

**AGRI-INSURANCE
FEASIBILITY STUDY**

Final Report for
Welsh Government
Submitted by

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Job No2827/BDB/March 2018

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S1. Executive Summary

The Welsh Government (WG) is aiming to build resilience of farming in Wales to the threats posed by catastrophic events, in particular severe weather and climate change. It wishes to investigate what options are applicable, affordable and possible to take forward. The options have to be seen within the framework of the Well-being of Future Generations (Wales) Act, and the Environment (Wales) Act, particularly as these relate to resilience and the potential change in frequency of extreme weather events.

Agra CEAS Consulting carried out this study and explored:

- a) the options for the form of arrangement between the government and private insurers for the subsidised provision of disaster insurance; and,
- b) the potential ways of travelling from the *status quo* to one in which the risks associated with extreme weather are transferred to subsidised insurance.

This exploration has considered, in conjunction with the insurance industry, the feasibility of subsidised insurance, including:

- the extent to which potential providers of subsidised insurance can be found among the private insurance community;
- the adequacy of data that would enable premiums to be calculated;
- the extent to which governments might intervene to fill any information gap; and,
- the adequacy of reinsurance provision.

This research for the Welsh Government was prompted by the extreme weather event of winter 2013 and was initiated before the UK's referendum on leaving the EU. The context was therefore different from the present, as a member of the EU, the potential use of subsidised insurance against extreme weather events was an option under EU rural development policy. The subsequent vote to leave the EU, though likely to close off the RDP opportunity, has opened up the possibility of subsidised insurance within domestic agricultural policy.

Irrespective of EU membership, the effects of anticipated climate change carry risks. Though uncertain, these include generally higher temperatures and, as a result, reduced snowfall. However, rarity may exacerbate impacts if farmers no longer routinely prepare for heavy snow. Also, there may be increased incidence of other extreme weather such as summer drought and winter flooding. It is therefore possible that insurance against extreme weather will be of greater interest in the future.

S1.1. Methodology

This study gathered information via two main methodologies: desk research and semi-structured interviews. First, a literature review was undertaken of material on risks and insurance, especially that connected with agriculture. This covered studies produced by international organisations, academic research and ‘grey literature’ (such as evaluation reports and similar). The second element of desk research was into recent catastrophic events in order to provide context. The focus was the adverse weather in Wales during March and April 2013. The third element of desk research was an initial investigation of the current suppliers of insurance to the agricultural sector in Wales.

Interviews were undertaken with three groups of organisations (Welsh Government, insurance providers, and stakeholders including farmers’ unions), firstly to understand the incidence and impact of recent catastrophic events on the farming sector in Wales. Additional interviews were undertaken with the Welsh Government and Defra to assess the possible establishment of an *ex ante* mechanism to provide support to farmers and to understand the approach taken to the events of winter 2013. Further interviews with farmer organisations and representatives of the insurance industry investigated the demand for, and potential supply of, insurance products in Wales.

The evidence gathered was then analysed within a SLEPT framework, which focuses on social, legal, economic, political and technical aspects of specific courses of action.

S1.2. Conclusions

The OECD recommends that Governments take a holistic approach to risk management, starting with the provision of information and training. The Welsh Government deals with this principally through Farming Connect. To date, this approach has been supplemented by the provision of *ad hoc ex post* support. Whilst “ordinary” risk, the OECD’s “market insurance layer”, is adequately addressed via commercial insurance policies, there is no commercial provision against the impact of extreme weather events, the OECD’s “market failure layer”.

After the extreme weather events of winter 2013, the Welsh Government provided £500,000 to three farming charities to allow them to provide complementary assistance to the agricultural community. This assistance focused on the welfare of farming households and short-term business continuity. Though not the route chosen, had there been a policy concern with impact on productive capacity, disaster aid in the form of *ad hoc* compensation for lost animals might have been made from public funds. ***A system of insurance, when used against extreme weather events, would offer protection through providing compensation for asset loss and income foregone;***

such provision would not therefore be directly comparable to the approach taken in 2013.

The use of (subsidised) insurance has proved to be a practical way of providing support to agricultural sectors outside Wales, most notably in Canada and the USA, though policy history, insurance penetration and data sources there are different from Wales/UK. Insurance is also successfully used to provide cover against natural disasters, for example cold insurance for sugar beet growers in England and livestock producers in Mongolia.

Whilst farmers in Wales have a clearly demonstrated appetite for various forms of “ordinary” insurance, they hold **a perception that the cost of premiums for insurance of non-breeding livestock would be prohibitive**. Our interviews and literature review revealed **no intrinsic attitudinal barrier against the use of insurance against extreme weather risks**, although there is some suggestion that farmers underestimate the impact of events that are relatively rare.

However, **there is no apparent present effective demand for this form of insurance in Wales**. This is likely to be at least partly because direct payments under the current policy framework to some extent “crowd out” the need for insurance solutions to the presence of risk. Within the context of the UK leaving the EU, it is possible to envisage a future domestic agricultural policy under which insurance solutions become more attractive, such as if direct payments are reduced in magnitude or removed altogether.

Given the current lack of supply from the insurance industry of policies covering losses from extreme weather, our initial expectation had been that there were technical barriers to the introduction. However, this research has shown that such provision is more possible than initially thought since providers have ways to address these problems. As noted above, the reason for the lack of development of products to date is related to the existing policy framework and an associated lack of demand. That said, provision might be hampered by the failure of demand and supply curves to intersect, i.e. **premiums would need to be at a level farmers are not prepared to pay**.

Part of this problem appears to relate to market failure in terms of data on actual losses. The insurance industry explained that, while data on the value of losses are not actually required to establish initial premium levels, the lack of information has to be priced in, meaning that premiums are higher than they would otherwise be. Nevertheless, **the lack of information on the value of losses was cited as the main explanation why**

it did not prove possible for the insurance industry to develop commercial policies against extreme weather after the events of winter 2013. The OECD notes that facilitating good start-up conditions (information, regulation and training) should be the primary role of government in the development of commercial insurance. ***Consideration should therefore be given to gathering and developing likely sources of data relating to losses of animals.*** According to the evidence gathered as part of this research, the availability of reinsurance does not present a barrier to the development of commercial insurance.

Insurance companies told the consultants that they would be willing to consider various forms of insurance products subsidised by the Welsh Government. They would also be prepared to consider operating an insurance system on behalf of the Welsh Government for a suitable fee. We were told that a variety of methods exist to subsidise insurance including granting tax relief to premiums, making payments to farmers, and subsidising the insurance industry directly. The latter approach is, perhaps understandably, more attractive to the industry and is probably also a less costly way of providing subsidy, as it would avoid contact with individual farmers and validation of their insurance purchases.

A variety of approaches to subsidising insurance would be possible and, in view of these unknowns, the level of subsidy required cannot be estimated without discussion between the Welsh Government and insurance suppliers.

Should the Welsh Government decide that subsidised insurance provision is worthy of serious investigation as a policy tool after the UK leaves the EU, it would be prudent to undertake further exploration with insurers as to how this might be done. Before embarking on such discussions, as noted above, it would be useful to undertake further development of data systems capable of providing information on actual livestock losses through extreme weather.

Our discussions with the insurance industry could not take the estimation of costs any further than general principles. ***A more closely specified set of intentions on the part of the Welsh Government is required to go further.***

1. Introduction

The Welsh Government (WG) is aiming to build resilience to the threats posed by catastrophic events, in particular severe weather and climate change. It wishes to investigate what options are applicable, affordable and possible to take forward. The options have to be seen within the framework of the Well-being of Future Generations (Wales) Act, and the Environment (Wales) Act, in particular as these relate to resilience and the potential change in frequency of extreme weather events.

Agra CEAS Consulting was awarded the contract to carry out this study. This research project has explored:

- c) the options for the form of arrangement between the government and private insurers for the subsidised provision of disaster insurance; and,
- d) the potential ways of travelling from the *status quo* to one in which the risks associated with extreme weather are transferred to subsidised insurance.

This exploration has considered, in conjunction with the insurance industry, the feasibility of subsidised insurance, *inter alia*:

- the extent to which potential providers can be found among the private insurance community;
- the adequacy of data that would enable premiums to be calculated;
- the extent to which governments might intervene to fill any information gap; and,
- the adequacy of reinsurance provision.

Part of this exploration has involved assessing the attitude of Welsh farmers to insurance in general and their current demand for insurance against natural disaster risks. To this end, interviews were carried out with the key farmer organisations. The reasons why such policies do not appear to be currently offered by the insurance industry are investigated. Discussions were held both with the Welsh Government and with the insurance industry, the latter in the form of the current main providers of insurance to agriculture in Wales, reinsurance companies and more broadly through the Association of British Insurers. Context was provided through a review of the extreme weather in winter 2013 and via discussions with the farming charities which administered support during this period.

The consultants were informed by Defra officials that a related contract has been let (November 2017) to collect evidence to determine the barriers to, and appetite for risk management tools by farmers in England. Defra is also carrying out an engagement exercise in England with insurers to understand what the barriers are to the provision of insurance products in the agricultural sector.

2. Research methodology

This study gathered information via two main methodologies: desk research and semi-structured interviews. The evidence gathered was then analysed within a SLEPT framework, which focuses on social, legal, economic, political and technical aspects of specific courses of action. The way in which the data gathering methodologies contributed to the evidence base is set out in the sub-sections below.

2.1. Desk research

There were three components of desk research. First, a *literature review* was undertaken of material on risks and insurance, especially that connected with agriculture. This covered literature produced by international organisations, academic research and 'grey literature' (such as evaluation reports and similar). The full literature review is included as Appendix 1 to this report. Key elements of the literature review have been summarised in this main report.

The literature review includes six country case studies where the approach to dealing with the impact of natural disasters linked to climatic events may hold lessons for application in Wales and where the approaches are well established and well documented (Australia, Canada, Netherlands, New Zealand, Spain and the USA). The literature review was dynamic in that it was updated throughout the study as new research became available.

The literature review was used as the starting point for the development of a set of questions which, after validation by the Steering Group, were subsequently used in our interview programme (see below).

The second element of desk research was into recent catastrophic events in order to provide context. The focus of this research was the adverse weather in Wales during March and April 2013, which has been contrasted to previous examples in this country.

The third element of desk research was an initial investigation of the current suppliers of insurance to the agricultural sector in Wales. An online search identified multiple organisations providing insurance to farmers, some of which appeared to cover natural events such as hail damage and other crop losses (see Appendix 2).

2.2. Interview programme

Our interview programme gathered information to supplement and build on our desk research. Interviews were carried out for purposes set out in the following sub-sections.

2.2.1. Identification of need for government intervention

To understand the incidence and impact of recent catastrophic events on the farming sector in Wales, interviews were held with the **Welsh Government** Agricultural Policy staff, those with responsibility for the Farm Liaison Service and Farming Connect, the Resilience Team and Knowledge and Analytical Services. These were supplemented by interviews with the Department of Geography and Earth Sciences at the **University of Aberystwyth** to investigate more generally severe weather issues in Wales.

Additional questions were put to the **Welsh Government** to consider the possible establishment of an *ex ante* mechanism to provide support to farmers. This series of interviews focused on the rationale for intervention, choice of support offered and the organisations delivering support. A discussion was also held with **Defra** on the approach to crises and the incidence of UK disaster payments in the decades before the devolution of responsibility for agricultural policy and on the current situation in England.

Finally, interviews were carried out with **Menter a Busnes** (which implements Farming Connect) to understand their role in providing support to farmers in risk mitigation. Three farming charities were interviewed to understand their role in providing *ex post* assistance: these are the **Farming Community Network** (FCN); **Royal Agricultural Benevolent Institution** (RABI); and, the **Addington Fund**.

2.2.2. Investigation of the demand for insurance tools

Farmer demand for insurance tools was assessed through interviews with the **National Farmers' Union Wales** and the **Farmers' Union of Wales** (these discussions also covered the events of winter 2013 and on-farm risk management). These were supplemented by further questions to **Menter a Busnes** to understand their perception of barriers to the use of insurance that farmers in Wales face.

2.2.3. Investigation of the supply of insurance

A third set of interviews was held with the insurance industry to understand why policies to cover the impact of extreme weather are not made available and/or why farmers do not avail themselves of suitable policies. Our first interview was with the **Association of British Insurers**. Subsequent interviews were undertaken with the **NFU Mutual**, the insurance market leader in Wales, **Willis Tower Watson** and the **Qatar Reinsurance Company**.

3. Research context

The main impetus for this research was the catastrophic weather event of March/April 2013. This Chapter places it in its historical context and provides a brief summary of the event and the action taken as a result.

3.1. Historical incidences of severe winter weather

Extreme weather has a history in Wales. Prior and Kendon (2011) reported that the two most severe winters in the UK in the last 100 years occurred in 1947 and 1963; the winters of 1979 and 2009/10 were also extreme.

Jones, *et al.* (2012) examined the events of winter 1947 in Cwm Tywi, mid-Wales, a community of upland sheep farms. The summer of 1946 had been wet which had resulted in a shortage of food and livestock feed. An estimated four million sheep and lambs died in the UK, most in the uplands and on moors, with thousands lost in Cwm Tywi. Some 500 sheep were found crushed under a snow drift and Jones, *et al.* (2012) state that snowfalls resulted in the death of over 80% of the sheep at Dolgoch. A rapid thaw then followed, causing floods.

Bowen and Martin (2016) considered the winter of 1962/63 in the Cambrian Mountains area of Breconshire, Radnorshire and Montgomeryshire in mid-Wales (and Dartmoor and the south west in England). Again, the extreme weather was preceded by poor fodder production and most upland farmers went into winter with a shortage of winter fodder. Although nationally the loss of livestock was lower than in 1947, there were still significant losses of sheep and lambs, enough for questions to be raised in the House of Commons. In common with 2013, there were severe localised impacts which can be seen in local production statistics. Some farmers estimated their losses at 50-70%, although it is not clear if this refers to the actual number of ewes that died, or lambs, or the potential loss of production; Bowen and Martin report that more conservative estimates put the increased mortality at 13%.

According to the Department of Geography and Earth Sciences at Aberystwyth University¹, 1867 is a closer comparator to the events of winter 2013 than either 1963 or 1947. The 1867 event involved quite widespread snow in the second half of March, with 20-foot drifts in the valleys. As was the case in 1947, a rapid thaw resulted in subsequent flooding. Farmer diary entries from the time record the burial of dead lambs, other physical and financial losses, as well as the emotional impact. Joseph Jenkins from Tregaron reported not remembering such severe weather in March and

¹ Dr Sarah Davies, personal communication.

that lambs had starved as a result of the “*inclemency of the weather and from difficiency [sic] of nourishment*”.²

Looking forwards, Jones, *et al.* (2012) report that the UK Climate Projections indicate higher temperatures in Wales and therefore less frequent snowfall in the future, as well as more frequency of extreme weather, such as summer droughts and winter flooding. Whilst this suggests that the risk of heavy snow may be reduced, its rarity may in fact exacerbate future consequences. Prior and Kendon (2011) make a similar point; in the context of generally milder winters, the impact of severe weather may be greater due to lack of preparedness.

3.2. Severe weather in winter 2013

The Met Office reports that March 2013 was one of the coldest Marches in its historical series and that it was especially cold during the second half of the month³. Temperatures were well below average, with the UK mean temperature 3.3°C lower than the 1981-2010 average at 2.2°C. March 2013 was the coldest since 1962, and the equal second-coldest since 1910. It was also the coldest month of the “extended winter”, the first time this has happened since 1975.

