Final Thesis

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Let the markets in! A question of private flood insurance in the Netherlands?



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Abstract

At present in the Netherlands, a public flood compensation program is in operation. Some consider this system to be inefficient and no longer appropriate. As severe weather events become ever more frequent, linked to climate change, compensation payments may put the government under increasing financial strain and there is a belief that some or all of the risk should be transferred to the private insurance sector. For others, however, the collective approach to flood compensation has been a necessary component of the country's successful flood resilience over the last half a century. Based on an evaluation of the strengths and weaknesses of public and private flood insurance and compensation schemes used in other countries, this thesis will seek to determine whether the introduction of private flood insurance to the Netherlands is socially and economically desirable and under what conditions this might take place.

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"For Jesse Finander – a great guy and inspirational friend."

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1 Introduction

1.1 Climate Change and Flood Risks

Already, floods impact more people globally than any other form of natural disaster. Yet the risk from flood events is frequently underestimated (Swiss Re, 2012). The IPCC recently signalled that the severity and frequency of flood disasters would rise in the future. Year on year, an even greater number of people will be affected by flood damage. Further, total annual economic losses from flooding are also anticipated to rise due to a greater concentration of vulnerable assets (Swiss Re, 2012). The need for society to take adaptive measures against flooding is becoming urgent (IPCC, 2012). How governments respond to this challenge varies considerably. Differences are related to historical, political and institutional factors, national insurance market characteristics and variations in actual flood risks. Indeed, a national flood compensation system that works in one country will not necessarily work in another. Hence, although it is not realistic to think in terms of a one-size-fits-all solution (Jongejan and Barrieu, 2008), it is instructive to examine key elements of national financial compensation systems to find examples of good and bad practice that could potentially be replicated or adapted.

With climate change, the costs of flood impacts are frequently underestimated and are rising (Swiss Re, 2012). National flood compensation systems have the potential to help societies adapt to negative impacts of extreme weather events by spreading risk and providing incentives for risk reduction (Botzen and van den Bergh, 2008). In most industrial countries, flood insurance is a complex multifaceted task that often draws on the expertise and financial resources of both public and private sectors (Paudel, 2012). Yet, in the Netherlands, following the catastrophic 1953 North Sea flood, the insurance industry withdrew flood insurance from the market, citing the commercially unacceptable degree of flood risk the country faces. Since then, the Dutch government has assumed responsibility for flood compensation.

With the continued encroachment of urbanisation into flood prone zones, such as sea boards and floodplains, if no significant private flood insurance is made available, the overall liabilities associated with flood risk that the Dutch government currently underwrites can be expected to increase further (Aerts & Botzen, 2011, Pryce & Chen, 2011). This situation is regarded as problematic by those who consider the current public arrangement as an inadequate and economically inefficient response to more extreme weather events.

Floods come in more different forms than other natural disasters including flash floods, river floods, storm surges, dam or dike breaches, ground water saturation, torrential rain and tsunami. Devastating floods, in common with other natural disasters, can never be completely avoided and are known to be difficult to insure for reasons related to their low probability and high impact. Recently, however, as a consequence of improvements in risk modeling, the insurance industry is reassessing the limits of what is thought to be technically insurable (Swiss Re, 2012) and insurers are once more looking to sell flood insurance to the Dutch public¹. Against this backdrop, whether it is still appropriate that the Dutch government remains the sole actor liable for the compensation of potentially huge losses from flooding is a valid question that deserves critical examination.

¹ In 2012, a startup company, Neerlandse, began selling an online flood insurance directly to the Dutch public and the Dutch Association of Insurers proposed a mandatory flood insurance system. Both these recent developments are highly significant to the Dutch context where for many decades flood risk has been viewed as too great for the private insurance industry to cover. Neerlandse is not a member of the Dutch Association of Insurers.

1.2 Compensation Arrangements

Flood compensation or insurance² in many countries is considered an important instrument to stimulate private households and communities to invest in flood prevention and flood protection measures. Under certain conditions flood insurance can be an effective strategy to reduce flood risk uncertainty by spreading financial risks geographically and intertemporally (Kunreuther and Rose, 2004 from Botzen, 2010). A national flood insurance system is considered to be effective if it delivers benefits not only to the insurer and the insured but also to the wider society in which it operates. Benefits to society will, however, only accrue if the system is financially viable and also economically efficient. The financial viability of flood insurance systems involves many factors. The most important determinant is that the cost of paying compensation should be spread across a large number of policyholders so that transaction costs are low and the capital fund accrued from policies sold is sufficient to cover insured flood losses each year.

Economic efficiency³ in the context of this thesis refers to the role flood insurance systems can play in optimising the allocation of resources in society. Economic efficiency is related to flood insurance as, according to a report from The World Bank, nations with flood insurance systems recover faster from floods and therefore incur lower economic losses compared to countries with no or little flood insurance in place (The World Bank, from Verbond van Verzekeraars, 2013).

In the Netherlands, the system of financial compensation for flooding is the responsibility of the state. Specifically, public payment of flood compensation is legislated for under the 1998 Calamities and Compensation Act (WTS). Since the 1950s, no mainstream form of private flood insurance has been available to the Dutch public. Instead there is a legal provision for limited financial compensation payments from the government to flood victims under certain conditions specified in the Act⁴. As weather conditions are expected to become more extreme, critics of the current arrangement point out that the total public flood loss liability for the Dutch government is anticipated to increase beyond the financial limits set in the WTS and may become an increasing burden to the Dutch state (Botzen, 2010).

Over the last two decades, several attempts have been made to create a role for private flood insurance in the Netherlands. The most recent call for change came from the Dutch Association of Insurers in 2013 in their proposal for the introduction of mandatory flood insurance to be sold by private insurers. The association made its case for change based on three main arguments. First, they referred

² Flood insurance is an ex-ante contract in which an individual or entity receives financial reimbursement for flood related losses from an insurance company. If the terms of the insurance contract are fulfilled, a pre-agreed level of compensation will be paid the the policyholder. At its most basic, flood risk insurance works by spreading the burden of the risk of flooding across many individuals and geographic regions. The insurance company pools clients' risks to make payments more affordable for the insured and to make a profit (Investopedia, 2013). Flood compensation is defined as ex-post payments aimed at helping flood victims to recover from the losses suffered. Flood insurance with a system of national flood compensation system to include private flood insurance with a system of national flood compensation are used interchangeably.

³ For the purpose of this thesis, economic efficiency is broadly defined as a state in which a society's resources are optimally allocated to maximise benefit for each person while also minimizing waste and inefficiency (Investopedia, 2013). A narrow economic definition of economic efficiency which involves reaching a Pareto optimal state i.e. when any changes made to advantage one person would harm another, is not used as it ignores overall well being of society which is a central concept to this thesis.

⁴ The WTS has an annual cap of 450 million euros and is designed to pay out on an ad hoc basis when a natural disaster occurs. Compensation through the WTS is limited to freshwater floods. Sea floods, for example, storm surges, are specifically excluded by the WTS as the risk is regarded too large and unpredictable.

to the growing risk of flooding as a result of climate change. Second, they highlight alleged weaknesses related to the absence of market mechanisms in the current system. It is argued that because the entire burden of financing the flood management system rests with government, this can lead to inefficiency across the system. Third, that there is an issue of moral hazard as those individuals or entities at risk of flooding have little financial incentive to invest in flood prevention or adaptation to minimise the cost of flood damage if they expect that the government will ultimately foot the bill. The proposal from the Dutch Association of Insurers was however rejected on grounds that their suggested changes breach competition rules.

