

AN INVESTIGATION OF FLOOD MEMORY, INSURANCE AND PROPERTY VALUE: THE UK REGIME

Namrata Bhattacharya-Mis¹ Jessica Lamond¹

¹ Centre for Floods Communities and Resilience, Faculty of Environment and Technology, University of West of England, Frenchay Campus, Bristol, BS16 1QY, UK

ABSTRACT

Availability of insurance cover is considered to be a key issue in saleability and reinstatement of property. With increasing flood risk properties are likely to find it harder to access easy and cheap insurance. Premium levels will increase if there is fully adjusted risk based prices. Evidence suggests that the underwriting process of insurance often tries to bring a balance between history of claim and estimated or predicted risk. Therefore the memory of claims remains inherent within the system and affects future insurance terms. Literature reveals that properties with repeated impacts of flooding having memory of flood event are more prone to issues concerning high premium during renewal of insurance. Property insurability is often discussed in literature, but focused research on insurance in the context of system memory is disproportionately scarce. Such a void in the knowledge domain of what affects insurability for properties facing higher frequency of flood events and memory of claims in the system motivated the requirement for a re-examination of existing work. This research draws its lessons from a purposive literature review from recent surveys in flood risk literature both in the residential and commercial property sectors interpreted through the lens of flood memory. The review suggests that suitable management of memory within the insurance system can provide positive impact in risk reduction, reduce moral hazard and adverse selection of insurance, and enhance resilience for the property for future renewal of insurance.

Keywords: flood memory, insurance, property value, repeat flood, resilience.

INTRODUCTION

Flood events encompass damage to both natural and built environment through considerable loss in commercial businesses, lengthy social and operational disruption for property owners and substantial insurance claims (Evans *et al.*, 2004). Swiss Re (2012) indicated that the summer 2007 flood incurred approximately 1.7 billion costs to UK insurers making it the third costliest ‘fresh water’ disaster in the global insurance industry. It is not surprising if the insurance industry is factoring in both the rising cost of claims and the uncertainty in risk assessment into their models to price future policies. Research shows that the sustainability of insurance models depends on the presence of an insurable risk and an available population who can afford insurance rates (Dlugolecki, 2009). However as Kunreuther (2005) suggests with decline in affordability, the present insurance models may need changing, incorporating more flexibility and greater diversification. It is possible that with increased and more frequent floods there will be increased demand for insurance further exacerbating the

¹ Namrata.Bhattacharya-Mis@uwe.ac.uk

¹ Jessica.Lamond@uwe.ac.uk

difficulty of getting cover unless the perception changes towards increased resilience measures to reduce risk of flooding. Sharing risk and adapting effective risk reduction strategies through the adoption of resistance and resilient measures at property or community level have been proposed as an alternative to maintain insurability and therefore saleability of properties (Arnell *et al*, 1984).

The literature pertaining to flood risk, insurance and property value is contextualised in three different interrelated aspects: the future marketability and saleability of property, recovery from impact and time taken for resale and finally the discount capitalisation on sale price. The Royal Institution of Chartered Surveyors (RICS, 2004) acknowledges that saleability, mortgageability and marketability of properties depend on the terms and conditions attached to insurance cover. The future marketability of property needs to be assessed prudently for determining long term validity of mortgage lending against the value of property (RICS, 2011). The expected impact of insurance on the value of property has been considered, for example, in the US by Macdonald *et al*. (1987) Skantz and Strickland (1987) and Harrison *et al* (2001) to be equal to the discounted cost of flood insurance in perpetuity. For the UK, Eves (2004) and BFRG (2004) while looking more generally at the impact of flooding on property value suggested that lack of insurance could result in sales falling through, longer recovery time to sale and therefore possibly lower prices for eventual sale. From a more recent study by Lamond (2008) in the UK, the perspective that such effects can be minimised over time if there are no repeated flood events and the underwritten conditions attached to the building insurance cover don't change was significant.

The foregoing discussion demonstrates that affordable flood insurance under normal terms is important in maintaining the physical and economic status of property in the floodplain. With repeated flood impact there is potential for flood memory to cause changes in the underwritten terms and conditions of insurance renewal leading to higher premium rates or even non availability of further cover. Though mixed results on the impact of value and insurance could be observed in literature, the context of two existing layers of memory one within the insurance claims history system and the other as insurance memory within the property system was not looked into. Thus it is proposed that flood insurance premiums represent a form of memory within the property system that may result in differential vulnerability among recently flooded properties depending on the manifestation of memory of flooding within the insurance system, the policy of insurers and the behaviour of potential policyholders. This research will therefore enquire from the existing evidence in literature the importance of flood memory within the flood insurance regime. The paper will ask the questions: How is flood memory represented in insurance? Who are the custodians of memory in the insurance system? How do the different memories affect the incentives to mitigate risk?