As the weather fronts moved further north between 22 and 24 March, they met cold air and brought sustained heavy snowfalls to North Wales. The persistent heavy snow combined with low temperatures and strong winds to bring blizzard conditions and severe drifting. The lying snow remained un-melted and in deep drifts across high ground into early April, with farmers struggling to recover livestock buried in the snowdrifts.

Like 1962/63, the severe weather in March 2013 was very localised. Jones, *et al.* (2012) note that severity is informally defined according to its risk of major damage, serious social disruption and loss of human life. Whilst by these criteria March 2013 might not be thought of as extreme, the spring had been very cold and so grass growth had been slow. This had increased the use of bought in feed at unanticipated cost leaving farmers in a vulnerable financial position. In addition, the snowfall occurred around lambing time. The timing and circumstances exacerbated the impact; had the snowfall occurred earlier, it would not have had the same impact.

Roberts (2012) in his review into the resilience of Welsh farming set out the events of winter 2013 as follows:

² Diaries in the National Library of Wales.

³ <http://www.metoffice.gov.uk/climate/uk/summaries/2013/march>

“The snowfall in March was an extremely unusual event due to the severity of the snow and the high winds, which prevailed, causing significant drifting in the uplands and mountains of North and parts of Mid Wales. This was compounded by the length of time the snow remained on the ground which, due to below average temperatures, was significantly longer than would normally be expected at this time of the year. The last time such an event was recorded was in the early 1940s.

“Secondly, the areas that were affected were extremely localised and without accurate intelligence many of the relevant parties would have been unaware of the events unfolding until much later. This was compounded by the fact it occurred over a double bank holiday period which meant there were fewer people at a managerial and an operational level within the relevant organisations present. These first two factors combined made an effective early response difficult to deliver.

“Thirdly, the snowfall came at the end of a long period of chronic bad weather which started with the cold spring of 2011. This coincided with the peak lambing period for upland flocks. The loss of breeding ewes and lambs was therefore much higher in certain businesses than would be expected during a normal lambing season”.

The difficulties faced by sheep farmers in north Wales were well documented by the media. For example, the BBC reported that heavy snow had trapped sheep across north Wales, leading to fears hundreds could die in the freezing conditions⁴. In the same article, the Farmers’ Union of Wales (FUW) reported sheep buried under 15 ft (4.57m) snow drifts and problems with feed deliveries. The Guardian referred to, “*the worst crisis for hill farmers in Wales in 60 years*” and reported that the melting snow revealed the carcasses of thousands of heavily pregnant ewes and new-born lambs⁵. In some areas, as much as three feet of snow fell in under 24 hours and drifts lasted for more than ten days. Media articles a year later highlighted specific examples of livestock losses. For example, a hill sheep unit at Llechrydau on the Wrexham/Shropshire border near Selattyn lost 300 in-lamb Hardy Welsh ewes, buried in drifts, and more than 600 lambs died indoors in the Ceiriog Valley as drifts blocked up the 19ft-high shed and mis-mothering reached epic proportions.⁶

⁴ <http://www.bbc.co.uk/news/uk-wales-21940646>

⁵ <https://www.theguardian.com/uk/2013/apr/01/wales-frozen-sheep-snow>

⁶ <http://www.dailypost.co.uk/news/north-wales-news/snow-disaster-one-year-on-6863417>

Farm businesses faced increased costs due to additional supplementary feeding required throughout the spring, an increase in the costs disposing of fallen stock and purchasing of replacements in the autumn. Some farming businesses also suffered a reduced income later in the season due to lower stock levels being sold at market. However, the localised nature of the event meant that there was no reported contraction in supply at the sector level.

3.3. Response to the 2013 severe weather

Interviewees explained that the press identified the problem relatively quickly and that farming charity volunteers were aware of problems from their personal experience. The farming unions appealed for help from the Welsh Government⁷ and, in response, the Welsh Government approached the three main rural charities: the Farming Community Network (FCN); Royal Agricultural Benevolent Institution (RABI); and, the Addington Fund. A meeting was held to discuss how support could be provided. The charities operated under the Farming Help umbrella.⁸

On the 16 April 2013, the then Minister for Natural Resources and Food awarded funds totalling £500,000 to support the work of the charities. Funds were provided as follows:

- **Addington Fund**, £250,000 to provide grants for fallen stock collection and animal feed bills.
- **Royal Agricultural Benevolent Institution**, £150,000 to provide grants to support farming families with living expenses.
- **Farming Community Network**, £100,000 to engage a Regional Director for Wales and expand the Network.

Welsh Government officials told the consultants that the funds provided were *ex-gratia* and were drawn from existing departmental budgets. Under section 60 of the Government of Wales Act (GoWA) 2006, the Welsh Ministers can do what they consider appropriate to achieve the promotion or improvement of the economic, social or environmental well-being of Wales.

The charities were used as vehicles for support because they had an established track record in providing assistance from the Foot and Mouth Disease outbreak in 2001 and because they are independent of government. According to a Welsh Government

⁷ See for example, <http://www.fwi.co.uk/livestock/welsh-unions-join-forces-to-call-for-snow-aid.htm>

⁸ Although not relevant to this report, it should be noted that the initial response from the Welsh Government was criticised by stakeholders as being slow and insufficient. See for example, <http://www.bbc.co.uk/news/uk-wales-politics-21980597> and <http://www.fwi.co.uk/news/minister-says-no-to-snow-aid-for-wales.htm>.

official there was no political desire to make payments directly to farmers;⁹ one interviewee from a charity involved felt that the indirect support avoided any risk of contravening EU rules on making payments to individuals. One interviewee explained that by distributing the money through charities, only those with genuine hardship were likely to come forward. Had a nationwide compensation programme been put in place, it was thought likely that everyone eligible would have accessed it, regardless of genuine need; the localised nature of the problem meant that not all those in eligible areas had genuine need of assistance. In addition, the rural charities already had established methods for assessing needs and for making payments which allowed a timely response.

The three charities provided complementary support. The **Addington Fund** provided support for business needs to keep affected businesses viable. This included money to pay for concentrate feed in the absence of forage or grass. The **RABI** provided support for living costs including food and heating costs for those unable to meet these expenses. The **FCN** provided (non-financial) support to farmers suffering from stress and anxiety.

The Welsh Government produced a list of affected Parishes and the **Addington Fund** provided assistance to farms within these which met the Funds' criteria for support. The amount provided depended on need, with a maximum support level of £2,000 per farm. The **RABI** dispersed money according to its usual practice, i.e. after assessment by regional welfare officers which takes account of savings.¹⁰ Other criteria, including ownership of non-agricultural assets, presence of children, etc., were applied flexibly within a set of loose guidelines. The business assets of working farmers were not taken into account. The non-financial support provided by the **FCN** was available to all.

The Welsh Government also put in place a number of measures to support farming businesses:

- **Derogation to the EU rules on disposal of fallen farm stock.** This was implemented in the worst affected areas of Wales to allow fallen stock to be buried on farm where evidence was provided that the fallen stock collectors could not reach the farm holding.
- **An EU exemption to allow an extension to normal hours of operation for the fallen stock collectors.** The Welsh Government successfully sought an EU exemption to allow an extension to normal hours of operation for the stock disposal

⁹ This is borne out by comments made by the Wales farm minister at the time and reported here: <http://www.fwi.co.uk/news/minister-says-no-to-snow-aid-for-wales.htm>.

¹⁰ A single applicant for support cannot have savings of more than £10,000 (£15,000 per couple).

companies as it became apparent that fallen stock was not being collected from farms in an acceptable time-span.

- **Discussions with the main high street banks.** To help with cash flow of farm businesses, Welsh Government officials met with the main banks to discuss how they could support farm businesses.
- **Early Payment of 50% of the annual Single Payment Scheme.** Some 2,665 farmers in the worst affected areas received 50% of their Single Payment for 2013 during mid-October.
- **Farming Connect.** In consideration of the longer-term future of farm businesses, Farming Connect prioritised applications for Whole Farm Plans for farm businesses that had been affected by the weather.
- **Task Force Group.** This brought together Government and stakeholders to discuss the situation and consider possible intervention by the Welsh Government and other Governmental bodies. Members included feed merchants, representatives of the transport and haulage industry and other ancillary companies.

Other initiatives were also put in place such as Forage Aid which was set up to support farmers whose livestock have been affected by an extreme weather event by providing forage and/or bedding to those in need.¹¹

3.4. Effectiveness of support provided via Farming Help umbrella, and lessons learned

It is outside the remit of this report to assess the effectiveness of the support provided in 2013. However, the Welsh Government told the consultants that the funds given to the rural charities were deemed to be effective in supporting the organisations in meeting the increased demand for pastoral services; interviews with the charities suggested that the support had been well received. The Addington Fund referred to letters received from supported farmers to demonstrate the importance of the assistance for some. Similar feedback was received by the RABI; some of those assisted later made donations so that others can be helped in the future. The FCN also concluded that the support provided had been helpful to those who received it, but noted that the problem is always in persuading everyone who could benefit from support to seek help. It is difficult to raise awareness of the service offered, and some farmers who need help find it hard to accept charity, even if the support offered is not financial. The FCN told the consultants that the Rural Payments Agency in England advertises the FCN's details in their handbook, but that the Welsh Government does

¹¹ <http://www.forageaid.org.uk/Home.aspx>

not. The FCN also pointed to a perceived lack of articles publicising their work in Gwlad.

In interview, the charities highlighted some lessons learned from their experience. The Addington Fund felt that in future the Welsh Government should avoid advertising the availability of financial support before this had been made available to the charity. The RABI felt that having a pot of Government money known to be available for future crises might help farmers accept charitable support. Following the crisis the FCN started working with a wider network of agencies, so that by the time of the Somerset and Cumbrian floods of 2015/16 the FCN considered itself fairly proficient in delivering support when required. The FCN felt that the establishment of a standing plan in Wales ensuring all relevant support actors are in touch with one another would be useful for future crises; such a plan is now in place in Somerset where the emergency support groups meet regularly to ensure that they are ready to act quickly when needed.

The charities had somewhat mixed views on the process involved. One stated that it would be reluctant to become involved again on the same basis due to stresses caused to its staff by the use of eligibility criteria. However, the charity stressed that it would do so if help was needed and there was no alternative. Another stressed the usefulness of having an emergency plan which could be put into actions quickly. This was thought to be especially useful to navigate issues which require various permissions, such as the movement of livestock.

The farmer organisations were asked to comment on the most important features of assistance following extreme weather events in the light of the 2013 response. They stated that the key is to get farmers back on their feet as quickly as possible, i.e. to get income coming in again, provide compensation for losses so reinvestment can take place and provide certainty. In addition, there are acute and immediate problems, such as animal burial, which need to be addressed. In this last respect, the response in Wales, which required negotiation on EU Regulations, was criticised as being too bureaucratic. It is possible that, after the UK leaves the EU, future responses might be quicker.

It was though accepted that there are some things that governments can do little about and the point was made that there is now a rapid alert system in place in Wales.

4. Risk in agriculture

Agriculture is an activity that is subject to multiple risk factors, and its measurement and management is something that both farmers and governments have to consider. The literature review (Appendix 1) reports alternative analysis of risk in agriculture. Of these, the OECD (2009) provides a holistic conceptual framework of risk management. It traces three 'axes' in the risk management system: the sources of risk, risk management strategies and tools and government policies. According to the OECD risk can be segmented, or layered.

- “Normal risk” or '**risk retention layer**'. These are losses (or gains) that are part of the normal business environment; they are very frequent but cause relatively limited losses (measured at aggregate level). Farmers should themselves be able to manage this type of risk with the instruments and strategies that are available at the farm, household or community level (such as choice of enterprises singly and in combination so that the risks are spread, diversification on and off the farm, and by engagement in other (non-agricultural) gainful activities), or through strategies that deal with income and consumption smoothing in the market (such as financial asset management) or through general government policies (such as tax system arrangements for income averaging and the use of tax-sheltered funds of income reserves).
- The '**market insurance layer**'. This corresponds to risks that are more significant, but less frequent. Both frequency and magnitude are in the middle of the respective ranges. In this layer there is scope for farmers to use additional specific market instruments such as insurance or options that are particularly designed to deal with farming risk.
- “Catastrophic risk” or the '**market failure layer**'. This third layer includes risks that are catastrophic in nature because they generate very large losses (at industry level), even if their frequency is low. This type of risk is more difficult to share or pool through the market mechanism, particularly if it is systemic (that is, the whole agricultural industry in a specific area is affected). There are arguments in favour of some government action in the case of catastrophic risk based on combating market failure.

Flowing from its studies, the OECD has made a series of recommendations concerning the role of government in the area of agricultural risk:

- Government policies should take a holistic approach to risk management, assessing all risks and their relationship to each other, and avoiding focusing on a single source of risk such as prices. Governments can help farmers to assess and manage their own risk by providing information and training.

- Agricultural risk management policies should focus on catastrophic risks that are rare but cause significant damage to many farmers at the same time. Contingency plans should define in advance the procedures, responsibilities and limits of the policy response.
- Subsidised insurance is one way of providing disaster assistance but it tends to crowd out the development of private insurance markets and has not been successful in preventing additional *ad hoc* assistance being granted after the event.
- Facilitating good “start-up” conditions – information, regulation and training – should be the primary role for the government in the development of market-based risk management tools such as futures, insurance and marketing contracts.
- Government policies should not provide support to deal with normal risk. Managing normal risk should be the preserve of farmers themselves. Minimum intervention prices or payments that are triggered when prices or returns are low may even be counter-productive as they tend to induce riskier farming practices.

5. Tools for risk management

5.1. Theoretical framework

The European Commission's Joint Research Centre (JRC) identified a number of main tools for risk management in agriculture (Bielza Diaz-Caneja *et al.*, 2009). These are:

1. **On-farm strategies**, such as:
 - Diversification
 - Vertical integration
 - Stabilisation accounts (self-insurance)
2. **Ad hoc aid provided by the government**
3. **Risk sharing strategies**
 - **Public funds or calamity funds** – regulated by the government and funded on a yearly basis, with possible contributions from the private sector, such as compulsory levies
 - **Mutual funds** – set up on private initiative typically for specific sectors, with losses paid for out of accumulated funds. These might take the form of:
 - Guarantee funds
 - Solidarity funds
 - Mutual insurance schemes
 - **Insurance:**
 - Based on results of individual farms:
 - Yield insurance
 - Whole-farm yield insurance
 - Revenue insurance
 - **Index insurance:**
 - Area-yield insurance
 - Area-revenue insurance
 - Indirect-index insurance (based on meteorological indicators or satellite images) and weather derivatives

This JRC presentation is not fully comprehensive. For example, government-run income or revenue safety nets also provide a form of protection against the impacts of natural disasters. The role of government in supporting mutuals or insurance is not explored, which would include the provision of guarantees and/or reinsurance. Nor is the institutional structure of the providers of cover analysed. ***Such complications illustrate that the tools for risk mitigation are many and can take multiple, overlapping and complex forms.***

A feature of the EU is the diversity in the way in which farmers in different Member States use risk management tools (Van Asseldonk *et al.*, 2016). Some of this variation can be explained by the nature of the farming systems or operators (business structure, size, personal characteristics, etc.); factors more related to the institutional structure and history of policy also seem to apply.

