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RISK FINANCING AND RISK REDUCTION – A COMPARISON NATIONAL ARRANGEMENTS ACROSS DEVELOPED COUNTRIES AND SPECIFIC LESSONS FROM AUSTRIA 2002-2013

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ABSTRACT

In the face of more frequent and intensive storms and floods insurance arrangements are becoming an increasingly important tool not only to address risk averseness, but also to incentivize risk mitigation and adaptive behavior. Indeed governments are looking to create new insurance arrangements or reforming existing ones. Contrary to existing literature claiming that there is no one-size-fits-all solution, we find that there are indeed design choices that can be found more and more frequently across risk-transfer systems and which seem applicable in different contexts: (1) Bundling of catastrophe risk with more standard homeowners', fire or accident insurance. (2) Private administration and public regulation of insurance; And (3) quasi risk-based premiums with some form of equity mechanism through some form of subsidy. We use a discourse analysis for the case of Austria, where above mentioned features are part of a high level discussion, but so far failed to gain traction and thus being implemented. We find that hierarchical thinking is deeply ingrained in almost all stakeholder groups. While successful flood protection is celebrated, individual awareness of the limits of public protection residual risks is missing and might cause unpleasant surprises in a climate change future.

Keywords: risk financing, flood insurance, flood protection, Austria, country comparison

1. INTRODUCTION

Both risk reduction and risk transfer in the face of increasing extreme weather events are high on the agenda of many countries across the world. Economic losses from hazards in general and floods in particular have increased considerably over previous decades, in Europe (Barredo 2009, Luger et al., 2010), but, considering some spatial variability, also elsewhere in the developed and in the developing world (IPCC 2012).

Studies suggest that this observed increase in disaster losses is caused primarily by an increasing exposure of population and capital, rather than a change in the hazard (Bouwer et al., 2007, IPCC 2012). Experts are predicting, however, that as the climate changes, storms, floods, droughts, wildfires and other weather-related hazards (depending on the region) will become more frequent and more intense (IPCC,

2012). Thus, insurance and safety-net arrangements are becoming increasingly important means not only to cover losses and address risk averseness, but also to incentivize risk mitigation and adaptive behavior (Kunreuther 1996, Crichton 2008, Kreibich et al. 2011).

Over the past 10 years reforms have been implemented are being planned are momentarily under way. As many systems rely heavily on ad hoc post-disaster aid as well as flat or subsidized insurance premiums, and thus are said to disincentivize individual loss reduction, trends can be observed of reform efforts to decrease ex-post aid and increase private and public insurance solutions including risk-based pricing (e.g. US, Netherlands, UK, Austria etc.). Indeed, risk reduction is a comparably recent demand towards natural hazard insurance and safety nets, one that was rarely considered in the past and therefore requires evaluating and reconsidering existing systems.

A considerable body of literature describes different national insurance systems the functioning and sustainability of existing insurance systems (e.g. Bouwer et al. 2007, OECD 2008, Schwarze et al. 2011, Paudel et al. 2012, Macaferri et al 2011). Often the focus is on the roles of public and private actors in these systems and how this influences their performance. If the results do go beyond the description of these systems, researchers across the board find that there is definitely no one-size fits all solution as to what constitutes a good insurance system. Although there seems to be a consensus that, given the character of flood risk, it has to be some form of public-private partnership. Even less is said about whether and how these systems actually do influence community and private risk reduction.

Given the amount of existing work, yet another comparison of insurance systems seems superfluous. However, in the light of the big variety of catastrophe risk insurance and safety net arrangements across Europe and the globe, it is important to be very precise on the differentiation of public and private roles as well as design choices in these systems. Understanding all of these nuances it is then important to find a level of generalization that allows a comparison of said systems. We believe that, although providing a large amount of useful information, previous studies largely failed on either one or both of these accounts. Furthermore, looking across 17 developed countries we discovered that that there are indeed design choices that can be found more and more frequently across risk-transfer systems and which seem considered applicable in very different contexts. Finally, given the broad attention that risk reduction in the context of risk financing has been receiving recently, we investigate the degree to which risk transfer mechanisms are being designed to incentivize private risk reduction, encountering little evidence that this is happening at all. We use the Austrian case to explore why coordinated risk financing and risk reduction are key for successful flood risk management, why it is not happening yet and why other reform options are not implemented.

