Incentivising household action on flooding

Options for using incentives to increase the take up of flood resilience and resistance measures

Matthew Oakley

Social Market Foundation

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ABOUT THE AUTHOR

Matthew Oakley

Matthew Oakley joined the SMF as Senior Researcher in July 2015. Alongside SMF, Matthew is also Director of WPI Economics. Matthew has previously been Chief Economist and Head of Financial Services Policy at the consumer champion, Which?. Head of Economics and Social Policy at Policy Exchange and an Economic Advisor at the Treasury. He sat on the Government's Social Security Advisory Committee between 2013 and 2016 and he led the Independent Review of Jobseeker's Allowance sanctions that reported to Parliament in 2014. He has an MSc in Economics from University College London.

EXECUTIVE SUMMARY

This report explores the full range of incentives that might be available to Flood Re and others to drive an increase in the take up of flood resilience and resistance measures.

Most households in the UK will never experience flooding, but nationally it is a significant social and economic issue. Over the last 10 years, an average of 19,000 homes have made flood-related insurance claims, and both the financial and non-financial costs of a flood can be significant and long-lasting.

Insurance plays an important role in mitigating these impacts in two ways:

- For those at risk, household insurance can provide peace of mind that support will be available in the case of flooding; and
- For those who have been flooded, support from insurers provides the finances and organisation needed to repair and reinstate their property and belongings and re-house residents whilst repairs take place.

However, particularly for those in high-risk areas, international experience shows that insurance against flooding can be prohibitively expensive. As a result, governments across the world support access to flood insurance through various schemes and agreements with the insurance industry.

The current UK scheme, Flood Re, was established by the Water Act 2014. This provides insurers with a re-insurance policy, at a price that may be far lower than the risk-reflective price, allowing them to offer discounted flood insurance to their policyholders in high-risk areas.

Flood Re helps to increase the number of households with access to affordable flood insurance - but the scheme's design does little to incentivise households to take measures to either reduce their likelihood of being flooded and / or reduce the damage that occurs if their property is flooded. It also comes with administrative costs, and increases the cost of home insurance policies through the Flood Re levy (currently £180 million a year). As a result, Flood Re was specifically designed as a time-limited scheme; by 2039 it is to be wound up, and a risk-reflective market for household flood insurance should be in existence.

In order to move towards this goal, Flood Re published its first transition plan in 2016. This outlined that Flood Re saw successful transition as being achieved if, once a risk reflective market is in place, that market provides affordable household flood insurance to all households that need it.

Achieving this would require the costs of providing household flood insurance to fall. Three factors could drive this:

- Reductions in the likelihood of flooding;
- Reductions in the average costs of reinstatement; and
- Increased competition between providers of flood insurance.

While Flood Re has no direct control over these things, the transition plan was clear that Flood Re can and should play a role in supporting, prompting and promoting the action that others need to take to reduce the costs associated with providing household flood insurance. The plan outlined a range of work that Flood Re would undertake in this vein. One key element of work was to identify ways in which more households could be encouraged to take up flood resistance and / or resilience measures, which could reduce the likelihood and / or damage of flooding, and therefore reduce the costs of providing insurance to those properties.

The greatest benefit of resistance and resilience measures will be felt by households that are at high risk of flooding. However, particularly for lower-cost interventions, all households could benefit, and there is a strong argument for a much wider set of properties taking up this action. There are a number of reasons for this:

- The properties may be at risk, but not currently judged to be. A prime example here is that around two thirds of the residential properties flooded in the major event in summer 2007 were not previously identified as high risk on flood maps;
- Risk is always changing, as the built and natural environment change, meaning that low risk properties may experience higher risk in future. It could be more cost effective for these properties to take on low / zero cost measures now, rather than wait; and
- Ultimately, all properties are at some risk of flooding – meaning that if resistance / resilience measures are costless, it would make sense to improve resilience for the whole housing stock.

Encouraging take up across all of these properties would extend the scope of action significantly outside of Flood Re's current remit, but is in our view essential to recognising the full benefits of flood resistance and resilience.

Increasing take up of action on flooding

There are currently a range of barriers that are likely to reduce the number of households that take measures to reduce the impact of flooding. These barriers are found at three broad stages of the decision-making journey:

1) **Motivation**: Households need to be motivated to engage in the market in the first place. They need to believe both that they are at risk of flooding and that they are responsible for protecting their property against the likelihood of this or the damage that it might cause;

2) **Access and assess information**: Households need to access information about the various products available in the market and then be able to assess the costs and benefits (including quality and price). Together this means that households can understand the best value for money option; and

3) **Take action**: Households need to be able to take the appropriate action. This requires that they can afford to take that action and that there are no behavioural biases that restrict the likelihood of action.

A consumer could 'drop off' the path to taking action on flooding at any one of these stages. A number of approaches to changing behaviour have already been discussed during the passing of the Water Act 2014, and since Flood Re's launch. These include changes to Flood Re premium thresholds, accounting for resilience measures through reduced premium thresholds (and / or policy premiums) and a "three strikes and you're out" principle in Flood Re. The analysis in this report suggests that none of these approaches would be successful in delivering the change in behaviour needed to deliver significant progress towards an affordable, risk-reflective market. Some would also work counter to the stated ambitions of the Flood Re scheme.

Instead, it seems likely that any approach to supporting and incentivising households to take up flooding measures will need to consist of a package of new initiatives. These could include initiatives aimed at:

- **Increasing understanding of risk and damage**: By launching a set of pilots to test how communication on flood risk is best communicated and by whom;
- **Increasing ownership of the issue**: By requiring that all households at high risk of flooding have a flood resilience survey conducted and that this forms the basis of a Flood Performance Certificate that is available to potential buyers. Initially, this could be funded through a central government fund, or by Flood Re;
- **Increasing understanding of potential options and their benefits**: By continuing to develop local approaches to sharing knowledge and best practice. This would also be supported by flood resilience surveys and improved communication (above) and a better grant scheme (below); and
- **Reducing costs**: By extending, reforming and improving the grant scheme that is available to encourage the take up of flood resilience / resistance measures. Including consideration of whether Flood Re should run and part-fund the scheme.

These measures should increase the number of households voluntarily taking up relevant measures. However, given the scale of the financial, emotional and behavioural psychological barriers involved, it is likely that harder incentives, including mandatory measures, may need to be considered. This is particularly true if the adoption of resilience / resistance measures is to play a significant part in ensuring that, by 2039, a market for household flood insurance exists that is both risk reflective and affordable.

There are two distinct areas surrounding building regulations that might be changed to support the needed action:

- **Presumption for resilient repair**. Building regulations could require a set of resilience standards that need to be met when properties that have been flooded are being reinstated. This might include a set of measures that are common to all properties (for example, raised electricity points). Given the variability in packages that will be suitable for different properties, going further than this would require each flooded property to have a resilience survey. If this happened (as suggested above), regulations could require a minimum level of recommendations from that survey to be adopted (much like there are minimum standards for insulation and / or structural soundness).

- **Renovation and new build**. Negligible and low-cost resilience measures could become mandatory for all new and renovated properties. A significant advantage of introducing change through this route would be that it could help to support a change in social norms. For example, if all new properties (or renovated properties) were required to have raised electricity points, this would no longer be seen as a signal of flood risk; it would become the new norm.

Conclusion

This report outlines a wide range of approaches that could be used to encourage households to take up flood resilience and resistance measures. While it has highlighted that the existing evidence is not strong enough to outline a blueprint for action, it has indicated a set of key principles that should drive future work.

1) The first step to developing a plan for the way forward will be to clearly articulate the desired behavioural change. In short, the properties that would benefit from increased resistance / resilience action need to be identified. This is essential so that the scale of the task can be understood.

2) This report has suggested that there are a wide range of properties that would benefit from some level of resilience action. If this were found to be the case, there is little scope for Flood Re to be the major driver of direct change in households' approach to resilience. In particular, a move to incentivise households to take up flood resilience through changes to insurance premiums, Flood Re premium thresholds or a "three strikes and you're out" principle, are unlikely to be effective. In principle, they are all sound ideas, but in practice, they are likely to make too small an impact on too few households to drive wholesale change.

3) Instead, Flood Re should work with others to develop and implement a package of measures that can be adopted over the course of the next 20 years. Given Flood Re's clear public purpose and need to drive action on transition to an affordable and risk-reflective household flood insurance market, it is a body that can coordinate multi-year, multi-organisation pilots to build on innovation / qualitative assessments that have already been undertaken. In the immediate years, this should involve significant piloting and evaluation to understand what works, before national programmes are rolled out.

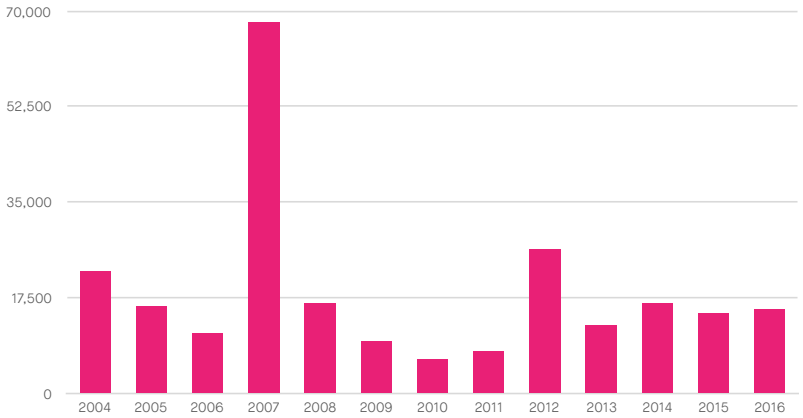
4) Given the importance of communication and navigating behavioural psychological barriers, bringing in significant expertise in the behaviour science field would provide vital support for these pilots.

Using these principles to take forward the approaches recommended above could provide a vital boost to households' propensity to take action to protect themselves against the risk of and damage caused by flooding. By doing so, it could also be a central part of Flood Re's approach to supporting the creation of an affordable risk-reflective household flood insurance market by 2039.

Chapter 1: Context

While most households in the UK will never experience flooding, it is a significant social and economic issue. On a national scale, the costs of flooding can be significant. The last ten years have seen major flood events in 2007, 2009, 2012, 2013/14 and 2015. Floods in December 2015 directly affected 17,000 properties, leading to £1.3 billion of damage.[1] There were also much wider indirect impacts, with power cuts, disruption to public services and transport infrastructure impacting on tens of thousands of households. The summer 2007 floods alone were associated with 43,000 flood-related residential insurance claims.[2] Over the last 10 years, an average of 19,000 homes have made flood-related insurance claims each year (figure 1).

Figure 1: Flood related domestic insurance claims per year



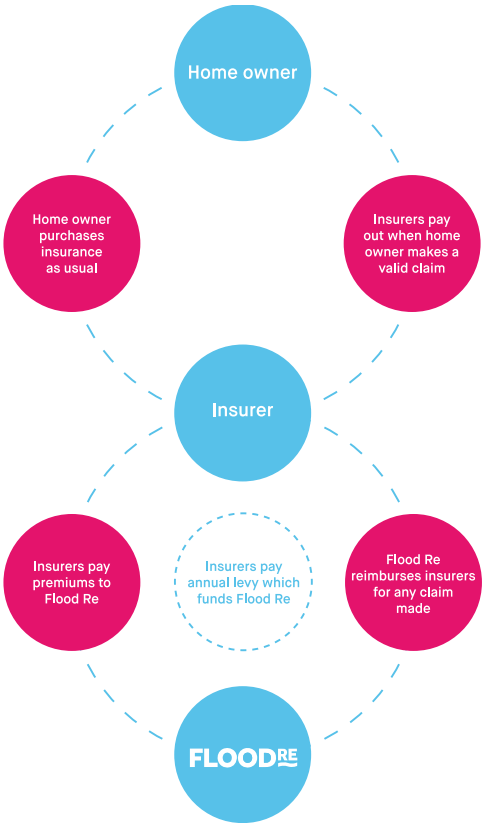
Source: ABI

For those individuals, households, businesses and communities that do experience flooding, the consequences cannot be overstated. Aside from the immediate danger and risk of serious injury when flooding occurs, the physical and emotional impact caused by the damage to property and belongings can be severe and long lasting. The reality of sewage running through living rooms, a lifetime of memories destroyed and irreparable impacts on businesses, are far from the media focus on images of stranded cars and stoic residents canoeing down the high-street.

The role that insurance can play in mitigating some of these impacts is obvious:

- For those at risk, household insurance can provide peace of mind that support will be available in the case of flooding; and
- For those who have been flooded, support from insurers provides the finances and organisation needed to repair and reinstate their property and belongings and re-house residents whilst repairs take place.