There is evidence that trade-offs exist between these tools. For example, Schoengold *et al.* (2012) show that recent receipt of *ad hoc* disaster payments and insurance indemnity payments are associated with a reduction in the use of conservation practices that can be used to reduce risk from weather shocks – an example of moral hazard.¹² Another example of the trade-off between tools frequently encountered in the literature is that government actions to mitigate risks can crowd out the provision of insurance by the private sector.

The OECD (2008b) provides an alternative detailed consideration of risk-related policy measures (see Appendix 1). It is pointed out that all agricultural policy measures have an impact on risk; for example, direct income payments may alter the coefficient of variation in farm incomes, and they may change farmers' attitudes to risk.

The OECD (2008b) also observes that risk-coping measures, whether *ex ante* or *ex post*, that involve transfers to farmers are required to be notified to the World Trade Organisation (WTO). The Green Box (policies which are considered to be non-trade distorting) provides for the inclusion of insurance subsidies, income safety-nets and disaster relief payments, but with strictly defined implementation criteria that mean that many insurance subsidies do not qualify. For many countries, non-product specific Aggregate Measure of Support (AMS) is exempted under the *de minimis* provisions¹³ and is therefore not counted towards the ceiling commitment.

One characteristic of *ex post* forms of support is that they can be subject to political pressure in crisis conditions, which may lead to unwise decisions, whereas *ex ante* support is designed in a rather different framework (OECD, 2011). That said, many countries that predominantly use (or intend to use) forms of support designed *ex ante*

¹² The danger that if a contract promises people payments on certain conditions, they will change their conduct so as to make these conditions more likely to occur. For example, moral hazard suggests that if possessions are fully insured, their owners are likely to take less good care of them than if they were uninsured, or even to connive at their theft or destruction (Black, 1997).

¹³ All WTO members may apply the '*de minimis* clause', which allows any support amounting to less than 5% of the value of the product under consideration (specific aid) or of total agricultural production (non-specific aid) to be excluded from the current AMS. This ceiling is set at 10% for developing countries.

(such as insurance) still sometimes use *ex post* disaster aids in certain circumstances; a running issue is how to combine the two approaches in the optimum way.

5.2. The current CAP ‘risk management toolkit’

The ‘risk management toolkit’, an option for Member States within Rural Development Policy for the period 2014 to 2020 (Article 36 of Regulation (EU) No 1305/2013), consists of the following instruments:

- Financial contributions to premiums for crop, animal and plant insurance against economic losses to farmers caused by adverse climatic events, animal or plant diseases, pest infestation, or an environmental incident.
- Financial contributions to mutual funds to pay financial compensations to farmers, for economic losses caused by adverse climatic events or by the outbreak of an animal or plant disease or pest infestation or an environmental incident.
- An income stabilisation tool, in the form of financial contributions to mutual funds, providing compensation to farmers for a severe drop in their income.

It is worth noting that reinsurance of insurances or mutual funds is not eligible for support under the EAFRD.

In practice, many Member States have chosen not to make use of the toolkit, despite the possibility of co-financing. For example, the Income Stabilisation Tool (IST) has so far only been programmed in Hungary, Italy, and the region of Castilla y Leon (Spain) (European Commission, 2016). Instead, Member States continue to operate national schemes under the State Aid rules (see below), deploy other policy instruments, or leave it up to business demand in the private sector.

Of these tools, the most relevant to the present study is the possibility to use Rural Development funds for financial contributions to insurance premiums and/or mutual funds, covering losses caused by adverse climatic events, animal or plant diseases, pest infestation, or an environmental incident. Of course, ***this possibility will not extend beyond 2020 and any successor set of tools will be dependent on what arrangements are made for agriculture subsequently.***

The Welsh Government told the consultants that it was not in a position to introduce Measure 17, risk management under the Wales 2014-20 RDP, as work into the possibility of introducing an insurance/mutual fund approach for Wales, linking to the wider responsibility and cost-sharing agenda was still at the early stages of development.

5.3. Insurance as a tool to combat risk

In brief, insurance is the use of contracts to reduce and redistribute risk (Black, 1997).¹⁴ (See the literature review in Appendix 1 for an economic analysis of the functioning of insurance.) It is a form of management tool primarily used to hedge against the risk of a contingent, uncertain financial loss. The principle is that a contract is made between one entity that provides the insurance (the insurer, insurance company, or insurance carrier) and another that purchases the insurance (the insured or policyholder). The insurance transaction involves the insured entity bearing a guaranteed and known relatively small loss in the form of payment to the insurer (the premium) in exchange for the insurer's promise to compensate the insured in the event of a covered loss (the peril), that is to make 'indemnity' payments. If such an event occurs, a claim for financial compensation (indemnity) will be made by the insured entity. The loss must involve something in which the insured has an insurable interest established by ownership, possession, or pre-existing relationship.

When insured parties experience a loss for a specified peril, the coverage entitles the policyholder to make a claim against the insurer for the covered amount of loss as specified by the policy. Insurance premiums paid from many insureds are used to fund accounts reserved for later payment of claims – in theory for a relatively few claimants – and for overhead costs. So long as an insurer maintains adequate funds set aside for anticipated losses (called reserves), the remaining margin is an insurer's profit.

Risk which can be insured by private companies typically shares seven common characteristics (Mehr and Camack, 1976) which are further elaborated in Appendix 1:

1. Large number of similar exposure units
2. Definite loss
3. Accidental loss
4. Large [significant] loss
5. Affordable premium
6. Calculable loss
7. Limited risk of catastrophically large losses

In commercial (private) insurance there is generally a pooling of risk, whereby an insurance provider will have multiple policyholders (also called 'exposures'). The most complicated aspect of the insurance business is the actuarial science of ratemaking (price-setting) of policies, which uses statistics and probability to approximate the rate of future claims based on a given risk. After producing rates, the insurer will use discretion to reject or accept risks through the underwriting process. At the most basic

¹⁴ For a brief history of insurance, see: <http://www.bbc.co.uk/news/business-38905963>

level, initial ratemaking involves looking at the frequency and severity of insured perils and the expected average payout resulting from these perils. Thereafter an insurance company will collect historical loss data, bring the loss data to present value, and compare these prior losses to the premium collected in order to assess rate adequacy.

5.3.1. Reinsurance

Reinsurance companies sell policies to other insurance companies, allowing them to reduce their risks and protect themselves from very large losses. The reinsurance market is dominated by a few very large companies, with huge reserves. A reinsurer may also be a direct writer of insurance risks.

Various arrangements are to be found (further details are presented in Appendix 1):

- **Proportional reinsurance:** one or more reinsurers take a stated percentage share of each policy that an insurer issues ("writes"). The reinsurer will then receive that stated percentage of the premiums and will pay the stated percentage of claims.
- **Non-proportional reinsurance:** the reinsurer only pays out if the total claims suffered by the insurer in a given period exceed a stated amount, which is called the 'retention' or 'priority'. Many types of detailed arrangements can be found, including contracts designed to protect the cedants against catastrophic events that involve multiple policies.

While reinsurance contracts often cover more than one policy, reinsurance can also be purchased on a per policy basis, in which case it is known as **facultative reinsurance**. Facultative reinsurance commonly takes the form of relatively brief contracts known as facultative certificates and often are used for large or unusual risks that do not fit within standard reinsurance treaties due to their exclusions.

5.3.2. Insurance and natural disasters

Insurance comes in many forms, but the present study is concerned with damage to property in the form of livestock (or crops) overcome by weather conditions (and associated income loss). Property insurance provides protection against risks to property, such as fire, theft or weather damage. This may include specialised forms of insurance such as flood, volcano, hurricane and earthquake insurance.

There are similarities between insurance against damage from extreme snow in Wales and these other forms of extreme event, particularly earthquakes. Earthquake insurance pays the policyholder in the event of an earthquake that causes damage to the property, a risk not usually covered by ordinary homeowners' insurance policies. Most earthquake insurance policies feature a high deductible ('excess'), which makes this type of insurance useful if the entire home is destroyed, but not useful if the home

is merely damaged. Insurance companies must be careful when writing this type of insurance, because an earthquake strong enough to destroy one home will probably destroy many homes in the same area. An earthquake that impacts on a locality in which an insurance provider has sold multiple policies may quickly drain all the company's resources; this would of course also apply to localised weather events. Insurance companies devote much study and effort toward risk management to avoid such cases.

Capital constrains insurers' ability to sell earthquake and similar insurance. Jaffee and Russell (1997) found that demand for insurance against catastrophic events (earthquakes, hurricanes and floods) was high whereas private insurance companies in the US were not willing to provide insurance against these risks. When searching for a reason for this mismatch they concluded that catastrophic risks require insurers to hold large amounts of liquid capital, but institutional factors (such as accounting, tax and takeover risk) make insurers reluctant to do this. Thus the basic problem appeared to rest in the **capital market rather than in the insurance market**. Though certain financial instruments were being developed to assist (such as catastrophe futures and Act of God bonds), they concluded that the government would continue to play an essential role in the catastrophe insurance market. It is worth noting that in the US, flood risk is insured by the federal government.

However, as will become apparent, such capital market issues do not appear to be a constraint on catastrophe insurance in Wales.

6. Addressing risks from catastrophes and natural disasters

Who bears the costs of mitigating the impact of risk from natural catastrophes is a contentious issue (EAGRCS, 2010) and the move by the Welsh Government towards cost sharing of losses related to animal disease (Welsh Government 2008 and 2016) might also be thought as applicable to those resulting from extreme weather.

However, ***an economic case can be built for government intervention to provide a degree of compensation to farmers for at least some natural disasters that impact on Welsh agriculture.*** This was accepted recently without question by the House of Lords (2016) in its inquiry into the resilience of UK farms to volatility in commodity prices and other shocks. The basis of this case is market failure.

According to the OECD (2000), in economic theory market solutions could be available to neutralise any risks, so that the allocation of resources would be the same as in a riskless situation. However, the conditions for market solutions to occur are often imperfect. Markets will have gaps, and they have a cost. Market failure is also at the centre of the analysis published by the European Commission (2001) as to why commercial risk-management products may not be available or provision may be incomplete. Reasons are found both on the supply *and* the demand side.

On the ***demand side***, the three main reasons that may result in incomplete or missing markets are:

- Farmers perceive the risks they face as being smaller than they actually are. This phenomenon ('cognitive failure') can result from insufficient information or misjudgement. The Commission's view was that events of low probability which are associated with high potential losses (catastrophes) are very likely to be neglected in individual decision making.
- Even if farmers do not underestimate the risks they face, they might count on other safety nets, including off-farm income or government support programmes (disaster aid) in case of significant losses, and as a consequence might not use the risk management tools available.
- Know-how to make use of certain risk-management tools (e.g. use of futures markets) can be acquired only at high start-up transaction costs and is, therefore, not always available to farmers.

On the ***supply side***, the reasons vary from product to product:

- Insurance products might not be offered on the market because the conditions for insurability, such as independence of risk and symmetry of information, are not sufficiently fulfilled. Cordier (2014) stresses that the design of insurance policies

requires precise data. According to Skees and Barnett (1999), each violation of these conditions increases the marginal cost of insurance and reduces market supply. Only if risks are independent and an insurance company can cover a large number of exposure units can it accurately predict the average future losses. Normally natural hazard risks are correlated up to a certain degree, meaning that many exposure units (farms) incur losses at the same time, making losses for the insurance company highly variable. The higher the variance around expected losses, the greater the need for including a 'reserve load' in the premium. A particular challenge is the insurance of catastrophic risks, which are infrequent but of high consequence, making it necessary to add catastrophic loads to the premium. These factors lead to premium rates that are much higher than those for largely independent risks.

- Because of potentially big losses incurred in covering agricultural natural hazard risks, an insurance company will normally try to obtain reinsurance, which involves additional transaction costs. Such reinsurance, if it is available, is likely to be expensive because of its limited market and specialist nature. Thus an economic case may exist for government to intervene in this reinsurance market.

The presence of market failure is not sufficient by itself to justify government action (Hill, 2010). ***The rationale for intervention also depends on there being a technical fix available*** (which may include a range of alternatives, such as subsidised insurance or schemes to make direct compensation payments) and, crucially, that the benefits gained to society (such as prevention of firm failure and associated waste of resources, efficiency loss in production, damage to local economy, welfare problems of farm families and so on) are greater than the additional costs to society of intervention, including not only the costs of payments made to beneficiaries, but also those of delivery. Both benefits and costs may be difficult to measure precisely.

It is also necessary to carefully distinguish between the private benefits and costs and those to society at large; only the social ones are directly relevant to an economic case for intervention, though the private ones will have political dimensions that will affect policy decisions. History suggests that change in agricultural policy is often driven more by issues of equity and political economy than by economic efficiency (Blandford and Hill, 2006).

A rationale for intervention based on political economy should not be ignored. Sometimes public action is needed to facilitate further, more significant change elsewhere in policy, providing a strategic reason for a particular form of intervention. This might be the case if, say, the introduction of subsidised insurance to counteract losses suffered from national disasters facilitated a more substantial desirable reform

of agricultural policy than was otherwise possible. In the USA it was intended that subsidised insurance would allow the withdrawal of *ad hoc* disaster compensation, though in practice this has not happened entirely.

Furthermore, the OECD (2000) also pointed out that there is danger of over-intervention (government failure) and of creating an additional source of risk. Changes in policy on how to deal with losses arising from natural disasters that are too frequent and unpredictable could precipitate impacts that intervention was trying to avoid.

6.1. Definition of national disaster, and conditions for aid applied by WTO rules

The specific natural event that is the primary focus of this study for the Welsh Government is extreme weather. While this may be a commonly understood term, the literature shows that, for the purpose of regulating intervention in an international context, a precise definition is needed. EU guidelines on State Aid in the agricultural sector (European Commission, 2001 – subsequently updated) listed the events which can be classified as natural disasters/exceptional occurrences (earthquakes, avalanches, landslides, floods, etc.) and adverse weather conditions (frost, hail, ice, rain, drought, etc.). Outbreaks of animal or plant diseases were not normally considered as natural disasters/exceptional occurrences, though thinking on this may have changed following experiences with foot-and-mouth disease and other epidemics.

Furthermore, to be compliant with WTO rules, certain limits are set on the manner in which disaster aid is calculated and granted. Following the 1994 Uruguay Round Agreement on Agriculture (WTO, 1994), countries are required to notify to the WTO their annual levels of agricultural domestic support. Support under measures subject to the reduction commitment is reported as the current total Aggregate Measurement of Support (AMS), often referred to as ‘Amber Box’. For countries/blocs such as the UK/EU that do not have developing country status, measures exempt from the reduction commitment include:

- measures exempted because they qualify under the criteria set out in Annex 2 to the Agreement (often referred to as ‘Green Box’ measures);
- measures respecting conditions for exemption set for direct payments under production-limiting programmes (often referred to as ‘Blue Box’ measures).

