



# Strengthening insurance partnerships in the face of climate change – Insights from an agent-based model of flood insurance in the UK

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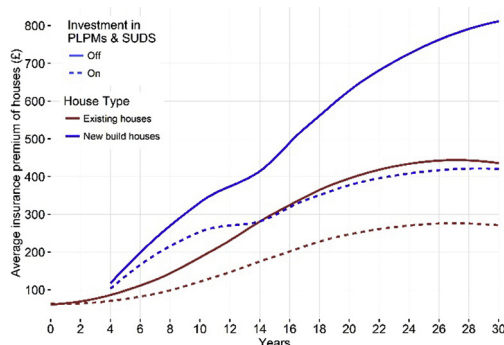
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## HIGHLIGHTS

- Local developer and local government actions have implications for Flood Re.
- Local government investment in SUDS and PLPMs reduces insurance premiums.
- Reducing insurance premiums and developing in flood risk areas require trade-offs.
- ABM a useful tool to investigate trade-offs in achieving aims of Flood Re.

## GRAPHICAL ABSTRACT



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## ABSTRACT

Multisectoral partnerships are increasingly cited as a mechanism to deliver and improve disaster risk management. Yet, partnerships are not a panacea and more research is required to understand the role that they can play in disaster risk management and particularly disaster risk reduction. This paper investigates how partnerships can incentivise flood risk reduction by focusing on the UK public-private partnership on flood insurance. Developing the right flood insurance arrangements to incentivise flood risk reduction and adaptation to climate change is a key challenge. In the face of rising flood risks due to climate change and socio-economic development insurance partnerships can no longer afford to focus only on the risk transfer function. However, while expectations of the insurance industry have traditionally been high when it comes to flood risk management, the insurance industry alone will not provide the solution to the challenge of rising risks. The case of flood insurance in the UK illustrates this: even national government and industry together cannot fully address these risks and other actors need to be involved to create strong incentives for risk reduction. Using an agent-based model focused on surface water flood risk in London we analyse how other partners could strengthen the insurance partnership by reducing flood risk and thus helping to maintain affordable insurance premiums. Our findings are relevant for wider discussions on the potential of insurance schemes to incentivise flood risk management and climate adaptation in the UK and also internationally.

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## 1. Introduction

The risk of climate-related disasters and associated economic losses has been increasing globally in the last few decades and will continue to

do so as a result of climate change and socio-economic development (IPCC, 2012). To manage these risks and improve society's ability to prepare for, respond to and recover from disasters, there have been growing calls for greater collaboration and partnerships between the public, private and civil society sectors. These multisectoral partnerships (MSPs) are increasingly seen as critical for the delivery of sustainable development goals and improved disaster risk management (UNISDR (2011) and UN (2015)).

Despite the growing calls for partnerships, there has been little research examining how effectively they can help reduce the risk from disasters, the roles of public, private and civil society actors, and how they can act together. A critical issue is how to bring together those actors that can really bring about change. Furthermore, partnerships for disaster risk management are usually not static and may evolve over time, as they will be affected by a range of factors, including population growth, development trends and changing climate risks. This can have implications for the membership as new or different partners may be needed to fulfil the aims of a partnership.

In this paper, we investigate the role that partnerships can play in incentivising flood risk reduction by focusing on the arrangements between the UK government and the insurance industry. The flood insurance partnership between the Association of British Insurers (ABI) and the UK government was first established in 2000. It was modified into a new partnership in 2016 with the creation of Flood Re (outlined below), presented by industry and government as an innovative way of securing future affordability and availability of flood insurance. Yet, there are concerns about its ability to achieve its aim of providing a transition to a market with risk reflective pricing where insurance remains affordable and widely available (Hjalmarsson and Davey, 2016), especially because in its current set-up it does not provide any direct means to encourage risk reducing behaviour. Recognising its lack of potential to directly influence risk reduction, Flood Re identifies the need to build strong partnerships with a range of actors from the public, private and civil society sectors as a key strategy to ensure a successful transition phase (Flood Re, 2016).