This critical stance towards the absence of private flood insurance in the Netherlands is, however, not universal. According to the Delta Commission, the collective basis of flood governance in the Netherlands is a defining national characteristic which has been successful at minimising flood risk in the Netherlands for many decades (Deltacommissie, 2008). The collective and public nature of the current compensation system under the WTS can be viewed as the bedrock of Dutch flood management policy. The current flood compensation policy represents a truly societal sharing of the single greatest natural threat facing the future of the Netherlands. Over the last half a century, given the low incidences of flooding, the public Dutch system of flood resilience has been evidently successful. It can be argued that to a society that faces such a singular collective risk, the entire public nature of the system of flood management, including flood compensation has ensured that floods are as rare as they are unacceptable.

Consequently, there is a view that the contingent and commercial or market driven nature of private flood insurance systems offers fewer benefits when compared with a universal and public flood compensation system. Given that losses resulting from the few floods that have happened in the Netherlands over the last decades have been compensated and recovery times have not been significantly delayed, it is reasonable also to question what benefits a move to a system of flood compensation based on private insurance arrangements would bring.

1.3 Knowledge Gap: Private Flood Insurance in the Netherlands?

As a result of their geography, the Dutch have been compelled to continually challenge existing strategies in order to find improved ways to manage the threat of flooding. As the public backlash after the catastrophic 1953 floods demonstrated, avoiding complacency in relation to flooding is as much a political and economic imperative as it is a social one. Since the fifties, a great deal of technical knowledge has amassed around both water management and the mechanics of flooding in the Netherlands. Less, however, is known about the social and institutional aspects of modern flood compensation and recovery. This is reflected in the preamble to the Delta Commission report, which states that the primary working assumption regarding the future of Dutch water governance is "that a safe Netherlands is a collective social good for which the government is and will remain responsible." (Deltacommissie, 2008: P.6). The report then goes on to state that while other countries may have poorer levels of protection, they often have better systems of disaster management, including better flood compensation arrangements. This is an explicit acknowledgement that the current system, while highly effective at flood prevention, could be improved in relation to flood compensation. This research will, therefore, attempt to contribute to three knowledge gaps within this field that are identified below.

First, despite recent attempts to change the current system the debate around public/private flood insurance has not yet been systematically addressed through the application of evidence based research. By way of illustration, regarding the future financing of flood risk for new developments, the

Delta Commission report stipulates as one of its twelve main recommendations that the "costs resulting from local decisions must not be passed on to another administrative level, or to society as a whole. [T]hey must be borne by those who benefit from these plans." (Deltacommissie, 2008: P.12). The report is not explicit as to how this recommendation can be put into practice under the current WTS system. It ignores or sidesteps how the current system might be changed or what might replace it to achieve this policy goal. The introduction of some form of private flood insurance might be an approach to help the government attain this goal and lead to a greater higher degree of collective risk sharing between the private and public spheres. Whether it is desirable that public financing of flood risk management continues when there are private insurance companies making profits by selling what are in fact very low risk policies is a public policy tension that merits exploration.

Second, with recently proposed changes to the system of Dutch flood compensation it is timely to revisit the academic literature concerning the effectiveness of national flood compensation systems. As private insurers play important roles in the operation of many other industrialised countries' flood compensation systems it is useful to understand under what circumstances might private sector involvement in flood compensation in the Netherlands also offer improvements above the current public system. Free market ideological principle is not a sufficient reason to make such a bold change. It is not, however, necessarily a polarising choice between private and public responsibility, regulation versus free market forces. Research has indicated that a mix of actors and multiple joined-up flood risk strategies is likely to lead to increased flood resilience (Hegger & Driessen, 2012).

Third, the introduction of private flood insurance to the Netherlands is an example of the private sector attempting to take over areas of responsibility that have been in the public sector for decades. It is a widely held belief that for sustainable development all societal domains – business, government and civil society – must play their part to help solve the highly complex environmental problems such as climate change adaptation. This thesis reflects a microcosm of the challenges and dilemmas this change will entail. Hopefully the analysis and conclusions that can be drawn from this thesis will shed greater light on this phenomenon for policy makers and academics alike.

1.4 Research Objective, Relevance and Main Question

While the Netherlands has invested substantial sums in flood defenses, it is still a high risk and vulnerable nation as it is situated mostly below sea level in a delta where several major European rivers discharge and it is bordered by the North Sea to its West. Floods are still the most severe natural hazard facing the country (Kievik and Gutteling, 2010). It is therefore a contemporary public policy concern that, in both frequency and severity, globally extreme weather events that result in significant flooding are increasing. Given that over sixty per cent of the Dutch population live in areas at risk of flooding and that the most economically important areas such as the Zuidplaspolder near Rotterdam and Schiphol airport lie several meters below sea level, flood losses could be very substantial (Jongejan and Barrieu, 2008). Across the country, if any of the major dike rings fail, the projected losses are presented in the below table.

Dike Ring	Area	Potential Loss (billion euro)
6	Groningen and Friesland	70
14	Central Holland	300
43	Betuwe, Tieler and Culemborgerwaarden	10
21	Hoeksche waard	7

Table 1: Overview of four selected events with flooding of part of the Netherlands (DWW, 2000)

Given this vulnerability, it is assumed that some kind of flood risk compensation, be it public, private or a mix of both, will increase national welfare because the impacts of flooding are rarely limited to the immediately affected areas. Economic costs, such as damaged capital assets and lost productivity, impact whole economic systems. Societal losses, while more difficult to quantify, are keenly experienced by flooded communities and beyond. However, it is the threat to social welfare caused by uninsured flooding incidents that is particularly significant. It is often the most vulnerable populations that are most negatively impacted by flood if some form of universal flood compensation is not available.

Moreover, with recent proposals to change Dutch national flood compensation the question of how it should be paid for also becomes increasingly relevant. It has been advocated that a more comprehensive strategy is required to manage flood risk in the future that may include both physical damage mitigation measures as well as financial risk sharing among societal domains (Jongejan and Barrieu (2008); Botzen & Van Den Bergh (2008); Aerts & Botzen, (2011); Paudel, (2012)). A systematic evaluation of whether certain flood risk compensation arrangements are better than others is a question that is both socially and politically relevant. As such it is the right time to look into different future scenarios concerning flood compensation including what benefits private flood insurance might offer the Netherlands and under which conditions this transition might is take place.

To meet the described research objectives of this thesis and to address the identified knowledge gaps, the following central research question is proposed:

Can the introduction of private flood insurance to the Netherlands be socially and economically desirable and under what conditions might this take place?

The ultimate objective of this research is to offer a basis from which policy recommendations can be provided to the Dutch government. To do so, it will examine the potential strengths and weaknesses of alternative national flood compensation systems to better understand whether the adoption of some form of private insurance will offer tangible improvements or advantages over the current system and what those different options might be. It will seek to elucidate under which conditions the Netherlands would indeed benefit from the inclusion of at least an element of market rigour and should therefore seriously consider transitioning to a private flood insurance market. It is the hope that this thesis will

also contribute descriptive and explanatory knowledge around flood compensation aspects of flood risk governance and recovery arrangements.

The next section will describe the research methodology followed to address the main research question of this thesis.

1.5 Research Methodology

The research strategy is two pronged. It will first consider what advantages a transition towards some degree of private flood insurance may entail for the twenty first century Dutch. Secondly, it seeks to understand under which conditions this might take place. To reach these dual goals a five step research methodology is followed. Each step is designed to address a research sub-question that has been designed to steer the research towards a conclusion that will answer the main research question. In doing so it is hoped that the research objectives of this thesis will also be met. The data sources used to answer the research questions and justification for comparative case study approach chosen for this thesis are also described in the section below.