Figure 2: Illustration of how Flood Re works



Source: Flood Re

However, for those at significant risk, international evidence shows that household insurance (including flood cover) on the open market can be

extremely expensive. As a consequence, the impact on household finances can be large. One UK example highlighted in the media demonstrated premiums rising from £300 to over £4,000 following the development of better flood mapping.

These high costs can lead households to under-insure or not take on insurance at all and, unsurprisingly, this has been a particular problem for low-income and vulnerable households.[3] In dry years, this leads to emotional strain and anxiety. When flood events occur, this can leave individuals and families with nowhere to live and with a property in need of many thousands of pounds of repair, and no financial means to undertake these repairs.

Faced with the clear need for households to have insurance, but with an open market providing an outcome that is unaffordable for many households, countries across the world have adopted a range of different approaches to ensure insurance coverage. In the UK, Flood Re supports the insurance industry to provide affordable insurance to households at risk of flooding.

What is Flood Re?

Flood Re was established by the Water Act 2014.[4] It is a statutory scheme developed through a partnership between the Government and insurance industry with the intention of increasing the availability and affordability of household flood insurance.

It does so by providing a reinsurance facility for providers of household insurance. Insurers who use this (by ceding properties to the scheme) pay a premium (between £213 and £1,218 for a combined contents and building policy) that is based on the council tax band of the property that is being ceded.[5] Left to the open market, premiums for at-risk properties are regularly far higher than this (and sometimes many thousands of pounds a year), showing that this provides a substantial discount to the risk-reflective price.

Each policy has a standard excess of £250, again providing a substantial discount to excesses that were commonly applied prior to the introduction of Flood Re.

While Flood Re does not deal directly with households (who continue to deal with their insurer), it is likely that insurers will pass this pricing structure on through the policy premium and excess that they charge their customers.

Emerging evidence on the market for UK household insurance suggests that this has been the case.

When flood events occur and impact upon properties ceded to the Flood Re scheme, as now, insurers will continue to manage and operate the claims process and pay out when a home owner makes a valid claim. Flood Re will then reimburse the insurer for valid claims made and paid out.

The premium provided by the Flood Re scheme is supported by a levy that is applied to all insurers writing home insurance policies in the UK. This currently amounts to £180 million a year. Should it be needed, Flood Re also has the ability to require industry to provide more funding through a compulsory call for more funds. The expectation is that this call would rarely (if ever) be used as the Flood Re model has been tested to be resilient to a flood-related loss of a larger scale than any flood events seen in the last 100 years.

Annex 1 provides more details about the Flood Re scheme and its eligibility criteria.

Why was Flood Re needed?

Since the 1960s, a series of agreements between the insurance industry and government have supported access to flood insurance as part of the standard cover provided by home insurance. This culminated in the Statement of Principles first agreed between the Government and ABI in 2000. However, a range of criticisms were levelled at this approach, including that:

- Whilst providing an average subsidy of £430 to at-risk properties, it did little to ensure the affordability of insurance for those households at greatest identifiable risk of flooding (where premiums and excesses could run in to thousands of pounds); and
- It provided an implicit cross-subsidy between households at risk of flooding and those not at risk of flooding. This raised premiums for those with low risk of flooding and did little to support action necessary to reduce the likelihood and impact of flooding for those at risk.

As a result of these criticisms the agreement was due to expire without renewal in 2013. Without further action, it was estimated that 200,000 households would have struggled to obtain affordable household insurance.[6] Low-income and vulnerable consumers would have been most likely to

struggle and could have been forced to leave themselves uninsured.

The result was the need for a new solution to ensure that households at risk of flooding retained access to affordable household insurance. Building on experience from other countries and other re-insurance schemes in the UK (e.g. Pool Re, which provides cover for the losses associated with terrorist attacks), Flood Re was developed and implemented.

Transition

While an effective way to address concerns on affordability, the scheme creates longer-term challenges, including that it:

- Continues to rely on a subsidy paid for through higher-than-needed premiums for properties at low risk of flooding;
- Introduces administrative costs, that would not be in place in its absence. Again, this increases the costs of insurance for those households at relatively low risk of flooding; and
- Provides affordable insurance that reduces the incentive for households and government to take action to reduce the extent of flood risk or potential damage from flooding.

For these reasons, Flood Re has been created as a time-limited scheme. To ensure this, the Water Act 2014 outlines that, by 2039, a risk-reflective market for household flood insurance should be in existence and Flood Re, and the subsidy it provides, will no longer be required. To get to this point, the statute outlines that Flood Re must create a series of transition plans that detail the actions that it will take to support the market to transition to this state.

The first of these plans was published in 2016. It outlined that Flood Re saw successful transition as being achieved if, once a risk reflective market is in place, that market provides affordable household flood insurance to all households that need it. In short, that household flood insurance continues to be available and affordable for households once Flood Re has been wound up. This would require prices to remain static once the scheme's subsidy had been removed.

To achieve this, the overall costs of providing household flood insurance will need to fall by the same amount as that subsidy (currently estimated at £180 million a year). The transition plan outlined that there are three key factors

that could drive this reduction in costs:

- Reductions in the likelihood of flooding;
- Reductions in the average costs of reinstatement; and
- Increased competition.

The plan also outlined that Flood Re has relatively little influence over the factors that might drive improvement in these areas. For example, at the national level, the likelihood of flooding is at least partly driven by climate change, environmental policy and flood defence investment and maintenance. Equally, the costs of reinstatement are largely a factor of the scale of damage caused, the length of time the resident spends out of the property and the approach to reinstatement taken by a range of trades. Flood Re currently has little direct influence over any of these factors.

However, the transition plan was also clear that Flood Re can and should play a role in supporting, prompting and promoting the action that others need to take to reduce the costs associated with providing household flood insurance. The plan outlined a range of work that Flood Re would undertake in this vein.

Incentivising property-level resilience and resistance

One of Flood Re's main commitments was to consider how it might incentivise households and insurers to ensure that property-level flood resistance and resilience measures are more widely taken up by households at risk of flooding or who have already been flooded.

Resistance (flood exclusion) measures include things like flood doors and air brick covers which reduce the risk of flooding of a particular property.[7] Resilience (flood repairable) measures are designed to reduce the extent of damage (to building materials and belongings) and ease reinstatement, once water has entered a property. These might include things like resilient wall and floor finishes and raised services (e.g. raising the position of electrical sockets).[8]

The role that these measures could play is clear; despite the Government's commitment to an ongoing and significant investment in national flood defences, it can be difficult or uneconomic to protect some properties from flooding. For these properties, taking property-level action can reduce the

risks of flooding. Where flooding does occur, property-level action can reduce the likely damage, ease reinstatement and allow families to move back into the property more quickly. More broadly, even where flood defences provide some protection, there will always be events that breach these barriers or impact households in unexpected ways. By taking property-level action, households can protect themselves against potential damage when this occurs.

Overall, by reducing the risks of, and damage associated with flooding, property-level resistance and resilience measures are a route through which the costs of providing household flood insurance could be reduced. In turn, this means that they can help to support Flood Re's goal of transitioning to a more affordable, risk reflective, market for household flood insurance.

This report

This report is written in the context of Flood Re's commitment to explore these incentives and the Government's existing desire to boost the uptake of such measures. For example, a recent Defra report highlights the "...long-term goal of enabling individuals and communities to take more ownership for the management of their flood risk and to recover more quickly as a result."[9]

It does not provide a detailed analysis of the various packages of resilience and resistance measures that might be available. Nor does it provide a full cost-benefit analysis of the case for increasing the use of flood resistance and resilience. Reviews along these lines can be found in other reports.[10]

Instead, it takes as given that between now and 2039, the market for flood resilience and resistance products will continue to improve, evolve and develop and that, for some households, installing packages of these products will provide a cost-effective response to the threat of flooding. It uses this context to explore the full range of incentives that might be available to Flood Re and others to drive an increase in the take up of flood resilience and resistance measures.

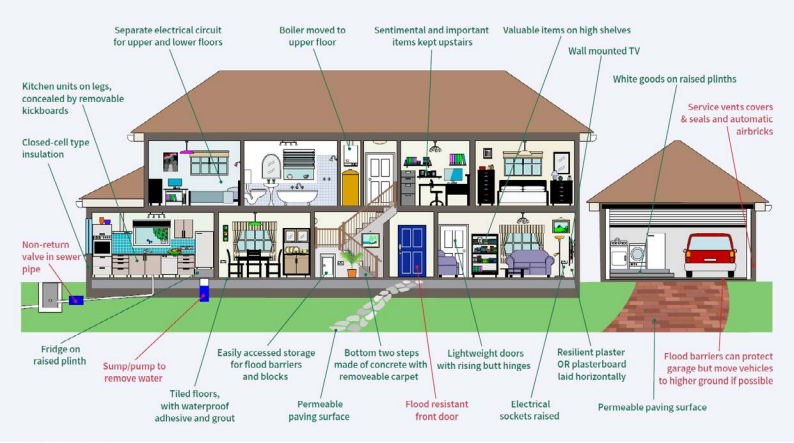
Chapter 2: Flooding and flood resilience and resistance

There is a growing academic and practitioner literature on flood resilience and resistance measures and the role they can play in flood risk management strategies. Whilst this report is not focussed on assessing the pros and cons of different measures, this chapter outlines key themes that frame the rest of the report. It is primarily informed by recent work that Flood Re has commissioned to map the evidence base relating to flood resilience and resistance.[11]

Resilience and resistance measures

The first thing to note is that there are a large range of flood resistance and resilience measures available to households. Some of these are highlighted in figure 3.

Figure 3: Example of resilience and resistance measures.[12]



Source: MDA

Notes: Red text indicates flood resistance measures. Green text indicates flood resilience measure

In general, since flood resistance requires that the whole property is protected (as if one entry point is protected, water could simply enter through a different entry point), resistance measures tend to need to be installed as a complete package.[13]

In contrast, flood resilience can be approached incrementally, with each measure providing potential benefit in terms of reduced damage in the event of a flood. For example, an at-risk household might benefit from tiling a kitchen floor and raising electricity points. Each measure comes with benefits that are not reliant on the other – meaning that installing one or both of the measures would come with potential benefits in terms of reducing expected damages. As such, resilience measures form part of a "...pragmatic approach that can be applied incrementally at various windows of opportunity with lower financial barriers than alternative strategies."[14]

The need for packages of measures

Flood resilience and resistance measures are also complementary. The literature highlights that, while households tend to be more likely to take up resistance measures, these cannot be relied upon to provide the protection that they need. Ultimately, barriers can be overtopped, and for deep flooding, it can even be dangerous to try to exclude water (as it can lead to structural damage). This means that an effective approach to flood risk management at the property level requires at-risk households to accept that, in some circumstances, water will actually enter the property. As such, packages of flood resistance and resilience measures are recommended.

However, the appropriate package of measures will vary by the type and age of the property, flood type (e.g. fluvial, surface water, coastal), expected frequency and depth, speed of onset, the lifestyle and capacities of the occupier and skills and experience of the contractors employed.[15]

It is also clear that individual household approaches will not always be effective. For example, there is little point trying to install resistance measures for one house in a terrace, since flood waters could enter through adjoining properties. This means that, to be successful, resilience and resistance measures may need to be adopted as part of a community approach.

Costs

Given the large variation in the nature of resilience and resistance measures, it is no surprise that the cost of different elements varies significantly. Some measures come at low or negligible cost, whereas others will cost many thousands of pounds. Estimates of the cost of single measures or combinations of measures also vary significantly across the literature.

Overall, packages of measures have been estimated with a large range:

- Resistance - £2,500 - £16,500; and
- Resilience – negligible - £35,000.

An important point to note here is that these costs are typically quoted on the basis of works undertaken to upgrade a property. However, as it is most likely that these works would be undertaken during an existing renovation or when a property is being reinstated following a flood, what matters is the difference between these costs and the equivalent non-resilient / resistant installation.

A key example is that flood doors can cost between £1,500 - £5,000 to install, but if existing doors need to be replaced, the additional cost could be as low as £300.[16] Figure 4 demonstrates examples of packages of resilience measures that could be installed and compares these costs to non-resilient repair. The most expensive package of resilient repair shown comes in at £12,540. However, once the like-for-like replacement costs of £7,770 are accounted for, the additional costs of resilient repair are less than £5,000.

Costs have also already been shown to be falling.[17] Part of the reason for this is that existing products are being used more smartly. An example is that expensive lime plaster would previously have been likely to be used to replace standard gypsum to make a property more resilient. However, more recent approaches have used cheaper but equally effective alternatives.