Moreover, product-specific and non-product specific AMS support that accounts for less than 5% of the value of production (referred to here as *de minimis* support) is exempted from the current total AMS.¹⁵ For many countries, non-product specific AMS

¹⁵ The ceiling is 10% for developing countries.

support is exempted under the *de minimis* provisions¹⁶. Although a scheme to assist Welsh farmers to cope with disaster might be designed that qualified for this type of exemption, this could only provide limited payments per beneficiary and might be seen as an inadequate response to the impact of extreme weather. Hill (2010) reported that this limit had recently been increased from €3,000 to €7,500 per farm over a three-year period, but in 2013 this was raised to €15,000 (Commission Regulation (EU) No 1408/2013 of 18 December 2013), though this is subject to a cap for the UK of €270 million (which corresponds to the cap of 1% of annual output).¹⁷

Bardaji *et al.* (2016) point out that *de minimis* payments have been used occasionally to compensate for the insufficiency of financial funds initially provided from elsewhere, such as in France in 2014 where the government decided to add *de minimis* payments to close a gap in the sums allocated to crop insurance. Though modest in size at the farm level, the limit on possible payments may be sufficient in some circumstances to act as adequate compensation and should be considered in relation to the pattern of losses suffered in Wales as the result of extreme weather. However, the UK's share of the EU's AMS is one of many areas which will need to be agreed on in the course of exiting the EU.¹⁸

Beyond the level of *de minimis* schemes, WTO notifications on domestic support commitments include information on transfers associated with risk-related measures (OECD, 2009). Depending on implementation criteria, insurance payments can be either in the AMS support ('Amber Box'), the 'Blue Box' or the 'Green Box'. Some payments such as crop insurance subsidies are notified as non-product specific AMS support.

The WTO 'Green Box' includes two categories of measures specifically designed to include insurance subsidies (income safety-nets and disaster relief payments), both with strictly defined implementation criteria (Annex 2, paragraphs 7 and 8 of the Agreement on agriculture). Paragraph 8 deals with "Payments for relief from natural disaster" (Annex 2, paragraph 8 of the Agreement on agriculture – see Box 6.1). The strict implementation criteria are to ensure aid is minimally distorting to agricultural markets, and many conventional insurance subsidies would not qualify.

¹⁶ Confusingly, Bardaji *et al* (2016) fail to record any positive values in any Member State for *de minimis* payments in their study for the European Parliament, though it is not clear whether this means there were none or information was lacking.

¹⁷ The Commission's *de minimis* conditions for State Aid appear to be in line with those of the WTO.

¹⁸ Brink (2016) considers how this might be done.

Box 6.1: Uruguay Agreement: Agreement on Agriculture, Annex 2, paragraph 8

Payments (made either directly or by way of government financial participation in crop insurance schemes) for relief from natural disasters

- a) Eligibility for such payments shall arise only following a formal recognition by government authorities that a natural or like disaster (including disease outbreaks, pest infestations, nuclear accidents, and war on the territory of the Member concerned) has occurred or is occurring; and shall be determined by a production loss which exceeds 30 per cent of the average of production in the preceding three-year period or a three-year average based on the preceding five-year period, excluding the highest and the lowest entry.
- b) Payments made following a disaster shall be applied only in respect of losses of income, livestock (including payments in connection with the veterinary treatment of animals), land or other production factors due to the natural disaster in question.
- c) Payments shall compensate for not more than the total cost of replacing such losses and shall not require or specify the type or quantity of future production.
- d) Payments made during a disaster shall not exceed the level required to prevent or alleviate further loss as defined in criterion (b) above.
- e) Where a producer receives in the same year payments under this paragraph and under paragraph 7 (income insurance and income safety-net programmes), the total of such payments shall be less than 100 per cent of the producer's total loss.

In relation to paragraph 8 it is important to note that:

- Eligibility for disaster relief payment relates to a historical time reference period (similar to that for income safety nets), but the qualifying criterion is a 30% loss of production (not income), though it is not clear whether volume or value is implied. ***An obvious prerequisite is that that suitable data are available.***
- Unlike income safety nets, which are required to apply eligibility tests at the level of the individual farm, this is not stated explicitly for disaster payments. However, it is implied, as payments to farmers who had not suffered losses in an area impacted by severe weather could hardly be justified.
- An additional criterion is the need for an official declaration that a natural disaster has occurred or is occurring.
- There does not appear to be a restriction on the amount of income loss that may be compensated, but in practice a production loss of 30% is likely to lead to an income drop that is greater than 30%.
- Rules limit the combination of payments under the income safety net and the disaster compensation.

Concerning the condition that intervention that falls within the WTO 'Green Box' should not distort international markets, it could be postulated that knowledge that *ad hoc, ex post* compensation might be available for the impact of exceptional and unpredictable natural disasters will have some marginal effect on farmers' strategic decisions, and this is strengthened if a mechanism is set up *ex ante*. However, if the compensation

is for loss of income or assets, the impact on aggregate production and hence on international markets is remote, uncertain and likely to be small. However, Annex 2 of the UAA makes it clear that exemption from AMS reduction (i.e. 'Green Box' eligibility) extends to schemes that have 'minimal' effects on trade distortion or on production. Further, it lists training and advisory services as meeting the requirements, the effects of which on production and trade could, arguably, be greater than those of catastrophe compensation.

In summary, ***it may be possible to design a scheme of support for compensation of Welsh farmers to enable them to deal with extreme weather events that satisfies the de minimis conditions set by the WTO, but these place restrictions on the size of allowable payments.*** Beyond that, the conditions for disaster payments to be WTO 'Green Box' are clearly set out, though there is some room for interpretation of detail. There are restrictions on the conditions when payments can be made (in terms of the historic period to which production in the current year suffering from the natural disaster is compared, and the extent of the production loss) and the maximum proportion of the shortfall that can be paid. Any scheme for Wales will have to respect these boundaries.

7. Use of disaster assistance in the EU Member States

The European Commission (2001) described a number of public 'fields of action' for helping farmers cope with risk:

- Providing the conditions in which private markets in risk reduction instruments can work (such as the legislative framework, providing training on risk management tools for farmers).
- Lowering the costs of risk-management tools, such as by providing subsidies for insurance or reinsurance. Subsidies could also be justified on a temporary basis to encourage the development of market solutions. This might include assistance to setting up mutual support schemes, or tax concessions for establishing reserve funds.
- Providing public risk coverage, e.g. by providing disaster aid payments, public insurance and reinsurance, or a specific safety net.

Each has relevance to this study, with the emphasis on the alternatives of disaster aid payments and of publicly-supported insurance. The first involves combating market failure by enabling information to be more readily available and creating conditions in which commercial insurance can operate. We have already seen that a lack of data, for example on the severity of losses in Wales due to extreme weather, can be a factor in holding back the provision of insurance, and thus it can be expected that public support for information systems should encourage their operation. The second includes the offering of subsidies to insurance, which is a core element in this feasibility study. The third concerns direct intervention by government in the form of disaster aid payments or public insurance (in contrast to subsidies on insurance provided by others. The third mentioned form of support in the last group - the notion of a specific (income) safety net - can be put aside as impractical because, to be WTO-compatible, it requires authoritative data of incomes at the individual farm level over a run of years (three or five preceding one of unusually low incomes) and is designed to deal with income drops caused by multiple factors, not only extreme weather.

Disaster aids are paid to help farmers cope with losses from non-insured natural catastrophes. According to the European Commission (2001), disaster relief can come in a variety of forms – specific payments, supplements to existing schemes, investment grants, interest concessions and so on. They are open to criticism on the following grounds:

- They can affect risk-awareness. If farmers know that free *ad hoc* disaster aid will be given in the event of a natural disaster, they may be less likely to take the corresponding risk into account in decision making. Furthermore, disaster aid potentially crowds out private initiatives.

- There may be a substantial time lag between the occurrence of a loss and compensation being paid. Technical solutions might include interim payments and channelling funds via the insurance industry, which is likely to have infrastructure in place to facilitate payments.

In the EU, disaster payments are mainly made by Member States and under the State Aid framework; this framework is discussed in the literature review (Appendix 1). In this context, although the EU has a role in two tasks. First, it approves state aids by Member States and second, it contributes financially to Member States' sanitary and phytosanitary measures taken in respect of disease outbreaks. Approval is necessary to prevent possible distortion of competition between producers in different Member States. The Commission has adopted community guidelines for state aid in the agriculture sector which covers the conditions under which disaster aid can be given.

However, in Wales the support provided in 2013 was not under this framework. Rather, as has been described above, it was in the form of a payment to farming charities with primarily a welfare orientation. Strictly, it was not aid to agricultural production, but support to farm households to maintain their consumption standards or their resilience in the face of extreme weather. This, then, is the *status quo* as we understand it with which the possible use of subsidised insurance against the impact of extreme weather has to be compared and contrasted. While the future use of payments to compensate for production losses (such as capital lost in the form of dead animals) using state aids may be a possible option, it does not represent the current intention of the Welsh Government as evidenced in discussions with the consultants. Nevertheless, for completeness the literature review (Appendix 1) covers the use by EU Member States of payments under the State Aid framework.

7.1. Subsidised insurance as a tool for coping with natural disasters

7.1.1. The need for subsidised insurance

There is evidence that farmers in English areas prone to one natural disaster (flooding) are prepared to pay a larger percentage of their profits as premiums than those in lower risk areas (Sauer, 2011). However, in both the literature and in discussions between the consultants and both the farming industry and insurance providers, ***generally unsubsidised insurance against extreme weather impacts is not seen as viable.***

The European Commission (2008) considered the use of insurance to provide farmers with the means to manage their own risk in relation to natural disasters. It concluded that ***the cost of subsidising premiums would inevitably be high, entailing a need for relatively expensive reinsurance, it involved low transfer efficiency, and a***

common definition of disaster would be required. However, as noted above, this did not prevent support for such insurance being offered to Member States on an optional basis as part of their Rural Development Programmes in the current period. This suggests an exploration of the conditions under which subsidised insurance might operate successfully is needed.

7.1.2. Conditions for subsidised insurance to operate

The European Commission (2006b) and Bielza Diaz-Canaja *et al.* (2009) set out very similar clear statements of the conditions for insurance to operate commercially. For an insurance scheme to be actuarially sound, the loss ratio (the proportion between indemnities and premiums paid) should be lower than one (100%) in a quantity enough to pay the administrative and low adjustment costs. This applies taking into account the entire premiums, including subsidies and all the insurance and reinsurance costs. At present such conditions appear to be fulfilled in only some types of risk cover, principally single risks such as fire, crop damage by hail and personal accident.

The OECD (2011) points to the conditions that have to exist for a risk to be insurable:

- independence across insured individuals and covered risks;
- losses should not be catastrophic or so huge that any company could not afford the indemnities;
- losses must be measurable, and accidental or unintentional; and,
- premiums must be affordable.

Features of the current market for agricultural insurance in the EU are that:

- Single risk insurance (such as hail and fire insurance) is widely available provided either by the private sector or with some level of public subsidy.
- Multiple risk (combined) insurance is less available, and only 16 Member States reported it in these two publications, of which ten operated only with government involvement or subsidies.
- Coverage of crop losses appears more available than that of livestock losses.
- Insurance against natural disasters may be covered indirectly in some multiple risk insurances (i.e. death of livestock), but they present major problems to insurance providers because of their systemic nature (large losses affecting many farmers at the same time) and lack of data on their frequency, with the outcome that premiums are loaded to an extent that they are not attractive to farmers.
- The degree of government involvement and provision of subsidies varies widely between Member States. At one extreme, in Spain the government collaborates with farm unions and insurance companies to run the system; all insurance companies operate as a pool, in a co-insurance regime, and most risks are

covered.¹⁹ For Belgium, Germany, the Netherlands and the UK hail insurance or single-product insurance are the main products available, with negligible demand for other farm insurance products, and no subsidies.

- There appears to be a relationship between the level of subsidies on offer and the level of development of insurance. Usually private insurers only cover hail and fire, but as the government involvement increases, more comprehensive coverage is provided by the insurance market.
- The market is often dominated by a few providers, suggesting a lack of competition and hence prices that might be higher than they would be in a more competitive market.
- Market penetration (by what is available) also varies widely, from over 50% in Austria, Bulgaria, Hungary and Sweden to below 10% in others (and 7% in the UK).

The European Commission (2005a) notes other characteristics of subsidising insurance:

- the "systemic" nature of much risk (i.e. potential damage hits a high proportion of farmers simultaneously) makes many agricultural risks non-insurable in most countries as insurance companies are not willing to take this type of risk. Generally, this would entail a need for relatively expensive reinsurance. For this reason, the European Commission (2005a) suggested that national reinsurance schemes should be considered as an alternative to supporting insurance premiums.
- The insurance market structure can have an influence on the welfare effect. Where insurance markets are not competitive (which seemed common), ***the introduction of a subsidy might have the effect of raising the prevailing premium, while only having a limited effect on the wider market participation.*** The benefit in terms of farmers' reduced exposure to risks is limited.
- Farmers with higher risk levels will be those with the highest likelihood to buy insurance. This will push the insurer to raise the premium and the insurance will become unattractive for most farmers (an example of adverse selection²⁰). This danger can be reduced by suitable system design (such as a 'bonus-malus'

¹⁹ The situation in Spain has arisen for historical reasons unrelated to the perceived likelihood of a serious event.

²⁰ The tendency for any contract offered to all comers to be more attractive to those most likely to benefit from it. For example, if an insurer offers health insurance without any medical examination, the expectation is that people with poor health prospects are likely to accept it, while people with better health prospects, who can get better terms from a more selective insurer, will reject the unconditional contract. In trying to be non-selective, adverse selection causes the worst risks to select themselves (Black, 1997).

system, involving discounts or penalties for previous claim history), but this takes time to fine tune. However, Thomas (2008) points out that, from the perspective of public policy, ***some adverse selection may be desirable if it raises uptake by a policy target group; there may be a loss in efficiency of contracting, but this may be necessary to achieve policy aims.*** In other words, economically ‘adverse selection’ may not always be politically ‘adverse’.

- In its favour, insurance provides relatively quick payment of compensation (probably less delayed than *ad hoc ex post* aids), thereby reaching farmers closest to when it is most needed.
- The administrative burden depends greatly on the type of scheme chosen. Many insurance schemes require the availability of accurate information on losses at farm level, but index-based insurance (see section 10.1) would not need assessment for each insured farmer.
- There may be environmental impacts. The availability of risk management tools, partly publicly funded, may cause farmers to take unnecessary risks and increase production intensity in sensitive regions. Introducing new risk management tools may therefore have a negative environmental impact in some cases, especially those involving issues of moral hazard.
- To be compatible with paragraph 8 of annex 2 of the Uruguay Round Agreement on Agriculture, insurance for a natural disaster or the outbreak of an animal disease requires formal recognition of these conditions by government authorities. Such a condition limits indemnities to those areas where a disaster is officially declared.

7.1.3. Forms of subsidised insurance

The unwillingness or inability of insurance markets to provide affordable risk management mechanisms has encouraged many governments across the world to subsidise agricultural producers and/or insurance companies that offer agricultural insurance (subsidised loans, tax breaks, subsidised reinsurance, etc.). The resources absorbed by these interventions to correct market failure have to be set against the benefits obtained thereby. However, such programs are often inefficient and come at high social costs, pointing to the need to devise ways of avoiding these drawbacks (Mianda and Vedenov, 2001).

In the context of Spain, where subsidised insurance is a national characteristic of agricultural risk management (see case study in Appendix 1), Anton and Kimura (2011) point out that subsidies to insurance can create economic rents and inefficiencies, and there is a need to take action to ensure the providers operate in a competitive market. In New Zealand the notion of any form of agricultural subsidy is now criticised, with the view that subsidies to insurance would introduce distortions to the market that are best avoided (Melyukhina, 2011).

