20–30%	Government-set	Primarily taxpayers	Insurance funding and provision	Taxpayers
Germany	Private	Voluntary	Optional (add-on)	25–30%	Risk-based	None	Mitigation and zoning	Policyholders
Italy	Private	Voluntary	Optional (add-on)	<10%	Risk-based	Taxpayers (indirectly)	Mitigation	Taxpayers
Russia	Private	Voluntary	Optional (add-on)	<5%	Risk-based	—	—	—
Japan	Private	Voluntary	Bundled (with comprehensive homeowners policy)	40%	Risk-based	Policyholders	Mitigation	Policyholders
U.K.	Private	Voluntary	Bundled (with homeowners policy)	95%	Risk-based	Policyholders	Mitigation, mapping and zoning	Policyholders

Notes: Take-up based on residential coverage. Figures for commercial property are typically higher. No additional information for Russia was available.

Germany

In Germany, flood insurance is privately offered as a bundle that includes other natural disasters, and is available to policyholders as an optional endorsement to standard homeowner's policies. Flood is the major peril insured under this optional natural catastrophe coverage, which includes both fluvial and pluvial flooding but excludes storm surges.

The German flood insurance scheme is a private market-based system, largely deregulated, with no backing from government and with private insurers purchasing reinsurance in the international market.

Insurers set policy terms, prices and deductibles independently and based on risk. As a consequence of risk-based pricing, the vast majority of properties are insurable although some may not be. The take-up rate of natural disaster coverage (including flood coverage) is estimated at 30%.[9]

Adequate risk pricing was made possible by government action to forbid floodplain development in risk zones and by an upfront investment to create a nationwide flood mapping tool (known as ZÜRS), which the German Insurance Association (GDV) developed to help insurers assess risk. ZÜRS provides insurers with a zoning system for flood, backwater and heavy rain risks. The system is based on the following four risk zones.

Risk zone	Return period	Insurance availability
Very low	>200 years	Insurable
Low	50–200 years	Insurable, conditionally on mitigation measures
Moderate	10–50 years	Insurable, conditionally on mitigation measures
High	<10 years	Uninsurable

Source: Adapted from (Swiss Re and ICLR 2010) *and* (Consorcio de Compensacion de Seguros 2008)

The risk zones are used by all insurers to determine insurability (and price). The majority of properties are located in the very-low-risk zone, approximately 10–12% of properties are in the low-risk zone, and only 3% are in the moderate- or high-risk zones.

Italy

In Italy, flood insurance is available through the private market and can be purchased as an add-on to residential fire policies. This optional product is bundled with earthquake coverage. The flood coverage includes both fluvial flooding and torrential rainfall damages. Additional protection is also provided for landslides that result from rising river waters.

Residential take-up levels are low, at less than 10% of countrywide property values. This is not surprising given that overall property insurance take-up is also low, at approximately 35%.[10]

This low insurance take-up is primarily explained by cultural and institutional reasons. In particular, there is a widespread belief that it is the government's responsibility to compensate losses due to natural disasters. Following natural catastrophes, the Italian government historically intervenes with financial support or ad-hoc legislation.

Russia

In Russia, insurance for flooding is provided by the private market as an optional coverage.

Qualitative, anecdotal evidence suggests that the insurance product is rather expensive. Cost pressures, combined with a widespread cultural reluctance to purchase non-mandatory insurance products, generally leads to low take-up rates (only 5% of households have basic property insurance).

Japan

In Japan, private flood insurance coverage was introduced in the mid-1980s. This was part of a government-sponsored flood risk management initiative built on the understanding that for private flood insurance to flourish, flood risk had to be mitigated first.

From the 1960s to the 1980s, Japan saw significant public investment in risk mitigation measures, with a large share of the national budget – ranging from 8% in 1961 (equivalent to 1.5% of the GDP) to 4.5% in the late 1980s (equivalent to 0.5% of the GDP) – invested in disaster risk reduction activities.[11]

These investments were able to bring flood risk under control. At that point, residential flood insurance coverage was introduced by extending standard homeowner's policies to cover damage from typhoons. As such, flood coverage is not available as a stand-alone product but can be obtained as part of a standard homeowner's policy.

Through this approach, flood losses are now compensated, albeit with a significant degree of co-insurance (i.e., insurers compensate for up to 70% of flood damage, with the remaining 30% resting on individuals[12]) to maintain incentives for investment in risk reduction measures.