1.5.1 Research Approach

Step 1

This thesis concerns economic as well as social benefits from private flood insurance systems. Consequently, for a national flood insurance system to be considered to be effective it has to deliver benefits not only to the insurer and the insured but also to the wider society in which it operates. Benefits to society will, however, only accrue if the system is financially viable and also economically efficient. Yet, it is the lack of financial stability along with the economic difficulty insurers face in assessing flood risk in the Netherlands that has frequently been cited by the industry as two reasons why flood insurance there is troubling. Therefore, if the introduction of private flood insurance to the Netherlands is to be of benefit both to the insurers and to Dutch society it must overcome these two challenges.

As there is currently no national flood insurance in operation in the Netherlands, it is necessary to look to other countries and also literature to find out how these systems are effective before it is possible to understand what lessons might be applicable to the Dutch context. The first research step of this thesis will therefore be to understand what are the main components of an effective national flood insurance system. The following question is addressed in the first step of this research:

SQ1: What are the main components of effective national flood insurance systems?

This research question will explore relevant scientific literature on both general principles of insurance and those concepts that relate specifically to flood insurance. Any additional theories relating to flood insurance will also be examined if they contribute relevant knowledge to address the research questions in hand.

The output of the first step of the research will be an identification of the main components of flood insurance systems and an understanding of how flood insurance systems operate to be effective. These components will be applied as a basic analytical framework to understand the operation of

different types of national flood compensation systems in practice and facilitate more meaningful cross country comparisons in subsequent research steps.

Step 2

Flood compensation in the Netherlands is currently based on a public system. With a few exceptions no flood insurance has been available there since the 1950s. It is therefore necessary to examine the operation of flood insurance systems in other countries to shed light on the potential benefits private flood insurance might bring to the Netherlands. The components of flood insurance systems identified in the previous research step will be used as an analytical framework to enable cross country comparisons. Three case study flood insurance systems have been selected: UK, France and Belgium. The justification for why these countries were chosen is described in detail in the next section. These three case studies are analysed to answer the following two sub-questions:

SQ2a: What are the characteristics and effects of flood insurance systems in practice?

In addition to finding out the attributes and effects of different flood insurance systems, the main research question also calls for an understanding of the social and economic benefits. As these are difficult to quantify at the national level without significantly more research resources than were available for this thesis, the next best alternative it is to take into account how the performance of each national flood insurance system is regarded in the general media and also scientific literature. The following question will be therefore be answered for each case study:

SQ2b: What is the normative discourse around different flood insurance systems in practice?

The purpose of this step is to gain greater understanding of the operation of national flood insurance systems in practice. Data is therefore gathered from selected academic literature but also more up to date news sources such as websites, newspapers and trade journals.

Step 3

After each of the national flood insurance systems from the three case study countries have been analysed, it is necessary to understand what practice based conditions lead to the effectiveness of each system. This is a highly complex task in which there are many factors at play. To attempt to navigate through this complexity, the framework of flood insurance system components and the understanding of what it is to be effective from the first research step will again be used to make comparisons across systems. The following research sub-question will therefore be answered:

SQ3: What conditions contribute to effectiveness of national flood insurance systems in practice?

The output of this step will be an understanding of the differences and similarities between the three cases and knowledge of how each system of flood insurance is effective. The output will be structured using the analytical framework from the first research step. The information collected is also verified through the in depth questions used during the expert interviews.

Step 4

To understand whether elements of private flood insurance from these systems can be beneficial to the Netherlands, it is necessary to know the characteristics of the current flood risk compensation system in the Netherlands including recent proposed changes to the system. The following research subquestion will therefore be addressed:

SQ4: Are the conditions present to introduce a private flood insurance system in the Netherlands?

The output of this research step will be an understanding of the conditions necessary for transitioning to a system of private flood insurance.

Step 5

This final step will attempt, through a conclusion and discussion, to address the main research question by aggregating the answers from the previous research steps. Limitations to the research methodology and suggestions for future research will be outlined.

1.5.2 Case Selection

According to Gerring (2007), a qualitative case study research method is suitable if the intention is to discover scientific knowledge that sheds light on a larger class of cases. It involves in-depth observation and analysis of a spatially delimited phenomenon (the unit of analysis) observed at a single point in time or over some period of time. The unit of analysis in this thesis is national flood insurance systems.

The national flood insurance systems of three countries were chosen as case studies to address the research questions posed by this thesis. The cases were not randomly selected but were chosen to shed light on the conditions pertinent to the introduction of private flood insurance to the Netherlands. In an ideal world, the historical, economic, social and geographic flood context of each case study would be as close to the situation in the Netherlands as possible. The Dutch context and flood risk profile is, however, wholly unique. To help in getting round this limitation, Belgium was selected as a case because it is the most geographically, socially and economically similar country to the Netherlands. Moreover, recent changes to Belgium's national flood insurance system - to bundle flood insurance with fire insurance - closely mirror the recent proposal from the Dutch Association of Insurers to introduce private flood insurance to Netherlands and can therefore shed light on a possible future scenario under similar conditions to those found in the Netherlands.

The UK was selected because it has operated a pure private and free market flood insurance system. Like the Netherlands, it has also gone through a consultation between the insurance industry and government to look to change the national flood compensation system. The UK is introducing an element of public compensation through the pooling of high risk properties under the government backed insurance pool called *'Flood Re'*. The fact that these changes are being discussed (and have been accepted) suggests that there are limits to a private flood insurance model in terms of social justice that the Netherlands could learn from in its own deliberations about the future.

Finally, France was selected as it is acknowledged to successfully operate a mixed public-private natural catastrophe insurance system (which includes flooding). France offers an alternative public private model from either the UK and Belgium from which certain lessons for the future of flood insurance in Netherlands can be learned. Of particular relevance is an understanding how the French are able to achieve collective risk sharing and involve the private insurance sector and the operation of flood compensation policies at the community level.

1.5.3 Data Sources

The most up to date empirical data required for this thesis is gathered through face to face interviews with flood insurance experts from academia and also industry. Where possible these interviews were conducted face to face but email correspondence was also used when necessary. The interviews were structured to permit some degree of cross referencing for validation purposes using the questions contained in Appendix 2.0.

Due to difficulty obtaining interviews with informants directly involved in on-going and commercially sensitive public consultations and negotiations, the thesis has also made substantial use of supplementary data sources including relevant scientific literature, company reports and press releases, insurance industry journals, websites and publicly available national statistics. The informal ruling by the Dutch competition authority (Appendix 1) on the Dutch Association of Insurers is a key data source.

1.5.4 Expert Interviews

Given how fresh some of the results of this research are, and taking into consideration the wide range of data sources used in this thesis, a form of triangulation is necessary to verify the results. To do this, during the summer of 2013 a panel of experts was selected from the insurance industry and from academia. The criterion for inclusion in this research was that they had been recently involved in one capacity or another in contributing to the future direction of Dutch flood compensation policy. To offer some level of generalisability, a semi-structured interview format was followed based on the questions in Appendix 2.0. The interviews (with two exceptions) were recorded and transcribed. The experts were selected for the following reasons:

Wouter Botzen is an Assistant Professor Environmental Economics at VU Amsterdam. He was selected as an expert because he is a leading academic researcher in the field of climate change and flood insurance in the Netherlands. He has published several key papers used in this research. His key finding is that a form of private flood insurance within a multi level public-private system offers advantages based on economic efficiency compared to the current Dutch WTS public compensation system. He has worked with the Dutch Association of Insurers as an adviser. Furthermore, his policy recommendations were used by the Association as academic justification for their proposal to introduce mandatory flood insurance.