Weather impacts and related losses often show great diversity even within regions, suggesting that different premiums should be applied to different micro-regions (Kemény *et al.* 2013). Even within micro-regions individual producers face a very high diversity of risks, which implies that in the long-term only a bonus-malus system developed for individual agricultural producers (that is, one that includes discounts and penalties according to claims histories) can mitigate different risks, and that this can be the basis of a well-performing risk management system that is suitable for a wide risk community.

The potential of index-based insurance provision has attracted considerable attention, in particular for use in developing countries (Barnett and Mahul, 2007). The International Fund for Agricultural Development (IFAD) and the United Nations World Food Programme (WFP) (WRMF, 2011) point out that conventional crop or livestock insurance relies on direct measurement in the field of loss or damage suffered by the farmer in order to determine the pay-out (indemnities). Assessment of farm-level losses is normally costly or impractical where there are many small-scale farmers and insurance markets are undeveloped.

Weather-index insurance responds to an objective parameter, such as rainfall or temperature, at a defined weather station during an agreed period of time. The parameters of the insurance contract are set to correlate, as closely as possible, with the damages suffered by the policy holder. All policyholders within a defined area receive pay-outs based on the same contract and measurement at the same station, eliminating the need for farm-level loss assessment. While not a panacea, research by the WRMF suggests that weather index insurance is more effective as part of a larger package of risk management strategies and services.

Leblois and Quirion (2010) highlight the need to explore implementation issues, such as the spatial variability of weather and on interactions with other hedging methods. Li and Miranda (2015) focus on the timing of payments, so that resources are provided from the insurance before the weather-related damage is suffered, which allows timely mitigating actions to be taken; for example, farmers could prepare themselves to deal with drought before the worst effects are felt, and the resources provided would fund these preparations. Such a system requires (i) a strong objectively measurable signal that is highly correlated with losses, but which is realised before the losses are incurred; and, (ii) the signal must be realised in time for loss mitigation measures to be cost effective.

FAPRI (2014) has illustrated the significance of implementation issues in the UK using a hypothetical payment programme that compensated for low crop yields for wheat. A farm-level model was discarded on grounds of lack of data availability necessary to establish historic norms, underlined by potential issues of information asymmetry (with associated adverse selection and moral hazard) and of adjustments to compensate for the churn of structural adjustment. Aggregate data were more available, but there were implications of choosing either UK level figures or averages for each of the constituent countries; payments to farmers in the four countries were some 30% higher when averages of yields in the separate countries were used rather than the all-UK average (which is dominated by England). Though not explicitly mentioned, ***any such average-based system, in common with all index-based approaches, could result in situations in which payments were made to farmers whose yields had not suffered from the conditions that had impacted on farmers in general, something that might be difficult to justify politically.***

7.2. Financial support in the form of compulsory cross-subsidy: Flood Re case study

Though public subsidies are normally thought of as payments funded from government budgets, attention must be given in this context to Flood Re, a form of funding to flood reinsurance of domestic housing in the UK based on compulsory contributions from premiums from other housing insurance policies that (mostly) are not in areas subject to flooding risk. Thus, the basic risk has characteristics shared with extreme weather events and agriculture in Wales, and funding has similarities to that provided for the activities of agricultural Levy Boards. The potential use of a levy to cross-subsidise insurance to cover risks to Welsh agriculture from extreme weather events may be worth considering.

From 2000, flood insurance was widely available to households at high risk of flooding due to a series of voluntary agreements between the Government and members of the Association of British Insurers (ABI). These agreements did not address the affordability of the home insurance provided, however, and so the insurance companies and the Government worked together to develop a different way of dealing with flood insurance. Their chosen solution was a 'flood reinsurance' scheme – known as Flood Re – to help support households at highest flood risk.

Introduced in April 2016, Flood Re is a reinsurance company, but unlike other reinsurance companies, it is a not-for-profit fund owned and managed by the insurance industry, and is publicly accountable. Flood Re's aim is to promote the availability and affordability of flood insurance to those who own and live in properties in flood risk areas, and to do this by compulsory cross-subsidisation. Establishing it required

Government legislation, and it is apparently the first scheme of its kind anywhere in the world. It is intended to be in place for 25 years.

Customers buy their insurance from insurers or insurance brokers in the usual way and claims are handled similarly; individual customers do not deal directly with Flood Re. When the cost of the flood risk part of their policy climbs above a certain level, it may make sense for the insurer to place that part of the policy with Flood Re, and the insurer will be able to recover payment costs from Flood Re.

The insurance industry paid the set-up costs of Flood Re, which were over £20 million, not including the costs to individual companies for preparing their own systems. The pool of money to cover claims made on policies which are in the scheme comes from two places – the charge for each policy which is passed into Flood Re, and an additional annual £180 million levy on UK home insurers. Flood Re also has its own reinsurance policy in place to ensure it will be able to cope with significant or multiple flood events.

The Association of British Insurers has estimated that Flood Re will help cover the 1-2% of homes (about 350,000 houses) that are at greatest risk of flooding, though there is no cap on numbers. According to The Daily Telegraph, the extra coverage, paid for through a Flood Re levy on all home flood insurance policies, will cost policyholders about £10.50 each.²¹

A detailed account of the operation, costing and critique of Flood Re can be found in Appendix 1, section A1.7.1.

7.2.1. Potential application of a compulsory cross-subsidy approach in Wales

The potential to use a similar system of cross-subsidisation in the context of extreme weather risks to Welsh agriculture would require the identification of the policies on which a levy could be placed. Unlike the Flood Re scheme, which covers domestic property in areas of differing risk level and which is virtually universal, cover of weather-related events is far more variable across the sector. This implies that, in order to generate adequate funds, any levy would need to be on policies that relate to other risks, which may raise issues of equity and be harder to justify. If funds cannot be raised by transfers within the insurance world, other mechanisms would need to be explored. For example, ***where losses relate to animals, a levy on all livestock producers to provide the basis of reinsurance might be contemplated, though***

²¹ Flood Re launches to lower insurance bill for risky homes. 3 April, 2016. <https://www.telegraph.co.uk/business/2016/04/03/flood-re-launches-to-lower-insurance-bill-for-risky-homes/>

again this may be less politically acceptable than a subsidy financed by taxpayers.

7.3. Subsidised Mutual Funds as a tool to handle catastrophic risks

Subsidies to mutual funds may also play a part in helping farmers cope with extreme weather and similar disasters. Traditional mutual funds are based on the establishment of financial reserves built up through participants' financial contributions, which can be drawn upon by members in the event of need according to predefined rules (Bardaji *et al.* 2016). Such funds could be sectoral or regional, so could be adapted to areas or types of farming in which extreme weather conditions are prevalent. The scope for moral hazard is strongly limited by the nature of the mutual agreement because everyone pays into the scheme and feels joint ownership of the funds. Shared knowledge of individual exposure to risk is believed to militate against adverse selection.

The function of mutual funds can go beyond the simple reliance on a shared capital reserve. They can be in a good position to negotiate reinsurance of losses due to extreme weather in excess of the fund's accumulated reserves, access credit at preferential rates, and transfer part of the fund's risk exposure by negotiating with insurance companies or 'securitisation' of the fund's exposure through specific contracts that could be sold on the over-the-counter market for financial derivatives; weather bonds have been put forward as one such instrument (Xu *et al.* 2008). In all these transactions, the power of the fund would be larger than that of the individual farmer.

In theory, different forms of public support can be used to encourage mutual funds:

- contribution to start-up capital;
- Government allowances to annual contribution (by participating farmers) to the Fund;
- compensation of payments made to farmers; and/or,
- fiscal incentives to contributions.

In practice, in the EU the support to mutual funds for adverse climatic events, animal and plant diseases, pest infestations and environmental incidents (or income stabilisation) ***is limited by Regulation (EU) No 1305/2013 to the administrative costs of setting up mutual funds and to amounts paid as financial contributions to farmers*** (and interest charges on loans to make this possible). The Regulation specifies that no contributions by public funds shall be made to the initial capital stock. As with disaster aids, there are conditions under which payments can be made (including the official declaration of a disaster and that this destroys more than 30% of

the average annual production of the farmer, though indexes can be used to calculate the annual production of the farmer).

Attention is drawn in Bardaji *et al.* (2016) to the French FMSE (*Fonds national agricole d Mutualisation Sanitaire et Environnementale*) which provide compensation to farmers affected by environmental and sanitary crises. Participation in the FMSE is compulsory, which permits a broad pooling of risk, avoids adverse selection, and keeps contributions to a low level. It has a common section for all farmers and sector-specific sectors. Up to 65% of compensation expenses can be refunded by (apparently) a combination of the French government (25%) and EU (75%). At present, it seems to cover disease risks and environmental risks from contaminations, accidental release of pollutants, and fires. Extreme weather is not mentioned.

8. Examples of international responses to risks associated with natural disasters

The literature review (see Appendix 1) shows that the use of insurance in North America to provide support to agriculture is quite strongly developed and is quite well documented. However, it appears that subsidised insurance by itself has not proved capable of dealing with losses from natural disasters. Both the USA and Canada maintain elements of *ad hoc ex post* direct aids to help compensate for such events, though the subsidised insurance appears to have reduced the call for such support.

In summary:

- **Canada** and the **USA** both use a mixture of subsidised insurance and *ad hoc ex post* disaster aids to counter the impact of extreme weather. In Canada, AgriInsurance provides producers with cost-shared insurance for natural hazards in order to minimise the financial implications of production and/or asset losses, whereas AgriRecovery is a framework (rather than a single programme) that guides how federal-provincial-territorial governments work together to assess the impacts of disasters on agricultural producers and respond with timely, targeted initiatives where there is need for assistance beyond ongoing programming. In the USA, in addition to a widespread use of subsidised insurance as a major policy tool, there is a raft of other disaster assistance schemes that cover blizzards, of which the **Livestock Indemnity Program** provides benefits to producers for livestock deaths in excess of normal mortality caused by adverse weather.
- **New Zealand** avoids intervention in the insurance market. Its Adverse Events Framework provides a diverse range of support mechanisms, with rationales based on both equity and economic efficiency, but compensation for losses (Special Recovery Measure) is only made eligible by the largest-scale adverse events, and then applies to sharing the cost of restoration of on-farm infrastructure, pasture, crops and forestry.
- In **Australia** there appears to be a recent rise in the interest in, and availability of, insurance to deal with the country's main weather risk, which is drought. This may be related to the dismantling of the previous drought-specific programme that comprised relief payments, interest rate subsidies and exit assistance. In what is judged a complex and confusing market, the government has introduced grants to assist farmers with obtaining professional advice on the policies available.
- In **Spain** insurance appears to cover many risks from natural adverse events that in other countries would be regarded as uninsurable. However, the history of Spain

has resulted in the development of a hybrid system that involves institutions representing the government, providers and the farming sector. It seems that such an approach would be difficult to replicate elsewhere. Even in Spain there is a need for *ad hoc ex post* disaster aids to cover events that fall outside the coverage of the policies, with regional governments accounting for some of these payments.

- In the **Netherlands** there has been a move away from *ad hoc* disaster aids towards insurance, which in this country is largely provided by mutuals. There has been a recent example of collaboration between private insurance companies and farmer organisations leading to the creation of a mutual that has been willing to cover risks that were previously uninsurable.

In summary, **countries display a mixed set of responses** that reflects, amongst other factors, their historical use of subsidised insurance as a policy tool. It seems that there is a move towards encouraging the use of insurance to deal with weather extremes, but direct aid is also usually needed as a supplement in the most severe situations.

9. The current management of risk in Welsh agriculture

9.1. The current approach to emergencies

As explained above, Wales has not taken up the risk management options available under the EU's Rural Development Regulation.²² There is no systematic *ex ante* provision for payments to individuals or businesses in Wales following natural disasters.²³ However, the Welsh Government explained that following a flood, and where necessary, consideration would be given to funding local authorities and Natural Resources Wales to restore damaged defences to rebuild the resilience of communities.

The Welsh Government told the consultants that the definition of an emergency is contained within Section 1 of the Civil Contingencies Act 2004 (CCA):

- a) an event or situation which threatens serious damage to human welfare in a place in the United Kingdom;
- b) an event or situation which threatens serious damage to the environment of a place in the United Kingdom; or,
- c) war, or terrorism, which threatens serious damage to the security of the United Kingdom.

A natural disaster would be covered by either a) or b). There does not appear to be a formal link with the WTO rules on the declaration of a catastrophe (under which payments are allowed) which relate to the impact on agricultural production (see section 6.1).

²² Defra officials told the consultants that England had decided not to use the EU's risk management tools because other options were felt to offer better value for money. However, it was stressed that this does not mean that there is something intrinsically wrong with the tools. Defra explained that there is general recognition that the Basic Payments Scheme acts as a cushion against risk; the Agricultural and Horticultural Development Board provides direct help to the agricultural sector in terms of managing risk. Defra officials noted that a reduction in direct payments might prompt greater farmer interest in insurance products.

²³ Compensation is paid for livestock taken by government for notifiable animal disease control purposes, in accordance with the relevant legislation. The Welsh Government (Office of the Chief Veterinary Officer) has made statutory compensation payments to farmers to control animal diseases in line with animal health legislation. Capital and income losses (e.g. loss of any income that the animal may have generated) are considered to be consequential loss and it is not government policy to compensate for such loss.

There is no mechanism formally to “declare” an emergency by the Welsh Government under the CCA.²⁴ For most emergencies, the responsibility for managing the response falls to statutory agencies which are seen by the CCA as “Category 1 Responders”. Where major emergencies require wider co-ordination, the Pan-Wales Response Plan²⁵ puts in place the relevant response structure.

The Emergency Response and Recovery, the non-statutory guidance supporting the CCA 2004, makes it clear that, “the UK’s approach to emergency response and recovery is founded on a bottom-up approach in which operations are managed and decisions are made at the lowest appropriate level”. This means that responsibility for declaring a “major incident”, i.e. “events or situations which would constitute an emergency” as defined by the Act, falls to responder agencies such as the Police and not Government.²⁶ The role of the Welsh Government in these situations is to support and supplement the efforts of local responders through the provision of resources and co-ordination.

The 2013 severe weather event did not meet the criteria for the declaration of an emergency because the impacts were not sufficiently widespread. This meant that emergency aid could not be paid. An *ad hoc* approach is taken to providing *ex post* support, as detailed in Section 3.3 with reference to the extreme weather in March 2013.

Appendix three contains a concise examination of the approach taken in England to recent crises.

9.2. Risk management on farm

Chapter 4 explained that farmers manage general risk through their choice and mix of enterprises, engagement in diversified activities, engagement in non-agricultural activities, income-smoothing (including futures contracts and contracts linked to costs of production, especially in the dairy sector) and use of government policies such as income averaging for tax purposes. Specific actions, such as husbandry decisions on the location of livestock and securing buildings for winter, are also taken.

²⁴ Defra explained that there are no set criteria which are followed to declare a crisis in England. To some extent the decision to declare a situation a crisis is political and is influenced by lobbying as well as actual need. Political considerations are key in terms of the type of support that is provided, in what form, timeliness, etc. Responses must though follow the EU rules on State Aid.