Although coverage has been incorporated as part of comprehensive homeowner's policies, take-up rates for flood coverage remain relatively low.

The United Kingdom

In the U.K., flood insurance is privately offered and automatically included in standard homeowner's policies. As such, coverage is virtually mandatory and the vast majority of households are covered for flood damage. However, the current system is unsustainable and is being reformed.

Since 1961, flood insurance has been governed by a series of informal arrangements between the insurance industry and government, beginning with a "gentlemen's agreement" whereby insurers agreed to offer coverage to all properties regardless of risk while government committed to risk mitigation and infrastructure investment.

The initial setup proved unsustainable, largely due to a worsening of weather trends combined with insufficient investment in water infrastructure. The agreement was amended by a series of Statements of Principles. The latest amendment limited insurers' liability by establishing that coverage in areas with a flood probability greater than 1-in-75 years will be maintained only in the presence of new investment in mitigation infrastructure.

Although this is a private market system, both government and individuals have clear roles to play. Government is an enabler of insurance, by providing basic flood mapping, adequate flood control infrastructure and stringent land use planning. Consumers play their part by paying risk-based premiums and, in some cases, by investing in risk mitigation measures to maintain insurability.

Despite the recent amendments, it had been known for some time that the arrangement was unsustainable and would not be renewed. The reason is twofold. First, existing insurers were required to retain high-risk properties, while this didn't apply to new market entrants. Second, the agreement called for government to invest in mitigation, and this investment has not been at the level insurers had expected.

Insurers and government reached a new agreement (known as Flood Re) on June 27, 2013, and the broad legislative structure is in now place. The regulations governing the operations of Flood Re are expected to be tabled following the 2015 U.K. general elections.

In essence, Flood Re is a risk sharing pool, supported by a government commitment to backstop excess losses, which will be operated and financed by insurers as a not-for-profit fund to subsidize flood coverage for high-risk properties. Flood Re was created to ensure availability and affordability to high-risk properties, and to enable a sustainable transition to a risk-based pricing environment over the planned 25-year existence of the Flood Re pool.

Continued real estate development in flood-prone areas, combined with severe under-investment in flood defence and water infrastructure, meant that risk-based premiums for coverage to high-risk properties were becoming unsustainably costly. Addressing the affordability issue required artificially capping premiums for high-risk properties and subsidizing the difference (between risk-based and artificially capped premiums).

Flood Re is a way to explicitly provide such subsidization, by ceding high-risk properties to a risk sharing pool and supplementing this pool with additional revenue from a levy charged to all other policyholders.

Flood Re targets only high-risk properties. Flood insurance for other, non-high-risk properties will remain privately offered. Eligible high-risk properties have been identified through risk mapping (there are between 300,000 and 500,000 properties nationwide, equivalent to approximately 2% of the total properties in the U.K.) and are tracked in a national registry. Homes built after 2009 have been excluded from the scheme to avoid encouraging unwise building in high-risk areas.

Flood insurance coverage will continue to be bundled with home insurance coverage. Insurers will be required to offer coverage to high-risk properties (under their own policy terms), and they can choose to do so independently or by ceding the policy to the Flood Re pool.

- If the risk-based premium the insurer would ordinarily charge for a given policy exceeds the applicable price ceiling, the consumer is charged only the capped price. The insurer then cedes that policy (100% of its capped premium and associated risk) to Flood Re.
- If the premium the insurer is willing to charge is less than the applicable price ceiling, the insurer may choose to retain that policy.

To ensure affordability, the scheme sets out price ceilings for eligible (high-risk) flood insurance policies. The ceilings are adjusted using Council Tax bands (i.e., property tax). This transparent process will allow consumers to know up front the maximum premium they may have to pay if they choose to buy flood coverage.

Because the pool is a concentration of bad risks that are charged less-than-actuarially-sound premium rates, it will always operate at a loss. To mitigate this, the Flood Re fund is topped up through additional income from a levy charged to policyholders, amounting to £180 million per year (equivalent to a £10.50 levy on each policy). This amount is said to be equivalent to what policyholders already implicitly pay to cross-subsidize high-risk properties.

To implement the system, the insurance industry is paying £10 million in start-up costs. Flood Re will also purchase reinsurance to cover losses up to a 1-in-200-year flood event level – and participating insurers will not be liable for losses beyond this level. According to the latest Memorandum of Understanding between government and the ABI, should an event generate industry losses in excess of this level, the government will work with Flood Re and the industry to determine how available resources should be distributed to policyholders.