Youbaraj Paudel is a PhD student under Wouter Botzen at VU Amsterdam. He was selected as his field of study is Dutch climate change risk insurance and adaptation. A relevant finding of his is that flood insurance premiums are higher under private systems than public or public-private arrangements. He believes it is not possible for private insurance to be commercially viable for the insurance of major natural catastrophes and there will always be a need for public compensation beyond that available through private insurance arrangements.

Matthijs Kok is a Professor and part-time chair of Flood Risk at TU Delft. He is also a founding partner of HKV Consultants. He has worked as a consultant advisor with the Dutch Association of Insurers, Neerlandse, and the Dutch government, including the recent proposal to introduce mandatory flood insurance to the Netherlands.

Kosta Keramopoulos was selected as he is a founding partner of *Neerlandse*, the first company to begin selling private flood insurance in the Netherlands. His company is not a member of the Dutch Association of Insurers and therefore has a different perspective on the future of private flood insurance in the Netherlands compared to members. The company took a firm stance against the association's proposal for the introduction of mandatory flood insurance. He is in favour of a free market for flood insurance in which companies and homeowners are free to choose whether to participate based on a fuller understanding of the flood risk faced in individual circumstances.

Marko van Leeuwen was selected as he is a spokesperson for the Dutch Association of Insurers. He was asked on behalf of his members about the association's stance on the introduction of mandatory private flood insurance. He was able to answer questions by email but was bound by confidentiality agreements with his employer.

J.W. is a senior broker for the Lloyd's of London syndicate that won the bid to reinsure four billion euros of Dutch flood risk under the Dutch Association of Insurers 2012 proposal for mandatory flood insurance. He was able to contribute an external industry perspective on the association's proposal and also current movements in the flood insurance industry in France, Belgium and the UK.

T.S. is a senior underwriter of property at a leading Lloyd's of London syndicate. He is a leading expert in natural catastrophe insurance and had inside knowledge of the UK's recent public consultation to introduce a new public backed insurance pool for high risk domestic properties called 'Flood Re'. He also is an expert on European flood insurance policy.

All the experts requested that they should not be quoted directly in this thesis. This is a very understandable position as much of what was discussed pertains to very recent commercially sensitive decisions and attributed quotes could have professional repercussions as well as a potential bearing on the future of flood compensation in the Netherlands. To get around this restriction, while also still including these expert views, they are amalgamated and will be referenced collectively as (EP, 2013). It should be noted that the opinions expressed during the interviews are personal and do not reflect the positions of companies or organisations for which the experts work or have worked. More information can be found in Appendix 3.0.

Short email exchanges were also held with a number of other academics and industry experts. Most people contacted declined to be interviewed or did not reply to the invitation sent.

1.5.5 Time Period

The data time period researched covers the historical and contemporary functioning of the flood insurance systems. The furthest back data will be gathered is to 1953 when the last major and catastrophic floods were experienced in the Netherlands and the UK.

1.6 Report Outline

The broad outline of this thesis is briefly described to help reader more easily navigate through the rest of this document:

Chapter: Sets-out the research framework within which this thesis was conducted. The main concepts, scientific relevance, knowledge gap, main research question, research sub-questions.

Chapter 2: Identifies what are the main components of flood insurance schemes by examining scientific literature. This provides the basis for the research framework to evaluate the national case studies in the subsequent chapters.

Chapters 3 to 5: Analyse the key characteristics and attributes of the UK, French and Belgian flood insurance systems to elucidate conditions for effective private flood insurance

Chapter 6: Identifies practice based conditions for effective private flood insurance based on the difference and similarities between the three case studies.

Chapter 7: Examine the characteristics of the Dutch flood compensation system to understand the feasibility of the introduction of private flood insurance based on the presence of the practice based conditions.

Chapter 8: Presents the answer to the main research question in the form of conclusion followed by detailed discussion of the main results of this thesis.

The key findings for of each research sub-question will be presented as interim conclusions at the end of the relevant chapter. In this way, the reader should be able to understand how the research steps undertaken answer the main research question of this thesis.

2 Components of Flood Insurance Systems

2.1 Introduction

National flood insurance systems are made-up of a number of components that work together to deliver flood insurance particular to the country it serves. There is, however, variation in how these systems work and the types of the flood insurance delivered. For example, the type of property that is covered or whether flood insurance is mandatory or optional differs greatly from country to country. To be able to make cross country comparisons based on these differences it is necessary to be able to breakdown flood insurance systems into general components. For the purpose of this thesis a system component is considered to be any system element and related attributes that are involved in delivering flood insurance. This, however is not sufficient. In order to make policy recommendations regarding the introduction of private flood insurance to the Netherlands, it is also necessary to gain an understanding how these components contribute to the system's effectiveness. The first research question of this thesis is therefore posed as follows:

SQ1: What are the main components of effective national flood insurance systems?

2.1.2 Chapter Outline

The chapter will therefore first identify the common components of national flood insurance systems using existing classifications found in literature. The most important components and their attributes will be used as a basic analytical framework to evaluate and compare systems in operation in the three chosen case studies: UK, France, and Belgium.

The chapter will then consider what it means for flood insurance to be effective. Theories regarding the conditions required for the effectiveness of insurance systems in general will be detailed as well as those that relate specifically to the challenges of providing flood insurance.

2.2 Components of Flood Insurance

This section is based on a categorisation by several of the key researchers⁵ in this field of natural catastrophe insurance systems. As flood peril is a subcategory of natural catastrophe this is relevant starting point. The authors' categorisations have been adapted to the research goals of this thesis.

2.2.1 Historical Context

National flood compensation systems develop within a distinct economic, social and political context. To understand how each system functions, what its strengths and weaknesses are, a brief reference is made to the recent history of each of the national flood insurance systems studied.

2.2.2 Mandatory or Voluntary Status

⁵ To identify the functional components, a broad analysis based on research from Paudel (2012) is used to help understand the general and technical components of a flood insurance system. Second, to focus in on the question of private sector involvement in flood compensation, a public-private classification by Swiss Re (2012) will be used. Following this, a more indepth analysis based on work by Jongejan and Barrieu (2008) is detailed to reveal the different types of public and private involvement commonly found. Finally, a classification by O'Neill and O'Neill (2012) based on the principle of social justice in flood insurance is used to contribute a social welfare perspective to the research question.

Participation by individuals and businesses in a national flood insurance system is voluntary or mandatory or quasi-mandatory. A compulsory system overcomes three challenges of providing flood insurance. First, the cognitive difficulty people have to calculate accurately their own flood risk is reduced⁶ because a mandatory scheme removes the need for individual choice. Second, a compulsory system also overcomes the problem of adverse selection i.e. those who do feel the threat of flood are the only ones purchasing insurance which has the effect of driving up insurance premiums for all? Third, compulsory flood insurance ensures high market penetration and a large pool of insured properties which increases financial viability of the system. Furthermore, the problem of free riding is lower under a compulsory system as the risk is spread across the whole population, not just those who directly benefit from the insurance. Overall, in a compulsory system reliance on *ex-post* government compensation is consequently lower than in a voluntary system because all households will have some level of flood insurance. This serves to increases economic efficiency as recovery times post flood will be faster under mandatory systems compared to a voluntary one. Uninsured losses either have to be paid for the by the state or can act as a drag on economic recovery if individuals are unable to pay, which reduces the economic efficiency of the flood insurance system and decreases social welfare.