²⁵ <http://walesresilience.gov.uk/behindthescenes/walesresilience/panwalesresponseplan/?lang=en>

²⁶ A notifiable animal disease outbreak is managed under the Animal Health Act 1981 rather than the CCA 2004. The Welsh Government Contingency Plan for Exotic Animal Diseases sets out the procedures, processes and structures for an animal disease outbreak. The Plan is reviewed annually and is regularly tested in exercises and disease incidents.

The National Farmers' Union explained in interview that the CAP provides a degree of risk management (mitigation) through the Basic Payment Scheme which buffers farm revenue from price and production movements, a point also made by the Welsh Government. Farmers can receive advice covering risk management through Farming Connect (and the Advisory Service), which operates under the Wales Rural Development Plan, although there is no specific designated training in this area. Advice covers issues such as slurry storage capacity and livestock feeding requirements, as well as building design to improve resilience against bad weather. The "Farming for the Future" campaign has been launched specifically to help farmers prepare for exiting the EU. Farming Connect offered a series of Business Review Surgeries after the snow of 2013 to help farmers see how they could best recover. Leaflets were sent out to farmers in affected areas to raise awareness of the help available.

The NFU Mutual provides support to its members in terms of risk management, including advice on available insurance and advice on business planning which can help farmers deal with the impact of specific risks. However, one farming union explained that farmers have historically assumed that the CAP and other government policies would provide protection from natural disasters, including extreme weather.

The Welsh Government's Farm Liaison Service (FLS) also provides support to farmers and Gwlad is used to communicate with farmers on specific issues. However, beyond directing farmers to relevant schemes, the FLS focuses on dealing with events (emergencies) rather than on risk and its prevention. For example, in winter 2013 the FLS contacted farmers to check that they were OK and to gather information about what was happening at the local scale.

9.3. The current provision of insurance products

There are no policies currently available which explicitly cover livestock against extreme weather. However, the all-risk policies which are taken out for high value breeding stock cover death from any cause; several policies paid out after the extreme weather in 2013 where insured breeding livestock were found frozen to death.

Nuclear accidents are generally excluded from insurance, as are situations where governments instigate mass-culling programmes (in the face of disease outbreaks).

Farmers are not generally required to undertake any mitigating actions in order to obtain insurance. However, for specific insurance such as against TB, a farmer would have to comply with testing regimes. Insurers may expect farmers to follow best

farming practices in terms of mitigating risk as part of obtaining insurance. For example, livestock producers have to maintain appropriate biosecurity, etc. All must follow basic government regulations. However, one insurer told the consultants that it is generally recognised that farmers have an interest in managing risk and in doing what they can to reduce it. Insurance is something that they would fall back on, not depend on. In countries where there is large-scale insurance against hail damage to fruit, farmers still undertake many actions to reduce the likelihood of damage for their own reasons; they are not obliged to take these measures. This perception was corroborated by the farming unions who noted that farmers do whatever is necessary to protect their businesses and that “moral hazard” is not likely to be an issue because of their instinctive care for their businesses.

The Welsh Government considered the wider use of insurance as part of the cost sharing agenda, but concluded that brokers were reluctant to offer products, in other words, there is a lack of supply. As noted above, where policies are in place the cost of premiums is thought to be prohibitive. This was a view shared by the farming unions and is also widely held in the EU (see section 7.1).

The farming unions were asked whether the losses suffered in winter 2013 were severe enough to have justified farmers having insurance. The perception was that those hit hardest might well have suffered losses that would, in that instance, have justified their having insurance. However, when viewed in the context of the frequency with which this sort of event occurs, farmers would probably not have found premiums cost effective. The magnitude of losses is only part of the consideration; the likely frequency of loss is also an important factor. It would be interesting to know whether farmers badly affected in 2013 have now insured more than just breeding animals, but this was thought unlikely by one of the organisations spoken to.

9.4. Farmer attitude towards the use of insurance

The farming unions explained in interview that most farmers have some form of insurance and that some will have several policies in place (see section 9.5). The point was made that farmer use of other forms of commercial insurance suggests that ***there is no attitudinal barrier to its use against extreme weather***. However, given that premiums can be perceived as relatively high, there is a basic rationale for farmers not insuring against risks that they feel are very unlikely to occur; one insurance provider questioned whether severe weather is considered enough of a risk by farmers for them to want to take out insurance, a point also made by a farming union. The consultants were told that premiums to insure breeding animals can cost around 20% of the value of the animal and, as a result, farmers often only insure for one year and then take straws of semen so they have the breeding potential as a form of insurance. The point

about farmer perceptions of the cost of insurance on livestock as a reason for avoiding its use was also made by the Welsh Government and farming organisations.²⁷

Different farmers will have different approaches to the use of insurance informed by their attitude to risk, type of farming and their farm location. For example, an exposed hill livestock farm is more likely to face weather damage than a sheltered lowland farm and therefore may consider insurance more important (though we have not seen empirical evidence to support this).

The farming unions explained that it is likely that there is a lack of demand among their members for insurance against extreme weather. (There is also an issue with supply.) The point was made that Wales is a small country and so the potential market is not large. However, if there were to be a disaster, there would probably be systemic losses, i.e. a lot of farmers would be affected, which would make providing insurance potentially very expensive (but see the discussion of reinsurance below, Box 10.2, page 46). A contrast was drawn with the USA where insurers were felt to be better able to offset risk given the size and diversity of the country.

It was considered likely that the support provided via the CAP has hitherto provided a form of insurance and protection from volatility which means that farmers do not recognise a need for this form of insurance; farmers insure against risks that they consider they need to insure against. Asked whether farming unions felt farmer interest in insurance would increase if leaving the EU resulted in the reduction or removal of the Basic Payment Scheme, one commented that there has not (yet) been any discernible change in farmer interest in insurance since the referendum. On the other hand, one noted that Defra are considering insurance as a potential policy tool (one of several) as part of a future domestic agricultural policy.

The farming organisations were asked whether Welsh farmers would be likely to cooperate in the establishment of mutual funds as a way of coping with the risk of natural disasters. Two organisations explained that whilst farmers are happy to take measures for themselves, they would be unlikely to want to see their money potentially supporting someone else. However, another union said that the attractiveness of a mutual approach would depend on farmers' perception of risk. It might be possible to have policies which are targeted on specific commodities such as wheat or milk. The livestock sector would be more complicated because livestock can have very different

²⁷ We were told by Defra that the take up in England of some form of specific agriculture insurance is 20% in the livestock sector and 17% in the crops sector. As a general rule, we were told that the use of insurance is higher in sectors where publicly-funded support is lower.

values (according to breed, type/age of animal, etc.) which adds to the complexity of calculating premiums.

We were told by two organisations that the use of levy funds to build up mutual funds would not be welcomed by the industry; lowland farmers would not want their money to be spent on upland farmers and *vice versa*. Friction could also develop between farmers where some may not make claims due to location or robust infrastructure, whereas others would, in some cases because they had not made comparable investments in resilience.

9.5. The current uptake of insurance products by the agricultural sector

There are thirty or so risks within the total agricultural cover offered by the NFU Mutual (the market leader in Wales). Almost all farmers cover themselves against fire, theft and property damage to buildings, machinery and other assets; cover for employers' liability is a legal requirement and public liability is also routinely bought, as is motor cover. Livestock farmers often insure high value breeding animals and sheep dogs, but cover for production stock is less common. Some farmers buy loss of revenue protection in the event that assets are damaged and cannot be used. However, very little crop insurance is bought in the UK; there are policies against hail damage which have been available for around 200 years, but no cover is thought to be offered against flood damage to crops. A notable exception is frost damage to sugar beet (see Box 10.1, page 44). There is also some specialist horticulture coverage (poly tunnels, etc.).

Consequential losses (income loss and costs associated with restoration) are within the current range of cover, although the additional fodder costs incurred in 2013 would not have been covered. Consequential losses require a valid property loss claim in order to pay out (say loss of a building or machinery through fire). One insurance provider explained that the market for consequential loss insurance is small.

10. The potential provision of insurance against extreme weather

Given the current lack of supply of, and apparent lack of interest by farmers in, insurance products against extreme weather, and the difficulties reported in the literature review on providing cover for this type of risk, it was surprising to be told by the insurance industry in our discussions with them that products could, in theory, be provided relatively easily.

One insurer explained that ***the first stage in providing an insurance product is to understand the exposure*** (the value at risk). In the context of providing insurance for livestock against extreme weather, the approximate risk could be calculated from average farm sizes and average values of livestock at various stages of development and the risk of death from either extreme cold or snowfall. Some idea of previous losses would also be useful in establishing necessary premiums.

The incidence of extreme conditions is less problematic as the UK has good data on weather going back for a relatively long period of time. The level of detail available is thought to be sufficient given suitable statistical techniques, although one insurer explained that really localised events could still be problematic.

Another insurer pointed out that while temperature data are relatively easy to deal with, snow is more difficult given that it can drift and so even low levels of precipitation can result in problems in some places. Snow is also very hard to predict with accuracy²⁸ and actual records of snow on the ground might be needed rather than simply records of precipitation.

10.1. Two approaches to insurance provision

The two main approaches are:

- 1) indemnity policies, the traditional loss-assessed approach where actual losses are assessed in order to trigger payment; and,
- 2) index-based approaches (“basis risk”) where payment is made when an index is triggered.

It is possible to combine the two approaches where an index is triggered and then a specific loss is assessed.

The data requirements to calculate the premium depend on the approach used. In both cases, general weather data would be needed to establish the exposure to risk.

²⁸ <https://www.channel4.com/news/by/liam-dutton/blogs/why-you-shouldnt-believe-a-uk-snow-forecast-more-than-three-days-ahead>

Loss data from farms, including the cause of the loss, would be needed to calculate the premium for indemnity policies. There is a potential data gap here and this would have to be factored in to the cost of the premium. This approach is also more expensive to operate because loss-assessors are needed to go out on farm. According to the insurers interviewed, farmers tend not to like “basis-risk”; they prefer to deal only with their own risk. The insurers interviewed explained to the consultants that it seeks a reasonable balance between simplicity and accuracy when looking at product design and pricing.

The insurers interviewed referenced cold insurance available in England for sugar beet producers as a possible template for offering weather-related insurance products in Wales. This is the only specific insurance policy in the UK which provides cover against the impact of extreme weather (Box 10.1).

Box 10.1: Cold insurance for sugar beet

This policy is written by NFU Mutual and is a form of index-based insurance. The cover is based on data from four weather stations in the sugar beet producing area and data on yield variations over time. The weather data are triangulated with a weighting towards the station nearest the specific grower. There is a balance between the accuracy of data desirable for pricing and the reality of farming which covers wide areas.

When the temperature remains below a certain level for a specified period of time for a specific farm, the index is triggered. This means that the farm can then make a claim against the policy if their production falls below a specified level. This approach requires data to set the trigger and then data to demonstrate a loss, in other words, this is a combination of the two approaches. Premiums are calculated with reference to the frequency and magnitude of previous losses.

There is only one premium level; the growers have decided to operate collectively (mutualisation), even though many growers (those on sandy soil, near the coast, etc.) would never make a claim. The premium is subsidised by British Sugar. The insurer providing this cover uses reinsurance to manage its exposure to risk.

Another comparable product is a freeze-index policy in Mongolia.²⁹ This was developed in 2012 after a hard freeze which resulted in substantial numbers of livestock deaths. A local livestock census is now taken in the summer and, if the numbers drop by more than 6% following winter, then the policy pays out to those taking up the insurance (irrespective of the causes of death). This policy has a pure index-based approach and uses industry-level data, i.e. there is no assessment of loss at the individual farm level. We were also told about drought insurance policies operating in Africa which are run almost exclusively using satellite data. However, the

²⁹ <http://www.worldbank.org/en/news/feature/2015/03/04/new-insurance-model-protects-mongolian-herders-from-losses>

point was made that if there is a practical way to assess losses in addition to using an index as a trigger, then this is useful.

An index-based approach raises the question of whether everyone should face the same premium. Some farmers might feel that they would only need support in really severe weather events. For example, with reference to cold weather, farmers in more exposed areas might be likely to call on the policy whereas those in protected areas might never need to call on it. An index-based approach in Wales may require mutualisation to subsidise the programme.

One insurance company explained that if formulating a policy against extreme weather in Wales, the industry would first need to gather weather data to develop an index. This would involve establishing what actually happened, at what level did the event become a problem, how frequent has this severity of event been, etc. The consultants were told that some farmers in Austria buy their own weather stations to provide highly localised data. This allows insurance companies to offer specific triggers for individual farms; farmers can even select their own trigger levels (with cost implications for the premium). Such equipment is readily available in Wales (see Appendix 1) though our discussions with the insurance industry did not suggest that its use would form an essential element for their provision of cover.

Another insurer told the consultants that weather data and evidence on previous losses would allow a calibration using historic events. However, such evidence is not necessarily critical to the provision of cover. The consultants were told that some insurance policies are based on very little actual data, although the calibration should be as sophisticated as possible with the data available. In principle, even though exact data on losses do not exist, it would be possible to use estimates for index-based policies. Index-based approaches are not constrained by the actual losses incurred, the key is the frequency with which the index would be triggered and the level of payout that this would entail. How far this could be carried over to policies that also involved indemnity payouts for actual losses at the farm level, which is probably the preferred approach for Wales, is not evident at this stage. However, it is clear that the insurance sector could, in principle, offer policies in the absence of comprehensive data on past farm-level losses, a factor that would be built into the level of premiums charged. Commercial conditions for this to happen would though need to be favourable.

When asked whether extreme weather cover in Wales ought to be loss assessed or index-based, insurers explained that it could be either and that there would be a trade-off between simplicity (index-based approach) and affordable pricing (loss assessed

approach).³⁰ We were told that the perception of the insurance industry is that farmers are resistant to a pure index-based approach. Farmers who have taken up insurance against cold damage to sugar beet were more comfortable having to provide evidence of loss/damage. The insurance industry believe that this is partly related to a lack of comfort around financial engineering, which is what an index-based approach is.

10.2. Estimating premium levels and establishing the ability to pay out

It would be possible to estimate indicative levels of premiums if the insurance industry were provided with data on past losses caused by extreme weather. Whilst initial calculations would be quite generic, these would be enough to investigate affordability (and the extent to which any government support might be required). Insurance companies have to take a view on the risk they are taking as a result of not having full information and this would result in higher premiums than would result from full certainty. The (subsidised) insurance policies used in the USA have premiums around 12% of the insured value for crops and 8% of the insured value for livestock. As a general principle, we were told that any risk is insurable with an appropriate premium.

Calculating premiums for a straight index-based approach, i.e. without any loss assessment, would be more straightforward. We were told that it is even possible to start with a desired premium level and then calculate the trigger level for an index-based policy. In this case the lower the premium, the more infrequently the trigger level would have to be reached.

It is also necessary for the insurer to build up a fund from which to pay out. This fund has to be sufficient to cover payouts arising from a 1 in 200-year event and can be made up of both capital and reinsurance policies (see Box 10.2). An insurer told the consultants that there is a lot of capital globally which can be invested in risk as long as there is an appropriate return. Finding reinsurance is therefore not generally a problem. However, weather conditions in the UK are relatively benign (by global standards) and an insurer explained that persuading farmers that they need cover is not easy.

Box 10.2: Reinsurance

Reinsurance is explained in the literature review (section 5.3.1). Most insurance companies tend to have a national portfolio and therefore cannot always offset their risks themselves. For this reason, insurers often buy reinsurance cover to reduce their liabilities in the event that policies are required to pay out.

