A COMPARISON OF RESIDENTIAL FLOOD INSURANCE MARKETS IN 25 COUNTRIES[1]

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Revised version - June 28, 2015

Abstract:

Recognizing the growing interest in improving resilience to flood risk around the world and the role that insurance can play in that regard, several countries are debating what national flood insurance solutions they should have in place, or how to improve the current situations. Insurers are also fully involved in those discussions, either because they cover the risk, partner with the national government in doing so by underwriting, selling policies, adjusting claims after disasters, or because they are contemplating market opportunities.

This white paper reviews homeowners' flood insurance in 25 countries: the role of the public and private sectors, design choices (required or voluntary insurance, bundled with other coverage or standalone, pricing determination), elements of market penetration (typically fairly low unless requirements are in place, and enforced), links between insurance and mitigation efforts (which we find to be relatively poor in most countries, except the U.S.) and other features in describing the similarities and differences across the national solutions.

We find that the "best" design or features will depend on the specificities and culture of the country under study. It is of value, though, to better understand options and alternative ways to provide flood insurance solutions to those in need of financial protection; this review can help in that process.

[1] A web based platform is currently being developed by the Wharton Risk Center team to make the data on each one of these markets easily widely accessible, searchable, and international comparisons possible (available in the fall of 2015).
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Note: This version is a working draft attempting to provide the largest international comparison currently available on residential flood insurance around the world; our goal is to share it as a basis for discussion with the key stakeholders and other specialists so we can better access data from these 25 markets (and possibly as many other relevant ones) as a next step of the research.

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Section 1. A Growing Interest in Flood Insurance[4]

Recent catastrophes have inflicted significant economic losses. The global average *annual* cost of natural disasters between 2000 and 2012 has been estimated to be around $100 billion (Kousky 2013). Insured losses have increased as well. During the period 2001 to 2010, insured losses from weather related disasters averaged $30 billion annually (Swiss Re 2011). Of all natural disasters globally, floods are the most costly (Miller et al. 2008) and have affected the most people (Stromberg 2007). This is true worldwide, including in the most advanced economies. For instance, in the United States, of all natural hazards, floods accounted for the most lives lost and the highest amount of property damage over the 20th century (Perry 2000). According to United States Geological Services (USGS 2006), in the average year in United States, floods caused $6 billion in property damages; floods have also triggered about two-thirds of all presidential disaster declarations over the period 1950 to 2011 (Michel-Kerjan and Kunreuther 2011).

Recent large-scale floods that occurred in Austria (2002, 2013), Australia (2000, 2011), France (2010), Germany (2002; 2013), the UK (2014) and the U.S, (2005, 2008, 2012) have triggered historical levels of losses. They fueled fairly intense national debates about who should pay for the economic consequences of flood catastrophes and the appropriate roles of the public and the private sectors. They also challenged flood insurability built on risk-based premium principles and how one addresses issues of affordability of flood insurance (Michel-Kerjan and Kunreuther 2011; Kousky and Kunreuther 2014; Mechler et al. 2014; Botzen and Van den Bergh 2008).

In low-income and developing economies, floods have been very devastating as well, including severe floods in China (2010), Morocco (2013; 2014), Pakistan (2010), Philippines (2012, 2013), and Thailand (2010). In these countries where insurance markets are much less developed, there is also a growing national discussion about what flood insurance solutions tailored to local needs could look like.

Most of the existing body of literature on flood insurance systems, approaches the subject in one of these ways (a) takes a detailed look at flood insurance only in a single or a handful of countries (typically 3 or 4) (Michel-Kerjan 2010; Paudel 2012; Swiss Re 2012); (b) surveys a larger number of countries but only for a few of the design choices we study here (Bower et Al. 2007; Maccaferri et al. 2012); (c) studies several design choices in a number of

[4] We thank Anna Lorant, Ben Collier, and Marilyn Montgomery for their insights in preparing this document. Partial financial funding was provided by the Zurich Insurance Community Flood Resilience program.

countries but on general disaster insurance with no systematic focus on flood risk (OECD 2008a and b, 2012; Schwarze et. al., 2011; World Bank 2008; Butzengeiger et al. 2011); (d) done at a fairly high level of description (Bouwer et al. 2007; Aakre et al. 2010; Maccaferri, et al. 2012), insufficiently explained (Paudel 2012), or not comprehensively (Schwarze et al. 2011, OECD 2008, 2012).

We believe it is thus a good time to review existing residential flood insurance solutions in several countries comprehensively and systematically, building on the existing literature and expending upon it. In this paper, we focus on residential flood insurance, to categorize how different countries have established different “design choices” for selling residential flood insurance. We are not making a judgment on whether one solution is better than another, recognizing that the development of such solutions has a lot to do with national culture, market constraints and historical losses. That said, looking at several countries allows us to put forward several key design choices that are essential to consider:

1) Public vs. Private Roles:

- Is flood insurance sold by the private sector alone, the public sector alone or through public-private collaboration?
- In case of a collaboration between the two sectors what are their respective roles?
- Is the government playing the role of primary insurer, reinsurer and/or assisting in the implementation of risk reduction measures?
- Are insurers bearing all the risk, sharing it, or are they simply financial intermediaries via their marketing networks and claim adjustment expertise?

2) Voluntary vs. Mandatory:

- Is the flood insurance purchased voluntarily by homeowners, or is it mandatory?
- Are insurers required to offer flood insurance to some residents (e.g., those living in high-risk zones; those with a mortgage)?

3) Bundled vs. Single:

- Is flood insurance sold as an endorsement to an existing homeowner’s policy, as part of the coverage under a homeowner’s policy or is it standalone coverage?

4) Risk-based vs Subsidized:

- How are insurance premiums determined, and by whom?
- Do premiums reflect risk fully (i.e., consider hazard, exposure and vulnerability), only partially risk-based, or do not reflect risk (e.g., uniform across all homeowners)?
- Are premium subsidies offered to those who require special treatment (e.g., low-income households)?

5) Economic Incentives:

- Are there economic incentives for homeowners or communities that link flood insurance with risk reduction measures?

6) Federal Disaster Relief

- Are post-disaster compensation mechanisms in place that might interfere with existing insurance solutions?

We look at 25 countries: Austria, Australia, Belgium, Canada, Czech Republic, Germany, Finland, France, Hungary, Iceland, Indonesia, Japan, Mexico, Morocco, Nepal, Netherlands, Norway, Peru, Poland, Romania, Slovakia, Spain, Switzerland, the United Kingdom, and the United States (Figure 1). In 2013, Zurich Alliance launched a global program to enhance flood resilience in four of the 25 markets we study here. The countries where the alliance has ongoing projects are: Indonesia, Mexico, Nepal and Peru. We build our analysis on existing studies, ongoing research of the co-authors and interaction with the decision makers of these markets and programs. While this is not an exhaustive list, we feel these elements capture flood insurance considerations on the supply and demand side pretty well, while still being comparable across countries.

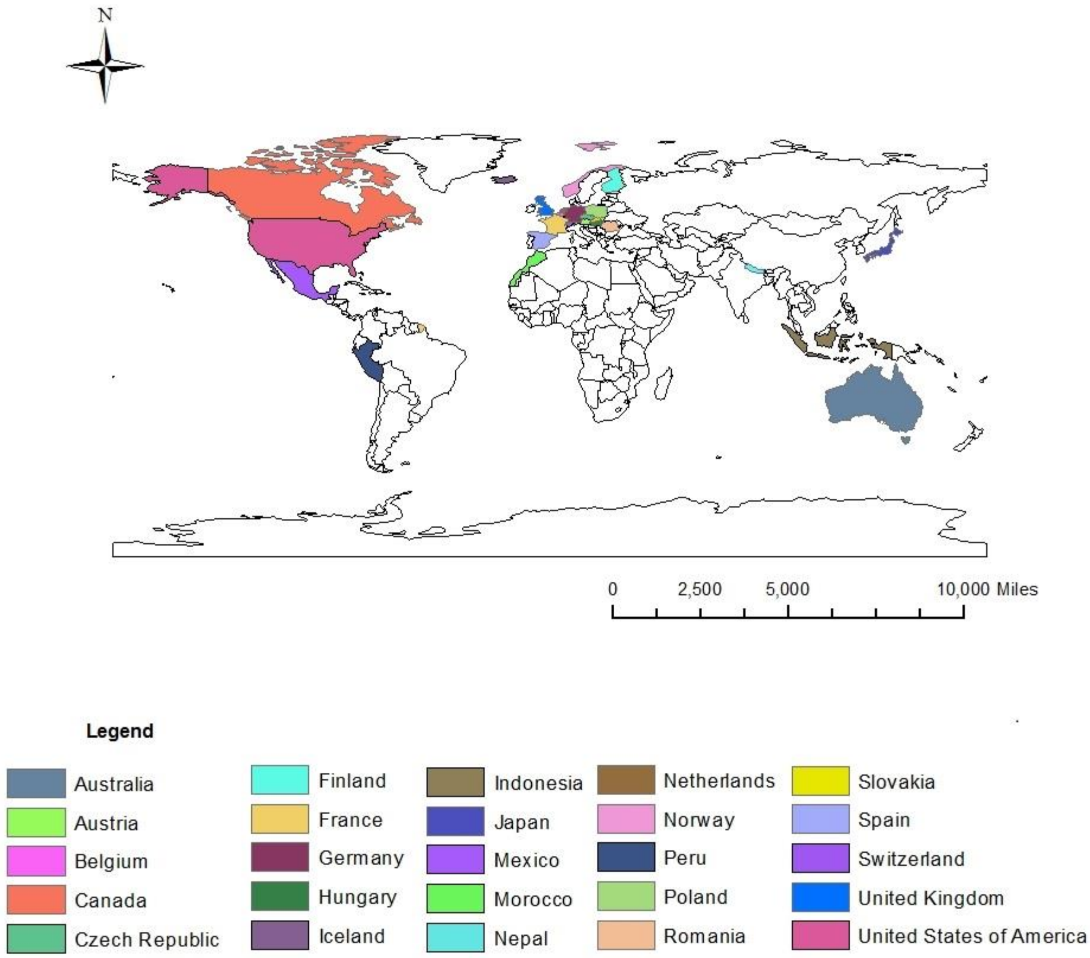

FIGURE 1: THE 25 COUNTRIES COVERED BY THIS STUDY

The paper is organized as follows. **Section 2** briefly introduces the aforementioned design choices and market conditions at a generic level. **Section 3** provides a summary table of the relevant variables characterizing the flood insurance options for each of the 25 countries to the extent we were able to access information. The data availability across countries is fairly heterogeneous. Some countries have been the focus of more analytical research that has been published (e.g., France, Spain, United States) while for other countries there is limited data available either because it is not collected or because it is not made public. **Section 4** concludes.