The role of government will remain limited to:

- Setting the price ceilings for flood coverage, which are anticipated to increase over time;
- Providing financial support in the event of extraordinary catastrophic losses exceeding the capacity of the pool; and
- Investing in new and improved flood defences by spending £2.3 billion over the next four years and committing additional investments over the following six years. The government anticipates that flood risk will be reduced by 5% and that over 300,000 properties will be protected by 2021. However, stakeholders – including the Committee on Climate Change, the National Audit Office and the ABI – have pointed to an estimated £500 million shortfall in the required spending on flood defences.

The United States

In the U.S., flood insurance is available through a federal program – the National Flood Insurance Program (NFIP). The program was established in 1968 as a joint initiative by private insurers and all tiers of government. The federal government – through the Federal Emergency Management Agency (FEMA) – is responsible for administering the program.

Homeowners can purchase NFIP coverage only if they live in NFIP-approved communities located within 1-in-100 year floodplains, referred to as Special Flood Hazard Areas (SFHAs). For a community to be approved, it must commit to specific floodplain management requirements set by FEMA, which include floodplain development and zoning. Coverage is optional, although it is mandatory for mortgage holders located in SFHAs.

FEMA sets the premiums based on Flood Insurance Rate Maps (FIRMs). Properties that were developed in SFHAs before being identified as high-risk in this mapping system are provided insurance at subsidized premium rates, at a discount as high as 40% of the risk-based rate.[13] Those that were developed after the creation of flood maps pay actuarially sound rates (as determined by FEMA).

In exchange for an expense allowance, private insurers write and service NFIP policies under their own brand. This enables NFIP to leverage insurers' expertise in marketing, underwriting and claims handling, without insurers having to retain any of the associated risk.

Because the NFIP pool is based on selecting only bad risks and heavily subsidizing coverage, the system, by design, cannot be financially self-sustainable. It continues to operate thanks to a backstop guarantee by the federal government. This reliance on public funds to meet unfunded liabilities, instead of leveraging risk transfer through international reinsurance markets, has resulted in compounding public debt. This is further magnified by the fact that flood maps are out of date and floodplain management programs are often not enforced, meaning that the premium rates set by FEMA are likely below their actuarially sound level. Recent moves to try and move prices closer to risk-based levels have faltered due to political pressure. Currently, FEMA/NFIP has debt of approximately $23 billion USD and is unlikely to be able to repay it.[14]

France

In France, flood insurance is offered as a mandatory bundle that includes other natural disasters, through a government program (Cat Nat) established in 1982. The program combines private insurance with public reinsurance provided by the Caisse Centrale de Reassurance (CCR), a state-owned reinsurer supported by a government backstop.

The government sets Cat Nat premiums at a uniform rate across France, without any differentiation based on risk exposure. Cat Nat premiums are charged to consumers as an additional percentage on their standard property insurance premiums, which is currently set at 12%. All policyholders with standard homeowner's insurance are required to participate.

For a claim to be eligible under the Cat Nat scheme, both national and local governments must declare a state of emergency. Once this happens, government-guaranteed reinsurance funds from CCR become available.

Reinsurance with CCR is not compulsory, and primary insurers can choose to rely on international reinsurance markets instead. There are, however, strong incentives to reinsure with CCR, because the reinsurance premiums charged are artificially low and because it can offer unlimited coverage with low solvency and liquidity risk owing to the government's backstop guarantee.

The main drawbacks of the French model are related to the public nature of rate setting and risk transfer.

Public rate setting means that premium rates are set by government rather than based on risk. Not only does this remove any incentive for risk mitigation investment (both by individuals and by local authorities), it is also rather unfair as it effectively forces low-risk consumers across the country to subsidize those at higher risk of disaster (although the offering of a multi-peril, all-catastrophe bundle ameliorates fairness concerns). As such, the system is more akin to a welfare or risk redistribution program than insurance.

Public risk transfer results in reinsurance rates (through CCR) being artificially low and reinsurance payouts being state-guaranteed, both of which create a strong incentive for primary insurers to reduce their retention rate (i.e., to increase the share of risk ceded to CCR), especially for high-risk portfolios.[15] This, in turn, places considerable stress on CCR and, hence, on taxpayers.