Costs are also likely to continue to fall both as understanding and technology improve over time and as the market matures and competition amongst providers increases. A reduction in cost could also be driven by increased take up of resistance/ resilience measures; this would be likely to boost the scale of the market and could provide economies of scale (and certainty) for producers which could reduce costs.

Figure 4: Summary of costs of flood resilience packages, compared to non-resilient repair[18]

House Type: Semi-detached	House Type: Mid-Terraced	House Type: Mid-Terraced
Net Internal floor area: 49m^2	Net Internal floor area: 37m^2	Net Internal floor area: 72m^2
Resilience Package	**Resilience Package**	**Resilience Package**
Salt resistance added to lime plaster	Sand and cement render	Cavity membrane and sacrificial gypsum (horizontal)
Retain timber floor and door	Closed cell insulation	Closed cell insulation
Removable carpets and vinyl flooring	Retain concrete floor and timber door	Retain concrete floor
Rising butt hinges for internal doors	Quarry tiles and ceramic tiles to floor	Replace external doors with UPVC
Removable kitchen cabinet doors	Rising butt hinges for internal doors	Removable carpets and ceramic tiles to floor
Acrylic bath panel and wall mounted vanity unit	Removable kitchen cabinet doors	Rising butt hinges for internal doors
Raised sockets + non-return value	Raised sockets	Removable kitchen cabinet doors
Cost of package: £11,420	Non-return valve	Raised sockets + Non-return valve
Like to like comparison: £8,950	**Cost of package:** £7,420	**Cost of package:** £12,540
Additional cost of resilient repair: £2,470	**Like to like comparison:** £5,553	**Like to like comparison:** £7,770
	Additional cost of resilient repair: £1,890	**Additional cost of resilient repair:** £4,770
		Cost without membrane: £3,230

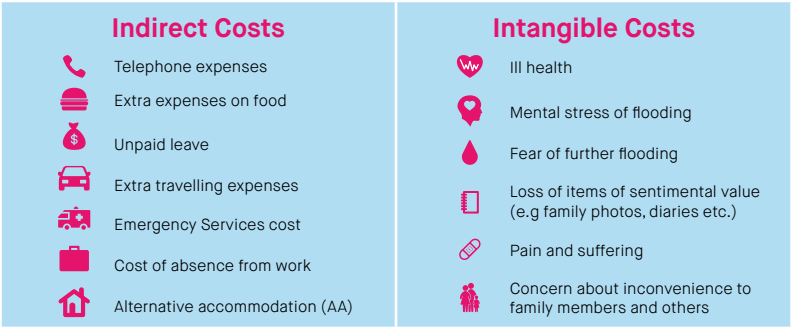
Benefits

Estimates of the benefits (both in terms of reduced risk and of avoided damages) of resilience and resistance measures vary across the literature. There are a number of reasons for this, including:

- The benefits of resilience measures will depend on the specifics of the property in consideration. For example, its location, structure and layout all affect how effective the measures might be and value of potential damage reductions will vary significantly based on the value of contents;
- The benefits of resistance measures vary depending on how they are used and maintained. For example, a removable flood barrier is not at all effective if it is not installed in time before a flood. This means that, even if measures are installed or available, the future impact may be limited due to ineffective use by the home owner; and
- Importantly, there is little empirically robust evidence on the impact of resilience measures on speed of return to a property once it has been flooded. Anecdotal evidence shows that with sufficient resilience measures, some properties could be habitable within a day. However, it is hard to generalise or draw firm conclusions from this anecdotal evidence.

These factors make the direct risk / financial benefits very hard to estimate. An added difficulty is that there is a large array of wider indirect and intangible costs that might be avoided or reduced by the installation of flood resistance and resilience measures. Figure 5 demonstrates examples of these.

Figure 5: Examples of indirect and intangible costs associated with household flooding[19]



One particularly large financial and non-financial cost is the need to re-house affected households. This can last a very long time. For example, by September 2016, over 2,000 households affected by the December 2015 floods were still unable to return to their homes.[20]

As well as leading to direct costs of rental properties, relocation and potential travel costs, other research shows that physical health, emotional stress and mental health issues are positively correlated with the length of time that households spend outside of their home.[21] This means that, as well as the financial costs involved in re-housing families, any estimates of the benefits of resilience measures should, ideally, include the impact on mental health and broader wellbeing.[22] While estimates vary, they regularly suggest that these costs might amount to well above ten thousand pounds.[23]

Cost effectiveness

Given the level of uncertainty and variability surrounding the costs and potential benefits of individual measures and packages of measures, it should be no surprise that assessments of cost effectiveness also vary widely. In part, this is due to views and assumptions in the modelling (re: risk, damage, performance, benefits, life, discounting) which are a result of different perceptions and perspectives of those undertaking the work.

However, there is a growing body of research that suggests packages of resilience and resistance measures can be delivered cost effectively. For example, evidence from Germany, France and USA suggest that flood damage mitigation measures should be seen as successful and cost effective.[24] In the UK, a recent report looked at potential packages of measures and found three out of four packages considered would be cost effective after just one flood.[25] This was the case despite the report only looking at the direct costs associated with flooding, rather than including the wider intangibles and indirect costs.

While the literature on cost effectiveness is somewhat mixed overall, there are three key considerations that are common across the literature and that would need to be considered in any potential cost effectiveness evaluation:[26]

- Cost effectiveness improves if measures are adopted as part of reinstatement or renovation / build (as here you are concerned with the differential in costs between resilient and non-resilient approaches, rather than overall cost);
- Cost-effectiveness needs to be considered with reference to a particularly property. For some high-risk properties, utilising existing approaches towards resilience / resistance would deliver cost-effective protection. For others, this will not be the case; and
- Assessments of cost-effectiveness need to consider a wider range of benefits than simply the financial costs of repair and reinstatement. It is vital that the social, emotional and health costs of longer periods out of a property are included. When this happens, the cost effectiveness of a range of approaches increases significantly.

Conclusion

Overall, emerging evidence suggests that there are individual property-level resistance and resilience measures and packages of measures that can provide cost-effective reductions in potential flood damage. Once the wider financial and non-financial costs have been considered, it is likely that resilient / resistance measures fitted as part of reinstatement, property renovation or build, would prove cost effective for a reasonably wide range of properties in the UK.

However, there is still a great deal of uncertainty over a range of factors, including:

- The performance of measures in real-life flood situations;
- The appropriate specification of packages of measures for specific households; and
- Precise cost-benefit ratios and return periods for specific measures and packages of measures.

These areas of uncertainty do not invalidate the general conclusion drawn above, and there are strong reasons to suppose that knowledge, performance and cost effectiveness will improve in the future. There are two key reasons for this:

1) Over time, understanding and knowledge of these issues is likely to improve. One major challenge has been the fact that the available measures and approaches towards flood resistance and resilience have changed significantly over the last two decades. This means that there is a lack of reliable evidence on a range of newer and innovative low-cost measures. For example, this includes "...the use of cavity membranes and sacrificial plasterboard, water resistant wallboards...and Nano technology."[27] Industry practice and knowledge has also not always kept pace. As research, evaluations and trades catch up and approaches adapt, a greater understanding of the potential benefits of new measures will develop; and

2) As understanding of existing measures improves, it is also likely that technology and approaches will evolve significantly over the next two decades. This means that it is extremely likely that by the end of the life of Flood Re, property-level flood resilience and resistance measures will be more effective and relatively cheaper than is the case today.

Taken together, this all suggests that, in future, there is likely to be a well understood set of resilience and resistance measures that are judged to be cost effective. As such, it is important to consider how households might be supported to take these measures up. However, to reflect the existing uncertainty, the rest of this report does not seek to outline measures or packages of measures that are likely to be effective. Instead it seeks to understand the drivers of household decisions over the take up of these potential measures and the routes through which they might be incentivised.

Chapter 3: Existing action on resilience and resistance

The need to incentivise the take up of flood resistance and resilience measures is not new. A number of schemes already exist, and have existed, that attempt to influence household decisions in this area. However, despite significant recent and historic action in this area, households have not (on the whole) been pushed to take up measures to protect their homes. Defra summarise the situation neatly:

> *"...despite efforts by multiple agencies, the tendency of households or small businesses at risk to adopt measures to protect their property from flooding is generally low."*[28]

Wider research with households at risk of flooding shows the extent of the problem. This suggests that six in ten of those at risk claim to know that they are at risk, but only around one in three of those who have already been flooded take action to reduce their risk or potential damage. For those who had not already been flooded, just one in 17 (6%) had taken any action.[29]

Published evidence on the effectiveness of previous schemes is scant. However, a number of themes emerge both from the evidence that is available and from discussions with those involved in responding to recent flood events. This chapter provides a brief overview of the available evidence on recent schemes.

Grant schemes

One of the most common approaches in the UK has been to encourage take up of resistance and resilience measures by providing grant funding for those affected by floods. Box 1 provides examples of previous schemes.

Evidence from insurers involved in responding to recent flood events suggests that previous schemes have suffered from administrative and conceptual difficulties. In particular, while knowledge of the schemes in affected areas was viewed as being high, there were concerns that:

- Application processes were confusing;
- Variations in the scheme across local authorities made it difficult for insurers (and / or surveyors) to support households to take up the grant;
- Affected households were (understandably) reluctant to take action that could be perceived as delaying repairs to their property after a flood, meaning that application processes acted as a barrier to considering resilient repair;
- Equally the "quest to be quick" meant that resilience measures that were previously adopted might be removed post flooding as it was perceived to be quicker to strip out and renovate; and
- Many households did not consider it to be their responsibility to protect their property, instead stating that it was the responsibility of local / national government to improve drainage and defences.

Echoing existing research, a number of practical problems also existed;[30]

- Householders were unaware of the products that might be suitable for their properties;
- Surveyors were not always aware of the options for resilient / resistant repair. This was exacerbated by a lack of industry standards and certification and led to inconsistent practice and recommendations for resilient repair; and
- Households did not always trust the advice of experts. Nor did they have trust in the likely performance of resistance / resilience measures and often relied on supplementary protection (e.g. from sandbags).

Overall, anecdotal evidence suggests that uncertainty surrounding the scheme and the complexity of administration put many eligible househlds off.

Box 1: Examples of grant schemes supporting take up of resilience measures post-flooding

- The Household Flood Resilience Grant Scheme, is a Government-funded national scheme that provides up to £5,000 towards the cost of resistant / resilient repair for those properties flooded in the December 2015 floods;
- The Cumbria Flood Recovery Fund run with funds from the Cumbria Community Foundation provides grants of up to £2,000 for Cumbrian households installing resistance / resilience measures;
- The Communities and Business Recovery Scheme was run through local authorities (funded by Central Government) to provide relief for areas affected by Storms Desmond and Eva;
- The Scottish Government announced a £3.94 million grant funding commitment for residential and business properties affected by flooding in 2015. A subsequent announcement in January 2016 announced a further flat-rate grant of £1,500 for affected households;
- In Northern Ireland, the Homeowner Flood Grant is a Government funded scheme that provides homeowners finance for up to 90% of flood protection measures up to a value of £10,000. To qualify, properties must have flooded in the past or be located in a known flood area, be privately owned and meet a number of other conditions (e.g. that they are not eligible for funding from other flood grant schemes);
- Local tax relief (in the form of reductions in or holidays from Council Tax) is also provided by some local authorities when flood events have affected their local area. The intention is that this break from payment could allow funds to repair / reinstate the property; and
- A range of charities and grant giving bodies also give support and funding for households who have been flooded.

Box source[31]

Wider evidence

These conclusions are also supported by evidence from a range of other schemes. For example, a recent Defra-funded demonstration project highlighted a number of themes, including that:

- For the potential benefits of resilient repair to be realised in practice, significant changes to the repair and reinstatement process will be needed;
- This needs to be supported by improved understanding of the role / responsibility of different individuals / agencies / trades involved in the process;
- While there could be benefits from placing decisions on the installation of negligible / cost neutral resilience measures in the hands of surveyors and trades on the ground, this needs to be supported by improved technical guidance, training and knowledge / understanding of the issues. In this regard, the project tested a "surveyors' checklist", which was found to provide a helpful contribution and changes to building regulations would also provide support for the approach; and
- Forming alliances of local businesses, agencies and households can be an effective approach to ensuring that messages are communicated effectively and knowledge across an affected community increased.