Section 2. Design Choices and Other Important Considerations

Several distinct attributes can be considered in the design of a residential flood insurance market. We review them in turn.

2.1. Public vs. Private Roles

Flood risk insurance may be a fully private or fully public arrangement, but in practice most solutions involve some collaborative effort between the public and the private sectors. Our review reveals that the private insurance industry currently plays one of the following roles in the flood insurance market: underwrites and assumes risk as primary insurer with or without state regulation (e.g., Germany, Norway, UK); underwrites the risk on behalf of the government but does not bear any of the risk (e.g., USA); plays the role of a reinsurer for a government program (e.g. Romania).

The role played by the government in flood insurance markets can find its origin in different ways:

- Insurers consider the risk to be uninsurable because of its catastrophic nature and its high concentration, which makes diversification difficult. In other words, no mutually advantageous risk transfer can be exploited by the consumer and supplier of insurance, or the demand would be considered too low (Kunreuther and Michel-Kerjan, 2011);
- There is a culture of solidarity which is part of the national constitution as in France where "The Nation proclaims the solidarity and equality of all French people in bearing the burden resulting from national calamities," resulting in the government providing most of disaster insurance for all (§12 of the Preamble of the French Constitution);
- Because the government is considered to be primarily responsible for preventing flood losses, it can be viewed by some as being also responsible for those losses;
- There traditionally has been a strong reliance on government intervention, as may be observed in some countries, for example Austria (OECD 2012, 65).

The roles of the public sector with regard to flood insurance markets are more diverse than for the private sector as the governments may function as: 1) primary insurer (underwriter of risk); 2) reinsurer; 3) guarantor – ensuring security for the insurance sector (lender of last resort, industry subsidies (e.g., tax exemptions for reserves); and 4) regulator of insurance markets, which can be somewhat minimal (e.g., obligatory reserves) or fairly extreme (e.g., obliging insurers to offer catastrophe risk policies, introducing and/or limiting deductibles).

2.2. Voluntary vs. Mandatory Flood Insurance

Insurance coverage can be **voluntary** (i.e., there are insurance products available, but residents are not required to purchase them) or **mandatory** (i.e., residents are required to purchase insurance, whether as part of an all-hazard policy or as a stand-alone policy).

Mandatory insurance can take different forms: On one extreme, national or regional/state legislation can require homeowners to purchase insurance. Nation- or state/region-mandated insurance presents **several advantages**: since all homeowners are supposedly insured there is less of a need for ad hoc post disaster relief (Raschky and Weck-Hannemann 2007; Kousky, Michel-Kerjan and Raschky 2014). A second advantage is reduced adverse selection since all homeowners, and not only those with high risks, purchase coverage. Third, depending on the size of the country or region, the insurance pool may be more diversified geographically through this requirement.

Mandatory insurance can **also be based on factors other than geographic**. Most commonly, banks may require insurance to protect their mortgages from the uninsured homeowner defaulting after suffering severe damage from a flood. In the United States for instance, the requirement to buy flood insurance in high-risk zones (as defined by the U.S. Federal Emergency Management Agency) applies only to those who have a federally backed mortgage. In Slovakia, mortgage financed constructions need to be 100% insured due to lender's requirement.

The mandatory requirement can also be supply-side based if insurers are obligated to offer insurance. The consumer can then decline coverage, as in the case of Belgium and Spain.

While mandatory insurance has the advantage of increasing market penetration, there can be barriers. In some countries, for example, Hungary, there have been discussions whether the obligation to protect oneself is constitutional. Discussions also took place in the United States around the same argument made against those who suggested that flood insurance should be required for everyone in flood prone areas, independently of whether or not they have a federally backed mortgage. In that case, many felt that the government cannot obligate people to do so against their free will (Michel-Kerjan, 2010).

2.3. Flood as a Standalone Policy (Single) vs. Bundled Policy

Another design choice is whether flood insurance is sold independently or bundled with homeowners' insurance policies. Almost all of the countries we studied have adopted some form of bundled system, where catastrophe risk coverage (including flood) is attached to homeowner's or accident insurance policies. Homeowners' property insurance typically covers fire, theft and, in most countries, catastrophe risks such as flood, wind, etc.

Bundling of coverage presents **several advantages**. First, homeowners are aware that they are covered for all types of disasters thus avoiding legal costs for determining which hazard actually caused the damage. Second, it reduces administrative and search costs: instead of purchasing policies for different hazards from several insurers, the homeowner purchases just one policy. Third, it might increase flood insurance penetration, in that many more homeowners will purchase all hazard-coverage than a single flood policy because they are concerned with losses from other disasters (e.g., fire, earthquake, tornadoes). Fourth, by covering multiple hazards there is cross-risk diversification since flood is independent of many risks, such as theft and earthquake. However, bundled coverage may increase the chance of a correlated catastrophic loss, such as wind and water damage from a hurricane. It is important for homeowners to know what portion of their premium covers each type of risk.

2.4. Pricing and Premiums

Insurance is a widely recognized market-based instrument that spreads the economic costs of catastrophic events across many policyholders. Insurance companies set different premiums depending on risk categories, such as flood zones, and, in general, cover the cost of damages utilizing the premium they collect from the policyholders. Many economists argue that pricing risk appropriately will place incentives for risk mitigation (cf. work by Botzen, Kunreuther, Michel-Kerjan). The differentiation of the flood insurance premium – for example a higher rate for households that are located in flood-prone areas – provides an incentive for individuals to limit their risk exposure so that they become eligible for lower premiums (Michel-Kerjan and Kunreuther 2011; Botzen and Van den Bergh 2008). It may also encourage homeowners to reduce risks and thus receive reductions in premiums (see following section).

A risk-based premium, in theory, takes into account the three elements of risk: hazard, exposure and vulnerability. Homeowners can lower the insurance premium they pay by undertaking loss reduction measures and limiting the adverse impact of those elements of risk. For example, homeowners would receive premium reductions if they reduce their exposure (for instance by relocating out of the hazard zone), reduce their vulnerability (for instance by flood-proofing their home) or if their community reduces the hazard (for instance, by building a dike). In existing insurance systems, however, premiums seldom take account of all three elements of risk. We therefore, distinguish four categories of premiums according to the extent that they differentially price the risk:

- Full risk based pricing taking account of the hazard, exposure and vulnerability of each insured property with no subsidy in place;
- Partial risk based pricing taking account of both hazard and exposure (but not vulnerability), e.g., risk zones and property value (e.g. UK, Germany, U.S.);
- Minimal risk based pricing taking account of only property value (percent of property value irrespective of location, building type, etc.,) (e.g., France, Norway);

- No risk based pricing (flat premiums): Flat premiums are only indirectly risk-based as they are calculated as a standard per-mil rate of the homeowner's insurance which is usually calculated based on property value (e.g., Spain, Romania).

2.5. Linkage between Flood Insurance Premiums and Risk Mitigation Efforts

By rewarding behavior that reduces risks and potential damages, insurance arrangements are able to reduce total loss and moderate economic impacts of adverse events. Insurance arrangements can also limit damage by rewarding well designed buildings with lower premiums, lower deductibles, and higher coverage limits on insurance policies (Kunreuther 1996). Thieken et al., 2006 in their survey analysis find that, in the run-up to the 2002 flood in Germany, insured households tended to be more informed about mitigation and were more likely to flood-proof their building than uninsured households.

We have found limited evidence in the residential flood risk insurance markets that either governments or insurance companies actively encourage precautionary measures by linking the cost of insurance to individual efforts (or linking premium to vulnerability) (Thieken et. al., 2006). **An exception is the U.S., where the federal government has instituted a dedicated flood-specific Community Rating System (CRS); actions taken by communities to improve preparedness to floods and reduce exposure to the risk allow their residents to benefit from flood insurance premium rebates that can go up to 45%** (Michel-Kerjan, 2010).[5]

While public, large scale risk mitigation measures are mainly carried out by governments, both public and private insurance and other risk transfer mechanisms have the potential to incentivize private risk mitigation. Also public-private partnerships may prove feasible options to further risk awareness and mitigation.[6]

Existing literature identifies a number of broad categories of insurance practices that promote risk reduction actions by public and private actors (Warner et al. 2009; Linnerooth-Bayer et al. 2011). In the above section, we discussed the role that risk pricing can play by setting premiums to reflect risk to reward preventive activities. In addition, insurers engage in a wide-range of activities that provides loss-reducing incentives, including: 1) warranties / must do clauses 2) premium/deductible discounts 3) awareness raising / client consulting.

[5] Several of the authors are currently starting a detailed analysis of this CRS program benefiting from a unique access of its entire database for all the participating communities over time. We feel the CRS could well be applied in other countries to incentivize communities to improve their protection against and resilience to flood risk. It also provides a solid series of metrics to measure flood resilience efforts of these communities along 18 distinct activities.

[6] In several countries, insurers (or insurers-supported efforts) and governments have been working together to develop publically available online catastrophe risk mapping and zoning tool (e.g., the HORA initiative in Austria: www.hora.gv.at or the Mission Risques Naturels in France: http://www.mrn.asso.fr/).

Case studies (Surmisnki 2010; Orie and Stahel 2013; Mills 2012) demonstrate that insurers are active in activities that increase client awareness about their risks and measures for its mitigation (cf. special case Austria). Insurers can also influence public policy makers to change regulations or invest directly in risk reduction. A recent example is provided by the Association of British Insurers (ABI) that is actively advocating for higher public spending on flood defense.

As another risk-reducing activity, insurers may place requirements (warranties or must-do clauses) in their contracts that the insured take specified measures to reduce risk. As a familiar example, car insurance often does not cover theft damages if the car was left running, properly locked or if a window or roof opening was left open or unlocked. For flood insurance policies there appears not to be anything as specific; hazard coverage sometimes includes similar conditions; however, these are typically general, such as requiring the owners to keep the insured property in a good state and take all reasonable steps to prevent damages without explicitly naming any preventive measures. Additionally, with the use of deductibles, policyholders are motivated to be creative in limiting potential losses ex ante, ex post as well as during the flood (Botzen and van den Bergh, 2008).

Finally, and rarely, insurers make direct investments into mitigation measures, like the Swiss cantons monopoly insurers (KGV) that finance the Fire Service and Cantonal Civil Defense Services. In addition, KGV has made available funds in many Swiss cantons to provide financial support for preventive measures.