Best Practices and Lessons Learned

The role of insurance

In many developed economies, there is a role for insurance in the financial management of flood risk. This has several advantages over relying on government disaster relief programs. There are two reasons for this. First, while the objective of government relief programs is to reduce hardship by providing basic financial support, insurance seeks to fully compensate consumers by restoring them to their pre-disaster position. Second, while government relief programs typically encourage risky behaviour, insurance premiums are a function of the underlying risk, therefore creating a strong incentive for consumers to undertake risk reduction measures.

However, unlike standard homeowner's insurance, which is rather common, the take-up of flood insurance is typically very limited even in countries where an established flood insurance market exists. As IBC's analysis indicates, take-up rates fluctuate considerably with each country's experience, but are frequently within the 10% to 20% range unless the product is mandatory or bundled with other perils.

Adverse selection – when flood coverage is demanded only by high-risk consumers – is the main reason for the failure or fallibility of many of the international models. Because of adverse selection and the predictability (or non-randomness) of flood risk, risk-based premiums tend to be unaffordable. This leads to low take-up rates, which, in turn, reinforce the adverse selection problem.

This is particularly true of insurance schemes based on optional coverage. By contrast, where flood insurance is provided as part of a wider bundle, adverse selection and the resulting high premiums are greatly reduced. In fact, evidence from international experience suggests that flood insurance works best when bundled with other perils.

One of the main downsides with bundled coverage is that it forces low-risk consumers to subsidize high-risk ones (which is what allows for lower premiums). However, to the extent that most of the bundled product is priced based on risk, the outcome can still be equitable as low-risk consumers will be charged lower premiums overall. Moreover, the erratic severe weather patterns experienced in recent years – where locations previously deemed low-risk have suffered large flood losses – suggest that more properties than previously thought are likely to experience flood damage in the future, further reducing any unfairness inherent in the bundled approach.[16]

That said, the experience of countries such as Germany indicates that a relatively high rate of take-up can be achieved even in the absence of mandatory or bundled coverage, as long as there is a well-designed system of incentives supported by a sound risk management culture. Importantly, this includes an environment where private insurers have freedom to charge actuarially sound rates[17] and where government relief programs do not discourage the uptake of private insurance coverage.

The role of government

As a comprehensive Organization for Economic Co-operation and Development (OECD) study determined, "if the private insurance industry remains the main provider of flood coverage, it is essential for [government] to provide the appropriate conditions for managing flood risk."[18] This implies that government action should focus on:

- Promoting risk mitigation measures by means of direct investment in infrastructure and through implementation of early warning systems and strict enforcement of zoning, land use planning and floodplain development regulation;
- Increasing public education and awareness to ensure homeowners understand the risk they face and what they can do to mitigate it, and are financially prepared; and
- Addressing the issue of high-risk properties by either providing subsidies to households for whom insurance is unaffordable, or through financial relief programs that specifically target high-risk properties that may be commercially uninsurable.

In addition to these three key roles, developing a sound risk assessment platform through up-to-date flood maps is paramount. Because of increasingly severe and volatile weather trends, the immediate and long-term management of flood risk must hinge on a reliable analysis of associated losses. Throughout history, flood insurance has typically been introduced only in countries that have developed a sound flood risk management culture[19] – including techniques for an advanced assessment of the risk and ongoing investment in risk mitigation infrastructure.

For example, official flood risk zones that are developed based on a common understanding of risk – such as those used in Germany – are important to ensure equitable treatment of consumers. Such strategies establish a shared understanding of what is or isn't commercially insurable, setting appropriate expectations for consumers and governments alike.

While this strategy doesn't necessarily imply that governments should develop flood maps for use by insurers (as the underlying requirements are often different), governments should at least develop flood maps that can be relied on for land use planning purposes. Governments should also make the data available to the private market to ensure widespread understanding of risk.

Finally, even when an insurance scheme is designed to address the affordability issue of high-risk properties (for example, by bundling coverage), insurance for properties where there is a very high likelihood of frequently recurring losses may not be commercially viable.[20] In these cases, alternative government-sponsored risk management approaches – ranging from targeted investment in risk mitigation, to relocation of the property outside the high-risk area and the use of government relief funds – may make more economic sense.

What this means for Canada

A frequent question that arises is: Why is Canada alone among G8 countries in not offering flood insurance coverage?