Memory within the Insurance regime

In the context of insurance of flood affected properties, memory refers to the differential level of financial and physical vulnerability caused by the insurability as a result of gap between flood impact and recovery time. This is associated with the antecedent effect of the physical damage existing within the built environment due to previous flooding and the limited window of recovery time between events (Bhattacharya-Mis and Lamond 2014a). It can be argued that in the insurance system, memory can result in increased premium, increased excess, restrictive insurance

conditions or non-availability of cover. This then feeds through to the property system as embedded memory making property value vulnerable. The change in vulnerability of property due to memory in the insurance system arises through the resulting purchase or non-purchase of cover and any exclusions or excess terms enforced due to flood risk. Central to this, in theory, is the notion that in the presence of fully risk based pricing for insurance, flood memory is situated in the improved scientific calculation of hazard probabilities on a known asset base and may often be a shared and transparent form of memory. In practice, however, Lamond *et al.* (2009) pointed that insurance terms are not wholly based on the calculation of scientific risk. Other aspects of flood memory affect the supply such as claims history, flood damage history, community preparedness, and tolerance of cross subsidisation. Demand for insurance may also hinge on past damage and claims, community perception of risk and dread of future flooding. These forms of memory are more fragmented, held differentially by individuals and organisations therefore they suffer from information asymmetry and are likely to vary in importance spatially and temporally. These asymmetries can lead to the potential for adverse selection if knowledgeable high risk property owners more actively seek insurance and insurers don't hold the same risk information or don't rely on it to price risk.

The underwriting judgements of insurers and reinsurers are not entirely transparent and they will be affected by the uncertainty in scientific calculation of future risk. This will be in terms of availability and accessibility of necessary data associated with damage and their spatial correlation with level of risk to specific properties. On a larger spatial scale, insurers hold reserves to fund expected levels of claims and often reinsure to have enough resources to provide payments in exceptional events. At a national or regional level Chandler (2012) referred to the possibility that memory of such extreme events might adversely affect the risk taking capacity of insurers which might make all properties at risk less insurable than before.

A history of clustered claims also resides within the memory of reinsurers and therefore can make insurance less affordable with high premiums (Aseervatham *et al.*, ; Bowker, 2007). Memory of flood events held by the local community or policy holder may have an impact on both the demand for insurance cover and the general level of preparedness, potentially resulting in risk reduction and lower claims. Arguably, the local community has a more detailed knowledge of exposure and susceptibility to hazard than the underwriter or reinsurer but their assessment of hazard is influenced by memory of past events and their appreciation of risk by a variety of heuristics (Tversky and Kahneman 1974). Individual underwriters and local insurers may also employ some of these heuristics in providing quotes for new cover. Freeman and Kunreuther (1997) pointed that it is crucial to consider the potential of an important practical implication of existing memory within a specific insurance system to gather a better understanding of its impact on future risk reduction processes for enhancing resilience. The discussion below focuses on the UK insurance context and the evidence for impacts of memory across stakeholders in order to raise some possibilities in the light of current changes in the UK regime.

The custodians of memory

The perspective gained through consideration of flood memory in insurance markets leads to a specification of three main custodians of memory of differing transparency, spatial and temporal scales. These are the reinsurer or capital reservist, the direct insurance underwriter or scheme provider, and the insured policy holder or community. In the UK from the late 1960s to date, the main stakeholders have been

private reinsurers, private insurance companies and individual property holders. However, while the financial cost of flooding is increasing there is imposed reduction in flood defence expenditure by the government (Bennett & Hartwell-Naguib, 2014). Often it is expected that insurance will be able to offset the financial risk of flood hazard, encourage mitigation and minimise future flood impacts. However with changing risk, shortcomings in the management of embedded memory may lead to low willingness to involve in risk reduction therefore the existing uncertainty becomes greater (Kenney *et al.*, 2006). Such conditions coupled with expected future increase in risk has led to the withdrawal of the ‘Gentlemen’s Agreement’ and successively more rigorous Statements of Principles proposing risk based pricing (ABI, 2014). This has culminated in the recent negotiations to establish an insurance pool (Flood Re) for properties at high risk. This transformation as argued by Penning-Rowsell and Priest (2014) is likely to change the way in which flood memory is held and consequently change the behaviour of key stakeholders.