For this study, apart from risk-based pricing, we are particularly interested in the contractual requirements for loss prevention measures, warranties or must-do clauses as well as awareness raising activites. We have found only limited evidence for must-do clauses while awareness raising activities are found to varying extents in most insurance systems.

2.6. Public Safety Nets and Level of Coordination with Insurance Arrangements (Ex-Post Policy)

Governmental post disaster aid as well as public flood protection infrastructure, while they are not part of a design choice for a flood insurance market as such, may influence the functionality and usefulness of disaster risk insurance.

Ad-hoc aid

Almost all countries with a history of flooding provide ad-hoc aid in the case of catastrophic events, as it is difficult for politicians to stand by when the electorate is affected by a natural (or manmade) catastrophe. While most aid is not statutorily mandated and thus not guaranteed, in many cases it is taken for granted, e.g. Germany and most countries in Central and Eastern Europe. Even countries with designated disaster relief funds have been known to add financial resources if the fund was depleted (e.g., Austria in 2013). And even in countries that have had traditionally little government involvement in disaster relief, the series of recent catastrophes have changed that trend considerably. As a matter of fact, 50% of the cost of Hurricane Katrina (the most costly disaster ever in the United States) was compensated by federal relief; and more than 80% of the cost of Hurricane Sandy was paid through special appropriations of the U.S. Congress. (Michel-Kerjan, 2013).

Disaster relief funds

Disaster relief funds are most often budget items fed by taxpayer dollars, which are used to compensate flood victims directly or are used to rebuild public infrastructure and cover uninsured losses. Relief funds are different from ad-hoc aid as they are legally established ex-ante policy instruments (e.g., Austria, the Netherlands, and Canada).

When post disaster aid remains uncoordinated with insurance arrangements it may negatively influence insurance markets as well as the risk perception and private risk reduction of households risk – charity hazard (cf. Browne and Hoyt 2000, Raschky and Weck-Hanneman 2007; Kousky et al. 2014). Public risk mitigation may have similar negative effects as it may reduce risk awareness, but if well managed, may also be conducive to the availability of affordable insurance policies.

For this paper we distinguish insurance arrangements with public and private involvement: (1) **coordinated public-private systems**, where regulation, public-private partnerships or other forms of coordination between public and private sectors is the basis for the arrangement and where post disaster relief is designed to complement insurance; (2) **coexistence of public and private sector activities** where as a result, extensive post-disaster aid may lead to a crowding out of insurance (but a more responsive public sector for preventing disasters).

Table 1 provides a summary of the different design features (columns) of the 20 national flood insurance solutions (rows). We then review the flood insurance mechanisms of each country under study in section 3 of the paper. (Countries are listed in in alphabetical order, with the exception of Canada and the Netherlands since neither country has a flood insurance market; these discussions are underway between the government and the insurance industry in both countries).

Table 1: Summary of Design Features of 25 National Insurance Systems for Homeowners Flood Insurance

	Private Role			**Public Role**				**Public-Private Interactions**		**Voluntary vs. Mandatory Insurance**			**Bundled vs. Single Policy**		**Premium Setting**				**Link between Insurance and Risk Reduction Efforts**			**Ex-post policy**	
Country Abbreviation	Primary insurer (underwriting)	Reinsurer	Administrator	Primary insurer	Reinsurer	Guarantor	Regulator	Coordinated	Coexistence	Voluntary	Mandatory Purchase (policy holders)	Mandatory Offer (insurers)	Bundled	Single	Risk-based	Partially risk-based	Minimally /Non risk-based	Premium Subsidies (public)	Warranties	Premium/ deductible/indemnity limit	Awareness raising/ client consulting	Disaster relief fund	Ad-hoc aid
AT	X	-	-	-	-	-	X	-	X	X	-	-	X	-	-	X	-	-	-	-	X	X	-
AU	X	-	-	X	-	-	-	-	X	X	-	-	X	-	-	-	X	tbd	tbd			X	-
BE	X	-	-	-	-	X	X	X	-	-	-	X	X	-	-	X	-	-	tbd	X	-	X	-
CA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-
CH	X	-	-	X	X	-	X	X	-	-	X	X	X	-	-	-	X	-	-	X	X	-	-
CZ	X	tbd	-	-	-	-	X	-	X	X	-	-	X	-	-	X	-	-	X	tbd	X	X	-
DE	X	X	-	-	-	-	X	-	X	X	-	-	X	X	-	X	-	-	tbd	X	-	-	X
ES	-	-	X	X	X	X	X	X	-	-	-	X	X	-	-	-	X	-	-	-	X	-	-
FI	X	-	-	-	-	-	-	-	-	X	-	-	X	-	-	-	X	-	tbd			-	-
FR	X	X	-	-	X	X	-	X	-	-	X	-	-	-	-	-	X	-	tbd	X	-	-	X
HU	X	tbd	-	X	-	-	-	-	X	X	-	-	X	X	-	-	-	-	-	X	-	-	X
ID	tbd			X	X	-	X	-	X	X	-	-	X	-	-	X	-	-	-	X	-	X	-
IS	-	-	X	X	-	-	-	X	-	-	X	-	X	-	-	-	X	-	-	-	-	X	-
JP	X	-	X	-	-	-	-	-	-	X	-	-	X	-	-	-	-	-	-	X	-	X	-
MA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	tbd			-	X

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	Private Role			Public Role				Public-Private Interactions		Voluntary vs. Mandatory Insurance			Bundled Vs. Single Policy		Premium Setting				Link between Insurance and Risk Reduction Efforts			Ex-Post Policy	
Country Abbreviation	Primary insurer	Reinsurer	Administrator	Primary insurer (underwriting)	Reinsurer	Guarantor	Regulator	Coordinated	Coexistence	Voluntary	Mandatory Purchase (policy holders)	Mandatory Offer (insurers)	Bundled	Single	Risk-based	Partially risk-based	Minimally /Not risk-based	Premium Subsidies (public)	Warranties	Premium/deductible/indemnity limit	Awareness raising/client consulting	Disaster Relief	Ad-hoc aid
MX	X	-	-	-	-	-	X	X	-	X	-	-	X	-	X	-	-	-	-	-	X	X	-
NL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-
NO	X	-	-	-	-	X	X	X	-	-	-	X	X	-	-	-	X	-	tbd	tbd	-	X	-
NP	X	-	-	-	-	-	X	X	-	X	-	-	X	-	-	-	X	-	-	-	-	-	X
PE	X	-	-	-	-	-	X	-	-	X	-	-	X	-	tbd				tbd			-	-
PL	X	-	-	X			X		X	-	X	-	X	-	-	-	X	-	-	-	-	-	X
RO	X	-	-	X	-	-	X	tbd		-	X	-	X	-	-	-	X	-	-	-	-	-	-
SL	X	-	-	tbd				tbd		X	-	-	X	-	-	-	X	-	tbd			-	X
UK	X	X	-	-	-	-	-	X	-	X	-	-	X	-	-	X	-	X	-	-	-	-	-
US	-	-	X	X	-	-	X	X	-	X	-	-	-	X	X	-	-	X		X	X	X	X

Notes: X=applicable/in use, - =not applicable/not in use, tbd=to be determined (could not be found out so far).

The abbreviations are as follows: Austria (AT), Australia, (AU) Belgium(BE), Canada(CA), Czech Republic (CH), Switzerland (CZ), Germany (DE), Spain (ES), Finland (FI), France (FR), Hungary (HU), Indonesia (ID) , Iceland(IS) , Japan(JP), Morocco (MA), Mexico(MX), , Netherlands(NL), Norway (NO), Nepal (NP), Peru (PE), Poland(PL), Romania(RO), Slovakia(SL), United Kingdom (UK), and United States (US). Shaded countries are where the flood resilience program of Zurich Alliance is undergoing.

Section 3. Review of the 25 Countries

NOTE: IN THE CHARTS, THE SHADED AREAS ARE THE MECHANISMS USED BY THE COUNTRY.

3.1. Austria (AT)

Private role	**Primary insurer**	Generally, floods counting as “force majeure” are not covered by homeowner’s and property insurance (only damage from excessive precipitation). However, many insurers offer optional catastrophe packages.
	Reinsurer	
	Administration	
Public role	Primary insurer	The government acts as a regulator, however with only minimal influence. Reserves for insurers are required, but at the same time exempt from taxation.
	Reinsurer	
	Guarantor	
	Regulator	
Public/ private interaction	Coordinated	Private insurance and extensive post disaster relief are not coordinated. Raschky et al. (2013) show that this leads to crowding out of insurance.
	Coexistence	
Voluntary vs. mandatory	**Voluntary**	Buying flood insurance is not obligatory, however, increasingly household and homeowner’s insurance standard policies include a small coverage for natural hazards including floods.
	Mandatory purchase	
	Mandatory offer	
Single vs. bundled	Single	Flood insurance is only available in bundled form connected to homeowner or contents insurance. Additionally it is often bundled with other catastrophes.
	Bundled	
Premium setting	Risk-based	Premium setting varies among insurers in detail, but is overall quite similar: Premiums are partially risk-based depending also at the amount insured. Policies with low indemnity limits (up to EUR7.500) are not risk-based, for higher coverage, insurers assess risk individually based on hazard and exposure. Some insurers do not insure property in high-risk zones according to the HORA (Austrian Hazard Overview and Risk Assessment).
	Partially risk-based	
	Minimally/not risk-based	
	Premium subsidies	
Link between insurance and risk reduction efforts	Warranties/must-do clauses	We are not aware of any warranties requiring private risk reduction in return for a policy, lower premiums or lower deductibles. Indemnity limits are generally very low across insurers (and may only be raised after an individual risk assessment), but there are no deductibles. In a public-private effort, the HORA tool has been created mainly for awareness-raising among policy makers and the public.
	Premium/deductible/indemnity limit	
	Awareness raising/client consulting	
Ex-post policy	**Disaster relief fund**	Austria has a well-endowed disaster relief fund, almost three-quarters of which are invested in public flood protection. The rest is used for compensation after flood events, in theory up to 50% but in practice sometimes up to 100% of public and private damages may be compensated.
	Ad-hoc aid	