First, while residential flood coverage is not available across the country and for all water-related risks, Canadian P&C insurers already cover water-related damage, including sewer backup, through both residential and commercial policies, and overland flooding, through automobile and commercial property policies. As a result, Canadian insurers have suffered losses at or near $1 billion for five years in a row – and in 2013 that figure was a staggering $3 billion or more – making water claims the number 1 cause of home insurance losses across the country.

Second, simply having a flood insurance program is not enough. It needs to be a program that works, and many of the international schemes that we have examined simply don't work. None of them offer an effective "off-the-shelf" solution that could be implemented in Canada.

IBC's review has highlighted two important distinctions between alternative flood insurance models.

First, many of the schemes are not financially sustainable. Countries such as the United States implemented a program that, by design, is financially unsustainable leading to ballooning public debt in recent decades.

Second, many of the international schemes reviewed enable compensation but at a cost that may be unaffordable to some. The key to designing a financially sound flood program is to price coverage based on actual risk. That, however, means that high-risk consumers will pay high premiums.

Affordability for all consumers, including those at highest risk, comes at a cost. If coverage for high-risk individuals is available at premiums below the level that would be necessary based on actual risk, that difference will have to be made up through one of two approaches. It must either be spread among all policyholders by bundling the product – in which case low-risk policyholders subsidize high-risk ones – or it must be paid through government subsidies – in which case taxpayers subsidize high-risk policyholders.

Whether residential flood insurance will ever become commercially viable in Canada, the international experience clearly points to four preconditions that are essential to establish a strong flood risk management culture:

1. There must be accurate, up-to-date flood hazard mapping to allow all tiers of government – as well as insurers, developers and other key private sector stakeholders – to make smart decisions about mitigation investment, urban development and flood risk management.
2. There must be ongoing, targeted investment to build and maintain resilient flood defences and sewer and stormwater infrastructure.
3. There must be widespread risk awareness and a sound understanding by all stakeholders – including governments, communities and individuals – of the physical and financial consequences of flood risk and of the tools that are available to ensure Canadians are prepared.
4. There must be limited recourse to government revenue to finance post-disaster compensation to ensure that individuals face effective risk-mitigation incentives, and the financial burden on taxpayers is minimized.

Although these basic preconditions are not in place today, there are growing signs that Canada is moving in the right direction.

The 2014 Economic Action Plan announced a proposal to develop a National Disaster Mitigation Program (NDMP). The objective of the NDMP is to take a proactive approach to disaster risk management and to reduce the impact of natural catastrophes on Canadians.

In addition to generating new investment for disaster protection and mitigation initiatives, the NDMP aims at prioritizing measures to identify and mitigate the impacts of floods, including the strain on government finances and the Disaster Financial Assistance Arrangement (DFAA) program.

These initiatives are consistent with Public Safety Canada's all-hazards approach to emergency management, which sees prevention and mitigation activities as one of its four pillars. These activities are aimed at eliminating or reducing the risks of disasters in order to protect lives, property and the environment, and reduce economic disruption. Mitigation includes structural measures. such as construction of floodways and dikes, and non-structural measures, such as building codes, land-use planning and insurance incentives.

The Economic Action Plan also announced the government's plans to consult with the industry to explore options for a national approach to residential flood insurance and insurance issues arising from natural disasters more generally, noting that Canada is the only G8 country without residential flood insurance coverage.

Recently, individual insurers have started taking steps to address this coverage gap by introducing, or exploring the introduction of, some type of residential overland flood insurance product.

Nevertheless, it remains clear that Canada and its P&C insurance industry need a more comprehensive and institutionalized solution to tackle the pressing challenges faced by high-risk properties. For this reason, IBC welcomes the federal government's recent commitment to work with the industry to develop a national approach to flood insurance – an approach that, from the industry's perspective, will need to address the preconditions identified above and identify clear roles and responsibilities for all stakeholders.

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Endnotes

1 (ICLR 2012)
2 IBC analysis on (Public Safety Canada 2014)
3 IBC analysis on (PCS-Canada Service data 2013)
4 (Swiss Re 2012); (OECD 2003)
5 (Swiss Re and ICLR 2010)
6 (Swiss Re 2012)
7 IBC analysis on (Public Safety Canada 2013)
8 Ibid
9 (German Insurance Association 2012)
10 (Swiss Re CatNet GeoPortal 2014)
11 (Geneva Association 2013)
12 (Consorcio de Compensacion de Seguros 2008)
13 (Walker 2006)
14 (US Government Accountability Office (GAO) 2014)
15 (Swiss Re and ICLR 2010)
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