Overall, the evidence from both grant schemes and other pilots in this area suggests that, as well as cost and emotional barriers to households taking up resilient repair, there are a range of practical challenges. These mean that, even where effective and affordable solutions might exist, and households could be convinced to take them up, ensuring that this happens in practice will require widespread changes in the support, guidance and regulation surrounding the reinstatement process. A number of these areas are considered within the *Property Flood Resilience Action Plan*, which should be seen as a priority for continued coordinated action. The rest of this document focuses on the role of household decision-making (and how it is influenced) in supporting the action that is already being taken forward.

Chapter 4: Understanding the barriers to take up

The previous chapters have demonstrated that, despite there being a range of potentially large benefits for households taking up flood resilience and resistance measures, relatively few UK households at risk of flooding actually do so. Sometimes this has been the case, even when significant financial incentives and non-financial support have been in place to help households. This chapter explores the reasons that underpin this.

Some of the reasons are straightforward and include issues such as affordability. However, there are a range of wider barriers associated with how households actually make decisions.

Some of these are due to a lack of available or trustworthy information on the availability or cost-effectiveness of resilience and resistance measures.[32] However, others arise because consumers do not act in a way that a fully-informed, fully-rational individual would. This means that they often fail to engage in markets at all (for example, in energy and current account markets, the average consumer rarely switches) or where they do, they struggle to make the right decisions (for example in telecoms markets, consumers are regularly on deals that do not maximise their utility). This makes the overall landscape of household decision making in this area complex and potentially difficult for policymakers to navigate.

For households at risk of flooding to engage meaningfully and positively in a decision over whether to install resistance and / or resilience measures, there are three key steps that need to occur:[33]

1. ***Motivation:*** Households need to be motivated to engage in the market in the first place. For consideration of resilience and resistance measures, this means that households need to believe both that they are at risk of flooding and that they are responsible for protecting their property against the likelihood of this or the damage that it might cause.

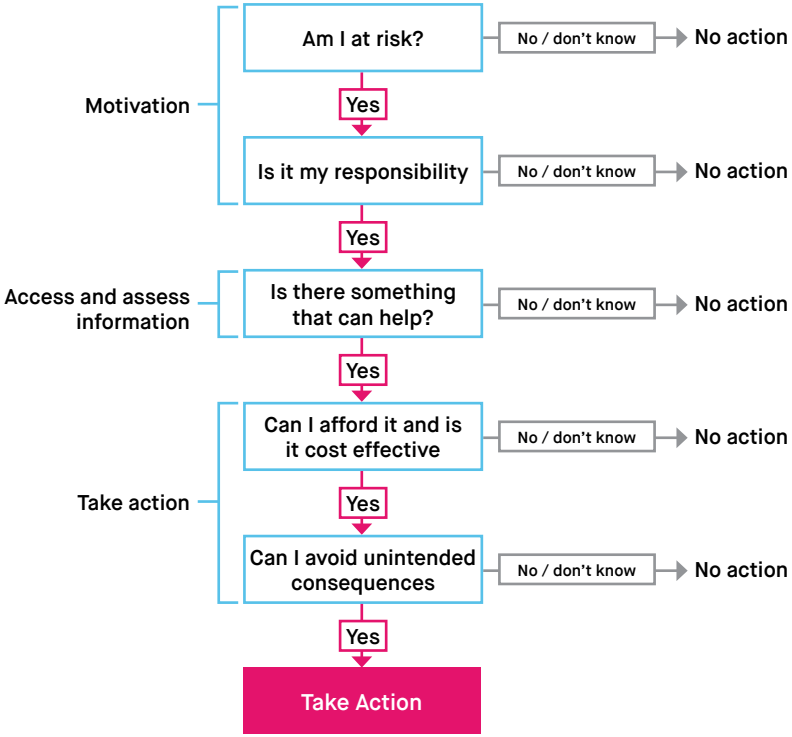
2. ***Access and assess information:*** Households need to access information about the various products available in the market and then be able to assess the costs and benefits (including quality and price). Together this means that households can understand what the best value for money

option is. For the consideration of resilience and resistance measures, this means that households need to have access to, and an understanding of, information about flood resilience and resistance products.

3. ***Take action:*** Households need to be able to take the appropriate action. This requires that they can afford to take that action and that there are no behavioural biases that restrict the likelihood of action. For the consideration of resilience and resistance measures, this requires that households can afford the proposed package of measures, believes that they provide value for money and that any unintended consequences do not outweigh the potential benefits.

Figure 6 demonstrates how this decision-making process might work in practice. It shows how, at each stage of the process, real or perceived barriers can result in the household not taking action, even if the rational and cost-effective response would be to install resilience and / or resistance measures. The following sections outline these potential barriers to effective decision making and action in more detail.

Figure 6: Illustrative decision-making process for household choices over resilience and resistance measures



Motivation

For households to actively want to engage in the market for flood resilience and resistance measures, they have to believe both that they are at risk of being flooded (therefore engaging in the resilience / resistance market could be worthwhile) and that it is their responsibility to do so.[34] However, on each of these there are significant behavioural biases which mean that this is not necessarily the case.

Am I at risk?

In principle, the first step to taking action to protect a property is for the householder to understand that they are at risk.[35] Without this understanding, there is little incentive to contemplate, let alone install, flood resilience and / or resistance measures.

The potential importance of knowledge of flood risk is demonstrated by recent research, which shows that the likelihood of taking up resilient repair is closely linked with knowledge of the likely future frequency of flood events and the impacts that they are likely to have on the household.[36] For example, one report finds that those who believe they are at risk of flooding within a year are four times as likely to have adopted some form of resilience / resistance measures.[37]

However, on the whole, wider research suggests both that understanding of risk is poor and that householders' propensity to take action based on their understanding of risk is low. For example, while research from the Environment Agency shows that nearly half of the population are aware of local flood risk, only 7% felt that this applied to their own property.[38] Broader reviews of evidence across many countries also demonstrates that there is only a weak association between risk perceptions and the adoption of flood mitigation measures.[39]

Part of the challenge here is that a wide body of research highlights that consumers struggle to make decisions under situations of uncertainty (i.e. when risk is involved). One of the key barriers to effective consumer action is in how risk is communicated and the impact this has on consumers' understanding.

The Environment, Food and Rural Affairs Committee also highlighted this as a challenge specific to the communication of flood risk. Their recent report outlines that witnesses to their investigation highlighted a key barrier as being the use of the "1 in 100" year formulation, which at best was not understood and, at worst, could lead to misinterpretation (e.g. that once flooded they will not flood again for another 100 years).[40]

This demonstrates, that even when households have already been flooded (and might be expected to act rationally to protect themselves against the realisation of future risks), they may not consider themselves to be at risk of flooding.

Of course, it is not just about the likelihood of flooding; it is also the likely impact or damage of flooding. These damages can be both financial and non-financial (including psychological, emotional and health impacts). Together with the risk of flooding, these combine for the household to form a view of the likely scale and likelihood of flooding causing damage to their property. The higher this is, the more likely that households will act to protect their property.

Again, evidence suggests that households who appreciate the potential scale of damage are more likely to take action. Households who understand the potential emotional / psychological damage (for instance from being out of their home for weeks, months or even years) are particularly likely to take action.[41] However, aside from those who have direct recent experience of flooding, those at risk of flooding often have a relatively poor understanding of the potential scale of these damages.

Wider international evidence also suggests that, even where households are aware of the potential damage that could be caused, responses in terms of likelihood to take up mitigation measures are limited. This finding is also echoed by findings from research into the propensity of people to mitigate the risks and impacts of other natural hazards, which concludes that "...risk perceptions are weak predictors of precautionary behaviour."[42]

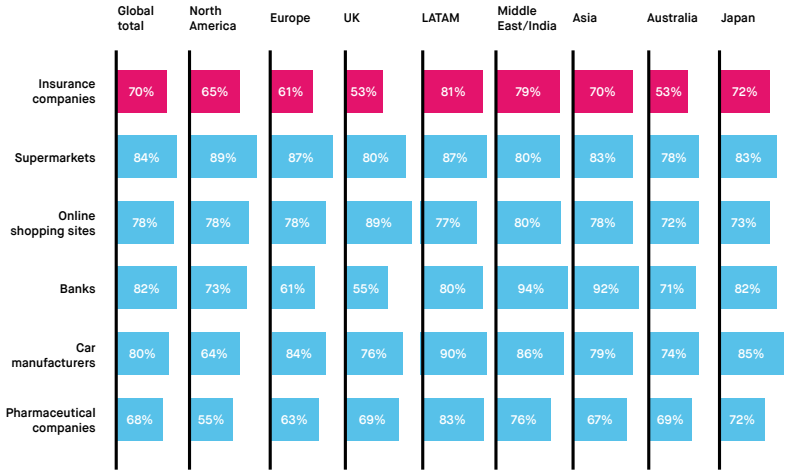
As with the links between understanding of risk and the likelihood of taking mitigation action, there are a number of behavioural factors that cause this limited response. The first of these is that a wide body of evidence suggests that households' desire to feel secure in their home creates a cognitive bias that means they dismiss information that suggests they are at risk. In simple

terms, by accepting information about the potential risks of water entering their property, households would be forced to accept that while in their home they, and their properties, are in danger. Therefore, to avoid this feeling of danger, households ignore or explain away information about risk.[43]

The second main driver of this is trust in the information. Here, for risk and both the financial and non-financial impacts of flooding, evidence also suggests that how the information is received is important. For example, research has demonstrated that social networks can be a more influential source of information than official channels. This has shown to be true in terms of responses to flood warnings.[44] The emergence and rapid growth of social media over the last decade presents both a significant challenge (in terms of households having access to a wider range of social networks) and opportunity (in terms of the ability of agencies to influence the information circulating through those networks).

Existing evidence also shows that some broad conclusions for the types of actors who may be trusted. For example, a recent pilot from Perth & Kinross Council demonstrated that the Fire Brigade are seen as trusted information givers and, as such, could prompt action.[45] On the other hand, levels of consumer trust in the UK insurance industry are low both by international standards and compared to other UK sectors (see figure 7).

Figure 7: Level of trust by type of business (% of consumers citing "complete trust" or "moderate trust" by type of business)



Source: ABI[46]

Overall, while it seems intuitive that those who understand more about flood risk and impacts will be more likely to take action, in practice, the existing literature suggests that perceptions of risk and potential damage from flooding can only account for between 3 and 6% of the observed variation in uptake of mitigation measures. In short, something else must be driving behaviour.[47]

This conclusion chimes with broader research on the propensity of individuals to take health-related protective behaviour. This is based on protection motivation theory and suggests that, rather than being driven by an understanding of risk and damage (threat appraisal), it is the extent to which people believe they can (and should) take action that can mitigate the risks and costs (coping appraisal) which drives behaviour.[48] In simple terms, and in reference to flooding, this means that even if households believe they are at high risk of flooding that will cause significant damage, they will not act if they do not perceive there to be anything that they can do to protect themselves effectively against those risks.

These factors are covered below, first by looking at whether people think it should be their responsibility, and then assessing the extent to which households believe they are able to respond effectively.

Is it my responsibility?

To take action, households need to believe that it is their responsibility to do so. However, a range of evidence suggests that this is often not the case for household flooding and potential mitigation measures. Instead, for a range of cultural, social and behavioural psychological reasons, households often believe that it is more the responsibility of someone else (particularly the state). A recent report has described this as the "...abrogation of responsibility associated with insurance and the expectation that Government will shoulder the burden."[49]

Research into households impacted by the 2007 floods revealed these sorts of views.[50] This showed that, overall, households did not feel strongly that it was the responsibility of households themselves, to adapt their property to flood risk. One key example of this view was from one respondent arguing:

> *"...why should I pay to protect my property? What is our Government doing? It is the job of my Local Authority to make sure that the drainage was clear of debris, if this has been done, we would not have suffered what we suffered in 2007."*

This view of government, or wider society as being responsible for protecting individual households is also echoed in other research. For example, one qualitative study reports the following discussion about the potential role of householders in protecting their property: [51]

Interviewer But what I'm really interested in, is who you think is responsible for protecting your place from flood. Is it the council, or is it you, the tenants?

Freddy Right, well it's ... it's two people ... it is two people: it's [the local] council and it's [the water board].

Interviewer How about, how about ... Some people would say that it there is no way of stopping the flooding, then maybe the people themselves should try to stop the water getting in.

Pat Yeah, but how can you blame the tenants!

Interviewer Aaah!

Freddy It's up to than to stop the damage really, cos ...

Pat They should be cleaning the gullies!

Freddy ... cos, everyone in this area told them exactly what the problem was [*unclear*]. The gulley, cleaning should be carried out regularly.

Pat Regularly; yeah.

Interviewer So if nothing was going to happen to stop the flooding, would you actually want to try to find out about other things that you could do? Or is it totally the council that's got to do something?