Country Abbreviation ¹	Private role			Public role					Voluntary mandatory vs.			Optional vs. bundled		Premium			Supporting risk mitigation			Rules-in-use		
	Primary insurer	Reinsurer	Administration	Primary insurer	Reinsurer	Regulator	Guarantor	Premium subsidy	Voluntary	Purchase (policy holders)	Offer (insurers)	Bundled	Optional	Quasi-Risk-based	Flat and quasi-flat	n.a. ²	must-do clauses	on based premiums	limits/ deductibles	Compensation fund	ad-hoc aid	tax exemptions for reserves
AT	•	tbd	-	-	•	-	-	-	•	-	-	-	•	•	-	-	-	-	•	•	•	
AU	•	tbd	-	tbd	tbd	tbd	tbd	tbd	•	-	-	•	-	•	-	-	tbd	tbd	•	-	•	-
BE	•	-	-	-	-	•	•	•	-	-	•	•	-	•	-	-	tbd	tbd	•	•	-	tbd
CA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	•	-	-
CH	-	-	-	• ³	-	-	•	-	-	•	-	•	-	-	•	-	-	-	•	-	-	tbd
CZ	•	tbd	-	-	-	-	-	-	•	-	-	•	-	•	-	-	•	tbd	•	•	-	-
DE	•	-	-	-	-	-	-	-	•	-	-	•	•	•	-	-	tbd	tbd	•	-	•	tbd
ES	-	-	•	•	-	-	•	-	-	-	•	•	-	-	•	-	-	-	•	-	-	•
FI	•	tbd	-	-	tbd	-	tbd	-	•	-	-	•	-	•	-	-	-	-	-	•	-	-
FR	•	-	-	-	•	-	•	-	-	-	•	•	-	-	-	•	tbd	tbd	•	-	-	•
HU	-	tbd	•	•	-	-	•	•	•	-	-	(•)	•	•	-	-	•	-	tbd	(•)	•	-
NL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	•	•	-
NO	•	-	-	-	-	•	•	-	•	-	-	•	-	-	•	-	tbd	tbd	•	-	•	-
PL	•	tbd	-	-	-	-	-	-	•	-	-	(•)	•	-	-	•	tbd	tbd	•	-	•	-
RO	•	•	-	-	•	•	•	-	-	•	-	•	-	-	•	-	-	•	•	-	•	-
UK	•	tbd	-	-	-	-	-	-	•	-	-	•	-	-	•	-	-	-	•	-	•	-
US	-	tbd	•	•	-	-	-	•	•	-	-	-	•	•	-	-	•	•	-	(•)	•	tbd

Table 1: Table: Design features of national insurance systems (•=applicable/in use, - =not applicable/not in use, tbd=could not be found out so far)

¹ AT=Austria, AU=Australia, BE=Belgium, CA=Canada, CH, Switzerland, CZ=Czech Republic, DE=Germany, ES=Spain, FI=Finland, FR=France, HU=Hungary, NL=Netherlands, NO=Norway, PL=Poland, RO=Romania, UK=United Kingdom, US=United States of America,

² neither risk based nor flat

³Public monopoly

2. COMPARISON OF NATIONAL RISK FINANCING ARRANGEMENTS

2.1 Private and public roles in flood insurance

In theory, catastrophe risk insurance may be purely private or purely public, but in practice, collaborative effort may exist such as (1) partnerships based on coordinated cooperation- for instance in the US and Spain, where private insurers play the role of financial intermediary and the government strongly regulate the insurance market; (2) informal coexistence such as in the UK, where until recently based on a gentlemen's agreement the state provided flood protection, while private insurers offered affordable premiums. There are also cases where there is crowding out of private insurers such as in Austria where extensive post-disaster compensation is available only for the uninsured, which in turn disincentivizes private insurance.

Reasons for public intervention in insurance markets may be for example due to frequent high losses that are not readily covered by the insurance and reinsurance sectors, social values such as solidarity and other nation-specific factors, for example a generally strong reliance on government intervention (OECD 2012, 65).

Based on our research private insurance business currently has either one of the following different roles in flood risk insurance.