For the policy holders it is worth noting that residential and commercial properties are increasingly being treated under different systems. Previous research surveys indicated that only a minority of the homeowners living within the high risk zone had severe difficulties in getting insurance regardless of their claims history (Lamond, 2008). Under the putative Flood Re scheme this will continue to be the case as risk based premiums will be explicitly subsidised through a levy on the wider insurance pool for the next 25 years (Defra, 2013). Homeowners are automatically covered for damage to property and disruption to their accommodation if they hold a bundled general insurance policy. Conversely businesses are often covered for physical flood damage within standard property insurance but business interruption and associated loss of earnings would normally require the deliberate choice of buying separate cover. In the future, Flood Re will not cover businesses – even those micro to medium enterprises that used to be covered under the statement of principle (ABI, 2014). The spatial scale of flood memory accessible to reinsurance markets is that of major national events and long term trends in claims data. For the UK market, as Dlugolecki (2009) suggested, data deficiencies in the past recording of claims has led to a greater focus on extreme flood events and modelled risk. Since 2005 the recording process has changed and consequently reinsurers may be more discerning in their pricing. Flood Re has the potential to reduce the need for reinsurance and may focus the scope of reinsurance cover to much more extreme events.

For the direct underwriter, under the Statement of Principles, provision of cover was affected by policyholder risk status and flood damage as recorded by claims history. However in a competitive market where policyholders are free to shop around, it is apparent that the collective duration of memory of claims was restricted, by the underwriting process, to the short term (usually up to 5 years). Research by Lamond (2008), Lewes (2004) and Morpeth flood action groups (2010) revealed that problems in getting cover, for the majority of flood affected households, reduced with time elapsed from the flood event and surveys also reveal that flood risk is still heavily cross subsidised (CREW, 2012). Flood Re has the potential to hold a much longer memory of past claims because it reduces the possibility for households to switch insurer and can keep a record based on the property rather than policy holder history. The improved property level information may disadvantage those at highest risk (as against their present policy) but will also allow for incentivisation of risk mitigation through better recording of mitigation, preparedness and loss prevented.

The impact of memory on preparedness

Quantitative evidence of memory acting on mitigation behaviour in the residential property holder system is summarised by Rose *et al* (2012). However propensity to insure in the UK is rarely measured because insurance cover for residential property is so common and flood insurance is bundled into the all risks policy. There is a range of moral hazard implications arising in relation to this kind of flood insurance (Pauly, 2005) by protecting all properties irrespective of risk levels can discourage property holders to take actions to reduce risk, especially when Statement of Principles was in place in the UK such practice was prevalent (Lamond & Penning-Rowsell, 2014).

Conversely, in the commercial property sector insurance is the second most common flood risk reduction measure adopted by repeatedly flooded businesses in selected case study areas (Bhattacharya-Mis & Lamond, 2014b). Those flooded most are more likely to insure leading to the risk of adverse selection where people insure only the highest possible risks and other comparatively lower potentially insurable risks remain uncovered (Pauly, 2005). However insurers that store accurate claims records are able to differentiate between past claimants setting the premiums accordingly and embedding memory into the insurance system.

Literature indicates that concern exists in property holders mind regarding financial impact of flooding on the asset value of the property and its long term insurability and saleability in the residential property sector (Joseph *et al.*, 2015 in press; Treby *et al.*, 2006). Such concerns are also visible in the commercial property sector is evidenced by a recent survey by Bhattacharya (2014) in two selected case studies in England. The study indicated that easier and cheaper availability of insurance might enhance the desirability of properties within high flood risk zones. Lamond, *et al.* (2009) saw early indications of direct action in commercial properties in particular. Therefore, despite the short duration of flood memory in practice within the UK residential and commercial market the threat of insurance withdrawal even in the short term is having some impact on property owners' behaviour.

The memory of flood history within the system managed effectively and utilised for risk assessment is able to enhance resilience through preparedness. Therefore with enhanced sustainability utilising system memory of flood history can help in building up future ability to finance, saleability and insurability of property. Within the UK Flood Re may enhance the shared memory between insurers and policy holders for the residential market. It therefore has the potential to reduce moral hazard for those properties included in the scheme. The large caveat attached to this assessment is that in excluding the highest risk properties the most vulnerable properties may be left without insurance cover.