A compulsory flood insurance system can be achieved in several ways: flood insurance can be bundled with other mandatory insurances; the government can legally oblige insurance companies to provide cover; the state can make it quasi-mandatory for people to take out flood cover by insisting it is purchased with other financial products such as mortgages. Product bundling with so-called 'simple risks' such as household fire insurance is a method to extend flood insurance coverage. Mandatory bundling is, however, not always appropriate as it can infringe competition rules at the national and EU level. Product bundling is also quite restrictive and may involve legitimacy issues if policyholders are not consulted or given a choice to opt in or out, nor a choice of products.

Whether an insurance system is mandatory or voluntary is an influential component in the functioning of national flood insurance systems and is therefore analysed in detail during this thesis. It is highly correlated with the next attribute: market penetration.

2.2.3 Market Penetration

It is necessary to understand how different national flood insurance systems influence insurance penetration. Penetration includes whether a system covers both domestic and commercial sectors. Within the domestic sector, to understand the extent of penetration it is important to know if the insurance system extends to renters as well as owner-occupiers.

As mentioned above, market penetration is highly correlated to a mandatory attribute of flood insurance systems. For various reasons, a low uptake of flood insurance in low-income populations is the norm when flood insurance is voluntary. For example, in Germany, where flood insurance is voluntary, penetration is in the region of five to ten per cent. While this is close to the global average for voluntary flood insurance (Swiss Re, 2012) it is low compared to other industrialised European countries with systems with a voluntary character. There are exceptions however, for example, the UK operates a private and voluntary system of flood insurance yet penetration rates are as high as 95% (Paudel, 2012). As it is necessary to buy flood insurance to obtain a mortgage in the UK, this type of so called 'bundled system' is considered to be quasi-mandatory rather than truly voluntary.

⁶ This is in accordance with a phenomenon known as risk myopia i.e. those who do not feel the threat of flood risk choose to opt out of purchasing flood insurance

2.2.4 Financial Attributes

How a compensation system is financed i.e., its sources of revenue, is key to understanding its inherent viability over the longer term. In private insurance systems, principal sources of finance include earnings from premiums, reinsurance coverage and interest from accumulating capital reserves. In systems with a public element there are frequently financial transfers from the government, as either direct compensation payments, or as an indirect subsidy in the form of a state guarantee for flood losses above a particular level.

Insurance premiums can be set by insurers, the government or by an agreement between both. Insurance companies can be incentivised to accumulate sufficient capital reserves through favourable tax arrangements. The calculation of insurance premiums also vary. They can be set at actuarially correct levels, which are termed risk-based premiums or they can be set at a fixed level which likely involves some form of cross subsidisation from low risk to high risk policyholders.

Another financial attribute to take into consideration is whether or not direct and indirect flood damages (such as loss of business days) are covered by an insurance system, the limits to maximum coverage, and the extent to which underwriting tools such as deductibles⁷ or premium excesses are employed.

2.2.5 Risk Transference Mechanisms

As the insurance cost of natural disasters varies greatly and unpredictably from year to year, a national insurance market may be jeopardised by a single event without sufficient financial risk transference in place. Risk transference mechanisms can be upstream, in the form of purchasing reinsurance from reinsurance companies. Reinsurance can help cover excessive compensation costs without putting at risk the financial viability of the insurance market.

Risk transference mechanisms are also downstream to consumers. For example, underwriting tools such as deductibles are used to transfer a variable proportion of the insured loss to the policyholder in the event that they make a claim. According to Botzen & Van Den Bergh (2008), a principal way in which flood insurance systems can contribute economic efficiency is through ex-ante and ex-post risk transference mechanisms. These work to transfer financial risk associated with flood losses and to provide incentives to invest in flood risk mitigation measures. Before a flood occurs, the system should produce incentives that lead to initiatives that may limit potential flood damage. For example, through the use of risk premiums, deductibles and other underwriting tools, flood insurance policies can be constructed in such a way that they give policyholders financial incentives to invest in both flood protection and damage limitation measures either themselves or to lobby political representatives to do so collectively on their behalf. After a flood has happened, an insurance system should release funds from a capital pool built up from premiums paid in each year. Such payments will reduce potential economic losses through the replacement or repair of damaged assets and in particular circumstances, provide financial compensation for lost economic activity

2.2.6 Mitigation Incentives

⁷ A deductible (or excess in the UK) is the portion of damage that the policyholder has to pay before the insurer covers the losses as set out in the insurance contract. It is referred to as an indemnity (Paudel, 2012)
7

A key component for the long run sustainability of an insurance system is the effectiveness of incentives and policies that are able to motivate stakeholders to either prevent or reduce potential flood damage (Paudel, 2012). It is not necessarily only a task for government bodies to implement flood risk reduction. In an economically efficient system, all stakeholders, including all levels of government, insurance companies, the building industry and policyholders will be incentivised to participate or fund flood risk reduction or adaptation measures. A classic approach is for insurance companies to offer lower deductibles/excesses and more attractive premiums to reward policyholders who voluntarily take measures to limit their own risk exposure.

2.2.7 Underwriting and Assessment Tools

As mentioned above, in an effective flood insurance system there should be mechanisms by which the system is able to incentivise people to take flood mitigation and adaptation measures. This, however, requires detailed research and modeling of flood-prone regions at risk. Through a traditional underwriting process, insurers use this information to correctly calculate risk and avoid the problem of adverse selection. Without adequate information about the risk or reliable assessment tools, it is hard or even impossible, for underwriters to calculate appropriate risk-based premiums. This is why extremely low-frequency events like flooding have been considered by some as being barely insurable or even uninsurable. Advances in ICT such as remote sensing and better computer modeling systems have given underwriters access to many more accurate assessment tools. The flood data that are input to these models are costly to gather. Often there are arrangements between government and industry to exchange these types of data and to share costs. Flood assessment tools and data exchange are, therefore, essential components of national flood insurance systems.

2.2.8 Public and Private Responsibility

The involvement of the state and, by inference the extent of private sector involvement is an important point of difference between different national flood insurance systems. It directly and indirectly influences most of the other components identified and it therefore a key attribute in this study. The next paragraphs describe the variation in this attribute and its relationship with the other components of flood insurance systems.

Often national flood compensation systems operate as types of public-private (PP) partnership. The aim of such arrangements is to share risk and to make optimal use of each sector's respective expertise. Insurance companies are motivated by profit maximisation. As such, they should be skilled at selling, underwriting and administering insurance policies. Government has the advantage that it has more flexible access to capital than commercial insurers and also possesses a greater capacity to spread risk temporally as well as geographically. Within a multi-level flood compensation system, as advocated by Botzen & Van Den Bergh (2008), the government's role could be as public reinsurer or as state guarantor for losses incurred above the commercial limits of the private sector.

Flood compensation systems can be categorised as public, private or a combination of public and private (PP). In PP systems there can be found many different combinations involving the operation of administrative tasks and/or financial aspects of flood compensation. The division of public private responsibility can be achieved through a multitude of approaches including, though not limited to: the legal devolution of powers from government to the private sector, the tendering of contracts to the private sector, or through public-private partnerships based on free market or regulated principles. The role of the state in flood compensation arrangements also varies by country but could include, inter alia, the state taking on flood risk directly, the provision of a state sovereign guarantee in a multilevel

insurance system, or the state creating favourable conditions for flood insurance, for example setting-up tax regimes that encourage the accumulation of capital by insurance companies. Paudel (2012) notes that most current natural catastrophe insurance systems, including those for floods, were developed to include a level of collaboration between government and the private sector. Even in a purely private system, such as that in the UK, there is still a role for government as industry regulator.