- Primary insurer with minimal state regulation
- Primary insurer with state regulation
- Administrator of government designed insurance programs

(state guarantees or reinsurance may apply to either one option)

Public roles are more diverse as the state may come in as:

- Primary insurer
- Regulator
 - minimal: e.g. offering tax exemptions for reserves, obligatory reserves, controlling)
 - strong: e.g. obliging insurers to offer catastrophe risk policies, introducing and/or limiting deductibles)
- Security (guarantor, reinsurance, lender of last resort)
- Ensuring equity (e.g. premium subsidies or vouchers)

Public activities beyond insurance that are influential on flood insurance arrangements are

Other existing policy may influence the functionality and usefulness of disaster risk insurance. Via this route the state may, for example incentivize market-based insurance by granting tax-exemptions for reserves or provide extensive community flood-protection (e.g. UK, Austria, The Netherlands). Safety net arrangements in the form of post-disaster aid, be it formally or informally (ad-hoc, but to be counted on) established may disincentivize the population to take up insurance and/or to privately mitigate their respective risk – charity hazard (cf. Browne and Hoyt 2000, Raschky et al. 2013).

Ad-hoc aid

Almost all countries with a history of flooding are known to pay out 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.

Disaster relief funds

Disaster relief funds are most often tax-fed budget items, which are used to compensate flood victims directly or are used to rebuild public infrastructure and cover uninsurable 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).

Both ad-hoc aid and regulated compensation may lead to “charity hazard” and negatively influence the uptake of private flood insurance or other private prevention measures.

When post disaster aid and insurance arrangements remain uncoordinated they may negatively influence the insurance markets as well as the risk perception and private risk reduction of households. Public risk mitigation may have similar negative effects, but if well managed may also be conducive to the availability of affordable insurance policies.

All but three of the countries we studied have either a disaster relief fund or provide ad-hoc post disaster compensation. However, in most countries the relief fund is being coordinated with insurance offered if available, countries at risk of crowding out market insurance are Austria, Poland, Romania and Germany.

2.2 Mandatory vs. voluntary

Insurance coverage can be voluntary or mandatory (state mandated); however mandatory requirement may take various forms. For example, the purchase of natural disaster insurance may be mandatory for all citizens; or the insurers may be mandated to offer the natural disaster insurance, in which case it can be declined by potential policy holders. A final form of mandatory insurance are marketed on a voluntary basis (e.g. household effects, buildings, fire) where insurers are legally required to include catastrophic risks in a standard policy. Such forms of bundled insurance are widely in use in case of catastrophic risks compared to optional offer of the individual risks. In many cases where the insurance against flood risk is mandatory; it is through some form of bundling. There are many supporters of mandatory catastrophe insurance in order to avoid moral hazard and make flood insurance feasible for private insurers (e.g. Paudel et al. 2012, Prettenhaler et al. 2009).

Truly mandatory systems, where purchase is obligatory for everybody seem are rare in our sample (2 out of 17), however, 8 of the 10 voluntary systems and all of the mandatory ones are bundled.

2.3 Bundled vs. optional

While mandatory insurance may be difficult to implement, in many cases encountered mandating insurance offers or purchase has been circumvented by bundling disaster risks with much more common policies that are wide spread such as fire or homeowners’ insurance, although no legal requirement is given in this case. It may be simply the type of contract an insurer decides to offer for various reasons. In some cases, this may be a way for insurers to circumvent determining risk-based premiums.

2.4 Premium setting

Insurance as a market-based instrument traditionally is considered most efficient when every policy holder bears his/her own risk. In existing insurance systems this is often not the case. Consequently some economists as well as policy makers push towards more individual responsibility and thus for the enforcement of risk-based premiums (cf. Kunreuther, Botzen etc.); thereby intending to promote individual risk mitigation efforts in order to reduce losses. A risk-based premium would thus ideally be determined by assessing the value of the object insured as well as the risk of the location. This is often unfeasible for two reasons: One, premiums may become unaffordable in high risk areas, which may lead to insurance not being available or the necessity of cross-subsidies. Two, the costs for initial risk assessments may be too high. Therefore, in practice, risk-based premiums may mean several things:

- Risk-based pricing: Pricing based on risk zones

- Quasi risk-based pricing: Pricing based on risk zones, with subsidies for low-income households.
- Quasi flat premiums: Pricing based on the value of buildings
- Flat premiums: Fixed independent price setting

Flat premiums, i.e. a constant percent of property value irrespective of location, building type, etc., or quasi flat premiums are frequently encountered in existing insurance systems, which on the one hand may be a result of insufficient risk mapping and zoning and/or difficulties in calculating risks, on the other hand it may reflect a culture of solidarity in the respective country (e.g. France).