The evidence from the commercial property sector is indicated by a general lack of motivation in investing in resilient and resistant measures in spite of having significant differences in their economic, social and psychological interests (Bhattacharya-Mis *et al.*, 2015). Since such factors affecting price structure and future saleability of properties are not often visible in the commercial real estate market presently, it can be presumed that such situations can make it difficult to engender motivation and awareness among stakeholders. Thus it can be proposed that if memory is optimised as an existing source of knowledge when insurance quotes and renewals are made through encouraging investment (for example towards preparedness and adaptation measures) such actions can make properties less vulnerable to changing risk of being less saleable or less insurable in the future.

Summary and conclusions

Based on the discussion above it can be concluded that flood Memory can play an important role in enhanced resilience through the mechanism of insurance. Provision of affordable and adequate insurance to all population at risk is a challenge in the changing and variable risk situation with unpredictable pattern of loss for the insurance industry. The various aspects of risk calculation, claims history, damage history and perceived risk can have an impact on the different characteristics of investment and saleability of properties. Where collective memory of flooding decays and is not supported by embedded memory in the form of high insurance, property markets will undervalue the flood risk. Conversely where memory is held in the insurance market, uninformed by local circumstances and exhibits in lack of availability, properties may become unnecessarily blighted.

The study showed the strength of utilising embedded memory within the system by increasing the prospect of getting affordable insurance through motivating people to take up preparatory risk reduction measures and avoiding moral hazards and adverse selection for a resilient future. It is established from the above discussion that in the present circumstances with changes in nature of risk and policies, it is important to have a transparent interaction of the existing memory within the system. Such practice might motivate insurers to incentivise risk reduction measures and to reduce the potential for moral hazard and adverse selection. Through the lens of flood memory it becomes apparent that shared memory incorporating scientific hazard information, flood event and claims history, and local knowledge of consequences, preparedness and mitigation may be helpful in moving towards sustainable risk sharing models.

References

- ABI (2014) *The Future of Flood Insurance: What happens next*. RICS. London
- Adaptation Sub-Committee Progress Report (2012) *Climate change - is the UK preparing for flooding and water scarcity*. Climate Change Committee.
- Arnell, N.W., Clark, M.J., Gurnell, A.M. (1984). Flood insurance and extreme events: the role of crisis in prompting changes in British institutional response to flood hazard. *Applied Geography*. 4, pp. 167–181.
- Aseervatham, V., Patricia Born, P. & Richter, A. (2012) *The impact of catastrophes on insurance markets – disentangling supply and demand effects*. Munich Risk and Insurance Center.
- Bennett, O. & Hartwell-Naguib, S. (2014) *Flood defence spending in England - Commons Library Standard Note*.
- Building Flood Research Group (BFRG) (2004) *The impact of flooding on residential property values*. RICS foundation report Building Flood Research Group. London
- Bhattacharya, N. (2014) A model to investigate the impact of flooding on the vulnerability of value of commercial properties. University of Wolverhampton.
- Bhattacharya-Mis, N., Joseph, R., Proverbs, D. & Lamond, J. (2015) Grass-root preparedness against potential flood risk among residential and commercial property holders. *International Journal of Disaster Resilience in Built Environment*. 6 (1) pp. 44-56