3.2. Australia (AU)

Private role	**Primary insurer**	In Australia, most of the private insurance companies do not provide flood coverage for private households. Private insurance companies are recently starting to include flood coverage in Australia one way or another. Suncorp who introduced flood coverage as standard in 2008, spent several years to develop its pricing and map all the properties which it covered in Queensland (40 percent market share). Zurich Insurance introduced flood coverage as standard in 2008. NRMA offered flood cover with opt-out in New South Wales, Tasmania from June 2009.
	Reinsurer	
	Administration	
Public role	**Primary insurer**	Some State insurers provide flood coverage for private households.[8]
	Reinsurer	
	Guarantor	
	Regulator	
Public/ private interaction	Coordinated	The private and public insurers coexist.
	Coexistence	
Voluntary vs. mandatory	**Voluntary**	The purchase of flood insurance from either private or public insurers is voluntary.
	Mandatory purchase	
	Mandatory offer	
Single vs. bundled	Single	In Australia, following the Insurance contract act of 1984, flash flood coverage is included in the standard coverage set out by the Insurance Contracts Act (1984). Riverine flooding or storm surge flooding, however, is optional.[9]
	Bundled	
Premium setting	Risk-based	The lack of availability of flood maps has been the single biggest obstacle to insurers' ability to underwrite flood risk.
	Partially risk-based	
	Minimally/not risk-based	
	Premium subsidies	
Link between insurance and risk reduction efforts	Warranties/must-do clauses	tbd
	Premium/deductible/indemnity limit	
	Awareness raising/client consulting	
Ex-post policy	**Disaster relief fund**	Disaster aid compensation is paid from State funds with part reimbursement from the Commonwealth. Flood relief money is paid to local authorities for repairs to infrastructure and cases of personal hardship and emergencies (Federal Flood Recovery Fund, National Disaster Relief Arrangements).
	Ad-hoc aid	

[8] In Eastern states of Australia, unavailability of flood insurance has largely been a problem. After the Wollongong floods in 1998 several insurers extended their policies to include flash flooding. In Western and Southern Australia flood insurance have long been available as standard offerings while, the Territory Insurance Office (TIO) has included flood insurance in the household insurance policies automatically in Northern Territories.

[9] A very small number of insurers provide unrestricted flood cover that includes mainstream flooding (riverine or surge), in their standard policies. Those that do may charge an additional loading for higher risks, as much as 45%, or may not offer cover in highly vulnerable areas.

3.3. Belgium[10] (BE)

Private role	**Primary insurer** Reinsurer Administration	Private insurers are the principle underwriters for flood risk; however they are subject to extensive state regulation.
Public role	Primary insurer Reinsurer **Guarantor** **Regulator**	The government acts as a guarantor in the case of exceptionally catastrophic events. It also regulates premiums for particularly exposed properties in order to guarantee availability of insurance for everyone –therefore a rating bureau has been established, where high risk cases (premium rate for flood risk > 9‰) are evaluated.
Public/ private interaction	**Coordinated** Coexistence	The public/private interaction is coordinated.
Voluntary vs. mandatory	Voluntary Mandatory purchase **Mandatory offer**	For home owners fire insurance is voluntary, but since 2005 it cannot be purchased separately. Catastrophe insurance, however, may be purchased without fire insurance. Non-insured property will not receive compensation from the disaster relief fund even in exceptional cases.
Single vs. bundled	Single **Bundled**	Insurers offering fire insurance must bundle it with other natural catastrophes including floods. The only exception is when a house has been built in a high risk area more than 18 months after the publication of flood risk maps. As about 90-95% of the Belgium population has fire insurance, this is sometimes interpreted as enforcing a solidarity mechanism, because also citizens not at risk of flood contribute to the system.
Premium setting	Risk-based **Partially risk-based** Minimally/not risk-based Premium subsidies	Insurers are free to assess risks themselves and adjust additional flood premiums on a case-by-case basis or propose a deductible. They are, however, obliged to inform customers about the official ratings and the possibility to switch to another insurer. In practice, most insurers offer flat premiums for the additional flood risk covered in the bundle.
Link between insurance and risk reduction efforts	Warranties/must-do clauses Premium/deductible/indemnity limit Awareness raising/client consulting	Although obligatory deductibles were abolished in 2004, most insurers do include them in their policies. The maximum deductible is limited at EUR 610 per case (natural disaster law).
Ex-post policy	**Disaster relief fund** Ad-hoc aid	If a catastrophic event goes beyond the individual capacities of an insurer, the national disaster fund makes payments to victims. If claims to this fund exceed 280 million Euros, payouts to the insurer will be reduced proportionally. This means that post-disaster compensation is coordinated with the insurance sector and thus internalized into the insurance arrangement.

[10] http://economie.fgov.be/nl/consument/Verzekering/brandverzekering/andere_verzekerde_risicos/verplichte_risicos/natuurrampen/#.U1kx_1fm7f0, (24.4.2014)

3.4. Czech Republic (CZ)

Private role	**Primary insurer** Reinsurer Administration	In the Czech Republic, different private insurers offer flood insurance.
Public role	Primary insurer Reinsurer Guarantor **Regulator**	Since 2006 the Czech National Bank is the official regulator for the insurance market and requires insurers to disclose reinsurance arrangements and estimate probable maximum loss (based on the 200-year event). The system is backed, not by the government, but through the obligation for foreign reinsurance.
Public/ private interaction	Coordinated **Coexistence**	
Voluntary vs. mandatory	**Voluntary** Mandatory purchase Mandatory offer	There is no obligation to purchase flood insurance
Single vs. Bundled	Single **Bundled**	Flood insurance is bundled with homeowner insurance
Premium setting	Risk-based **Partially risk-based** Minimally/not risk-based Premium subsidies	Premiums are partially risk-based since they are determined by four risk-zones and property values. The flood premium rates in different flood zone ranges from 0.2 to 4 per mil. The coverage is equivalent to sum insured under FLEXA[11] policy. A Flood Risk Assessment Tool (FRAT) is available for an accurate risk assessment and as a basis for improved flood accumulation reporting. However, currently it is very difficult to obtain adequate insurance when living in flood prone areas.
Link between insurance and risk reduction efforts	**Warranties/must-do clauses** Premium/deductible/indemnity limit **Awareness raising/client consulting**	It is unclear whether these mechanisms are enforced in practice. Risk mitigation may be incentivized by several means. Premiums may be adapted according to the level of private risk mitigation undertaken, which may also influence the deductible, although deductibles are said to be low or often non-existent. In the case of no losses, a bonus may be paid out.
Ex-post policy	**Disaster relief fund** Ad-hoc aid	The Czech government has annual statutory budget allocations for emergencies, and post-disaster assistance can be provided to households, businesses and local governments. There are no resources to investigate whether victims have met requirements for qualifying for assistance. Emergency relief is provided in the form of grants, reconstruction aid, low interest loans as well as grants. Local governments implement the disbursement of assistance (World Bank 2011). Local and national governments are also addressing the issue of the insurability of houses located in close proximity to rivers with investments in flood protection barriers as well as the government decision to prohibit housing reconstruction in the most flood prone areas (World Bank 2011).

[11] FLEXA policy includes fire, lightening, explosion, aircraft fall impact on the property insured

3.5. Germany (DE)

Private role	**Primary insurer** **Reinsurer** Administration	Only privately offered insurance for hazards is available in Germany.
Public role	Primary insurer Reinsurer Guarantor **Regulator**	Although state is the regulator, regulation through the state is minimal.
Public/ private interaction	Coordinated **Coexistence**	Public and Private insurers coexist.
Voluntary vs. mandatory	**Voluntary** Mandatory purchase Mandatory offer	There is no obligation to purchase flood insurance.
Single vs. Bundled	**Single** **Bundled**	Flood policies are often marketed as part of a package with other natural disasters as supplements to home contents or property insurance for both commercial and residential properties
Premium setting	Risk-based **Partially risk-based** Minimally/not risk-based Premium subsidies	Premiums are partially risk-based using flood risk maps (general zoning). Buildings that are situated in hazard-prone areas are often excluded from insurance, or they can only be insured by very high premium.
Link between insurance and risk reduction efforts	Warranties/must-do clauses **Premium/deductible/indemnity limit** Awareness raising/client consulting	Flood insurance arrangements include deductibles to stimulate loss-reducing measures by individuals, and policies are priced according to risk zones. Apart from zoning and deductibles, stimulation of damage-reducing measures by insurance companies is minimal minimal (Thieken et al. 2006). It is reported that many Germans consciously self-insure, which increases their motivation for taking risk-reducing measures (Linnerooth-Bayer et al. 2001).
Ex-post policy	Disaster relief fund **Ad-hoc aid**	Following catastrophic disasters, the government intervenes very generously on an ad hoc basis. As a case in point, after major flooding on the Elbe in 2002, victims were almost fully compensated for their losses. However, there is no legal claim on government assistance, and many Germans self-insure (Linnerooth-Bayer et al. 2001).
Miscellaneous		In 2005, a flood prevention law was introduced at the national level. The responsibility for its implementation are with the provincial governments, which in some cases lead to inefficiencies and regional differences in the execution in practice.

3.6. Finland (FI) (new system since January 2014 – needs follow up with insurance association)

Private role	**Primary insurer**	In Finland the private sector is the sole underwriter of flood risk.
	Reinsurer	
	Administration	
Public role	Primary insurer	The Finish government will almost fully withdraw from flood risk financing until 2016.
	Reinsurer	
	Guarantor	
	Regulator	
Public/ private interaction	Coordinated	tbd
	Coexistence	
Voluntary vs. mandatory	**Voluntary**	Home insurance which currently cover the flood risk is voluntary. On average, 86% of Finnish households take on voluntary home insurance.
	Mandatory purchase	
	Mandatory offer	
Single vs. bundled	Single	Flood insurance is now included in home insurance.
	Bundled	
Premium setting	Risk-based	Currently, there is no increase in home insurance premium even with the inclusion of flood coverage (at the start of the policies, at least). However, it is expected that premiums will be recalculated to eventually reflect the risk level.
	Partially risk-based	
	Minimally/not risk-based	
	Premium subsidies	
Link between insurance and risk reduction efforts	Warranties/must-do clauses	Deductibles and indemnity limits vary across insurers.
	Premium/deductible/indemnity limit	
	Awareness raising/client consulting	
Ex-post policy	Disaster relief fund	Not anymore (see reform section below)
	Ad-hoc aid	
Miscellaneous	Reform	Flood damage compensation through governmental funds was replaced in 2014 by a new private-insurance based system. Under new scheme, private insurance companies will provide damage compensation for all types of floods that are above a pre-defined threshold, defined with the regulating authorities (Peer Review Report Finland, 2014) http://www.preventionweb.net/files/38523_20140717finlandpeerreport.pdf