From our comparison we found that about half of the countries studied manage quasi risk-based pricing, which means they allow some form of trade-off with equity considerations.

2.5 Incentives for risk mitigation

Over the past 15 years, the potential for insurance to mitigate risk has become a new focus of academic research. Both insurers and policy makers seem to be convinced that risk mitigation through insurance schemes is necessary to deal with expected increased losses from extreme weather events.

While public, large scale risk mitigation measures are mainly carried 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 (c.f. table x). In Austria, for instance, national risk maps for several hazards including floods have been designed in a public-private effort.

Yet, there is little evidence, that this is in fact true. A first step is to look to the design of an insurance policy and whether features have been included to foster risk reduction in policy holders. Insurance, particularly when private and with risk-based premiums is often said to increase awareness and even incentivize risk reduction behavior and increase. Yet, there is little evidence, that this is in fact true. A first step is to look to the design of an insurance policy and whether features have been included to foster risk reduction in policy holders. We particularly looked for risk based premiums, must-do clauses, other premium-based incentives (e.g. premium reduction for implemented mitigation measures), and deductibles/indemnity limits, but we did not explicitly consider in house risk-mapping efforts and awareness raising among clients.

While attempts at risk-based premiums can be observed in about half of the cases in our study, only Germany can be considered at actually offering risk-based premiums. We did not find must-do clauses in all but one case (Hungary); And no premium-based incentives whatsoever. Deductibles and indemnity limits are quite ubiquitous (12 out of 17 countries). However, for the latter case a clear link to risk reduction behavior has not yet been established.

3. THE AUSTRIAN CASE

Austria is and has been a flood prone country. However, the 2002 floods caught Austria and Central Europe off guard and changed not only public investment in traditional flood protection in the country, but also led to an EU effort for improving flood risk management across the continent. Despite these efforts for integrated adaptive management, in Austria flood risk financing and flood risk reduction are two detached spheres. Even though at least post disaster compensation and flood protection are financed from one joint disaster fund, the *Katastrophenfonds*.

The *Katastrophenfonds*, first installed in the 1950s, is the key financing mechanism for flood protection measures on the one hand and post-disaster relief on the other hand. It is administered by the ministry of finance and fed by a combination of shares of income tax, corporate income tax and capital gains tax. It may finance flood protection measures at federal, provincial or community level up to a 100%. Public property damages at provincial levels are reimbursed up to 50%, whereas 60% of the costs of provincial governments for compensating private damages (BMF 2012) are repaid. **Compensation for flood**

victims is between 20 and 50% of actual damages and varies across provinces depending on socio-economic position and type of damage, whereas the risk in terms of exposure is not considered (Jachs 2011, 280). There is no legal entitlement to compensation from the fund. Insured damages are deducted from the compensated amount.

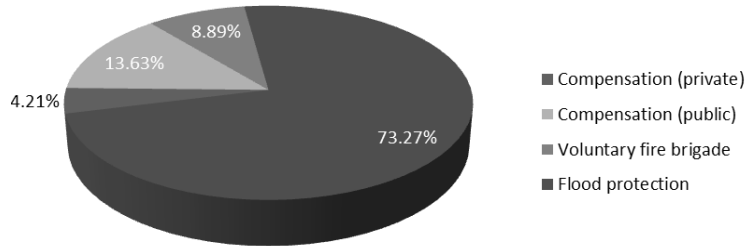


Figure 1: Katastrophenfonds 2013. Source: BMF (2014)

The lion share of the Katastrophenfonds (almost 75%) is invested in **public flood protection** (Figure x). In recent years the government has added budget to move along flood protection measures along the Danube and elsewhere. Including investments from provincial and municipal governments 4 billion Euros have and will be spent between 2007 and 2016 primarily on technical solutions, but also on early warning systems, risk mapping and other relevant spatial planning measures (Figure y).