This paper investigates this by focusing on partnerships with local government and property developers, and for one particular flood risk category, surface water (SW). This is the least understood of the flooding risks and represents one of the biggest potential impacts of climate change on the UK (Defra, 2012). SW flood risk management has been assessed by the UK's Committee on Climate Change as a key adaptation priority where insufficient progress has been made in managing vulnerability and providing a plan of action (Committee on Climate Change, 2015). An agent-based model (ABM), designed to simulate the dynamics of SW flooding, changing levels of risk and choices made by different partners (see Dubbelboer et al., 2017 for a detailed explanation of the technical aspects of model development and design) is used to explore how the flood insurance partnership could be strengthened. In particular, we investigate how the inclusion of other partners could enhance the risk reduction potential of insurance, testing this for the new Flood Re scheme; examine whether there may be trade-offs between the goals of maintaining affordable insurance premiums and reducing SW flood risk; and highlight complexities in identifying the most appropriate balance in the role of different partners to incentivise SW flood risk reduction.

## 2. The role of insurance partnerships in disaster risk reduction

In general terms, partnerships can be defined as “collaborative arrangements in which actors from two or more spheres of society (state, market and civil society) are involved in a non-hierarchical process, and through which these actors strive for a sustainability goal” (Van Huijstee et al., 2007, 77). Within the context of natural disasters, the overall shared goal for partnerships would be a reduction of risks and an increase in resilience. Nevertheless, having shared goals does not ensure the smooth running of a partnership, as partners may not

attach the same importance to these goals. Indeed, while an insurance company may want to reduce risks, it is ultimately driven by profits and accountability to shareholders. Maintaining shared goals and priorities between partners over time, and reconciling diverging interests and expectations to limit potential conflicts are critical challenges (Armistead et al., 2007; Chen et al., 2013; Surminski and Leck, 2016).

Flood insurance partnerships have the primary aim of providing financial risk transfer for flood risk, for example in the absence of a functioning market. However, there are indications that these partnerships could also help to achieve a move away from a narrow financial risk transfer focus towards a more holistic and joint-up flood risk management strategy (European Commission (2013)).

In the wake of recent natural disasters there has been growing interest from policy makers, practitioners and academics in the use of insurance as an economic disaster risk management tool to encourage prevention efforts and reduce physical flood risk (Crichton, 2008; Surminski, 2014; Surminski et al., 2015). This is based on the understanding that purchasing an insurance product can influence the behaviour of those at risk. This can be in a moral hazard context where insurance can lead to more risky behaviour. For example, individuals' motives and behaviour to prevent loss may be reduced if financially protected through a policy; or the existence of an insurance scheme may reduce a government's urgency to prevent and reduce risks. Alternatively, purchasing an insurance product can act as an incentive, where insurance can trigger risk reduction investments or the implementation of prevention measures (Kunreuther and Michel-Kerjan, 2009; Kunreuther, 1996).

There is wide agreement that insurance can encourage risk reduction by attaching a price tag to risk and by sending signals to agents such as policy holders, governments or insurers themselves, incentivising or even forcing them to address the underlying risk (e.g. Kunreuther, 1996, Botzen and van den Bergh, 2009, Botzen and van den Bergh, 2009, Treby et al., 2006). Indeed, there are many flood risk management options that flood insurance could incentivise, including flood proofing of buildings and property, retrofitting of houses, local flood protection measures, and building larger scale flood protection schemes (Bräuninger et al., 2011).

However, evidence highlights that this incentive role is underutilized (Botzen et al., 2009; Lamond et al., 2009; Surminski, 2014; Surminski and Hudson, 2016). A range of barriers exist, including the absence of adequate risk-based pricing, mismatch between required prevention investment by policy holders and the premium savings; the short-term nature of insurance contracts; as well as a prevailing uncertainty about the benefits of risk reduction measures (Ball et al., 2013; Bräuninger et al., 2011). In response, there is growing focus on partnerships as a way to address at least some of these barriers. The European Insurance industry, for example, views partnerships as vital for reasons of insurability, risk transfer and ensuring the use of appropriate adaptation and prevention measures (CEA, 2007).

### 2.1. The evolving UK flood insurance partnership

The UK flood insurance partnership between the UK government and the ABI was set up in 2000 as the “Gentleman's Agreement” in the wake of growing flood losses. From 2005 it became known as the Statement of Principles (SoP). It sets out commitments from the insurance industry to provide flood insurance, and from government to support flood risk management and improve the quality of public flood risk data. In 2008, this agreement was extended for a final five-year period until 2013 and committed the government and insurance industry to a transition to a free market for flood insurance (Penning-Rowsell et al., 2014).

However, from 2010 onwards, sparked by concern about rising risk costs and the increasing frequency of high loss events, the insurance industry and government took steps to reach an understanding on how to replace the SoP. After a public consultation the government selected

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