3.7. France (FR)

Private role	**Primary insurer** **Reinsurer** Administration	In France, the natural catastrophe insurance "Catastrophes Naturelles" insurance program (known as "CatNat program") was founded in 1982 after major floods in the valleys of the Saône and Rhône and in the South-West of France. Private insurers collect premiums, process and manage claims, and provide indemnifications in accordance with the limits defined in the insurance policy.
Public role	Primary insurer **Reinsurer** **Guarantor** Regulator	Reinsurance is provided by a public reinsurer Caisse Centrale de Reassurance (CCR), a state owned public limited or any private reinsurer (in practice the CCR offers very competitive rate and an unlimited guarantee from the French government, which makes market competition difficult). The French system allows insurers to reduce risk by purchasing reinsurance voluntarily, either from the public reinsurance CCR or in the private reinsurance market. The unlimited state guarantee provided to the CCR and the relatively low reinsurance prices charged by the CCR give insurers an incentive to reinsure especially the higher risk policies with the CCR.
Public/ private interaction	**Coordinated** Coexistence	The private insurers are responsible for covering the flood risks while the main role of government is to provide reinsurance and establish natural disaster prevention and mitigation plans.
Voluntary vs. mandatory	Voluntary **Mandatory purchase** Mandatory offer	The insurance program is a mandatory arrangement based on national solidarity. Due to mandatory nature, the program has a high market penetration (virtually 100%).
Single vs. bundled	Single Bundled	
Premium setting	Risk-based Partially risk-based **Minimally/not risk-based** Premium subsidies	Premiums for the "natcat" coverage (that is all types of disasters) is defined by the government as a flat 12% surcharge on every homeowner's basic insurance policy (independent of the level of hazard the homeowner faces).
Link between insurance and risk reduction efforts	Warranties/must-do clauses **Premium/deductible/indemnity limit** Awareness raising/client consulting	The deductible is fixed at 10% of the direct property damage (with a minimum of USD 436) if the community has a Natural Risks Prevention Plan (PPR). The deductible varies for properties located in communities without a PPR (Letremy and Grislain 2009).
Ex-post policy	Disaster relief fund **Ad-hoc aid**	Ad-hoc government aid is often provided to victims for uninsured losses; but since the coverage is required the government does not provide aid to homeowners who suffered from a flood for losses that should have been insured.

3.8. Hungary (HU)

Private role	**Primary insurer** Reinsurer Administration	In theory, the private sector underwrites flood risk. However, insurers are protected by careful wording and specific underwriting practices and do not offer insurance in most flood-prone areas and do not insure mud-brick constructions.
Public role	**Primary insurer** Reinsurer Guarantor Regulator	Due to the restrictive underwriting of private insurers the government set up a fully public system (Social Flood Insurance Fund) targeting the population in high risk areas. While everybody who is willing to pay a premium can get coverage, in practice, very few people use this opportunity. The main reason is supposedly that most of the people at risk have a low level of education and are insufficiently aware of both risk and possibilities to transfer it.
Public/ private interaction	Coordinated **Coexistence**	The systems operate independently and are only complementary insofar as the Social Flood Insurance Fund has been introduced to cover the population that has no access to insurance.
Voluntary vs. mandatory	**Voluntary** Mandatory purchase Mandatory offer	Both public and private flood insurance policies are voluntary.
Single vs. bundled	**Single** **Bundled**	While private policies are usually available as a bundle with other catastrophes, the public fund offers flood coverage only.
Premium setting	Risk-based Partially risk-based Minimally/not risk-based Premium subsidies	tbd
Incentives for risk mitigation	Warranties/must-do clauses **Premium/deductible/indemnity limit** Awareness raising/client consulting	Private insurers rarely apply deductibles in practice.
Disaster relief	Disaster relief fund **Ad-hoc aid**	The Social Flood Insurance Fund was introduced to avoid post disaster aid. However, in practice the government has continued to provide ad-hoc aid in the case of exceptional flood catastrophes.

3.9. Iceland (IS)

Private role	Primary insurer	In cases where properties enter an insurance contract with a private insurance company, the private insurance company collects the premium on behalf of ICI.
	Reinsurer	
	Administration	
Public role	**Primary insurer**	In Iceland, Iceland Catastrophe Insurance (ICI)-a state-owned corporation established under the Iceland catastrophe Insurance Act of 1975, provides coverage against the risk of flood in addition to coverage against other catastrophes.
	Reinsurer	
	Guarantor	
	Regulator	
Public/ private interaction	**Coordinated**	Those properties that enter an insurance contract with a private insurance company covering fire risk are also required to insure their property against catastrophe damages. In such a case, the private insurance company collects the premium on behalf of ICI.
	Coexistence	
Voluntary vs. mandatory	Voluntary	Due to the fact that the insurance against fire risk is compulsory in Iceland and those getting the fire risk coverage are required to get catastrophe insurance coverage, it indirectly makes the catastrophe insurance coverage compulsory.
	Mandatory purchase	
	Mandatory offer	
Single vs. bundled	Single	Flood coverage is in addition to coverage against other catastrophes.
	Bundled	
Premium setting	Risk-based	The premium is currently set at 0.025% of the sum insured (insured up to the amount determined for the purpose of valuation under the fire policy as assessed by the State Land registry).
	Partially risk-based	
	Minimally/not risk-based	
	Premium subsidies	
Link between insurance and risk reduction efforts	Warranties/must-do clauses	A deductible is set at 5% but not less than ISK 85,000 for the building and ISK 20,000 for its contents.
	Premium/deductible/indemnity limit	
	Awareness raising/client consulting	
Ex-post policy	**Disaster relief fund**	ICI may request a loan from treasury in event the fund and the reinsurance arrangement is exhausted subject to an overriding discretion of the relevant minister.
	Ad-hoc aid	
Miscellaneous		Reinsurance is permissible but not mandatory. Currently, 20 foreign reinsurance entities are involved in reinsuring the catastrophe risk. ICI may request a loan from treasury in event the fund and the reinsurance arrangement is exhausted subject to an overriding discretion of the relevant minister.

3.10. Indonesia (ID)

Private role	Primary insurer Reinsurer Administration	tbd
Public role	**Primary insurer** **Reinsurer** Guarantor **Regulator**	State insurers and reinsurers hold a significant part of the market for non-life insurance: state-owned PT Asuransi Jasa Indonesia (largest insurer of government properties) held the second largest market share for non-life insurance in 2008, whilst state-owned Reasuransi Internasional Indonesia is the largest local non-life reinsurer in Indonesia. Since 2014 compulsory tariffs are in place for both FLEXA and special perils (including EQ (and following fire and explosion), volcano eruption (and following fire and explosion), tsunamis, flood, windstorm/tempest and water damage) set by the Financial Services Authority. No specific regulatory treatment of catastrophic risks as such but non-life insurers, in general, have to meet the required minimum threshold for paid-up capital. It is also required from all non-life insurance companies to make an obligatory cession of 2.5% of total sum insured (but not exceeding $500k) to Reasuransi Internasional Indonesia through a pooling arrangement.
Public/ private interaction	Coordinated **Coexistence**	
Voluntary vs. mandatory	**Voluntary** Mandatory purchase Mandatory offer	It is not mandatory to insure against mandatory perils, EQ and flood insurance penetration for homeowners is extremely low.
Single vs. bundled	Single **Bundled**	Coverage for catastrophic perils is usually included as an add-on product in the insurance policies. Flood cover can only be offered under an "industry standard endorsement" for windstorm/tempest, flood, and water damage.
Premium setting	Risk-based **Partially risk-based** Minimally/not risk-based Premium subsidies	Premium is defined on the basis of property type and potential flood risk [note: contradictory information. To be checked]. Premium subsidies are not available.
Link between insurance and risk reduction efforts	Warranties/must-do clauses **Premium/deductible/indemnity limit** Awareness raising/client consulting	Flood coverage for properties is available with 10% deductible. Regulation allows companies to provide "no claim" discount (in case of policy renewal with the same insurer) up to a maximum of 5% (for property) Standard flood coverage extension excludes movable items outside from the coverage.
Ex-post policy	**Disaster relief fund** Ad-hoc aid	According to the disaster management law (no 24/2007) the government provides financial assistance for the reconstruction of private dwellings, however the magnitude of this financial contribution varies greatly by disaster events.
Miscellaneous		Whana tata (local company) in partnership with GTZ and Munich Re developed pilot microinsurance scheme against flood in 2009. The program was not renewed in 2010.

3.11. Japan[12] (JP)

Private role	**Primary insurer** Reinsurer **Administration**	In 1984, after typhoons in the early 1980s, the Japanese insurance industry added the coverage for typhoon wind and flood as part of the comprehensive homeowner's insurance policy.
Public role	Primary insurer Reinsurer Guarantor Regulator	Premium for fire (bundled flood) insurance by the private sector (i.e.comprehensive dwelling house policies) must be approved by financial services agency. Japan does not have public (government) backing for bundled flood/fire insurance by the private sector (government backing is only for earthquake related risks).
Public/ private interaction	Coordinated Coexistence	But in addition to private insurance, Japan also has cooperative insurance schemes (by non-profit organizations). Approximately 43% of fire insurance products (including flood) are offered by these cooperative entities, and the remainder is private insurance offering; as of 2012 http://www.bousai.go.jp/kaigirep/kentokai/hisaishashien2/pdf/dai6kai/siryo5.pdf
Voluntary vs. mandatory	**Voluntary** Mandatory purchase Mandatory offer	Flood insurance is voluntary
Single vs. Bundled	Single **Bundled**	Flood insurance in Japan is bundled with fire insurance. Property owners can opt to purchase flood coverage as part of a standard fire insurance policy. Comprehensive dwelling house policies are the most commonly purchased personal line fire insurance product and policyholders have an option to attach an earthquake option clause to their policies that cover flood risk.
Premium setting	Risk-based Partially risk-based Minimally/not risk-based Premium subsidies	The Japanese rating organization uses actual payout information from insurance companies to calculate premiums therefore they cannot disclose detailed information regarding how the rates are set. For sure, rates are different for different prefectures for overall fire insurance, but no detailed information can be provided for floods (based on a direct inquiry with the rating organization in February 2015)
Link between insurance and risk reduction efforts	Warranties/must-do clauses **Premium/deductible/indemnity limit** Awareness raising/client consulting	According to an OECD report (2006) the deductible are restrictive at 30% and there is a coinsurance requirement of 30% on the remaining 70% of the insured loss amount. However, alternative opinion state that the insurance industry is deregulated in a sense that indemnity limits and deductibles are not so fixed. Also if you have private versus coop insurance will change them
Ex-post policy	**Disaster relief fund** Ad-hoc aid	Japan has relief in the form of monetary contribution for reconstruction of residential buildings for natural disasters with more than 10 households in one city/village being damaged (the money should come from a fund that is managed by prefectural governments and 50% subsidies by national government). This is not ad-hoc in the sense that it was legislated (after a long battle of individual responsibility vs. government role; three years following the Kobe Earthquake in 1998). There is no provision of State compensation in Japan. In accordance with the Disaster Relief Act, local public bodies are required to set aside a specific amount of money as a disaster relief fund, which is managed by the prefecture.
Miscellaneous		The coverage of typhoon wind and flood as well as storm surge were added in response to the Isewan typhoon of 1959 which was a 1-in-70 year event. In Japan this typhoon is widely regarded as a turning point of Japan's modern DRM institution, including insurance systems). In fact the minimum catastrophic reserve requirements for insurance companies are still set to match the magnitude of this typhoon event (losses for 1-70 year event.)

