Recommendations

Insurers are seen as a key private actor who can play a greater role in reducing flood risks (Kunreuther & Michel-Kerjan, 2009; Surminski, 2014; Surminski et al., 2015) and the European Insurance industry also views public-private partnerships as vital for reasons of insurability, risk transfer and ensuring the use of appropriate adaptation and prevention measures (CEA, 2007). Yet, developing the right flood insurance arrangements or partnerships to incentivise flood risk reduction and adaptation to climate change has remained a key challenge.

The consideration of the insurance design principles highlights trade-offs between affordability, availability, and vulnerability reduction, particularly when considering the political realities that drive the reform or development of the new insurance scheme. The most commonly considered determinants of natural disaster insurance are affordability, commercial viability or availability of cover, and financial sustainability or solvency. **We argue that a fourth determinant should be recognised when assessing or designing insurance**: **the risk reduction potential of insurance**. Effective prevention is expected to play a significant role for affordability and availability of disaster insurance, but it is far from clear how these concepts interact, and where the scope for future reform is. As the example of UK flood insurance shows there are significant challenges in investigating and utilising the prevention role of insurance.

Our particular interest in the interactions between flood insurance in the UK and surface water flood risk management stems from the current changes facing the industry with the introduction of the new Flood Re pool in Spring 2016. We note that efforts to reform the insurance arrangements have been predominantly focused on dealing with the affordability of insurance, without considering the implications of alternative mechanisms for managing and reducing the underlying risks. Reflecting on evidence emerging from other European and international flood insurance schemes, we notice that this is not an exception, but rather the norm (Surminski and Eldridge, 2015). Yet, depending on its design and implementation, an insurance scheme can send signals to policy makers in support of flood risk management policies, which would address risk levels, for example through changes in the planning system and building regulations.

Our investigation finds that the new Flood Re scheme does not enhance this policy link nor the incentivisation of home resilience, which presents a missed opportunity. Analysis and engagement with stakeholders revealed a range of barriers (Table 16.1) for achieving risk reduction through the SoP or Flood Re, which need to be addressed if the current MSP is to improve its ability to manage and reduce surface water flood risk.

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Table 16.1.

Barriers to risk reduction under the Statement of Principles and Flood Re (Source: Surminski and Eldridge, 2015).

Barriers to risk reduction	Detail of barrier
Risk information	Insurers' concerns about confidentiality of their claims data, licensing questions regarding public flood data when used for commercial purposes, communicating probabilities and flood risk information to individuals, reaching those most vulnerable; large group of data-owners; cost of collating and streamlining data
Information about risk reduction measures	Unclear cost-benefits
Financial incentives for risk reduction measures	Unclear cost-benefits, behavioural barriers, hassle factor, size of premium not big enough to trigger investment, difficulty in tracking/data implementation of PLPM, affordability challenge, contract length
Resilient repairs	Unclear cost-benefits, might take longer than standard repairs
Incentives for public policy	Difficulty of tracking and monitoring enforcement
Compulsory measures	Unclear cost-benefits, competitive market, affordability
Incentive for new build	Limited interest by property developers to consider insurability, administrative burden for insurers, lack of data

The qualitative and quantitative analysis also raises concerns about issues of moral hazard as Flood Re could de-incentivise flood risk reduction at a household level and dissuade homeowners from investing in PLPMs while in place (Surminski and Eldridge, 2015).

However, **for incentives to reduce surface water flooding to be successful they need to target those who can take action**. This goes beyond the homeowner and government and needs to include all those who determine if, where and how houses are being built, refurbished or repaired, including property developers, mortgage providers and local planning officials. Thus, one aspect that warrants further investigation is how this partnership could be strengthened or expanded to contribute more significantly to flood risk reduction, in particular in the face of rising risks due to climate change. The ABM provides a novel tool to help analyse how the actors in the MSP could incentivise flood risk reduction, and highlights a range of options for strengthening this partnership in the face of rising surface water flood risk.

Results from the ABM highlight how climate change and socio-economic development can exacerbate current levels of surface water flood risk in the London Borough of Camden. The most beneficial results seen for surface water flood risk reduction are a combination of investment in both PLPMs and SUDS by the developer and local government, alongside more stringent conditions for approving new development proposals. This highlights the need for further investment and provision of grants for PLPMS and adds support to the current reviews and government led pilot schemes into PLPMs being undertaken in the UK. However, even with SUDS and PLPMs in place the average surface water flood risk continues to increase over time, and under no experiment does it stabilise or decline. Given the implications of climate change on surface water flood risk this illustrates the danger of further trade-offs between future development plans and flood risk management.