Pat No; it's the council.

Freddy Yes, I think it's the council too. It's their problem. It's up to them to keep the buildings at the standard and all that.

Interviewer But it's your videos and your carpets that are getting trashed, isn't it

Freddy Yeah.

Interviewer Cos, like, the council doesn't lose out by the sound of it. I'm quite amazed really. It sounds like they just lose 500 quid—which they pay you—and that's it.

Freddy Yeah. You know, I think that sooner or later one of the systems is going to realise what's going on. Some judge somewhere is going to notice this and is going to make them sort it out.

More broadly, the author argues that placing blame and responsibility like this is one way in which households can explain away their inaction and continue to feel secure in their homes. Conversely, taking action would require them to admit that their property was at risk of inundation and that they were, at least in part, responsible for this protection and, by doing so, this would undermine their feelings of security in the home.

The presence of insurance also introduces a moral hazard that gives households a lower incentive to protect their own properties. Evidence of this includes a recent report, which demonstrates that a key driver of adaptive behaviour was the extent to which people agreed with the statement: "My home is covered by insurance, so I don't need to worry."[52]

To some extent, this moral hazard may well have been reduced under the previous Statement of Principles, where better understanding of flood risk post-event could lead to significant increases in premiums and excesses for affected houses. However, for properties ceded to the Flood Re scheme, the moral hazard remains; even a property that has been flooded several times will face the same premium threshold and excess post flood event.

This suggests that, while beneficial to the households affected and broader society, the scheme is likely to reduce the incentive for households to undertake action to protect themselves.

Access and assess information

Once a household has taken the decision to engage in the market, in order to take action, they need to believe that:

1) There are products on the market that will effectively reduce the risk or costs of flooding (response efficacy); and

2) These products are suitable for their property (self-efficacy).[53]

This requires that they must be able to access and assess the information about the products and services available. However, there are a number of barriers in the way of households doing so.

Uncertainty about the potential costs and benefits

As demonstrated in chapter 2 information regarding the overall costs, impacts and suitability of resilience and resistance measures is extremely varied. The majority of the research to date has also focussed on measures and approaches that may be regarded as out of date. Where newer innovations have been tested, results tend to be focussed on laboratory settings or from anecdotal evidence from those households, businesses and professionals that are working with them.[54]

As highlighted by other research, the resilience sector also lacks a clear set of standards on the resilience properties for specific measures. This is even the case where standard materials are being used, but in a different way to usual. Examples include the use of water-resistant bathroom wallboards or membranes used in basement tanking, where the current standards have been set with reference to their performance in their existing use, rather than under the stress of a flood situation. This means that there are not currently any accepted standards to demonstrate the relative level of "flood resilience" a given product or approach might provide.

Overall, this means that it is challenging for households to understand the overall cost and effectiveness of potential measures, let alone their potential performance and suitability for their particular property.

In these circumstances, it is unsurprising that households can feel disempowered and unable to make the right decisions. One study found that one in four (27%) of respondents in a high flood risk area agreed with the statement "...I don't think I'd be able to choose the right way to protect my home." Others feared making the wrong choice or being exploited by those selling potential products.[55]

Even where products are installed, a lack of information and / or understanding can lead to the products not being used in the right way. For example, there is anecdotal evidence to suggest that even when resilient materials are fitted, these can be ripped out following a flood event. One such case is highlighted by a household who had just been flooded:

> *"...the plaster was unsanitary and covered in sewage and no amount of wiping down would have made it clean. It had to go"!* [56]

Lack of trusted voices

It is not just households who have a lack of information. Other studies have suggested that those responsible for supporting households following flood events also lack the requisite understanding and information to make the right choices. One recent study identified:

> *"...major gaps in evidence, and in communication and sharing of available evidence, reducing the confidence in implementation of measures within relevant trades and professionals, as well as by owners and occupiers directly."*[57]

When these individuals and organisations are unconvinced by the existing evidence, it is little surprise that households do not take up the measures themselves. Again, the challenge here is not simply around installing the measures, since anecdotal evidence suggests that resilience measures have been removed during reinstatement. There are a number of potential reasons for this, including the contractor's lack of understanding about their benefits and role, the "quest to be quick" with repairs, a lack of industry standards and accreditation and variations in surveying competency.[58]

Overall, this evidence suggests that household decision making may be significantly hindered by the fact that there is not one single (or indeed multiple) credible source of information that they can use to understand the likely efficacy of flood protection measures.

Take action

Can I afford it and is it cost effective?

The issue of how cost effective a particular approach may be, is challenging for households to understand. To fully assess this, they will need to be able to understand the risk and potential costs (financial and non-financial) of flooding, the costs of the package of resilience / resistance measures and the potential benefits (in terms of reduced risks and / or damage) of that package. All of this will need to be discounted to be considered over the product's likely lifetime. In all likelihood, this is never going to be the case; aside from the fact that the calculation is going to be household specific and complex, the sections above have shown that households do not even have access to a simple and trusted source of information on the costs and benefits of different approaches, on which they could base their calculations.

Of course, even if households had perfect information on the relative costs and benefits of a package of resistance / resilience measures, they may still be left with the prospect that they cannot afford to invest in the approach. Households may struggle here either because they cannot afford the measures, or they perceive the costs to be too great.

Existing research suggests that households might use "cost" as a way of justifying their inaction. However, alongside barriers to making decisions in situations of uncertainty or with less than full information (highlighted above), the scale of the potential costs does suggest that this could be a real barrier to household action.

Can I avoid unintended consequences?

As well as comparing the direct risks, costs and benefits of taking action to protect properties, there are a number of indirect impacts that households have been shown to factor into their decision-making process.

Prime amongst these is that adaptation will lead to others having extra information about flood risk, that is used against the householder's financial interests. The challenge here is that, whilst any adaptions have value (as, for a given level of risk, they reduce either the likelihood of flood waters entering the property, or the damage caused when flooding does occur), in practice, as information about potential flooding risk and damage are less than perfect, the concern is that this

value will not be reflected, and, in fact, adaptations would simply act as a signal about potential flood risk and / or damage. There are two key concerns with this:

1) It could lead to insurance premiums going up, if insurers learn about this action. Anecdotal evidence suggests that this has led to households not discussing resilience with their insurer, or actively hiding the fact that they have been flooded and / or have made resilient repairs; and

2) The presence of resilience measures (for example, raised electricity sockets) sends a signal to prospective future purchasers of the property and this significantly reduces the potential pool of prospective buyers and the market price of the property (known as blight in insurance terms). One study has suggested that one in four owner occupiers in a flood risk area had chosen not to take adaptive measures because they feared revealing the flood risk to prospective buyers.[59]

There is also an extensive literature that demonstrates the desire of households to ensure that their property conforms to societal norms and that it represents "home" to them. For example, a when asked about whether they would consider raising their doorway to protect against flooding, one respondent suggested:

> *"...I think we don't really want to (pause) change it—I like my house to look nice—I don't want to have a door that is like a bit daft."*

Each of these examples demonstrates that, alongside the practical cost-benefit decisions that households have to make, there are a range of factors including aesthetic and social and emotional barriers that can impact on the take up of resilience and resistance measures.

Chapter 5: The role of incentives

Chapter 4 outlined the significant theoretical and empirical literature around the barriers to households taking up flood resilience and resistance measures. While this is well understood, there is less available evidence on what actions might be taken to overcome these barriers.

A Defra synthesis report highlighted the existing state of evidence surrounding community and individual action to reduce flood risk and outlined a significant range of gaps in the evidence and areas for future research.[60] Box 2 highlights the key areas.

Box 2: Gaps in existing evidence and areas for future research identified by Defra

These included:

- Communities' and individuals' attitudes and behaviours, and the effect of experiencing flooding on these. Including:
- What are individuals' motivations for and barriers to taking action on flood risk management?
- How do attitudes vary regarding being given agency to act on flood risk management?
- What is the effect of experiencing flooding on individuals' attitudes and behaviours?
- How best to present or communicate knowledge to different audiences, such as probabilistic information which could for example help increase warning lead times.
- What are individuals' and businesses' reactions to (different forms of) incentives?
- How do individuals' experiences of dealing with insurance claims following flooding affect attitudes and behaviours in relation to insurance?

While Chapter 3 outlined a range of evidence on some of the areas in box 1, and a number of recent research studies (including from Defra and Flood Re) have begun to fill existing evidence gaps, it is clear that there are still large questions that need to be answered. As such, this report does not put forward a concrete plan for how households could be encouraged to take up more resistance and resilience measures. Instead, it outlines:

- A range of options that could be considered;
- The existing evidence over the efficacy of these potential options;
- Challenges and opportunities for each of the approaches; and
- Based on this analysis, the most likely areas where action will be needed and where future research might focus.

Note that what follows is not constrained by Flood Re's existing statutory and operational scope. It covers a range of areas where primary and / or secondary legislation may be required either to adapt Flood Re's approach or to legislate for wider changes.

Contextualising Flood Re action

Before turning to consider specific interventions that could be used to incentivise household action, it is important to understand that the scale of the potential action needed will go much further than tools that Flood Re currently has.

The first obvious point is that, based on the analysis so far, this report suggests that a large number of properties could benefit from taking up flood resistance / resilience measures. So far, this report has focussed on those households who are at high risk of flooding. However, where action is low or zero cost (in terms of the comparison to non-resilient / resistance construction), there are strong arguments for a much wider set of properties taking up this action. There are a number of reasons for this:

- The properties may be at risk, but not currently judged to be. A prime example here is that around two thirds of the residential properties flooded in the major event in summer 2007 were not previously identified as high risk on flood maps;[61]

- Risk is always changing, as the built and natural environment change, meaning that low risk properties may experience higher risk in future. It could be more cost effective for these properties to take on low / zero cost measures now, rather than wait; and
- Ultimately, all properties are at some risk of flooding – meaning that if resistance / resilience measures are costless, it would make sense to improve resilience for the whole housing stock.

Overall scope of direct Flood Re action

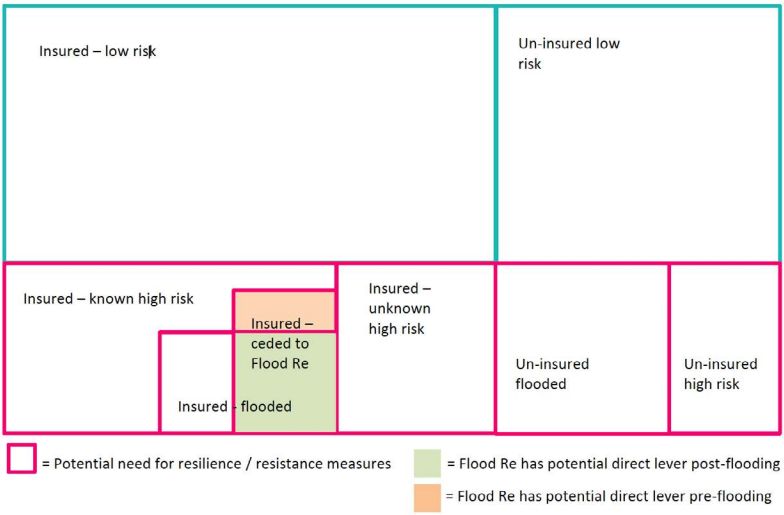
However, while a very large number of properties might benefit from resistance / resilience measures, there is a natural limit to the success of any approach that relies on providing incentives only to those properties that are ceded to the Flood Re scheme. This is particularly true when households are most likely to take action following a flood event, meaning that an approach focussed through Flood Re properties would be likely to have greatest impact on those properties ceded to Flood Re and also flooded.

A simple demonstrative modelling exercise demonstrates that, even over a 21-year period, this severely limits the number of properties that might be successfully encouraged to take up resistance / resilience measures. Using plausible assumptions on the flood risks associated with properties ceded to Flood Re (and the take-up of resilience measures) suggests that this approach might only encourage tens of thousands of households to undertake resilient repair by 2039.

Another way to look at this, is to examine Flood Re's current coverage, against all properties that might benefit from resilience / resistance measures. Figure 8 highlights the group of households that may well benefit from resistance / resilience in pink outline, the smaller shaded areas are those areas where Flood Re currently has direct or indirect influence. Key gaps include those who are uninsured and those who are at high risk and insured, but not ceded to Flood Re.

When examining this, it is clear that if the overall market for household flood insurance is to be both priced in a risk-reflective manner and affordable, the scope of incentives will need to be extended well beyond the existing scope of the Flood Re scheme. This will need to include rental properties (including social rented), properties built after 2009 and businesses who would also benefit from resilience / resistance measures.