[12] In Japan 49% of the population and 75% of total property are located on former river and coastal flood plains (Sato 2006).

3.12. Mexico (MX)

Private role	**Primary insurer**	In Mexico insurance companies offer coverage called "hydro-meteorological phenomena" which includes flood coverage. It is a broader coverage as it includes hurricane, flood, flooding from rains, mudslides. It is an optional coverage once one has the basic contract (fire).
	Reinsurer	
	Administration	
Public role	Primary insurer	The government does not provide flood coverage to the population specifically, but has a natural disasters fund (Fonden) which is activated when one of these natural phenomena of relevant magnitude occurs.
	Reinsurer	
	Guarantor	
	Regulator	
Public/ private interaction	**Coordinated**	There are few cases in which the state or local governments interact with a private initiative unless the government grants a coverage linked to a payment of some municipal tax (e.g., property tax on a dwelling – PREDIAL)
	Coexistence	
Voluntary vs. mandatory	**Voluntary**	In Mexico it is voluntary, offered through private insurance companies.
	Mandatory purchase	
	Mandatory offer	
Single vs. bundled	Single	It is associated with a basic cover of fire, it is not given in isolation.
	Bundled	
Premium setting	**Risk-based**	The rates are based on exposure (geographical area) and types of construction (vulnerability) of the assets. The fee is not regulated by the government and each company constructs its own offer.
	Partially risk-based	
	Minimally/not risk-based	
	Premium subsidies	
Link between insurance and risk reduction efforts	Warranties/must-do-clauses	The insured participates with the deductible and coinsurance for each loss and according to the geographic location of the insured asset. Some insurers conduct information campaigns on the exposure it has to flooding.
	Premium/deductible/indemnity limit	
	Awareness-raising/client consulting	
Ex-post policy	**Disaster relief fund**	The federal government has a to help in natural disasters (FONDEN), limited, generally to help the population, but does not compensate for the dwelling.
	Ad-hoc aid	
Miscellaneous		The government is working on a culture of prevention, making stricter building permits in zones with high exposure (near rivers). Today only 5% of the homes in Mexico have insurance coverage so there is still a way to go.

3.13. Morocco (MA)

Note: Morocco does not have a residential flood insurance market as of yet but a bill has recently been presented to the national parliament that would create a catastrophe insurance market in the country. The table below provides a summary of this proposal.

Private role	**Primary insurer** Reinsurer Administration	Primary insurers would include catastrophe risk coverage in homeowners' insurance and be reinsured by the state-run Company Societe Centrale de Reassurance (Risk-sharing arrangement and premiums distributions has still to be determined). Of not it is estimated that only about 15% of Moroccans have homeowners' Insurance today which means that if the law is passed these 15% Will automatically have insurance against flood risk.
Public role	Primary insurer **Reinsurer** Guarantor Regulator	The law would provide uninsured victims with some degree of compensation through a dedicated solidarity fund (fonds de solidarite) which operating design has still to be determine (including how much of compensation uninsured can obtain and under which condition).
Public/ private interaction	**Coordinated** Coexistence	Since private insurer would be reinsured by the SCR, there is a natural public-private partnership here.
Voluntary vs. mandatory	**Voluntary** Mandatory purchase Mandatory offer	No requirement.
Single vs. bundled	Single **Bundled**	Catastrophe risk insurance (including for flood) would be bundled to homeowners' coverage.
Premium setting	Risk-based Partially risk-based Minimally/not risk-based Premium subsidies	For the beginning of this program there might be a unique surcharge applied to the basic homeowners' insurance premium (similar to the French system established in 1982). Discussion are currently taking place between the Moroccan insurance regulator within the Ministry of Finance and the private insurers about the possibility to establish more of a tiered-approached based on knowledge of risk exposure, but this might come later.
Link between insurance and risk reduction efforts	Warranties/must-do clauses Premium/deductible discounts Awareness raising/client consulting	In discussion.
Ex-post policy	Disaster relief fund Ad-hoc aid	The Moroccan government has typically provided some aid post disaster to affected residents but this relief is uncertain and variable. In any event it has always been much lower than what residents would receive from their insurer would the bill become law and people are insured.

3.14. Norway (NO)

Private role	**Primary insurer** **Reinsurer** Administration	The primary insurer in Norway is a pool of private insurers. The purpose of the Norwegian Natural Perils Pool is to be a liaison between the participants in the Pool and the Norwegian National Fund for Natural Damage Assistance. The Pool settles the natural disaster damage compensation between the companies and ensures the reinsurance cover of Norwegian natural disaster insurance. The pool is organized as a distribution pool meaning that it is the companies themselves who have all contact with their policy holders, and the pool only equalizes losses (claims).
Public role	Primary insurer Reinsurer Guarantor **Regulator**	The government strongly regulates the insurance market.
Public/ private interaction	**Coordinated** Coexistence	Norwegian insurance for natural hazards is offered in a coordinated fashion by private insurers with strong public involvement and regulation.
Voluntary vs. mandatory	Voluntary Mandatory purchase **Mandatory offer**	All national and foreign companies writing fire insurance in Norway are obliged to join the Pool
Single vs. Bundled	Single **Bundled**	Flood insurance is bundled with mandatory fire insurance for properties.
Premium setting	Risk-based Partially risk-based **Minimally/not risk-based** Premium subsidies	Premiums are based only on property value at 0.11 per mil of the sum insured, which also means low-risk clients subsidize those at high risk
Link between Insurance and risk reduction efforts	Warranties/must-do-clauses Premium/deductible/indemnity limit Awareness-raising/client consulting	The compensation may be reduced if the damage is wholly or partly due to faulty constructions, insufficient maintenance etc. There is a deductible of 8000 NOK per insured event, and a limit per event of 12.5 million NOK.
Ex-Post policy	**Disaster relief fund** Ad-hoc aid	The so-called Norwegian Natural Perils Pool was founded in December 1979 by amendments to the Act on Insurance Contracts by the Norwegian insurance companies and the Ministry of Justice Natural Damage Insurance Act. Losses not insured by the market are covered by the Norwegian National Fund for Natural Damage Assistance, established in 1961.

3.15. Nepal (NP)

Private role	**Primary insurer**	Private insurance companies provide coverage against flood risk in Nepal.
	Reinsurer	
	Administration	
Public role	Primary insurer	Beema Samiti (Insurance Board), an insurance regulatory authority of Nepal (overlooked by the government) sets the premium charged by the private companies. The rate, terms and conditions are subject to change by the insurance board without any notice.
	Reinsurer	
	Guarantor	
	Regulator	
Public/ private interaction	**Coordinated**	The insurance board and the private insurarers coordinate for regulatory purposes.
	Coexistence	
Voluntary vs. mandatory	**Voluntary**	The coverage for all major natural perils, including flood, is voluntary
	Mandatory purchase	
	Mandatory offer	
Single vs. bundled	Single	Bundled with fire peril. Issued for one year period.
	Bundled	
Premium setting	Risk-based	Fire policy can be extended to cover floods by paying additional premium. Rates are based on Nepal Fire Tarrif which in turn is based on the class of construction, type of commodity, type of occupancy.
	Partially risk-based	
	Minimally/not risk-based	
	Premium subsidies	
Link between Insurance and risk reduction efforts	Warranties/must-do-clauses	Maximum sum insured up to rs 3500000 ($35,000 approx.) for building and furniture fixtures and up to rs. 500000 ($5000 approx.) for household goods. (tbd)
	Premium/deductible/indemnity limit	
	Awareness-raising/client consulting	
Ex-Post policy	Disaster relief fund	Government provides aid to the victims in case of a severe flooding event.
	Ad-hoc aid	
Miscellaneous		Residential properties rarely buy fire insurance (mostly bought by commercial buildings) and hence the flood insurance coverage. Homeowners with mortgage from bank are required to buy homeowners insurance which covers for perils such as earthquake but flood coverage is not available through homeowners insurance.

Notes: The information is collected from the website of insurnace companies in Nepal such as Natioanl Insurance company, Oriental Insurance company, United Insurance company and also Insurance Board of Nepal (Beema Samiti) which operates under the Ministry of Finance. Few of the information was verified by personal communication with an insurance agent in Nepal.

3.16. Peru (PE)

Private role	**Primary insurer** Reinsurer Administration	Many companies cover flood risk. This coverage is often provided through what is typically called "fire insurance" for a property. Flood coverage sometimes requires an additional premium on these contracts, and it may not be offered by all insurers. Several insurers also offer a similar microinsurance product that covers flood.
Public role	Primary insurer Reinsurer Guarantor **Regulator**	Insurers are regulated through the Superintendencia de Banca, Seguros y AFP, which includes prudential requirements for lenders. All regulated insurance contracts are provided online (http://www.sbs.gob.pe/usuarios)
Public/ private interaction	Coordinated Coexistence	We are unaware of public-private interactions specifically related to the household flood insurance market.
Voluntary vs. mandatory	**Voluntary** Mandatory purchase Mandatory offer	The coverage for all major natural perils, including flood, is voluntary
Single vs. bundled vs. single	Single **Bundled**	Bundled, as described above.
Premium setting	Risk-based Partially risk-based Minimally/not risk-based Premium subsidies	tbd
Link between insurance and risk reduction efforts	Warranties/must-do-clauses Premium/deductible/indemnity limit Awareness-raising/client consulting	tbd
Ex-post policy	Disaster relief fund Ad-hoc aid	The federal government has disaster relief programs but does not specifically provide compensation to individuals if their home is destroyed by a flood.