³⁰ Loss assessed approaches do entail addition costs which must be set against the more precise estimation of premiums. For example, there is a need for a loss assessor to conclude that the loss was caused by the insured risk and there would be a requirement to provide evidence of the loss, but the insurance industry explained that the evidence they would require would not be onerous.

Reinsurance companies buy different types of risks and risks in different locations so that they operate a risk-diverse portfolio which does not leave them over-exposed in one market or against one type of risk.

The type of reinsurance used depends on the risk profile of the insurance company. One of the insurance companies interviewed for this study suggested that proportional reinsurance would be most likely to be used in the case of extreme weather insurance, at least initially. This means that as the risk increases, so would the exposure of both the insurer and reinsurer. A mix of proportional and non-proportional reinsurance would also be possible where, say, risk is shared proportionally to a certain point, beyond which all the additional risk is covered. Changing the structure of the agreement would alter the price for reinsurance. A reinsurance company told the consultants that a facultative approach is only useful for very large risks (the example was given of a farm with 85,000 head of cattle in one location).

10.3. Why was commercial provision not made after the events of winter 2013?

A combined index and loss assessed approach for Wales was examined by the insurance industry after the events of winter 2013 reflecting the localised nature of the impacts. An index-only approach would have required payments to a large number of unaffected farmers (which might have been unacceptable) which would have increased premiums. However, the discussion held did not result in policies being brought to the market. One insurer explained that part of the difficulty was the availability of data at a suitable level of granularity. The point was made that conditions varied considerably at the local level. The lack of accurate data on previous livestock losses from extreme weather events was also problematic.

We were told that ***the challenge for insurers is in providing cover at a price that farmers are prepared to pay and which gives the insurer the potential for profit.*** In economic terms, the challenge is in finding the intersection between the supply and demand curves. When providing insurance against extreme weather was considered after the events of 2013 it proved difficult to find this intersection (price point).

An investigation into providing UK-wide crop insurance for arable farmers was used as an example of the difficulty in providing cover at a price which farmers would be prepared to pay. A typical UK farmer spends around £5,000 on insurance annually (there is great variability around this figure). The yield variation around “normal” for wheat means that payments might be triggered every three years (depending on the claims trigger point decided). Payouts on this basis would require an annual premium of around £1,000-£1,500 which is high in the context of the premium the farmer is paying to cover all the rest of his risks (motor, property, liability, etc). The insurance industry believes that ***farmers have an appetite to insure against events where the***

survival of the business might be in question, but less of an appetite to cover events which, while potentially damaging do not threaten business continuity.

10.4. Data sources for establishing livestock losses in Wales

The availability of data on the extent of losses (capital and income) suffered by farmers due to extreme weather and other natural disasters was investigated in interview with the Welsh Government.

Some animals are lost to bad weather every year in Wales (it is a normal part of farming), but it is not clear how many are lost normally, i.e. without specific extreme weather incidents. Without this baseline, it is not possible to calculate additional losses caused by extreme weather.

Veterinary sources could be a potential source of data as vets would be likely to be involved if large numbers of animals were affected by localised weather events (either killed or suffering adverse animal welfare consequences). We were told that individual schemes have used data on animal deaths on farm. For example, the 2012 outbreak of Schmallenberg virus may have involved hardship payments, the need for which would have been determined from the veterinary side. It is likely that there was some sort of evidence base behind these payments, although this is not something that we have been able to verify.

There is an official scheme for removing animals which die on farm, but, according to the Welsh Government, this does not have high take-up; other ways of disposal are used (from donation to kennels to (illegal) burial on farm). This could be a useful source of information, but it is clearly not comprehensive.

The Welsh Government explained that cattle have to be individually registered and so there is potential to build a data system around animals which die on farm. The registration system is becoming more advanced for sheep as well allowing individual identification, although batch registration is still used. We were told that it ought to be possible to identify abnormal numbers of deaths from these data sources. If an insurance scheme were to be introduced, there is potential to develop these registration systems to evidence losses.³¹

We were told that ***there is no data set that provides detailed financial information from all farms***. The most comprehensive dataset is the Wales Farm Business Survey

³¹ Another potential data source mentioned was EDI Cymru, an initiative to provide electronic tagging for sheep and goats run by the industry for the Welsh Government.

(FBS) which encompasses 550 farms. This small sample size makes it unlikely that the FBS would include enough farms affected by localised extreme weather to allow this source to be used to provide data. Other technical barriers exist to using the FBS as a source. For example, the survey is anonymous, so the Welsh Government does not know the identity of farms in the sample. This makes it difficult to even locate farms within areas affected by extreme weather.

Linking losses in income to causal factors is not straightforward. Turnover levels are very variable anyway so, even if a farm could be shown to be in an affected area, it does not necessarily follow that this would have been caused by the extreme weather event. The more complicated the link between the animal and the financial return is, the harder it is to link causality to weather events. The cost of losing a lamb which would have been slaughtered is relatively easy to establish. However, establishing ultimate financial loss from losing a breeding ewe with breeding seasons left is much more complicated. Beef sucklers can produce calves for up to ten years; an early loss could be substantial. Whilst lost breeding stock can be replaced, there is a premium because these are recognised as capital assets rather than revenue.

The consultants were told that it had not proved possible to link revenue impacts to the Foot and Mouth Disease outbreak, even though this was relatively widespread. Localised issues can hit individual farms very hard, but might leave no trace on farms not affected, but in the same locality. In conclusion, the Welsh Government felt that it would be very hard to collect sufficient data through the FBS to allow insurers to risk assess policies.

The Welsh Government told the consultants that, in theory, the tax system could be used to provide data on losses (although issues of causality would remain). This would require individual tax returns to be linked to status as a farm, and this might not be something that HMRC would be willing to allow.

10.5. Potential for Welsh Government support in relation to extreme events

10.5.1. How can the Government provide support?

As the literature review has shown, **there are several ways for governments directly to address the impact of extreme weather events.** Only some involve insurance. An *ex ante* approach is taken in New Zealand where farmers are aware that there is a graded set of responses to disasters of various levels of seriousness. One of the farming unions interviewed for this research suggested that a similar system could operate in Wales, although the frequency of events which might require support would be lower than in New Zealand. It was also thought that flooding would be a more

suitable risk to tackle in this manner given that it occurs more frequently than heavy snow. That said, the union was unsure that even flooding is a significant enough problem in terms of its impact on national production to warrant intervention. It was noted that the advantage of an *ex ante* approach is that farmers know where they stand in relation to support.

10.5.2. Government attitude towards providing support

The Welsh Government explained that *ex ante* payments are contrary to Welsh Government policy (although flood mitigation measures are a feature of some agri-environment schemes). However, an *ex ante* approach need not involve *ex ante* payments, just the establishment of a set of actions to be followed when triggered by extreme weather. Elements of an *ex ante* approach are actually in place already in Wales, see section 1).

Policy officials within the Welsh Government were asked about Government attitude to providing help to support the provision of insurance products to the agricultural sector. The following potential options were listed:

- subsidies to premiums charged by commercial insurance providers;
- supplements to indemnity payments to farmers;
- a Welsh Government-operated insurance scheme;
- direct re-insurance by WG of commercial providers of insurance;
- subsidies to re-insurance of commercial providers; and,
- subsidies to the establishment and/or running of mutual funds to cover such losses (including tax relief on contributions)?

It was stressed that while the Government has no current plans to introduce a natural disaster scheme with the commercial sector, ***support would not be ruled out for any of the options at this stage***; Government lawyers and business experts would need to assess these options once developed further. No work has been carried out to investigate any of these options to date. The Welsh Government has partnerships with commercial operators in several economic areas, so it is possible to envisage a system under which commercial insurance could be used to cover some level of risk with the Government providing *ex post* payments beyond this. Of course, any proposals for such a system would need to be fully assessed and scoped.

Welsh Government officials explained that support to facilitate insurance would be limited by the availability of funds to resource such a scheme. ***The Government could not estimate the level of annual subsidies that could be tolerated by the national budget***. State Aid rules currently apply and restrict the Government's options for intervention (see Appendix 1, section A1.6.1). However, ultimately it is for the Welsh

Ministers to determine policy based on priorities and risks. It was noted that Ministers might also have political reasons for not supporting such an approach.

10.5.3. Farming sector attitude to potential Government support

Farming unions told us that ***farmers would consider insurance against the impacts of extreme weather events if this was incentivised*** (via the farmer or the insurer). One union pointed to the use of subsidised insurance in Canada and the USA to support this argument. Another union felt that farmers' decision to take up insurance is simply a matter of balancing perceived risk against cost and that subsidising insurance would alter this balance by reducing the premium. It was suggested that one way of doing this could be via tax relief on premiums.

It was also noted that to date, the Government has supported industries (not just agriculture) almost as an insurer of last resort. If this were not the case in the future, the union thought that farmers would probably think more carefully about using insurance. However, there is an expectation currently amongst farmers that support would be provided in extreme cases.

10.5.4. Insurance industry attitude to potential Government support

The insurance companies spoken to were asked whether, from their side, reinsurance by the Welsh Government would be a viable option to make the provision of cover for extreme weather events commercially viable. All agreed that this would be an option worth exploring; the private sector can deal with attritional low volume risk, but government help can be needed beyond this. One operator explained that ***some form of public money would probably be required in order to facilitate the provision of insurance against extreme weather in Wales***. This operator pointed out that public money is used with respect to earthquake/flood insurance in some countries where the private insurance sector does not find it commercially attractive to offer cover. Another pointed out that, in a sense, the Welsh Government is already the insurer of last resort and that the US government acts formally in this role.

The consultants were told that there are cases where governments provide a cap on reinsurance losses. For example, the government of South Korea receives a premium from reinsurance companies to provide a loss cap.³² Under this policy, the government covers losses above a 300% loss ratio. Such an approach can provide cover for a 1 in 250-year event, whereas the private sector might only be able to provide cover for a 1 in 100-year risk on a fully commercial basis.

³² The nature of the insurance was not specified, but is not relevant in any case.

A reinsurer explained that internalising the cost is probably the most efficient approach to reinsurance and that lowering the cost of reinsurance would drive down the cost of insurance to farmers. If the Welsh Government acted as a reinsurer, it would have to make sure that these cost savings were passed on to the farmer and were not captured by the insurance industry.

The insurance companies interviewed for this research were asked whether, hypothetically, they would be willing to operate an insurance system on behalf of the Welsh Government, in return for a suitable fee. The response was rather equivocal. We were told that while this would be technically possible, there would need to be certainty that this was appropriate and the support provided would be adequate to cover for lost commercial opportunities. However, one operator said that as insurance is offered on a commercial basis, it should not be necessary to incentivise the industry, unless this is necessary to break inertia. We were also told that designing a system would be challenging and that the system would need to be as simple as possible for farmers.

Insurance providers explained that other countries subsidise insurance in different ways (see also the literature review). We were told that in most countries where there is subsidised insurance, the farmer is charged the whole premium and receives support in turn from the government. However, in Canada, the government makes a direct payment to the insurance providers to cover the expenses of running the scheme; payments to subsidise premiums are also paid to the insurer. In the US, the level of subsidy is the subject of negotiation between the government and insurers (the subsidy, which contributes to running costs, is paid to the insurers).

For sugar beet insurance in the UK, the subsidy (from British Sugar) is paid to the grower. In the case of insurance against extreme weather, as this would be an infrequent loss situation, the insurance providers felt that any subsidy would be better paid to the insurer (insurers, reinsurers or both) rather than to the farmer.

As alluded to in section 10.5.3, subsidies do not have to involve actual transfers of money. We were told that in Australia, the government is considering providing a tax-break on insurance payments (this lowers tax receipts, but does not require a direct payment from the government). According to an insurance company interviewed, there is a risk in paying subsidies to farmers that this money may not always be used for insurance premiums. It is easier to have the government pay the insurers directly in return for lower premium payments.

According to one insurer spoken to, the Flood Re model (see section 7.2) is unlikely to be appropriate in relation to extreme weather because the pool of agricultural insurers would not be large enough to build up sufficient capital reserves. In the opinion of this insurer, there would have to be a new tax on agricultural insurers which would require primary legislation and which might not be viable in any case. This insurer felt that Government support, not just an industry pool, would be required to make something like Flood Re work for extreme weather insurance for agriculture in Wales (and the wider UK).

In principle, it would be possible to hold a Dutch auction if extreme weather insurance were to be subsidised in the UK, but there are not many insurers. There are, though, a lot of reinsurers globally who would be interested in the UK market.

Finally, it would be possible for the government to buy the policy on behalf of farmers, the farmer need not be involved at all. The farming organisations spoken to felt that subsidising payments (by whichever means) would encourage some farmers to take up insurance against extreme weather, but the nature of the policy offered would also be key to uptake.

11. Options for Wales

This section brings together the research undertaken to provide a set of options for dealing with extreme weather crises in Wales, assesses how they compare and how they could be brought to market.

There is a wide range of possible options, only some of which include subsidised insurance. These have been set out in this report, with the insurance-based approaches investigated further in the Welsh context through our interview programme. It should be noted that these options are not equivalent in terms of the support they would offer the agricultural sector and, as a result, they would have different impacts. These options include the following:

- *Ad hoc* aid organised *ex post* and financed from government non-specific reserves (as used in Wales in winter 2013)
- Stratified planned approach setting out pre-determined responses to defined events (an *ex ante* approach)
- Government-run income or revenue safety nets
- Mutual funds
- Commercial insurance
- Subsidised insurance

The ***stratified planned approach***, under which a graded set of responses are set out *ex ante* to disasters of various levels of severity (as used in New Zealand's Adverse Events Framework, where drought is the main risk factor, though it should be noted that subsidised insurance does not form part of the response package). This approach was thought by one of the farming unions to be capable of operation in Wales and received support from other sources. A feature of this approach in New Zealand is to ensure that all opportunities are exploited by farmers.

It should be noted that basic elements of an *ex ante* approach already exist in Wales in that Farming Connect offers advice and training which farmers can use to manage their risk. The availability of this advice is clearly signposted by the Welsh Government. The opportunity for farmers to carry out income averaging to reduce their tax bill already in place, as is access to commercial credit and social security payments. Further elements of support could be added to this existing framework. For example, the Scottish Government announced in November 2017 that it is to set up a special advisory panel to help farmers and crofters respond to the effects of extreme weather on their businesses.³³

³³ <http://www.fwi.co.uk/news/expert-panel-help-farmers-battling-extreme-weather.htm>

The consultants were told that a formalised and further developed *ex ante* approach to extreme weather might be better suited to dealing with flooding rather than heavy snow because of the very localised nature of the latter. A formalised system might also be better suited to situations where extreme weather events are both more frequent and more severe. The public costs of an *ex ante* approach clearly depend on what is provided, but it should be noted that they extend beyond the agricultural budget into the social welfare system and HMRC; this can be seen as an advantage if the agricultural budget is under pressure. Additional costs of signposting are likely to be modest and already covered under Farming Connect and the Farm Liaison Service. It should also be noted that the farming charities and other organisations play a role in this signposting too.