Figure 8: Illustrative scale of need for resilience and resistance measures



Source: SMF

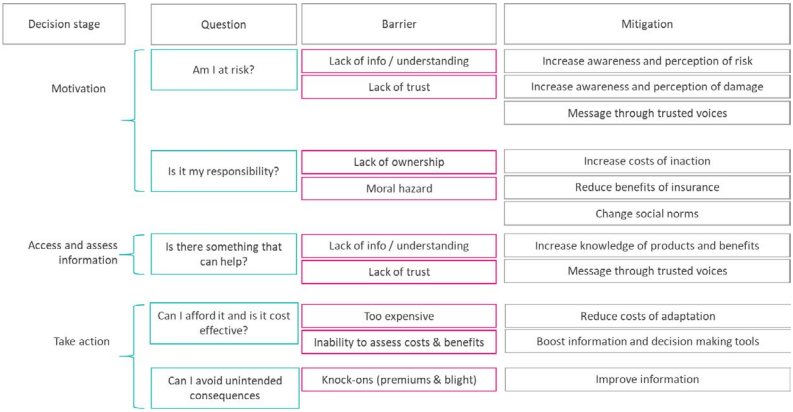
Potential incentives

For this reason, the following section outlines a range of interventions that can be used either to increase incentives that might be delivered through the Flood Re scheme and more broadly, or to increase the likelihood that households will respond to these incentives. These include:

- Increasing understanding of risk and damage;
- Increasing ownership of the issue;
- Tackling moral hazard;
- Increasing understanding of potential options and their benefits;
- Reducing costs (or increasing benefits); and
- Tackling unintended consequences.

Figure 9 outlines how each of these matches up with the barriers to action identified in Chapter 4. Following this discussion of household-level incentives, Chapter 6 discusses a set of potential "harder" incentives that might be needed to achieve largescale take up of resilience / resistance measures.

Figure 9: Potential routes to tackle the barriers to households choosing to take action to improve flood resistance / resilience



Increasing understanding of risk and damage

While not necessarily the key driver of decisions on whether or not to take on resilience / resistance measures, knowledge of flood risk and impact is a pre-requisite to taking action. Without knowledge that they are at risk, households will not take action.

Flood risk and impact

As outlined by many sources, the way in which flood risk and potential damage is currently communicated can be confusing for householders. There is already work underway in Defra to understand how this messaging can be changed.

However, different people in different parts of the country are likely to respond in different ways and responses are also likely to be context and time specific (for example with people responding differently pre-and post-flooding). This means that, as with all attempts to use information to influence behaviour, there is unlikely to be one single answer. Instead, a range of approaches will likely need to be adopted.

The next challenge is that, until responses to potential communication approaches have been tried and tested, it is impossible to say what will actually work. This means that, rather than specifying a single nationwide approach to changing communication, a series of pilots should be run with the focus on a single question:

> *"How can the risk and damage of flooding be communicated in a way that has the largest impact on the likelihood that households will take up resistance and resilience measures."*

These pilots should consider the broadest range of approaches possible and work with behavioural scientists to understand how the behavioural barriers identified above can be broken down.

Trusted voices

As well as getting the messaging right, it is also important that the communication is from the right people. Here, it is unlikely that messages from the Government and / or insurance industry will be the most effective route. Instead, existing research has shown that trusted local tradespeople and agencies like the Fire Brigade have been successful in communicating these issues. Other research has demonstrated that setting up local flood groups can be effective and networks of local trades, agencies and households to share information, knowledge and best practice and plan flood responses.[62]

In a similar light, Flood Re may also be an effective route to try to influence behaviour through communication. While it currently has no role in communicating directly with consumers, there is a clear opportunity to do so if it were shown to be an effective way to shape household decisions.

For this reason, pilots based on communication of risk and damage should test how the route of communication makes a difference to take up. At the very least, the pilots should consider communicating messages through:

- The Fire Brigade;
- Local Trades and / or local flood groups; and / or
- Flood Re.

Box 3 provides a more detailed example of how these pilots might be structured and what they might look to test. This builds on pilots already undertaken by the Government and others.

Box 3: Illustrative example of how pilots might be run

This box outlines an example of how a pilot might be run with the intention of answering the following question:

> *"How can the risk and damage of flooding be communicated in a way that has the largest impact on the likelihood that households will take up resistance and resilience measures?"*

This would require testing both the structure of communication and source / route of communication. To do so, the following approach could be adopted:

- Develop a standard set of communication materials, that present information on flood risk, the potential damage and impacts of flooding and the options / availability of resilience and resistance measures;
- These should include different ways of presenting the same information (e.g. different ways of expressing risk and / or the benefits of resilience measures);
- Identify a number of pilot areas where different routes of communication can be tested. If two different presentations were developed and the pilots were designed to test the efficacy of these and whether Flood Re or the Fire Brigade were a more successful route for communication, six areas could be identified and allocated such that:
    - Two areas were for Flood Re communication (with one area for each communication type);
    - Two areas for Fire Brigade communication (with one area for each communication type); and
    - Two areas where no communication activity takes place.
- Survey households in the pilot areas to understand their baseline level of knowledge, understanding and propensity for action;

- Undertake communication activity in each of the areas; and
- Conduct another survey to measure level of knowledge, understanding and propensity for action and compare this to the baseline level.

The above provides a simplified version of how a pilot could be run. In practice, social science experts will need to be involved in the design and testing of the pilots.

Increasing ownership of the issue

Changing attitudes towards responsibility for the management of flood resilience is challenging. There are two conceivable routes to doing so. Firstly, to change social norms and secondly to increase the personal costs of inaction.

Changing social norms

Changing social norms is likely to be the most effective way of shifting the burden of responsibility further towards households. However, it is something that the Government has already attempted to do, with little success. There are examples, however, of where this has been achieved. For example, changing societal attitudes towards wearing seat belts, drink driving and recycling are all areas where societal views have been changed over the last few decades.[63]

These changes have been driven, in large part, by a significant communications / advertising campaign and something similar is likely to be needed for flood resistance / resilience.

In essence, this is then a question about how risk and potential damage (see above) and the available solutions (see below) are communicated. Therefore, when considering how to improve communication of these issues, a vital element will be to ensure that they convey the fact that home owners can and should be taking ownership of their own protection. Again, drawing in behaviour science experts would be a good way to take this forward.

The other way to increase ownership of the issue is to make inaction costlier. Doing so would mean that households face a greater incentive to take action and would be more likely to do so. There are a number of ways in which this might work.

Flood ratings used in house sales

All that prospective house buyers can currently discern about flood risk is from surveys of the information about the surrounding area. This means that rather than actively encouraging households to improve resilience, this might actually reduce incentives as adaptations can be seen as a signal of the household being high risk, compared to others in the area. To tackle this, a rating system could be created that allowed prospective buyers to understand the extent to which the property had been made resilient.

The approach here could work like Energy Performance Certificates (EPC) do currently. These are a required piece of documentation when properties are built, sold or rented and they demonstrate:

- Information about a property's energy use and typical energy costs; and
- Recommendations about how to reduce energy use and save money.[64]

For properties at risk of flooding, a similar approach might create a Flood Performance Certificate that provides details of:

- The overall risk of flooding;
- When the property last flooded and the depth and nature of flooding;
- The likely cost of reinstatement from various potential future levels of flooding;
- Resistance and resilience measures that have been recommended by a surveyor; and
- An assessment of the extent to which these recommendations have been taken up.

With this information available to prospective buyers, owners would no longer be incentivised to avoid resistance / resilience measures. Instead they would face a potential boost to the capital value of their property as, rather than just looking at information about local area flood risk, prospective buyers could see the potential impact of the adaptations that have been made. This means that there are clear private gains to be made from taking on resistance / resilience measures.

By ensuring that each property at high risk of flooding has this information available, the approach may also normalise the take up of resistance / resilience measures and contribute to changing social norms. Another advantage is that the approach could be used to develop a central source of information about the flood resilience behaviour of households across the UK.

However, there is currently mixed evidence over the effectiveness of EPCs in changing household behaviour (see box 4). This means that, if this approach proved to be attractive, there are many factors that should be considered. These include:

- How to boost the salience of the approach, as compared to the EPC. Prospective homebuyers are already presented with a large amount of information – so new information on flood risk and adaptation would need to stand out amongst this existing information;
- Whether the cost of doing this would be worth the potential benefits. The approach could conceivably require each property to be assessed for flood resilience by a surveyor, which may prove too costly. Alternatively, only those properties already judged to be at high risk could be required to have a survey undertaken. Either way, it would need to be ensured that the benefits associated with the scheme outweighed these costs; and
- Relatedly, an important consideration is who would pay. Depending on the scope of the task, it might be something that the Government or Flood Re could support financially.

If this approach were to be taken forward, as with other areas where communication is being used to try to drive behaviour, communications and behavioural science experts would need to be involved to ensure that the maximum impact was made. The approach would also need to be piloted before being rolled out nationally.

Box 4: Evidence on the effectiveness of Energy Performance Certificates

Energy Performance Certificates (EPCs) were introduced in the UK following an EU directive in 2007. They are documents which display key pieces of information regarding a certain property including:

- A rating of energy use (Between A-G in kWh/m^2 per year);
- A benchmark value of comparison; and
- A recommendation report (with potential energy rating if all recommendations implemented, costs and benefits).

The goal is for them to provide information to prospective home buyers and allow Government to collect information regarding the energy efficiency of buildings across the country. As such, they support the Government's goals to monitor and reduce energy consumption in buildings.

Literature points to EPCs successfully addressing two market failures: Incomplete information – where sellers have little incentive to improve energy efficiency to entice prospective buyers – and split incentives – where market actors (i.e landlord / tenant dynamic) have opposing motivations. International evidence shows that EPCs can be designed in a variety of ways to maximise the incentives to act upon recommendation: In Singapore, EPCs are conducted for commercial properties (offices, hotels, shopping malls), and the highest scoring 25% in each category are awarded a public facing 'Energy Smart' label; an innovative method to galvanise energy improvements through incentives.

EPCs are also seen as a way to manage data: Denmark's EPC schemes ensure that all results are reported to a central register which is made public and is utilised by various research institutes and small studies; this data has also been incredibly helpful for the Danish Government's measurement of energy levels and improvements in efficiency. Moreover, the use of EPCs in Denmark (and take up of recommendations such as better insulation and boiler efficiencies) has meant that energy use has been kept constant over the years (since 1997) despite increases in stocks of buildings.

There are some drawbacks to EPCs however, and these mostly relate to the standard of inspections, measurements and usefulness of the document. Danish schemes, for instance, found it difficult to train assessors and standardising their inspections – a media embarrassment showed three assessors assessing the same building with different conclusions – and the Irish scheme found that they hadn't started training early enough for the launch. Another limitation of the EPCs is that actual measured consumption tends to differ from the calculated levels assessors record: one study found there to be a 30% gap. Finally, regarding use of the documents, in Germany, EPCs were not deemed helpful for prospective buyers in their purchase decisions: in a survey of 662, only 35% said they actually viewed the EPC for a purchase they were seriously considering and only 44% said they found EPCs trustworthy.

Box sources[65]

Tackling moral hazard

A related issue is how to reduce the moral hazard impact of Flood Re and insurance more generally. The problem here is that households feel that they have adequately protected themselves by taking out insurance, so have a reduced incentive to take resistance / resilience measures. As previously outlined, Flood Re makes this situation more acute as the presence of a subsidy means that at-risk households do not face the full economic cost of flood insurance. There are a number of ways in which this could be tackled.

Increasing premium thresholds

With reference to Flood Re, the most obvious way to both tackle the presence of moral hazard and to transition the market to risk-reflective pricing would be to increase the level of premium thresholds over time.

This would mean that, over time, the price paid by insurers to cede properties to Flood Re (and by implication the price paid by households), would move closer to the risk-reflective price. In theory, this should incentivise households to take on resistance / resilience measures over this period, so that the risk associated with their property reduced and their premiums remained lower.

Whilst in principle, this approach seems attractive, there are a number of practical considerations that make it unlikely to be viable or successful:

- Households have previously faced higher premiums and excesses, and this did not necessarily incentivise them to take on flood resilience / resistance measures. So, on its own, it seems unlikely that this approach would be any more successful in encouraging take-up;
- Households have also been shown to have a relatively low likelihood of responding to changing prices in insurance premiums. This is highlighted by the fact that nearly two thirds of people stick with the same home insurance provider year on year, and that around 40% of these do so without shopping around.[66] This is despite the fact that premiums can rise dramatically on renewal.[67] Recent action from the FCA and insurance industry has been attempting to boost switching behaviour, but the relevant point is that, given that such large variations in price do not prompt households to change their behaviour, it is hard to see how changing premium thresholds would provoke significant behavioural responses with regard to resistance / resilience measures;
- Even if household did respond to price signals, the approach would require insurers to accurately price resilience and resistance action into the premiums they charge households. At the time of writing, it is questionable whether this is deliverable with existing information, data and systems; and
- There is also a broader question about whether increasing premium thresholds over time in this way would be consistent with the Government's policy ambitions for Flood Re. The scheme was set up to promote the availability and affordability of flood insurance, so increasing thresholds would explicitly work counter to this ambition.