3.17. Poland (PL)

Private role	**Primary insurer** Reinsurer Administration	In Poland, homeowner's policy covers flood risk and all other natural perils automatically and is offered by most local private insurers.
Public role	**Primary insurer** Reinsurer Guarantor **Regulator**	Currently, the Ministry of Interior is working on the first draft of a compulsory catastrophe insurance law, which will make flood insurance compulsory for all homeowners in the country. At the moment, only rural dwellings are subject to this requirement. Under the proposed plan, the two state-owned companies—PZU and Warta- will offer a stand-alone flood insurance policy to homeowners, which will be made compulsory by the proposed catastrophe insurance law. The risk will be then partially retained by the companies and partially reinsured in the international reinsurance market. No special risk pooling mechanism is envisaged under the plan.
Public/ private interaction	Coordinated **Coexistence**	
Voluntary vs. mandatory	Voluntary **Mandatory purchase** Mandatory offer	Although the common design of the insurance policy doesn't provide for an option to opt out of natural hazard coverage, legislation is not well enforced and many risks remain uninsured. Due to increasing number of mortgage financed homes and the finance company's requirement to hold the flood insurance, the market penetration is increasing in Poland and currently 56 % of homes in Poland are insured against natural hazards.
Single vs. bundled	Single **Bundled**	Homeowner's policy covers flood risk and all other natural perils automatically
Premium setting	Risk-based Partially risk-based **Minimally/not risk-based** Premium subsidies	Due to the increasing competition for the residential property business, which still remains highly profitable despite a considerable increase in the number of market players, premium rates are rather low by international or even Central European standards. The basic additional premium rate for flood cover historically has been 20 percent of the basic fire rate, but in the current extreme competitive climate coverage is often included in a global rate. For instance, PZU, the biggest player in the market has been offering all-perils property covers (for example, FLEXA and NATCAT) for less than 0.1 percent of insured value, as compared to 0.25 percent in the neighboring Czech Republic.
Link between Insurance and risk reduction efforts	Warranties/must-do-clauses Premium/deductible/indemnity limit Awareness-raising/client consulting	Also, for reasons of competition, most policies in Poland have very low deductibles. In the case of PZU, for instance, deductibles on a residential property insurance policy are EUR 100, but even then, they are applied only if the loss is below that amount. Deductibles for flood and other natural perils are usually the same as for the main FLEXA policy.
Ex-post policy	Disaster relief fund **Ad-hoc aid**	Ministry of interior is in charge of allocating post-disaster aid in Poland.

Note: Since the 1997 floods, the government has been trying to limit land development in flood prone areas and has been investing heavily into flood protection infrastructure Since 1997, the government has allocated PZN 753 million (EUR 171 million) in its annual budget for emergencies. The funds can be used for (a) disaster risk prevention activities (b) liquidation of property damages caused by natural disasters through financial assistance to local governments and (c) post-disaster assistance to individuals.

3.18. Romania (RO)

Private role	**Primary insurer** Reinsurer Administration	In Romania, flood risk and other catastrophic risk are covered through the Insurance Pool for Natural Disasters (Poolul Asigurare Împotriva Dezastrelor Naturale PAID), which was initiated by 12 insurers in 2009 as the key private component of the Romanian Program for Natural Disaster Insurance. Still, other insurance policies covering floods are available on the market and in need to be coordinated with the obligatory standardized policy.
Public role	**Primary insurer** Reinsurer Guarantor **Regulator**	From the government side, the Ministry of the Interior is responsible for the Romanian Program for Natural Disaster Insurance.
Public/ private interaction	Coordinated Coexistence	tbd
Voluntary vs. mandatory	Voluntary **Mandatory purchase** Mandatory offer	Buying flood insurance is obligatory for all Romanian home- and land owners based on law 260. These obligatory policies cover only buildings, but not contents (Stofor s.a.).
Single vs. bundled	Single **Bundled**	Flood insurance is always bundled with other natural hazard risks common in Romania such as landslides, earthquakes and floods.
Premium setting	Risk-based Partially risk-based **Minimally/not risk-based** Premium subsidies	Policies are standardized with minimally risk-based premiums. There are two different kinds of premiums available: Type A: for brick and concrete constructions and Type B: for any constructions made of untreated material e.g. unburned brick.
Link between Insurance and risk reduction efforts	Warranties/must-do-clauses Premium/deductible/indemnity limit Awareness-raising/client consulting	The possibility to apply a deductible is part of Law 260, its extent to be defined by the CSA (Romanian Insurance Regulator).
Ex-post policy	Disaster relief fund Ad-hoc aid	There is no public post-disaster compensation

3.19. Slovakia (SL)

Private role	**Primary insurer**	Private insurance companies provide coverage against flood risk in Slovakia.
	Reinsurer	
	Administration	
Public role	Primary insurer	tbd
	Reinsurer	
	Guarantor	
	Regulator	
Public/ private interaction	Coordinated	tbd
	Coexistence	
Voluntary vs. mandatory	**Voluntary**	In Slovakia, the coverage for all major natural perils, including flood, is voluntary and can be obtained for an additional premium in addition to the standard package of FLEXA perils. Due to the flexibility of opting out, 30% of the insured homeowners opt out of the catastrophe insurance coverage. However, 51% of all the homes in Slovakia are insured against catastrophe hazard. Mortgaged financed constructions are 100% insured due to lender's requirement.
	Mandatory purchase	
	Mandatory offer	
Single vs. bundled	Single	Obtained for an additional premium in addition to the standard package of FLEXA perils
	Bundled	
Premium setting	Risk-based	No indications of premium rates are available, since they can vary widely depending on the area where flood coverage is requested.
	Partially risk-based	
	Minimally/not risk-based	
	Premium subsidies	
Link between insurance and risk reduction efforts	Warranties/must-do-clauses	Deductible for natural hazards are virtually non-existent or very small. Instead, since the floods of August 2002, insurers typically use sublimits of about of 20-30% of sums insured under the FLEXA policy. Some insurers check the loss history for new risks and exclude flood altogether if a risk had a flood loss within the last 10 years. Replacement is the basis for indemnity of property damage most of the time; though very occasionally cover is placed on a "book value" basis.
	Premium/deductible/indemnity limit	
	Awareness-raising/client consulting	
Ex-post policy	Disaster relief fund	The Ministry of Environment is responsible for preparing an annual flood damage report. The report serves as a basis for budgetary allocations for rescue and relief work as well as for post-disaster reconstruction and prevention. The government disaster risk financing mechanism typically involves a budgetary transfer from the Ministry of Finance to the Ministry of Environment (or other government agencies involved in disaster relief or rehabilitation work), which in turn make the funds available to the final beneficiaries: municipalities, regional environment administration offices, and state owned hydropower stations. The regional offices of the Ministry of Environment further allocate the funds to villages and private citizens.
	Ad-hoc aid	

3.20. Spain (ES)

Private role	Primary insurer Reinsurer **Administration**	Most private insurance companies do not cover against the risk of flooding. Private insurers administer policies, manage the loss claims (adjustment included) and pays indemnification.
Public role	**Primary insurer** **Reinsurer** **Guarantor** **Regulator**	A public corporate entity, the *Consorcio de Compensación de Seguros (CCS)* established in the 1950s complements the Spanish Insurance System by covering the risk that are not assumed by private insurers: so-called extra-ordinary risks (floods, earthquakes, terrorism, etc.)[13]. The Spanish government provides unlimited guarantee to CCS. The premiums are set by CCS.
Public/ private interaction	Coordinated Coexistence	
Voluntary vs. mandatory	Voluntary Mandatory purchase **Mandatory offer**	Flood insurance is a part of the catastrophe coverage which is compulsorily included in Property and Casualty (P&C) insurance policy which is based on solidarity and collective risk sharing.
Single vs. bundled	Single **Bundled**	Bundled with P&C insurance policy.
Premium setting	Risk-based Partially risk-based **Minimally/not risk-based** Premium subsidies	The premiums are not based on the flood risk zones.
Link between insurance and risk reduction efforts	Warranties/must-do clauses Premium/deductible/indemnity limits **Awareness raising/client consulting**	The Consorcio (CCS 1992 Article 16) is required to prepare risk prevention plans and programs and implement those through adequate campaigns and prevention measures. However, no financial incentives are provided to stimulate the undertaking of risk reducing measures.
Ex-post policy	Disaster relief fund Ad-hoc aid	Since everyone is covered under the Spanish program there has not been much of a need for disaster relief to residents.

[13] http://www.consorseguros.es/web/le_ic_pd_i (05.05.2014)

3.21. Switzerland (CZ)

Private role	**Primary insurer** Reinsurer Administration	In seven Cantons (GUSTAVO cantons) private insurers offer bundled flood insurance; while the offer is obligatory, home-owners are not obliged to buy this coverage.
Public role	**Primary insurer** **Reinsurer** Guarantor **Regulator**	In 19 of 26 Swiss cantons, the cantonal property insurer (KGV) operates as a public monopoly institution. The 19 cantonal insurers together form cross-cantonal reinsurance association (Interkantonaler Rückversicherungsverband). The Elementarschutz insurance by law has to be included in home-owners insurance. (http://www.svv.ch/de/konsumenten/praevention/versicherung-gegen-naturgefahren/versicherung-von-elementarschaeden-der-schw)
Public/ private interaction	**Coordinated** Coexistence	In the few cases where private insurance companies are involved this is done in a coordinated fashion with public monopolies and in accordance to public regulations.
Voluntary vs. mandatory	Voluntary **Mandatory purchase** **Mandatory offer**	In Switzerland 19 out of 26 cantons oblige home-owners to buy the so called Elementarschutz (see above), which covers weather-related hazard damage coverage for floods, storms, hail, avalanches, weight of snow, falling rocks, and landslides (earthquake not covered).
Single vs. bundled	Single **Bundled**	The Elementarschutz has to be tied to any fire insurance offer available.
Premium setting	Risk-based Partially risk-based **Minimally/not risk-based** Premium subsidies	Premiums are set by the respective cantons. The premiums are generally not risk based, but in high-risk areas surcharges may be applied. Insurance may also be offered at uniform rate in exposed areas.
Link between insurance and risk reduction efforts	Warranties/must-do clauses **Premium/deductible/indemnity limit** **Awareness raising/client consulting**	An increase of the industry-wide coverage limit to CHF 1 billion francs each for building and for chattels was introduced after storms in the summer of 2005. The coverage limit applies to buildings in the GUSTAVO cantons and for chattels insurance in all cantons except for Nidwalden and Vaud. The individual deductibles were also increased in 2006. While the mandatory insurance policies offer full coverage, private bundled insurance has indemnity limits for extreme events. Both the cantons as well as private insurer are pursuing awareness raising activities, such as early warning systems as well as guidelines for prevention and preparedness measures.
Ex-post policy	Disaster relief fund Ad-hoc aid	There is no post-disaster aid in Switzerland.
Miscellaneous		The most noteworthy feature of the Swiss KGVs is their right to participate in processes influencing risk reduction, including building codes and land-use planning, and also financing of the Fire Service and Cantonal Civil Defense Services. The canton monopoly insurers are heavily involved in prevention, investing twice as much (0.15%o of sum insured) in prevention than the private insurers (0.06%o of sum insured). There are economies of scope from pooling of prevention and risk transfer. These investments have significantly decreased claims. It is however difficult to establish whether lower claims are due to improved prevention.