2.2.9 Principles of Social Justice

O'Neill and O'Neill in their recent report *Social Justice and the Future of Insurance* (2012) distinguish two contrasting normative approaches based on principles of justice. They identify two extremes of flood insurance. At one end of the spectrum, they find individualist, risk-sensitive insurance. In this system, flood insurance is provided through a free market in which individuals' payments are in proportion to the level of risk they are exposed to. At the other end of the spectrum, they identify solidaristic, risk-insensitive insurance. In these systems, those at lower risk subsidise those at higher risk of flooding. They find individualistic, market-based approaches, such as the one in the UK, to be socially undesirable in contrast to more solidaristic systems found in most other European countries.

2.2.10 Future Direction

The likely future direction will be briefly described for each national flood insurance system

2.2 Component Interaction

National flood compensation system components operate in complex ways. In reality the components identified above are not independent of one another. In an attempt to capture two significant relationships a Swiss Re (2012) classification of national flood insurance systems attempts to relate the public/private status of each system with the voluntary/mandatory status. The result of the classification for several industrialised countries is set-out in figure 1 below:



Figure 1: Four-way classification of national flood compensation systems

This four-way classification, based on these two attributes, is used to categorise different national flood compensation systems. In each category, insurance is provided either by government organisations or the private insurance sector. In mandatory systems flood insurance is often bundled with other forms of catastrophe insurance as part of a package. It is rarely available as a separate policy choice in contrast

to optional schemes where flood insurance is offered as an elective choice as in Germany (Swiss Re, 2012).

The United States is an example of a public and optional system; Spain is an example of a public and bundled i.e. not optional system; Germany is an example of a private and optional system; and the UK is an example of a private and bundled i.e. quasi- mandatory system. France and Belgium are in the middle of this classification as they operate bundled public -private systems with a division in private and public sector flood risk financial responsibility. The Netherlands, as it currently stands with the WTS, is an example of an extreme public system and, as compensation is paid from general taxation, one which is in no way voluntary.

An approach taken by Jongejan and Barrieu (2008) also attempts to characterise systems by a composite of attributes based on types of government and private sector involvement. Their classification, however, fails to to include a category of system where the only role for the public sector is that of government as industry regulator and national lawmaker. This fifth category has been added for the purpose of this thesis.

The first category is where the state makes use of the country's legal system to assess when a flood is a national disaster and compensation is triggered to victims. The country's existing **social welfare system is used to compensate** people to the extent required under law. Such arrangements are frequently based on discretionary or ad hoc rules and guidelines. The Dutch WTS arrangement falls broadly under this category. In Germany, state compensation to flood victims has been provided alongside private flood insurance (Jongejan and Barrieu, 2008). The penetration of private flood insurance is correspondingly low in Germany due to the crowding out of private insurance by a parallel public compensation system.

In the second category, flood insurance is **quasi-mandatory** as government mandates that it be bundled with property insurances, such as fire. This approach was recently applied in Belgium and has been operational in France under the NAT/CAT since 1982. This system is based on principles of solidarity as policyholders exposed to different natural catastrophe hazards such as earthquake, fire or windstorms in effect subsidise each other's premiums regardless of the actual extent of the flood risk individuals face.

In a third category, governments establish compensation funds to help compensate victims of natural disasters. Such **insurance pools** are becoming increasingly popular solutions to insure natural disasters and are not necessarily paid for by the state. For example, the California Earthquake Authority is financed through a variety of revenue streams including premiums from policyholders, membership contributions from insurance companies, selling debt such as CAT bonds, reinsurance and through their own investments (ibid).

The fourth category includes systems where **public–private (PP) partnerships** have been established. An example is the USA where the government established a public flood compensation fund but it is administered by private insurance companies. Such arrangements are usually set-up to increase the penetration of flood insurance coverage with premiums designed to be affordable in order to stimulate uptake by as many at-risk communities as possible. The US National Flood Insurance Program (NFIP) is a well-known instance of a PP system of national flood insurance. The responsibilities are split, with private insurance companies administering policy writing, loss adjustment and claims, while the US government, through FEMA and the Federal Reserve, acts as underwriter. Catastrophe funds can also be created by the state or the insurance industry or in combination.

In the fifth category, not mentioned by Jongejan and Barrieu, are systems where the intention is that **private flood insurance is provided by the free market** and the state plays no direct risk-bearing role in flood compensation but does have influence as regulator. The UK is an example of this kind of arrangement.

Variations of all five categories can be found in operation in Europe. However public-private arrangements are becoming the most common with only a handful of countries operating pure public systems - notably Spain and certain cantons of Switzerland. Even the UK is moving from a pure private system towards a PP system with the introduction of the government backed 'Flood Re' to cover high risk properties. In typical multi-tier compensation systems, however, trigger events make a simple public-private classification problematic. For example, in public-private arrangements, it is common that the government is responsible for a layer of the risk only after official declaration of a disaster. Lower levels of flood risk, for example small local incidents remain the responsibility of the private sector, as is the case in the French NAT/CAT system. Therefore, the extent of flood damage will determine with which layer of the system responsibility lies. It is argued by Jongejan and Barrieu (2008) that a multilayer system involving public and private actors would appear to be offer the greatest resilience as it combines the financial stability of the state with the efficiency of private markets, particularly relevant where there are a high numbers of transactions to process.

2.3 Flood Compensation System Effectiveness

As the research question in this thesis pertains to both economic and social benefits from private flood insurance, for a national flood insurance system to be considered effective, it has to able to deliver benefit not only to the insurance companies that take on the financial risk but also to the wider society. There are theories of effectiveness for insurance systems in general but also for flood insurance systems specifically. Both are considered in the next section.

According to Swiss Re, Swiss Re (2012), one of the largest reinsurers in the world, to be able to deliver both social and economic benefits an insurance system has to be both financially viable over the longer term and also economically efficient. Swiss Re have condensed their theories for effective non-life insurance systems into a set of business guidelines based on the following five principles of insurance:

2.3.1 Mutuality

Mutuality occurs when a sufficiently large number of people who are at risk can be identified to form a risk community. On average, just 5% of a country's property assets are at threat of flooding, which means a "flood only" risk community would be too small to be economically viable for insured and insurers. ⁸

2.3.2 Assessability

 $^{^{8}}$ In the Netherlands the proportion of property at risk of flooding is between 60% and 70%.

Expected flood losses must be assessable in terms of the total value of assets that are insured in the risk area i.e. the potential losses <u>and</u> an estimate of the frequency of a flood occurring. This information is used to determine the insurance contract's terms and conditions under which the policy will operate. In most developed countries, underwriters assess floods using flood modeling tools and other statistical techniques. As with other categories of natural disaster insurance, because probabilities are low and historical data often missing, flood losses are very difficult to estimate. Modern catastrophe scenario planning tools are getting better, but many countries still do not have comprehensive flood models due to the high cost of development. A comprehensive national flood model is a prerequisite for insurers to calculate accurate risk premiums and to be able to balance their risk portfolios.

2.3.3 Randomness

The randomness condition is said to be met when the time at which the insured event happens is not predictable and is independent of the will of those insured. Improved flood assessment tools have to some degree worked against the randomness principle. For example, in countries with mature flood insurance sectors such as the UK, the publication of public flood risk maps and innovations in flood risk modeling have made it more straightforward for professionals and members of the public to assess flood probability. Nonetheless, according to Swiss Re (2012), the frequency of returning floods due to changing weather patterns is still mostly random as the timing of a flood is usually dependent on extreme weather, which cannot be predicted years, months or even weeks in advance.