These factors suggest that this approach would have relatively little impact on incentives to take up resilience / resistance measures and could also be undeliverable because of political considerations.

"Three strikes and you're out"

Another approach to avoiding moral hazard in the Flood Re scheme and incentivising households to protect themselves is to introduce a harder incentive into the scheme. The principle of "three strikes and you're out" was raised during the passing of the Water Act 2014. The core idea here is that if flooded households do not take up resilient repair, they would be barred from

having their policy ceded to Flood Re after the third time they were flooded.

Given the cost implications of undertaking resilient repairs, and the affordability constraints faced by large numbers of households at risk of flooding, this approach would (realistically) need to be combined with a grant scheme that covers the cost of resilient repair (as highlighted below, this could be administered through a number of routes, including through Local Authorities or Flood Re itself).

The approach could work as follows:

1) Once flooded, households with policies ceded to Flood Re would be encouraged to take up flood resilient repair. Should they refuse to do so, they would continue to be entitled to access the Flood Re scheme.

2) If they were flooded a second time, they would again be encouraged to take up resilient repair. They would also be warned that if they did not take up resilient repair, they would become ineligible for the scheme after a third flood claim and be given a demonstration of the impact that could have on their insurance policy.

3) If the household made a third flood-related claim, they could only remain eligible for the Flood Re scheme if they did choose to take on resilient repair.

There are a number of attractive features of this approach. For example, it encourages the action needed for transition and, in return for a short-term subsidy, makes the householder responsible for taking that action. This sort of approach would seem to be more politically deliverable than raising premium thresholds, as it appeals to the principle of "something for something." In short, households are getting a short-term benefit under the assumption that they will take action to become self-sufficient in the longer term.

However, there are a number of downsides. These include that:

- There is an obvious limit to the number of households that this might incentivise; relatively few households will be flooded three times over the course of the next 20 years, meaning that the impact on the overall take up of flood resilience would be extremely small;

- Even for those households affected, given the low take up of resilience / resistance measures prior to Flood Re, it seems unlikely that, on its own, removing the benefits of scheme for the household will prompt action; and
- The approach is operationally complex and, given the information currently collected by insurers, there are doubts over whether it is practically feasible. This means that new systems would need to be developed to ensure that the approach could be operationalised. This would be costly and, given the potentially low impact, there are questions over this would be a cost-effective approach.

Variants of the three strikes principle

There are a number of variants to this, which could improve the practicality or impact of the approach. For example:

- ***"One strike and you're out"***: For continued cover from Flood Re and access to the subsidy, flooded households would be required to undertake resilient repair after one flood claim. Again, this would likely need to be accompanied by a grant / loan scheme to ensure that it was affordable for the affected households. The benefit here is that it would widen the scope of the approach, as more properties would be flooded once in the next 20 years than would be flooded three times.
- ***Variable excesses***: This approach would be similar, but would see policy excesses rise for each flood-related claim for policies ceded to Flood Re. For example, after one claim, the standard excess might increase to £500 and then £1,000 after the second claim. This would create a financial incentive to install flood resilience measures – particularly if the installation were subsidised or provided through a grant / loan scheme.

Each of these variants would still only impact on those flooded properties ceded to Flood Re and there are questions over likely behavioural impact and how cost effective it would be because of operational challenges. This means that, overall, it is unlikely that significant changes in behaviour, across large numbers of households, can be driven by introducing hard incentives into the Flood Re scheme.

Increasing understanding of potential options and their benefits

Chapter 4 highlighted that, to take action, households need to feel that they have accessible and effective options available to them. However, knowledge and understanding of these options is currently very low, both for households themselves and for trades involved in supporting households following flood events.

This suggests that a vital way to incentivise households to increase their take up of resistance / resilience actions would be to improve this understanding and knowledge. Evidence suggests that increasing this understanding might have a greater impact than improving understanding about the risks and damage of floods.

As with understanding of risk, work is already underway to develop better communication tools in this area. Again, this should draw on behavioural science experts to develop a series of trials to understand how best to communicate this and the source of that communication.

Existing evidence shows that this information must come from trusted sources and adequately reflect the full range of options available and their relative pros and cons. It also shows that local networks can play a vital role here (for example pilots in Tewkesbury have shown the importance of the "Learning and Action Alliance (LAA)" and "Property Support Network").[68]

As highlighted by the evidence from Tewkesbury, a key part of this will be improving understanding and buy in from a range of trades involved in flood repair. This is likely to require consideration of how to provide a framework of standards, particularly for flood resilience measures. This is already being considered as part of the Flood Resilience Action Plan.

Limits to households' understanding

As good as this communication is, it is unlikely that all households will be able to take on, analyse and make effective decisions based on it. All areas involving decision making under uncertainty have been shown to be challenging for consumers to navigate and, as such, there is likely to be a limit to how far take up can be driven by simply improving the availability of information.

An alternative to trying to ensure that households understand and can navigate the potential market for flood resilience / resistance measures is to rely on experts to do so. In these circumstances, decisions over resilient repair would be (at least in part) left to surveyors / trades with an expertise in this area.

One way to deliver this would be through the Flood Performance Certificates approach outlined above. This would require all at-risk properties to have a survey undertaken to assess the potential range of measures that they might install and the pros and cons of each. This could then produce a report with recommendations to take forward. This would mean that households could assess the pros and cons of various approaches without the stress of a flood situation. While it would be unlikely that many people would actually take up measures pre-flooding, suggested resilience / resistance measures could be included as part of a Flood Response Plan – committing the household to undertaking resilient repair if flooding ever did occur.

Existing research in this area suggests that this would be a useful area to develop further thinking. For example, pilots designed and tested with support of the Tewkesbury Learning and Action Alliance, tested how effective a surveyors' checklist and guidance might be in boosting take up of resilient repair post flooding.[69] This was designed to encourage discussion of resilient approaches and of 20 uses, nine households took up some resilience / resistance measures. However, even after discussion with the surveyor, a number of households cited a lack of belief in the efficacy of the measures or a general lack of desire in taking on resilience measures as reasons for not taking forward recommendations.

While this was only a limited pilot (meaning the results cannot be generalised) and its success was mixed, it demonstrates an interesting approach to consider in future.

Reducing costs

As outlined above, even if households have perfect knowledge and understanding of the options available to them, they may still not feel that they are able afford them.

If some of the issues above were tackled, it is likely that this issue would become less of a problem:

- In part, the affordability issue is one of perception rather than reality. There are low cost options available and even small alterations can make a significant difference to a household's experience of flooding. This means that, should householders' understanding of the available products and measures improve, they will be more likely to judge them as affordable.
- As the market for resilience / resistance products matures, it is likely that measures will become cheaper. This will be a result both of innovation and new approaches (for example the use of existing products in new ways) and of increased competition and economies of scale that a larger market would bring.

However, some households will still be left with decisions over higher-cost packages of measures that would potentially be beneficial to them, but they will not be able to afford.

Improving the existing grant scheme

This is where a grant scheme such as the ones already run by the Government have the potential to work well. However, chapter 4 outlined that existing evidence has shown that even where these schemes are available, overall take up has been quite low. This suggests, that to be a more successful driver of behaviour, the schemes may need to be changed. Given the evidence highlighted in chapter 4, one obvious place to consider is how the scheme is delivered.

As already highlighted, to be successful, such a scheme would also need to be delivered alongside measures to tackle the lack of understanding of the availability, and respective costs and benefits of various products. To do this, a grant scheme could be delivered alongside the approaches above that suggest that a resilience survey is undertaken before reinstatement begins. The costs of these surveys could also be met through a grant scheme.

Delivering a scheme along these lines would require four major questions to be answered on decision making, total cost, administration and who pays.

1) Who makes decisions over the installation of measures?

On the question of decision making, building on the existing evidence, there seem to be two principles to follow:

- Where measures are of cost neutral or negligible / low cost (e.g. less than £2,000), and have little or no impact on the aesthetics of the property. The measures should be undertaken without formal consultation with the property owner. This builds on a growing body of evidence that suggests this approach would be successful.[70] This could be supported by allowing insurance companies to claim back the £2,000 directly from the scheme, without an application from the household.
- Where measures have a material impact on the aesthetics of the property, and / or are of significant cost (e.g. over £2,000) the property owner should be consulted over whether to go ahead with the works. Here, effective communication of the need for and potential benefits of the measures will be essential if households are to be encouraged to take up the measures. Insurance companies could again be responsible for claiming the money back, but would need agreement of the household to do so.

2) How much will the grant scheme cover?

Current grant schemes cover up to £5,000 of resilience measures. While some properties will not need to spend this much, it is clear that others would benefit from more than this. One option would be for a potential grant scheme to cover all of the costs of resilience / resistance measures.[i]

However, with potentially large private gains, there are real questions over the cost-effectiveness (and desirability) of subsidising the uptake of resilience / resistance measures for households that could afford to do it themselves.

To tackle this, a future grant scheme could be structured so that minimal works (e.g. up to £2,000) are covered by the scheme, but costs above this level are met on a basis of co-payment, which is determined based on the household's ability to pay.

[i] In practice, there may need to be cap on total payments (like in the Northern Irish scheme), to ensure that the package was affordable to the funder.

Doing so would ensure that significant works are not subsidised by the scheme when the household could already afford to undertake them. It would also ensure that those households who would benefit from significant resilience / resistance packages, but who cannot afford it, would be able to undertake the work.

3) How should the grant scheme (including surveys) be administered?

Given the challenges already identified with local authority administration of the existing grant schemes, it would make sense to change this arrangement. Having a national approach, with closer links to surveyors and contractors on the ground would be hugely beneficial for communication and for its potential impact.

One way to administer the grant scheme would be through the insurance industry. In this case, insurers or a representative body (e.g. the ABI) could be provided with a pool of money in order for them to coordinate scheme. Individual insurers could then coordinate the delivery of resilience surveys of flooded properties and the works agreed to be undertaken. They could then claim money back from this centrally held pool of money.

While this approach might be effective, there are two significant issues to consider.

- Whoever is administering the grant scheme will need to communicate and advertise the scheme successfully to households and the trades involved. Given the lack of consumer trust in the insurance industry, this might not prove to be the most effective route.
- An industry-run scheme would also face the potential to be accused of being run in the interests of industry, rather than households themselves. Whilst this would be unlikely to be the case in practice, the perception of this could undermine the scheme.

This suggests that a separate body should administer the scheme. A number of potential bodies could be considered, including the Fire Brigade. Another obvious organisation that could run the scheme would be Flood Re.

To understand whether Flood Re would be the appropriate body to administer the scheme, work would need to be undertaken to understand the extent to which Flood Re is, or could be, seen as a trusted actor in this area. There are a number of reasons why, in principle it should be:

- It has a clear public purpose;
- The need to transition to an affordable and risk-reflective market fits very well with the objectives of a grant scheme;
- It is accountability to Parliament on use of its funds; and
- It has a clear route to report on the scheme through its quinquennial reviews.

However, in practice, the efficacy of this approach will be determined by households' views of Flood Re and the extent they can be convinced that it is a credible and trustworthy body, delivering in their best interests. If this were found to be challenging, consideration should be given to delivering the administration through other bodies.

4) Who pays?

In all likelihood, a boost to the take up of resistance / resilience measures that is large enough to contribute meaningfully to the creation of a risk-reflective, but affordable, market will mean that the scale of the grant scheme will need to increase. Whilst creating an element of means testing within the scheme would deliver some savings (compared to a non-means tested scheme), the potential increase in funding needed could be significant.

Given that the Government already pays for the existing schemes, there is a strong argument for it to contribute to a similar scale in the future. That leaves the question of where the money for the increased investment would come from. There are at least three potential choices:

1) Central Government, funded from general taxation. This has the advantage of spreading the burden of potential costs across a large base of individuals;

2) Local Government, funded from an increase in council tax. This has the advantage of bringing the costs of the scheme closer to the area that will benefit from it; and

3) Flood Re, funded from accumulation of capital reserves in excess of what is deemed necessary to meet potential risks. This has the benefit of a broad base of contributors (from the levy) as well as having greater contributions from those ceded to the scheme. It also fits well with the

objectives of the Flood Re approach to transition and would seem to fit with the public purpose goals of Flood Re.[ii]

Ultimately, a decision over the routes of funding will need to be made based on the likely impact on the success of the scheme; the relative costs of administration; and the political / social policy implications and desirability of the distributional impact of each approach.