- Bhattacharya-Mis, N. & Lamond, J. (2014a) Socio-economics complexities of flood memory in building resilience: An overview of research. In: R Haigh, D Amaratunga, Kausal Keraminiyage, & T Menaha (Eds.). *4th International Conference on Building Resilience*. 2014 Media City, Salford.
- Bhattacharya-Mis, N. & Lamond, J. (2014b) An investigation of patterns of response and recovery among flood affected businesses in the UK. In: C.A. Proverbs, D., Brebbia (ed.). *Flood Recovery, Innovation and Response IV*. 2014, Poland.
- Bowker, P. (2007) *Flood Resistance and Resilience Solutions Defra*. London.
- Chandler, S. (2012) Evaluating flood risk in England and Wales in the approach to June 2013 [online]. *Journal of Building Survey, Appraisal & Valuation Volume 1 Number 3 Evaluating*. 1 (3), pp. 210–216.
- Centre of Expertise for Waters (CREW) (2012) Flood Insurance Provision and Affordability. Beyond the Statement of Principles: Implications for Scotland. The Scottish Government. Edinburgh.
- Defra, (2013) Securing the future availability and affordability of home insurance in areas of flood risk. Defra, London.
- Dlugolecki, A., (2009) Coping with climate change: risks and opportunities for insurers. Chartered Insurance Institute, London.
- Evans, E., Ashley, R., Hall, J., Penning-Rowsell, E.C., Saul, A., Sayers, P., Thorne, C. & Watkinson, A. (2004) *Foresight. Future Flooding. Scientific Summary: Future risk and their drivers*. Office of Science and Technology. London
- Eves, C. (2004) The impact of flooding on residential property buyer behaviour: an England and Australian comparison of flood affected property. *Structural Survey*, 22 (2), pp. 84–94.
- Freeman, P., Kunreuther, H. (1997) *Managing environmental risk through insurance*. Kluwer Academic Publishers, Boston.
- Harrison, D.M., Smersh, G.T., Schwartz jr, A.L. (2001) Environmental determinants of housing prices: the impact of flood zone status. *Journal of Real Estate Research* 21, 3-20.
- Joseph, R., Proverbs, D., Lamond, J., Wassell, P. (2015) Homeowners' perception of the benefits of property level flood risk adaptation (PLFRA) measures: the case of the summer 2007 event in England. *Journal of Safety and Security Engineering*, in press.
- Johnson, C., Penning-Rowsell, E. & Parker, D. (2007) Natural and imposed injustices: the challenges in implementing “fair” flood risk management policy in England *Geographical Journal*. 173 (4), pp. 374–390.
- Kenney, S., Pottinger, G., Plimmer, F. & Pocock, Y. (2006) *Flood risk and property, impacts on commercial & residential stakeholders' strategy*. Reading
- Kunreuther, H. (2002) The role of insurance in managing extreme events: Implications for terrorism coverage. *Risk Analysis*. 22, pp. 427–437.

- Kunreuther, H. & Pauly, M. 2005. Insurance Decision-Making and Market Behavior. *Foundations and Trends in Microeconomics*, 1, pp. 63-137.
- Lamond, J., Dhonau, M., Rose, C. & Proverbs, D.E. (2009) Overcoming the barriers to installing property level flood protection - an overview of successful case studies. In: *Road map towards Flood resilient urban environment*. 2009 Paris: Urban flood management cost action group C22.
- Lamond, J. & Penning-Rowsell, E. (2014) The robustness of flood insurance regimes given changing risk resulting from climate change. *Climate Risk Management*. 2 pp. 1–10.
- Lamond, J.E. (2008) *The impact of flooding on the value of residential property in the UK*. Wolverhampton: University of Wolverhampton.
- Lewes Flood Action Group, (2004) Survey results. Available from: <http://www.lewes-flood-action.org.uk/insurance/surveyresults.html>. Accessed on 7th July 2011.
- Macdonald, D.N., Murdoch, J.C., White, H.L. (1987) Uncertain hazards, insurance and consumer choice: evidence from housing markets. *Land Economics* 63, 362 - 371.
- Morpeth Flood Action Group, (2010) Flood insurance in the UK, Our proposal for the way forward. Morpeth Town Council & Morpeth Flood Action Group.
- Penning-Rowsell, E.C. & Priest, S.J.(2014) Sharing the burden of increasing flood risk: who pays for flood insurance and flood risk management in the United Kingdom. *Mitigation and Adaptation Strategies for Global Change*. DOI:10.1007/s11027-014-9622-z
- RICS (2011) *RICS Valuation Standards – Global and UK*. 7th edition. Norwich: RICS.
- RICS (2004) *The impact of flooding on residential property values*. Available from: http://www.rics.org/site/download_feed.aspx?fileID=2716&fileExtension=PDF. Accessed on 4th December 2010.
- Rose, C.B., Proverbs, D.G., Booth, C.A., Manktelow, K., (2012) “Three times is enemy action” – flood experiences and flood perceptions., in: Proverbs, D.G., Mambretti, S., Brebbia, C.A., de Wrachien, D. (Eds.), *Flood Recovery Innovation and Response III*. WIT Press, Southampton, pp. 233-242.
- Skantz, T.R., Strickland, T.H. (1987) House prices and a flood event: an empirical investigation of market efficiency. *Journal of Real Estate Research* 2, 75-83.
- Swiss Re 2012 Natural catastrophes and man-made disasters in 2011 Swiss Re sigma study. Available from <http://www.swissre.com/sigma/> Accessed on 13th February, 2013
- Tversky, A., Kahneman, D. (1974) Judgment under Uncertainty: Heuristics and Biases. *Science* 185, pp.1124-1131.
- Treby, E.J., Clark, M.J. & Priest, S.J. (2006) Confronting flood risk: Implications for insurance and risk transfer. *Journal of Environmental Management*. 81 (4), pp. 351–359.