2.3.4 Financial Viability

The insured community identified by the insurer must be able to cover its future financial losses on a planned basis. Insurance systems are normally funded by collected premiums. This revenue stream should be sufficient to pay for future losses, the cost of capital, and the administration of the system. Administration charges are typically between 150% and 250% of the risk premium (DEFRA1, 2013; EP, 2013).

2.3.5 Similarity of Threat

The insured community must be exposed to the same level and type of threat, and the occurrence of the expected event must give rise to the necessity for assigning funds in the same way to all those affected. There are many variations of flood events, for example, storm surges, tsunami, flash flooding, and dike breaches. All floods result in damage to property, often very considerable. While great efforts have been made to invest in minimising the threat of flooding in many countries the risk can never be reduced to zero, particularly for those communities living outside core flood defenses. This a is complicated principle to apply at the national scale. It could be argued that the similarity of threat is not equal when flood defenses have been built for the most economically important areas while less populated parts of the country are left with less protection. Also, within defined flood risk communities, not the whole population faces the same risk. For example, those who live in blocks of flats face negligible flood risk. These kinds of factors lead to legitimacy questions in systems based on mandatory flood insurance.

2.3.6 Effective Flood Insurance

Beyond the five principles of insurance developed by Swiss Re, for a flood insurance system to be considered effective. i.e. be financially viable and economically efficient it must also overcome obstacles that are specific to the insurance of flood risk. Flood risk, in common with other natural perils, is high impact and very low probability and, as such, notoriously difficult to insure when compared to other more

easily assessable property insurances such as fire⁹. Botzen & Van Den Bergh (2008) describe four main challenges.

The first challenge in designing an effective flood insurance system is to combat **adverse selection**. This is the effect of a relatively small number of property owners who are at greater risk of flood taking out flood insurance, or at least higher levels of flood insurance, than those who are less exposed to flood risk. This would lead to a situation where overall insurance costs are spread over few policyholders and individual premiums are consequently higher than if the risk community were broader. A situation of adverse selection can result in a negative spiral of ever-increasing premiums as the risk community shrinks thereby making it less attractive to join. **Cherry-picking** is a similar phenomenon but from the side of the insurance companies (Crichton, 2003). It occurs when insurance companies choose only to insure low risk customers leaving high-risk customers with fewer options as to where they can purchase flood insurance. The likelihood, again, is of higher premiums for high risk policyholders since the risk community they become part of will eventually be biased to those with high exposure. Both situations are most likely to arise when flood insurance is not mandatory. A situation of adverse selection or cherry-picking will **reduce financial viability** because the system will be more volatile if insured risks are not balanced in the system as a whole or between competing insurance companies.

The second challenge arises from the fact that the probability of large-scale flooding is **very low but has a high and unknown economic impact**. Often a lack of historical data of flood frequency and impact makes it difficult for insurance companies to assess risk and calculate actuarially accurate premiums that reflect individual risk. At both ends of the spectrum, both overly expensive or too cheap flood risk premiums will lead to economic inefficiency in two ways. Premiums that are below true risk will mean homeowners are not financially stimulated to avoid building in higher risk flood zones or taking out their own flood protection measures. If premiums are too expensive, lower income communities will opt out of flood insurance all together and can become a financial and social burden if they are unable to recover quickly after a flood has taken place.

The third challenge stems from the fact that when flooding occurs, many properties in the same region are likely to be affected at the same time - this is termed **correlated risk**. Correlated risks are more difficult to calculate accurately when indirect losses are also included, for example a business charging for lost working days. Any insurer - public or private - will not find it easy to know beforehand what the limit of losses might be, using standard underwriting tools. In a worse case scenario, a single storm could bankrupt any national flood insurance system and leave those who are insured with inadequate compensation to rebuild what has been lost. Unless the government steps in with direct financial aid or capital loans to prop up the insurance sector there is a risk that the sector will become insolvent and/or withdraw future insurance.

The fourth challenge is **political and institutional.** In many countries the government often steps in to offer financial compensation after a flood. This is to minimise social welfare and economic losses and is driven by political pragmatism even if it is not considered an official duty of the state¹⁰. A government is

⁹ Fire insurance, for example, is a typical property insurance that is more commercially attractive service for insurance companies to sell for two reasons. First, because it compensates a risk that differs from flood in that it is more predictable and therefore an easier risk to assess. And second, it is a peril for which there is greater public awareness and, therefore, demand (EP, 2013).

¹⁰ In the most recent 2013 floods in Germany, despite the fact that private flood insurance is available the German government has already committed to providing ad hoc financial compensation to flood victims (Guardian, 2013). There is a strong political motive behind this decision. As in 2002, the floods occurred just ahead of national elections. This has led to

unlikely to remain popular if it abandons the uninsured to rebuild their own lives without state aid. Free market purists regard these kinds of public interventions as unwelcome market distortions. They find that state compensation can crowd out private insurance if the public believe, rightly or wrongly, that the state will pay compensation to those without sufficient flood insurance of their own. This problem is not clear-cut, however. Government participation in flood compensation either directly or in the role of the insurer of last resort is regarded by many as a recommended component of a multilevel insurance system to cover losses that exceed the commercial capacity of the private insurance sector (Jongejan and Barrieu (2008); Botzen & Van Den Bergh (2008); Paudel, 2012).

2.4 Chapter Conclusion

In the above chapter, the main components of national flood compensation systems have been identified based on an original categorisation by Paudel (2012). The components and their attributes have been described in a way which can be used as a basic analytical framework in the next chapter to attempt to make meaningful comparisons between the country case studies and understand the relative strengths and weaknesses of each system.

The chapter has highlighted the fact that the components and attributes of flood compensation systems identified operate together and not in isolation. For example, the high correlation between the voluntary/mandatory status and flood insurance penetration is captured in categorisations by Swiss Re (2012) and also by Jongejan and Barrieu (2008). The social welfare aspect of flood insurance is also reflected in a categorisation by O'Neill & O'Neill (2012). This incorporates the choices policy makers face when designing flood insurance systems to include, or not, principles of social justice. This is important to understand the social advantages or disadvantages that private flood insurance might bring to the Netherlands.

The concept of what it means for a flood insurance system to be effective has been set out . First ,five general principles of insurance were described as the basis for financially viable and economically efficient insurance systems in general. Second, the need to overcome the four key challenges of providing flood insurance was also indicated as a prerequisite to theoretical effectiveness.

accusations of political expediency leading to waste and inefficiency compared to private insurance arrangements that might slow down the recovery period and therefore lead to an increase overall losses (Botzen & Van Den Bergh (2008).

The output of this chapter is a comprehensive analysis of what effectiveness entails in relation to the components and attributes of different flood insurance systems. Below is a table that sets out an analytical framework for use in subsequent research steps. It consists of the following elements - see next page:

Flood Insurance System Component	Attribute(s)
Historical Context	Brief description of how the system developed
Insurance System Type	Private; Public; Public-Private
Financial Attributes	Hazards covered (Fresh water; storm surge; other natural disasters); source of finance (General taxation; premiums; reserve equalisation subsidy; sovereign guarantee; reinsurers)
Public/Private Sector Responsibilities	The public/private mix. Who is responsible for: Insurance policy sale and administration; liability for financial risk; flood protection and mitigation; who pays financial compensation: private or public
Mandatory/Voluntary Status	Free market voluntary; compulsory flood cover; quasi-mandatory flood cover when bundled with other property insurances.
Market Penetration	% uptake of flood insurance and which property types and communities covered.
Risk Transference Mechanisms	Up-stream: reinsurance, CAT bonds, hedging and other financial instruments. Downstream: deductibles, risk based premiums, other new underwriting tools
Mitigation Incentives	Effectiveness of insurance risk transference mechanisms to motivate policyholders or governments to invest in flood loss protection and mitigation and measures
Underwriting and Assessment Tools	Flood data, flood models and assessment tools such as remote sensing
Principles of Social Justice	Individual, risk sensitive or solidaristic risk insensitive insurance
Normative Perceptions	How the national flood insurance system is viewed by society in terms of its overall effectiveness
Future Direction	Description of likely future direction of the national flood compensation system and relevant changes

 Table 2: Analytical Framework of Flood Insurance Systems

3 UK Flood Insurance

3.1 Introduction

The principal components of national flood insurance systems are identified, and what it means for a flood insurance to be effective, were discussed in the previous chapter and form the basis of a basic analytical framework. This will be used to derive answers to the following two research sub-questions in the second step of this research.