The provision of flood insurance is influenced by public policy – directly through regulation such as mandating cover or instigating the development of new schemes. And indirectly by providing the enabling infrastructure and environment, for example through a broad risk reduction framework, including building codes and better flood risk data provisions. This point is particularly relevant in the context of surface water flooding and underlines the need to engage with a broader range of stakeholders and decision makers. **A stronger policy approach to flood risk management (planning, defence, resilience measures, data etc.) will make the MSP more viable**. Collaboration between the national and local authorities, planners, and developers is crucial. Planning guidelines have been tightened under the National Planning Policy Framework (DCLG, 2012) and subsequent amendments for inclusion of SUDS in developments of 10 or more properties in 2015 (DCLG, 2014). However, the economic benefits of developments and demand for housing provide a case for developers to continue to build on high flood risk land, and for Local Authorities (LA) to approve such developments. While the EA is able to oppose developments at high levels of flood risk it is ultimately down to the LA to make the decision. The Adaptation Sub-Committee (2012) has raised concerns that there is still limited consideration of future risk under climate change within the approval process, and the actual levels of uptake of the EAs recommendations is not sufficiently transparent or accountable.

Furthermore, the magnitude and trends in average flood premiums seen when different insurer, government, and developer conditions are implemented also differ largely when future climate change is considered. This suggests that there is no single long-term optimal approach to managing surface water flood risk and maintaining affordable premiums, with the benefits and trade-offs of options changing over time with climate change, changing levels of flood risk, and changes to the built environment. This highlights the importance of including multiple actors in the MSP, and allowing a flexible framework that can be modified over time as different risk thresholds are passed. A **pathways approach** that sequences the implementation of actions over time, to ensure the system adapts to the changing social, environmental and economic conditions, would act to build flexibility into the overall flood risk management strategy (Ranger et al., 2010; Haasnoot et al., 2012).

For insurance our model shows that Flood Re is likely to achieve its aim of securing affordable flood insurance premiums. However, our findings also highlight that the new pool would be placed under increased strain if challenged with increasing risk as highlighted by the future climate change projections. Several of the questions addressed in our analysis have particular relevance for Flood Re's transition process, which determines if and how the new scheme operates over time. The transition plan highlights the challenges posed by rising risk and outlines who within and outside the partnership will have to address these issues. Flood Re acknowledges that in its current form it has no direct levers to deliver risk reduction, but it commits to working with other stakeholders,

including policy makers and insurers to support greater flood resilience (Flood Re 2016). Our findings show how important this collaboration for resilience is.

A key issue will be how the increasing gap between the level of premiums paid by high risk properties and the risk-based value they would face outside this scheme is addressed and managed over time. This is particularly important as Flood Re has been designed to be a transitional solution, with an anticipated run time of 20-25 years, smoothing the way to more risk-based pricing in a competitive insurance market in the future. Until now this issue has not received sufficient attention due to lack of data or analysis.

These issues are likely to become more apparent under climate change and urbanisation and need to be considered within the framework if areas like the London Borough of Camden are to become more resilient to surface water flood events in the future.

The development of the ABM as a tool for such an analysis is beneficial in that it provides a framework to further investigate the transitional mechanisms recently proposed as part of the Flood Re scheme (Flood Re, 2016), as well as how changes to regulatory measures and the roles and behaviour of different stakeholders could be enhanced to support surface water flood risk reduction under future climate change. The ABM has been demonstrated to stakeholders to highlight the value of such a modelling approach and outputs have been cited in a recent report by the insurance regulator PRA (Prudential Regulation Authority, 2015) on the impact of climate change on the insurance sector, triggering extensive stakeholder debate.

The ability of the framework to incorporate different agents with their own behaviours; flexibility for testing different conditions and behavioural rules; flexibility to test and evaluate different policies and options; and the ability to visualise and quantify this in a spatial and dynamic manner, highlights the potential benefits of such a modelling approach to support and inform decision-making. The flexibility of which would benefit from updates to account for updated information on the Flood Re Scheme and the mechanisms for the transition process, further expansion of the agents considered within the model to better reflect the potential MSP, and on-going and future stakeholder engagement, input, and evaluation.

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