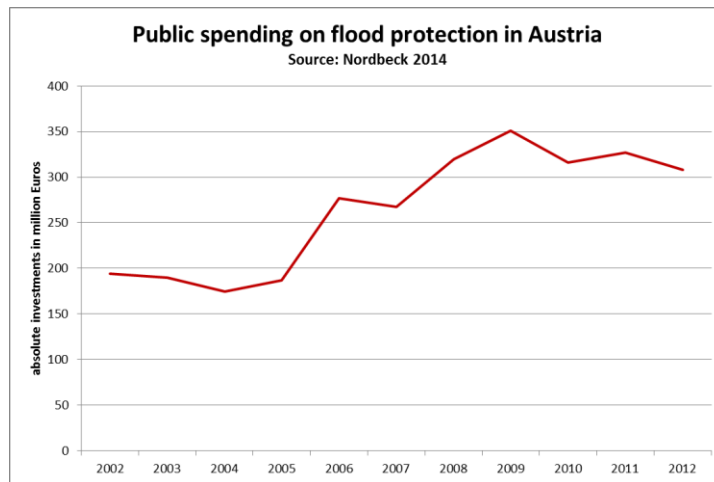


Figure 2: Increase in public spending in Austria including contributions from provincial and municipal governments. Source: Nordbeck 2014 (not published)

The increase in public investments for technical flood protection since 2002, first paid off during the 2013 floods a 100 and in some places 200 year event that put the new infrastructure to the test. Indeed, losses were significantly lower than in 2002 (Table x).

(in million Euros)	intensity	losses	insured losses	Katastrophenfonds	finance gap
2002	50-100 year event	~3,000	420	414	2,166
2013	100-200 year event	~900	250	tbd	tbd

Table 2: Floods in Austria. Source: VVO 2014

(1) Dedicated and natural retention areas are the first priority to soften the blow. (2) Flood banks and levees were constructed or modernized. The finalization of the Machlanddamm along the Danube is one of the best-practice examples. Seven municipalities coordinated a large scale project financed 50% by the Katastrophenfonds, 30% by the provincial government and 20% by the municipalities themselves. About 32 km of elaborate embankments and mobile levees, supported by pumping stations are designed to keep 100 year events at bay⁴. (3) More individual solutions are found for settlements along smaller rivers, combining aforementioned measures with e.g. widening and/or lowering of river-beds.

While governments at all scales work out the best flood protection they can provide and pay out compensation, a big gap remains between actual losses and those insured or compensated (cf. **Table x**). Homeowners could not close this gap if they wanted to as **flood insurance**, if available, has very low indemnity limits.

Generally floods counting as “force majeure” are not covered by conventional household and building insurance (only damage from excessive precipitation). However private insurers may, but are not obliged to offer flood insurance, thus insurers often decline insurance for property in high risk areas. As there are no standards and regulations, conditions, such as premiums, damages covered and indemnity limits vary across the insurance sector. Indemnity limits are set at a few thousand Euros, with flat premiums. Only if higher sums are to be insured a risk assessment is used to set premiums. Although the data situation on market penetration for flood insurance is far from ideal, it is safe to say that in Austria only very few households have flood insurance and that the reported low penetration rate around 10% are close to the truth.

Raschky et al. (2012) provide evidence that the “assured partial relief system”, i.e. compensation through the Katastrophenfonds in Austria provides a strong disincentive to not insure. Our research shows that this is only one of several factors, all having to do with the hierarchist character of Austrian politics and society.

3.1 Discourses

We identified discourses by means of a meta-study of key policy documents including official websites of public and private actors and substantiated our findings through key informant interviews representing the most important stakeholder groups when it comes to risk reduction and risk transfer in Austria.

3.1.1 “We are taking care of our people”

There is clearly one currently dominating discourse that will be difficult to overthrow. It is rooted in an almost classical hierarchical world view, where the government takes care of its people, who do not have to worry and do not want to worry. Informed by high-level experts we use technical engineering solutions to fix nature. For participants of this coalition, as a market solution, insurance is simply not on the table.

⁴ <http://www.machlanddamm.at/de/2.html>, (8.5.2014)

This storyline is supported by a coalition of politicians at all jurisdictional levels and also by many policy makers at municipal and provincial levels on the one side and most of the Austrian population on the other side. Flood protection and disaster relief are issues that neither the green nor a more liberal party would want to meddle with as it would not be conducive to their image.