3.22. United Kingdom (UK)

Private role	**Primary insurer**	In the UK, flood insurance is provided through the private market, as part of standard home and contents insurance policies. Reinsurance is also obtained from private market.
	Reinsurer	
	Administration	
Public role	Primary insurer	Government is responsible for investing in flood protection.
	Reinsurer	
	Guarantor	
	Regulator	
Public/ private interaction	**Coordinated**	Private flood insurance in the UK was established in 1961 as a result of "gentleman's agreement," which defines a division of responsibility between government that is responsible for providing flood protection and the insurance industry that provides insurance for flood risk as a part of the standard home insurance policies.[14]
	Coexistence	
Voluntary vs. mandatory	**Voluntary**	The purchase of insurance is not compulsory.
	Mandatory purchase	
	Mandatory offer	
Single vs. bundled	Single	The flood insurance in UK is generally bundled in homeowners' and household content policies.
	Bundled	
Premium setting	**Risk-based**	The premium rates are based on postcodes and are often high for flood coverage. According to ABI currently, there are subsidies to 78 percent of homes in areas of significant flood risk.
	Partially risk-based	
	Minimally/not risk-based	
	Premium subsidies	
Link between insurance and risk reduction efforts	Warranties/must-do-clauses	Risk-based premiums may provide incentive to mitigate flood risk
	Premium/deductible/indemnity limits	
	Awareness-raising/client consulting	
Ex-post policy	Disaster relief fund	There is no provision of State compensation in the UK.
	Ad-hoc aid	

[14] From 1961 through to 1 January 2003, flood insurance in Britain was a divided responsibility between the State and the private insurance industry. The State provided flood defenses and prevented development in the flood hazard zones and the insurance industry would provide flood insurance for all households and some small businesses regardless of their flood risk, such that an additional premium rate would not exceed 0.5 percent on the sum insured, except in exceptional cases of continual and regular flooding (Huber, 2004, pg5; Crichton, 2002, pg127). On January 1 2003, following the large insurance payouts for floods in the late 1990s, a new agreement between the members of ABI and government took place. The agreement stated that the ABI members would continue to offer insurance cover to its existing customers when the probability of their properties being flooded is 1 in 75 or less on an yearly basis The current agreement between the Association of British Insurers (ABI) and government, the Statement of Principles (SoP), (ABI 2008), officially ended on the 30th June 2013, but is still in operation whilst the political debate about the proposed new system, Flood Re, continues, with the aim to finalize and implement the new scheme by mid-2015.

3.23. United States (US)

Private role	Primary insurer Reinsurer **Administration**	Private insurers play the role of financial intermediary in the NFIP through what is called the "Write Your Own" (WYO) program, which allows the participating insurers to sell the stand-alone standard flood insurance for which they receive an allowance. Outside of the NFIP there is a small insurance market but it represents only a few percentage points of the entire market. There are ongoing discussions about private insurers starting to sell more flood insurance.
Public role	**Primary insurer** Reinsurer Guarantor **Regulator**	The federally-run National Flood Insurance Program (NFIP), established by the National Flood Insurance Act of 1968, provides flood insurance coverage to communities that adopt minimum floodplain management policies. Federally-backed flood insurance coverage is available to any property owner in return for mitigation of flood risks by community[15] regulation of floodplain development. The NFIP does not buy *reinsurance* and is authorized to borrow from the U.S. Treasury, as it has done in several occasion (the program is currently $24 billion in debt).
Public/ private interaction	**Coordinated** Coexistence	
Voluntary vs. mandatory	**Voluntary** Mandatory purchase Mandatory offer	The purchase of flood insurance is voluntary however, in 1973, regulations mandated flood insurance purchase for properties in 100-year floodplains with mortgage from a federally backed or regulated lender.[16]
Single vs. bundled	**Single** Bundled	Flood insurance is only available as a stand-alone insurance.
Premium setting	**Risk-based*** Partially risk-based Minimally/not risk-based **Premium subsidies**	The flood insurance premium rates are based on Flood Insurance Rate Maps (FIRMs) produced by FEMA (federal government). However, about one-quarter of the total NFIP insurance contracts (about 1.2 out of 5.3 million policies) are subsidized and their premiums are, on average, 35–50% of the actual risk.
Link between insurance and risk reduction efforts	Warranties/must-do-clauses **Premium/deductible/indemnity limit** **Awareness-raising/client consulting**	Mitigation planning and implementation of risk-reduction and prevention measures are integrated explicitly in the NFIP. Through the Community Rating System (CRS), NFIP's voluntary program, flood insurance premium rates are discounted to reflect reduced flood risk resulting from creditable community activities. [17]
Ex-post policy	**Disaster relief fund** Ad-hoc aid	For presidentially declared disasters, property owners can receive financial assistance from the federal government through individual assistance grant or low interest loans and are required to purchase flood insurance thereafter.

[15] A "community" is a governmental body with the statutory authority to enact and enforce development regulations. The authority to enforce such regulations varies by state. Eligible communities can include cities, towns, villages, townships, counties, parishes, special districts, states and Indian nations or tribes. Only those residing, owning property, or operating a business or nonprofit organization in a community that participates in the NFIP may purchase flood insurance through the program.
[16] The base flood or the 100-year flood is a flood event having a 1% or greater probability of occurring in any given year.
[17] For CRS participating communities, the cost of flood insurance for residents will be reduced based on the number of activities it undertakes and the points it receives for those activities. Flood insurance premium rates are discounted in increments of 5%; i.e., a Class 9 community would receive a 5% premium discount, while a Class 1 community would receive a 45% discount (a Class 10 community receives no discount).

3.24. Canada (CA)

Canada is unique insofar as neither private nor public flood insurance is available. Flood insurance became a publicly debated issue after the 2013 floods in Alberta and Toronto, after which many affected people erroneously thought their property insurance would cover their flood losses. Flood risk maps are considered outdated, and in 2013 many victims were not eligible for federal disaster coverage because their home was not located in a mapped flood zone.[18]

External factors

In the event of a large-scale natural disaster, the Canadian government provides ex-post financial assistance through the Disaster Financial Assistance Arrangements (DFAA), administered by Public Safety Canada. Although it is not entirely ad hoc, there are no binding legal arrangements. Similar to the Austrian case, the funds are provided to provincial and territorial governments "when costs exceed what individual provinces or territories could reasonably be expected to bear on their own." As a rule, the amount of aid is calculated as $1 per capita based on provincial or territorial population (Public Safety Canada 2014). However, unlike Austria, where payout from the federal government is immediate and provinces justify their aid by documenting their expenditures at a later date, in Canada provinces are reimbursed only after they document provincial/territorial expected expenditures. There are no restrictions on how this money will be further distributed to those that have experienced losses (Public Safety Canada 2014).

Another, perhaps unique, mechanism to support disaster victims is a provision in Canada's tax legislation that allows the Canada Revenue Agency to forgive penalties and interest when they result from circumstances beyond a taxpayer's control, including disasters.

Finally, the Canadian model of risk management is regarded as amongst the strongest in the world in terms of emergency response and community recovery. Still, recognizing the need to better coordinate prevention efforts (Kovacs and Kunreuther 2001, Shrubsole 2000), a multi-level national disaster mitigation strategy has been developed (Hwacha 2005). For this purpose, the Department of Public Safety and Emergency Preparedness Canada (PSEPC) was created in 2003 following major disasters, most notably the Saguenay River flood (1996), the Red River flood (1997) and the eastern Canada ice storm (1998).

[18] http://www.cbc.ca/news/business/flood-insurance-that-isn-t-there-when-you-need-it-1.1869651, (24.04.2014)

3.25. The Netherlands (NL)

Public and Private Role

In the Netherlands, private insurance coverage against flood damage is not generally available. In response to floods in 1993 and 1995, government compensation for disaster losses including flood damage in the Netherlands is arranged with the Calamities and Compensation Act (WTS). The existence of public compensation crowds out private market alternatives.

Therefore, most of the risks of flooding are carried by the public sector or by households and businesses in case the former decides not to grant compensation.

Design Choices

The WTS only provides compensation when a flood results in a considerable disruption of public safety and requires a coordinated effort of organization and civil services. Moreover, damage caused by storm surges is excluded from the WTS, because financial costs of such a flood might be considerable and difficult to estimate beforehand. A disadvantage of the current system with the WTS is that it is not clear in which cases flood damage will be compensated. The decision whether WTS compensation is provided, as well as the determination of the extent of the compensation provided, lies with the government that is in office when the disaster takes place. Therefore, these decisions are influenced by political will and public pressure, which can be regarded as arbitrary and subjective. Decisions concerning compensation are likely to be driven by equity and political motives rather than by rational economic grounds, as research about flood damage compensation by the U.S. federal government indicates (Downton & Pielke, 2001).

Section 4. Conclusion

As the cost of floods increase around the world, more countries are considering their flood insurance market and the role of the public and private sectors in sharing that risk, providing adequate protection to exposed residents and providing the right incentives for risk reduction to be implemented.

While there is no one single solution that could be applied in a similar manner in all countries, this review provides an important analysis of the different design features and mode of operation of these markets in 25 countries today.

The analysis can be used by policymakers and the insurance industry to reflect upon the similarities and differences that exist between their national solution to insure residential flood hazard and how others outside of their country have answered this challenge. The study can also provide a set of criteria to help measure the attractiveness of a specific solution and alternatives. As mentioned in the introduction of the paper, we have made no judgment on whether specific features are better than others; we feel that these choices need to be made by the countries themselves. That said, depending on the end goals (e.g., high market penetration to avoid the need for government relief; large investment in risk reduction measures; addressing affordability of flood insurance, etc.), this review can be useful to assess how different methods have achieved those objectives.

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