Overall, if a large-scale increase in the take up of flood resilience and resistance measures is to be achieved across the UK's housing stock, it seems highly likely that a larger grant scheme will be needed.

Accounting for resilience in Flood Re premium thresholds or insurance premiums

Existing research highlights that there is virtually no link between the action of individuals in terms of protection against floods and the insurance they receive. In this sense, a widespread argument has been that insurers could play a role in driving take up of resistance and resilience measures either by offering discounts on policy premiums / excesses when measures are installed, or by providing households more information on their flood risk and ways in which they might be able to mitigate it. Equally, Flood Re premium thresholds (and by implication, the premiums charged by insurers) could be linked with the extent of resistance / resilience action.

In principle this could be an attractive approach, as it would provide a direct incentive for households to invest in flood resilience / resistance measures. It is also an approach that has precedent in other areas of insurance. For example:

- In household insurance, premiums and excesses will typically reflect security features that have been installed in the property (e.g. door / window locks that meet specific standards; burglar alarms; neighbourhood watch areas); and
- In motor insurance, some insurers will allow drivers to fit telematics boxes to their vehicles. These monitor things including speed patterns, distance travelled and style of driving and are used to vary premiums based on actual driving behaviour.

ii Note that this approach would be unlikely to fit with the existing scope of Flood Re as laid out in existing legislation and with the FCA / PRA, so changes would be needed. However, in principle, the approach fits with Flood Re's overarching public purpose goals.

However, whilst the principle is strong, there are also major challenges here. These include that:

- Households do not tend to be significantly price sensitive to changes in insurance premiums. As outlined above, many households simply roll over their household insurance from one year to the next, with little regard to the change in price. This means that, for a financial incentive to be effective, it is likely to need to be quite large;
- In this regard, evidence we have to date suggests that potential discounts could be relatively small;
- Even if households did respond to price signals, the approach would require insurers to accurately price resilience and resistance action into the premiums they charge households. At the time of writing, it is questionable whether this is deliverable with existing information, data and systems;
- It is also not just about individual action. For example, resilience / resistance in some cases will require action from a number of people in the community – for instance, if the property is in terrace; and
- There are also societal / public policy challenges here. Providing households with reduced premiums after they have invested in the mitigation measures requires that they can afford to undertake the action. The problem here is that those for whom household / flood insurance is likely to be least affordable (and by implication, that Flood Re is designed to support) will also be those that can least afford to invest in mitigation measures. Therefore, they will be faced with higher premiums with little that they can do about it.

Overall, this suggests that, while attractive in principle, attempting to drive significant increases in the take up of flood resistance / resilience measures by accounting for them in insurance premiums is unlikely to be effective in practice.

Tackling unintended consequences

Chapter 4 identified two key potential unintended consequences of taking action to improve resilience / resistance. Those were:

- A fear of insurance companies using these measures as a signal of risk and increasing premiums; and
- A fear that prospective buyers will see these measures as a signal of risk and be less likely to want to purchase the property (or only willing to pay a lower price).

Each of these potential issues could be tackled with the options outlined above.

For example, if insurance companies took resilience / resistance measures into account (positively, in that they reduce premiums as a result), this fear would clearly be misplaced. It is also likely that this is simply a communications issue and as part of communicating the potential pros and cons of various measures, materials could outline a commitment from the industry that they would not (negatively) impact upon their policy premiums / excesses.

For prospective buyers, as outlined above, an approach that introduced Flood Performance Certificates would completely turn this argument around. With this information, any at-risk property that had not had resilience / resistance measures fitted would be seen less positively.

Chapter 6: Wider action and hard incentives required

Chapter 5 outlined a series of measures that could be used in isolation or as a package to introduce stronger incentives for households to take up flood resilience / resistance measures.

However, given the scale of the financial, emotional and behavioural psychological barriers involved it is likely that harder incentives, including obligatory measures, may need to be considered. This is particularly true if the adoption of resilience / resistance measures is to play a significant part in ensuring that, by 2039, a market for household flood insurance exists that is both risk reflective and affordable.

There are a broad range of approaches that could be adopted to do this. Two are considered below as they could work well in conjunction with the incentives already specified above.

Bypassing consumer decisions

The idea here is that, rather than relying on households to make informed decisions, this decision is taken out of their hands. The assumption is that, whilst a rational household would take the decision to take up flood resistance / resilience measures, the informational and behavioural barriers to doing so are too great. There are clear examples of where this has been the chosen course of action in other fields of public policy. For example:

- Auto Enrolment in pensions has been adopted. This requires that all employees are enrolled onto a pension scheme with a set of minimum contribution rules, unless they actively opt out. The reasoning behind this was that, whilst a rational individual would invest during their working lives to protect their incomes in retirement, a range of barriers including myopia and poor information meant that very few people actually undertook the necessary action.
- Smart meters are being rolled out across the country. These provide households with real-time information on their energy usage. Again, the belief is that households cannot access enough information about their energy use and that this has a detrimental impact on the environment

(and their bills). The Smart Meters are being delivered through energy companies, with the intention that they will upgrade every home to a smart meter by 2020.[71]

A similar approach could be delivered for resilience / resistance measures, whereby Government and industry agrees a set of products and / or principles that will be installed to every property at risk of flooding, before the end of Flood Re.

Requirements through building regulations

In practice, this approach would need to be supported by a change in building regulations. Such an approach has already been discussed in a number of other reports, including the Flood Resilience Action Plan. The idea is that resilience could be promoted through a requirement for certain levels of performance in building regulations. Again, examples can be seen in other areas including increased requirements on sound and heat insulation and fire safety, which have all been delivered through building regulations.

There are two areas where building regulations could be changed with significant effect:

- **Presumption for resilient repair.** Building regulations could require a set of resilience standards that need to be met when properties that have been flooded are being reinstated. This might include a set of measures that are common to all properties (for example, raised electricity points). Given the variability in packages that will be suitable for different properties, going further than this would require each flooded property to have a resilience survey. If this happened (as suggested above), regulations could require a minimum level of recommendations from that survey to be adopted (much like there are minimum standards for insulation and / or structural soundness).
- **Renovation and new build.** Negligible and low-cost resilience measures could become mandatory for all new and renovated properties. A significant advantage of introducing change through this route would be that it could help to support a change in social norms. For example, if all new properties (or renovated properties) were required to have raised electricity points, this would no longer be seen as a signal of flood risk; it would become the new norm.

Chapter 7: Conclusion and suggested focus of future work

This report has outlined a wide range of approaches that could be used to encourage households to take up flood resilience and resistance measures. While it has highlighted that the existing evidence is not strong enough to outline a blueprint for action, it has indicated a set of key principles that should drive future work.

1) The first step to developing a plan for the way forward will be to clearly articulate the desired behavioural change. In short, the properties that would benefit from increased resistance / resilience action need to be identified. This is essential so that the scale of the task can be identified.

2) This report has suggested that there are a wide range of properties that would benefit from some level of resilience action. If this were found to be the case, there is little scope for Flood Re to be the major driver of direct change in households' approach to resilience. In particular, a move to incentivise households to take up flood resilience through changes to insurance premiums, Flood Re premium thresholds or a "three strikes and you're out" principle, are unlikely to be effective. In principle, they are all sound ideas, but in practice, they are likely to make too small an impact on too few households to drive wholesale change.

3) Instead, Flood Re should work with others to develop and implement a package of measures that can be adopted over the course of the next 20 years. Given Flood Re's clear public purpose and need to drive action on transition to an affordable and risk-reflective household flood insurance market, it is a body that can coordinate multi-year, multi-organisation pilots to build on innovation / qualitative assessments that have already been undertaken. In the immediate years, this should involve significant piloting and evaluation to understand what works, before national programmes are rolled out.

4) Given the importance of communication and navigating behavioural psychological barriers, bringing in significant expertise in the behaviour science field would provide vital support for these pilots.

At the heart of these pilots should be an exploration of the following elements:

- Improving the information that households have on the risks and damage caused by flooding, including consideration of whether Flood Re should play a central part in this communication;
- Improving the information and understanding that households have on the range and efficacy of resilience and resistance products that are available, including consideration of whether Flood Re should play a central part in this communication;
- Increasing household ownership of resilience action and reducing the negative signalling effects of action by requiring at-risk households to have a resilience survey (mandatory when they are sold, rented or built, and voluntary otherwise) that leads to the creation of a Flood Performance Certificate;
- Improving and extending the existing grant scheme to cover more households and to introduce clearer rules on co-payment (means testing) and administering the scheme centrally through Flood Re;
- Using Flood Re capital reserves (in excess of those required) to part-fund the grant scheme alongside existing Government funding;
- Working to build and improve local networks (of householders and relevant trades) to ensure that communication, action and approaches are joined up across local areas. This should include measures to increase the development and use of Flood Response Plans and commitments to resilient repair; and
- Reforming building regulations to ensure that (at a minimum) low cost and negligible cost resilience / resistance measures are undertaken whilst properties are being reinstated post flooding. Also considering the wider roll out of resilience measures to all new and renovated properties.

By undertaking pilots and work to develop these ideas, Flood Re could play a vital role in driving forward a significant increase in the resilience of UK housing to flooding both now and in the future. By doing so, it could support a significant step towards ensuring that, by 2039, the UK's market for household flood insurance is both risk reflective and affordable for households.

Annex 1: Flood Re eligibility criteria

The criteria below outline qualifying policies which may be ceded to Flood Re.[72]

Properties will be eligible only if they meet all of the following criteria:

1. They are covered by an insurance contract which is held in the name of, or on trust for, one or more individuals or by the personal representative of an individual;
2. The holder of the policy, or their immediate family, must live in the property for some or all of the time (whether or not with others) or the property must be unoccupied;
3. They have a domestic Council Tax band A to H (or equivalent);
4. They are used for private, residential purposes;
5. They are a single residential unit or a building comprising of two or three residential units;
6. They are insured on an individual basis or have an individual premium;
7. They were built before 1st January 2009 (if a home is built before 1st January 2009 but then demolished and rebuilt, the new home is still eligible); and
8. They are located within the UK comprising England, Wales, Scotland and Northern Ireland (excluding the Isle of Man and the Channel Islands).

We expect that the following properties will be eligible for buildings or combined cover provided **they also meet the criteria 1-8 above**:

A. Bed and breakfast premises paying Council Tax and insured under a home insurance contract;
B. Farmhouse dwellings and cottages. Where farmhouse dwellings are included in a commercial line policy, provided the insurer can split out the dwelling element (which meets the criteria 1-8 (inclusive) above), that part of the risk can be ceded to Flood Re;

C. Holiday/Second Homes;

D. Properties occupied by home workers;

E. Individual leaseholders protecting their own property/flat;

F. Leasehold blocks if they contain 3 units or fewer and the freeholder(s) lives in one of the units to be insured;

G. Single unit leasehold properties where the leaseholder insures the structure of the property;

H. Residential 'buy to let' properties; and

I. Static Caravans/homes if in personal ownership.

Flood Re will also cover a tenant's / individual's contents in rented or leasehold properties even where the building's risk would not be eligible (such as in large blocks of flats) provided the policy and the property it relates to fulfil the criteria 1-8 above.

Properties which we would not expect to fulfil the eligibility criteria for buildings or combined cover include:

A. Bed and breakfast premises paying business rates;

B. Blocks of more than three residential flats;

C. Company houses/flats;

D. Properties covered by contingent buildings policies (e.g. held by banks);

E. Farm outbuildings;

F. Properties used by freeholders/leaseholders in deriving commercial income insuring blocks/large numbers of properties in a portfolio;

G. Housing association's residential properties;

H. Multi-use properties under commercial or private ownership;

I. Residential 'buy to let' (which do not meet the criteria 1-8 (inclusive) above);

J. Social housing properties; (eligible for Contents cover but not eligible for Buildings cover); and

K. Static caravan site owners (for commercial gain).

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Incentivising household action on flooding: Options for using incentives to increase the take up of flood resilience and resistance measures

This report outlines the significant need for increased action from households to protect themselves against the experience and costs of flooding. It shows that a range of organisations, including Flood Re and central and local Government, as well as households themselves, need to work to improve the take-up of property level resistance and resilience measures. Doing so would help to ensure that household flood insurance is available and affordable in the long term.

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