Government-run income or revenue safety nets (as used in Canada and the USA) need to be mindful of WTO requirements. A key requirement is that income losses can be demonstrated at the level of the individual farm, which is very data-demanding and is only practical in countries where there is ready public access to taxation records or similar registers that cover all operators of farm businesses (a sub-sample is not sufficient). In the UK, access to such data is not available to the operators of agricultural policy support mechanisms, so such an approach can be ruled out for technical reasons, at least for the foreseeable future.

Mutual funds are widely used in some other EU Member States, but there is little tradition of their use in the UK in the co-operative form found elsewhere (for example, in France and the Netherlands). This lack of familiarity may help explain the negative perception that the farming industry appears to have, although it is also possible that a generally negative perception explains their lack of use. The consultants were told that farmers would be reluctant to engage with mutualised funds because there is a potential discontinuity between those paying into these funds and those drawing on them. In the specific case of extreme weather, farmers in more sheltered lowland areas would be reluctant to pay into funds more likely to be drawn on by farmers in more exposed areas. Consideration of the use of levy funds for this purpose was considered a non-starter by farming unions. The use of mutual funds can therefore be ruled out on the grounds of acceptability.

Commercial insurance might develop against a policy background which involves the removal of direct support in the form of the Basic Payment Scheme which, to some extent, currently “crowds out” commercial insurance by providing a degree of protection from risk. However, the extent to which this commercial market might develop is by no means clear due to factors on both the supply and demand sides

(farmers tend to underestimate irregular and very occasional risks and it would be necessary for farmers to be reminded of these risks on a regular basis) and the lack of clarity at this stage in the development of future UK domestic policy. The Government's role in the provision of commercial insurance is limited to facilitation through addressing market failures in information. The costs of this are likely to be fairly modest where existing data infrastructure could be developed.

The purpose of this research was explicitly to consider the use of **subsidised insurance** in comparison to the *status quo*. While a member of the European Union, there was the possibility to use the risk management toolkit under the Rural Programme Development component of the Common Agricultural Policy (Pillar II), one element of which is subsidies to insurance. However, since this work was commissioned, the UK took the decision to invoke Article 50 of the treaty on the Functioning of the European Union with the likely consequence that the UK leaves the EU and therefore the CAP. This renders the use of the RDP risk management tools rather less likely and instead places this work in the context of a possible national agricultural policy. This has meant a stronger focus on the provision of subsidised insurance in principle, which might form part of future Welsh agricultural policy, rather than on the take-up of the option involving joint funding under the CAP.

The next section therefore examines the possibility of developing a subsidised insurance framework and compares this to the current use of an *ad hoc ex post* approach. It should be noted that the two approaches do not deliver the same impacts. The *ad hoc* approach in Wales has, at least so far, not attempted to compensate businesses for losses of animals as capital assets; rather, support has been focused on how these losses have impacted on personal living standards, well-being and farm viability, but with the amount of support available quite restricted and shaped with the household needs primarily in mind. In contrast, the use of subsidised insurance can be expected to be concerned primarily with the impacts on the business in terms of assets (livestock) destroyed and consequential falls in anticipated profits from the business.

11.1. Comparison of subsidised insurance against the *status quo*

We have used a SLEPT³⁴ analytical framework to assess the potential to use subsidised insurance and to compare this to the current use of an *ad hoc* approach (as applied after the events of winter 2013). Many of the aspects relate to insurance whether it is subsidised or not. It should be recalled that there are different approaches

³⁴ Social, Legal, Economic, Political, Technological. SLEPT is a development of PEST analysis that adds Legal considerations.

to subsidising insurance and these might result in slightly different issues; the approach used to date has focused on farmer household welfare and business continuity whereas subsidised insurance would focus on capital losses and associated effects on profit.

Table 11.1: SLEPT analysis of subsidised insurance versus an *ad hoc* approach

	Subsidised insurance	<i>Ad hoc</i> approach
Social	<ul style="list-style-type: none"> • Farmers are comfortable with the concept of insurance. • Farmers need to recognise a risk that need insuring against. • There would be no stigma in calling on an insurance policy. • Farmers are comfortable with policy which receives public support. • Insurance would be available nationally, but would be called upon as required at the local level. • (Voluntary) insurance might not be taken up by all farmers. 	<ul style="list-style-type: none"> • Distributing money via charities might make some farmers unwilling to accept support. • Support can be tailored to welfare needs (socially targeted). • Support can be delivered in a timely way. • Support is made available where it is needed, i.e. at the local level. • Support is made available universally where deemed necessary.
Legal	<ul style="list-style-type: none"> • There is no requirement for legal changes to facilitate commercial insurance. • Providing subsidised insurance would almost certainly require legislation. 	<ul style="list-style-type: none"> • Support is not provided directly to farmers related to production and there is therefore no need to ensure compatibility with State Aid or WTO requirements.
Economic	<ul style="list-style-type: none"> • There may be costs associated with addressing data gaps to facilitate commercial insurance. • Subsidised insurance would involve a regular cost which would need to be determined in conjunction with the insurance companies. • Once established, the costs would be known and regular which would allow accurate budgeting. • It would be necessary to decide how to provide the subsidy, i.e. to farmers or the insurance industry. 	<ul style="list-style-type: none"> • Support is provided “as needed”. Whilst political pressure could bid the amount of support up, it is also possible that a lack of concerted pressure and/or other demands for political attention could result in a payment lower than might otherwise have been provided. • Uncertainty means that the government is not able accurately to budget for the use of <i>ad hoc</i> support, neither do farmers know what to expect in the case of disaster. • Funds will be drawn from government contingency funds and therefore there is a need for government to maintain these funds.
Political	<ul style="list-style-type: none"> • No political impact in relation to commercial insurance. • Subsidised insurance would require political agreement and the allocation 	<ul style="list-style-type: none"> • By agreeing <i>ad hoc</i> support, the government is seen to be doing something.

	Subsidised insurance	Ad hoc approach
	<p>of necessary funds which would then not be available elsewhere.</p>	<ul style="list-style-type: none"> Charities may not be willing regularly to act on behalf of the government if they experience difficulties in providing support due to eligibility criteria, etc. Government may face claims for similar treatment of other sectors (such as tourism) where natural catastrophes have impact.
Technical	<ul style="list-style-type: none"> Weather data is generally of high quality in the UK. However, data on snow is more problematic due to its tendency to drift. Data on actual losses resulting from extreme weather are sparse. Although insurers have explained that it is possible to estimate premiums with very little actual data, this data gap is priced in, making premiums higher. 	<ul style="list-style-type: none"> Technical requirements are low. The Government can largely leave intervention to the charities once the area affected has been defined and broad basis of support agreed.

There are advantages and disadvantages of both subsidised insurance and the *ad hoc* approach previously used. A key advantage of the *ad hoc* approach is simplicity, there is no requirement for legislative change and no requirement to develop data sets to allow premiums to be calculated; technical requirements are low. However, this approach implies budgetary uncertainty and does not provide certainty for farmers in terms of what they can expect when faced with a disaster; a subsidised insurance approach would provide certainty on both sides. In social terms, farmers may be reluctant to accept help from charities and are more likely to draw on their own insurance policy, however, voluntary insurance might not be universally taken up. Finally, a subsidised insurance approach better fits within the cost sharing agenda than the *ad hoc* approach.

11.2. Route to market

The *ad hoc* approach used in winter 2013 has been reviewed and lessons have been learned. This section therefore focuses on the route to market for both commercial and subsidised insurance. ***Even if an insurance solution is in place, there may still be calls for ad hoc assistance in the form of welfare support in the most extreme situations***, although this might be politically awkward as those with insurance policies might consider this unequitable.³⁵ In this context, it should be noted that *ad hoc* support

³⁵ The literature review found that in Canada and the USA the extensive use of insurance had not completely eliminated calls for and provision of *ad hoc* aid.

is often not available where insurance policies exist to avoid moral hazard (see Chapter 7).

When considering the route to market for insurance policies against the risk of losses from extreme weather events, it is necessary to distinguish between commercial and subsidised provision.

Our discussions with the insurance industry made clear that insurance against extreme weather events in Wales is unlikely to be provided on a purely commercial basis. This possibility was examined after the events of winter 2013, but the information gap with respect to the value of losses was a major contributing factor explaining why policies were not offered. This implies that ***had there not been an information gap, commercial policies might have been written***. However, this is not necessarily the case; the size of premiums (reflecting the value of losses and the frequency with which these can be expected) might have been considered unaffordable by farmers, made more so by the loading of premiums that would have been incurred through using inadequate and incomplete data. Nonetheless, a prerequisite for the development of commercial insurance would appear to be the availability of adequate information on the value of losses incurred. Ways in which this market failure might be addressed have been explored with the Welsh Government. These focused on the potential to develop existing information systems to capture the information required.

In addition to the cost of premiums, the appeal of insurance to farmers depends on the wider policy framework. The support provided under Pillar I of the CAP reduces the need for farmers to consider insurance policies. Domestic agricultural policy after the UK leaves the EU will be influenced by the relationship with the single market post-exit and, at this stage, this remains unknown. However, ***should direct payments be removed or severely scaled back, farmer interest in insurance may naturally increase***.

It is possible, but by no means certain, that commercial insurance policies would be brought to the market if information were made available on actual losses incurred due to extreme weather events. Domestic agricultural policy could also change in ways which encourage farmers to take steps to insure their own risk, for example, if direct payments were removed or severely curtailed. However, should these conditions not be met, or, if they are met and commercial provision is still not brought to the market, then it may be necessary to consider subsidising the provision of insurance, if this is felt by the Welsh Government to be a suitable policy direction. As noted above, this is likely to depend to some extent on the domestic agricultural policy in place after the UK leaves the EU.

The first step on the route to market in this case (assuming that the information gap has been successfully addressed) is for the Government to declare a willingness in principle to assist the insurance industry in writing policies. At the present time, insurance companies have only been willing to discuss generalities. Having decided that this is something that is seriously to be explored, ***the Welsh Government would then need to engage in detail with the main suppliers of insurance*** in Wales, or a consortium of them, to discuss the practicalities. While our discussions with the industry have explored the issues in a preliminary way, it was evident that matters needed to be put on a more certain and official footing before the potential providers were prepared to reveal details which might carry commercial sensitivity (such as premium levels).

This discussion would need to cover the nature of support provided such as whether the insurance industry would require a fee to provide an insurance service, the level of subsidies needed to support provision, whether these should be paid to farmers or insurers, whether insurance would be mandatory or voluntary, whether, and in what form, reinsurance would be required, whether it would be necessary for the Government to cap the liability of insurers to contain their exposure to risk, etc.

12. Conclusions

This research for the Welsh Government was prompted by the extreme weather event of winter 2013 and was initiated before the UK's referendum on leaving the EU. The context was therefore different from the present, with the potential use of subsidised insurance against extreme weather events then seen as an option under EU rural development policy. The subsequent vote to leave the EU, though likely to close off the RDP opportunity, opened up the possibility of subsidised insurance as a policy tool within domestic agricultural policy.

In addition, the effects of anticipated climate change are uncertain, but include generally higher temperatures and, as a result, reduced snowfall. However, rarity may exacerbate impacts if farmers no longer routinely prepare for heavy snow. On the other hand, there may be increased incidence of other extreme weather such as summer drought and winter flooding. ***It is therefore possible that insurance against extreme weather will be of greater interest in the future.***

The OECD recommends that Governments take a holistic approach to risk management, starting with the provision of information and training, their “risk retention layer”. The Welsh Government deals with this principally through Farming Connect. To date, this approach has been supplemented by the provision of *ad hoc ex post* support. Whilst “ordinary” risk, the OECD’s “market insurance layer”, is adequately addressed via commercial insurance policies, there is no commercial provision against the impact of extreme weather events, the OECD’s “market failure layer”.

After the extreme weather events of winter 2013, the Welsh Government provided £500,000 to three farming charities to allow them to provide complementary assistance to the agricultural community. This assistance focused on the welfare of farming households and short-term business continuity. Though not the route chosen, had there been a policy concern with impact on productive capacity, disaster aid in the form of *ad hoc* compensation for lost animals might have been made from public funds. ***A system of insurance, when used against extreme weather events, would offer protection through providing compensation for asset loss and income foregone;*** such provision would not therefore be directly comparable to the approach taken in 2013.

The use of (subsidised) insurance has proved to be a practical way of providing support to agricultural sectors outside Wales, most notably in Canada and the USA, though policy history, insurance penetration and data sources there are different from Wales/UK. Insurance is also successfully used to provide cover against natural

disasters, for example cold insurance for sugar beet growers in England and livestock producers in Mongolia.

Whilst farmers in Wales have a clearly demonstrated appetite for various forms of “ordinary” insurance, they hold **a perception that the cost of premiums for insurance of non-breeding livestock would be prohibitive**. Our interviews and literature review revealed **no intrinsic attitudinal barrier against the use of insurance against extreme weather risks**, although there is some suggestion that farmers underestimate the impact of events that are relatively rare.

However, **there is no apparent present effective demand for this form of insurance in Wales**. This is likely to be at least partly because direct payments under the current policy framework to some extent “crowd out” the need for insurance solutions to the presence of risk. Within the context of the UK leaving the EU, it is possible to envisage a future domestic agricultural policy under which insurance solutions become more attractive, such as if direct payments are reduced in magnitude or removed altogether.

Given the current lack of supply from the insurance industry of policies covering losses from extreme weather, our initial expectation had been that there were technical barriers to the introduction. However, this research has shown that such provision is more possible than initially thought since providers have ways to address these problems. As noted above, the reason for the lack of development of products to date is related to the existing policy framework and an associated lack of demand. That said, provision might be hampered by the failure of demand and supply curves to intersect, i.e. **premiums would need to be at a level farmers are not prepared to pay**.

Part of this problem appears to relate to market failure in terms of data on actual losses. The insurance industry explained that, while data on the value of losses are not actually required to establish initial premium levels, the lack of information has to be priced in, meaning that premiums are higher than they would otherwise be. Nevertheless, **the lack of information on the value of losses was cited as the main explanation why it did not prove possible for the insurance industry to develop commercial policies against extreme weather after the events of winter 2013**. The OECD notes that facilitating good start-up conditions (information, regulation and training) should be the primary role of government in the development of commercial insurance. **Consideration should therefore be given to gathering and developing likely sources of data relating to losses of animals**. According to the evidence gathered

as part of this research, the availability of reinsurance does not present a barrier to the development of commercial insurance.

Insurance companies told the consultants that they would be willing to consider various forms of insurance products subsidised by the Welsh Government.

They would also be prepared to consider operating an insurance system on behalf of the Welsh Government for a suitable fee. We were told that a variety of methods exist to subsidise insurance, including granting tax relief to premiums, making payments to farmers, and subsidising the insurance industry directly. The latter approach is, perhaps understandably, more attractive to the industry and is probably also a less costly way of providing subsidy, as it would avoid contact with individual farmers and validation of their insurance purchases.

A variety of approaches to subsidising insurance would be possible and, in view of these unknowns, the level of subsidy required cannot be estimated without discussion between the Welsh Government and insurance suppliers.

Should the Welsh Government decide that subsidised insurance provision is worthy of serious investigation as a policy tool after the UK leaves the EU, it would be prudent to undertake further exploration with insurers as to how this might be done. Before embarking on such discussions, as noted above, it would be useful to undertake further development of data systems capable of providing information on actual livestock losses through extreme weather.

Our discussions with the insurance industry could not take the estimation of costs any further than general principles. ***A more closely specified set of intentions on the part of the Welsh Government is required to go further.***

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