It is reflected in the above described policies – the Katastrophenfonds in particular, which exclusively operates top-down; in the catalogue of measures for the risk management strategy; and on the relevant public information websites. “Do not worry, we take care of you” is the message, and indeed most Austrians do not worry. They feel that both flood protection and loss compensation are the responsibility of the government and stay uninformed.

Also the voluntary fire brigade, an essential civil society institution, traditionally for post-disaster clean-up, but nowadays also for setting up mobile levees, fits in with the hierarchic masses.

3.1.2 “There needs to be a better (i.e. more efficient) way”

This is the much less visible reform discourse, based on a more individualistic world view and the idea that flood protection and risk transfer provisions are also the responsibility of the individual. This storyline picks up on all the inefficiencies of the current system that goes beyond the inefficient compensation process and political abuse of funds and also condemns insufficient coordination of spatial planning. Adherents are, for example, national policy makers, who are closer to administering the Katastrophenfonds, know its shortcomings and inefficiencies better due to their bird’s view, and do not need to battle for prestige. Supporters for this storyline can also be found in the insurance business with the Austrian Insurance Association at its front line. Led by a team of Austrian researchers this coalition developed a feasible reform model following ongoing international trends of more private involvement, but still allowing for public regulation (Prettenthaler et al.). However, this proposal has not gained traction so far.

3.1.3 “Room for the river”

As mentioned above even the green party is joining the hierarchy band wagon when it comes to flood risk management. Most flood protection attempts seem to show enough environmental consideration to be acceptable also for environmental and egalitarian hardliners. Only some hardliners and a few environmental organisations such as the WWF in Austria demand large scale renaturalization of rivers and see this as the only sensible flood protection strategy. This discourse, however, is not continuously present, and only flares up, when critical projects, such as river regulation and hydropower plants are planned.

4. INSIGHTS

4.1 Austria

Delegations from all over Europe come to Austria to see the successful new mobile levees and the Machlanddamm is most certainly a flagship project to show off and while every politician is happy to hand out money and most flood victims are happy to receive it, risk awareness among the population remains low and most damages remain uninsured. While the population behind those embankments and levees was happy to not get wet feet during a flood for the first time in 2013, the infrastructure already reached its limits in many places, only a few centimeters higher and the water would have found its usual way to thousands of homes. The mobile levees cannot be upgraded. At the same time the public sector is reaching its limits dealing with compensation procedures that are not part of its normal routine. In fact it is insurance companies who have the knowledge to handle risk assessments, the administration of policies and in particular the processing of claims. It is thus highly important that people realize residual risks and take on some responsibility

First important steps in the right direction are made at the national level in implementing the EU flood directive, but it will be difficult to overcome those hierarchists, who like the technical fixes, playing

protector (or being protected for that matter) and at the same time collecting prestige points for the next election. While the insurer's association, researchers and national policy makers push towards an integrated mandatory system and deconstruction of the disaster-relief fund following international trends see below, province and communal politics oppose such developments

4.2 Global

Even if there is no one-size-fits all solution for designing national risk management, there are certainly some features that are being promoted across the board, they might differ in detail, but are at least quite similar and seem to be applicable in different contexts.

We find three trends of flood insurance design happening in the developing world (1) Bundling of catastrophe risk with more standard homeowners', fire or accident insurance; (2) Private administration and public regulation of insurance; And (3) quasi risk-based premiums with some form of equity mechanism through some form of subsidy.

However, the one universally demanded feature of flood insurance, namely incentives to reduce risks was nowhere to be found. There are only a few cases where an insurance arrangement in fact fosters some form of private or communal risk reduction, for example Switzerland and the US. Indeed, across the board risk-based pricing is waived not necessarily for lack of appropriate risk-assessment techniques, but for either equity and affordability reasons or the sake of transaction costs. Even given trends towards more risk-based pricing, reflected in academic and policy discourses, actual risk-based pricing is rare.

We concede that much more work is needed on the ground to identify the more specific outcomes of different design choices for national insurance systems. Particularly whether and how built in mechanisms for incentivizing private risk mitigation are working out in practice is difficult to determine. Both historical case studies of (e.g. Canada, Norway), as well as empirical case studies of more recently reformed systems will help us finding out more. Also this study will be extended based on a cross-national household survey to better understand the different perspectives of the largest stakeholder group in the game.

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