SQ2a: What are the characteristics and effects of flood insurance systems in practice? SQ2b: What is the normative discourse around different flood insurance systems in practice?

3.2 Historical Context

From the 1960s to the end of the 1990s, flood insurance in the UK operated a 'gentleman's agreement' that divided responsibilities between the state and the insurance industry. Under this agreement, the insurance industry offered flood insurance for all households and some small businesses regardless of their flood risks while the government was responsible for investing in flood protection. In the wake of large losses after floods in the late 1990s this agreement was rescinded by the insurance industry. In 2003, it was replaced by a voluntary agreement termed the 'Statement of Principles'. Under the terms of this limited term agreement, which was due to expire on July 1st 2013, members of the Association of British Insurers (ABI) committed to providing affordable flood insurance to all existing customers where the probability of flooding in a single year was less than one in seventy five or where flood defenses were planned to reduce the probability of flooding to an acceptable risk level within the next five years.

The Statement of Principles was revised in 2006 when the ABI insisted that a financially sustainable flood insurance system was possible only if the government held up its side of the previous agreement and invested in sufficient flood protection (Paudel, 2012). The terms of this agreement were extended in the absence of a replacement but became increasingly unpopular with private insurance companies. They argued that while they were able to set premium and deductible levels for new customers, they were not permitted to charge true risk-based premiums to existing ones. On the demand side, artificially low premiums that were affordable reduced incentives for existing policyholders to invest in their own flood protection or to lobby for community flood level precautions (O'Neill and O'Neill, 2012). Hence, this regime came to be seen as failing both the industry and consumers. Insurance companies complained that their portfolios were saddled with high-risk policyholders for whom they could not decline coverage, which left them at a disadvantage compared to new entrants into the highly competitive UK flood insurance market. Consumer action groups also were calling for change on behalf of households that were finding it increasingly difficult to afford to renew their flood cover each year. The government also feared that, without a change, the Statement of Principles might result in instability in the housing market in some areas if at-risk homes became unsaleable due to exorbitant flood insurance premiums (DEFRA, 2013).

3.3 Public Private Balance

The UK system of flood insurance has developed quite differently from that in operation in most other developed countries in that there has been no public provision of flood compensation or post flood relief from the state. Furthermore, the UK government does not provide any sovereign guarantee or reinsurance role in insuring against high impact, low probability natural disasters such as flooding. Instead, the UK operates one of the most mature and highly competitive insurance market in which flood risk, as reflected in the high premiums charged, is born by individual households and businesses

3.4 Mandatory or Voluntary Status

UK flood insurance risk is sold, traded and diversified between only private actors from either the commercial insurance sector or on private reinsurance markets. Paudel (2012) found that UK premiums, although risk based, are generally higher than those of equivalent risk found in public-private compensation systems in other European countries. Despite this, the market penetration for U.K. flood insurance is between 75 per cent and 95 per cent (Paudel, 2012). This high rate is not the result of laws that make flood insurance compulsory but by the requirement for flood insurance before a mortgage can be obtained. Hence flood insurance is a standard part of typical property insurance for both households and businesses in the UK.

3.5 Mitigation Incentives

Botzen & Van Den Bergh, (2008) reference the UK's historic lack of collaboration between the state and the insurance industry leading to insufficient public investment in flood protection. However, the UK flood insurance market is said to be mature. It is the UK government that has the primary responsibility to invest in adequate flood protection, not the insurance industry. With public spending on flood protection being relatively low, this - not a lack or market based incentives and mechanism for flood mitigation - is the ongoing weakness in the UK system (Botzen & Van Den Bergh, 2008). There is a disconnect between required investment and actual investment, due in part to low incentives for the state to spend on flood protection; it is the private insurance industry, not government, that is responsible for paying flood compensation in the UK. Crichton (2003) interprets this as a clear example of moral hazard on the part of the government.

3.6 Risk Transference Mechanisms

To hedge the overall risk of their portfolios, UK insurance companies actively make active use of private reinsurance markets such as Lloyd's of London to transfer the risk upstream. It is also the home of other more novel financial products such as the sale of catastrophe bonds (CAT bonds) and other sophisticated hedging arrangements (EP, 2013).

Downstream, UK insurance companies, while operating under the industry's regulatory authority, have a lot of latitude to include clauses in flood insurance contracts that transfer risk to policyholders. At it most basic, premium excesses are commonly used to discourage claims making and to share the risk covered. Other more complicated rules can also be included to make sure that policyholders are financially motivated to take on a portion of the risk themselves.

3.7 Financial Attributes

While strictly regulated by national and international bodies, insurers are free to determine premiums and specific contractual components included in the flood insurance policies they sell (DEFRA2 2011). The UK government regulates the UK flood insurance system but makes no contribution to flood compensation either directly or indirectly as a sovereign guarantor or reinsurer. It does, however, support and incentivise insurance companies to accumulate capital reserves through certain favourable tax exemptions. The system is, however, mostly self-financed through insurance premiums collected. Flood insurance is usually bundled with building or contents insurance in both domestic and commercial markets. UK banks, before granting mortgages, normally oblige homeowners to take out comprehensive insurance, which would normally include flood insurance. For this reason, it is difficult to sell a property in the UK for which flood insurance is expensive or not available.

3.8 Risk Assessment and Mapping Tools

The UK private insurance industry has been at the forefront of developing flood assessment and modeling tools. The twin business drivers of prudence and profit maximisation has meant that the UK flood insurance industry has for a long time been highly motivated to accumulate accurate data on UK flood risks to gain informational advantages over competitors and to assess risk more accurately.

3.9 Principles of Social Justice

The UK operates an individualist, risk-sensitive insurance under O'Neill and O'Neill's classification. Until 2015 when 'Flood Re' goes live, under the Statement of Principles, flood insurance is provided through a free market in which individuals' payments are in proportion to the level of risk to which they are exposed. After 2015, 'Flood Re' will cover the majority of high-risk properties. This form of direct government intervention in the UK market for flood insurance is a result of the system perhaps being too free market. The more or less free rein given to UK insurers over the last decades has resulted in socially and politically unacceptable outcomes, including unaffordable premiums and a growing proportion of the population without flood insurance protection. With the frequency and intensity of flooding set to increase across Britain (Lavers et al., 2013) this arrangement has come to be seen as both commercially unsustainable by the insurance industry and unsatisfactory by consumers in the face of yearly hikes in flood insurance premiums.

Given the decade of disagreements between the main stakeholders in the UK flood insurance market, it has been difficult to obtain flood insurance for properties in high risk areas and almost impossible for dwellings that have been repeatedly flooded (Botzen & Van Den Bergh, 2008). In the UK, those at high risk of flooding are exposed to higher insurance costs and an expectation of rising future premiums. Under the Statement of Principles, insurance companies were only obliged to offer insurance to existing customers, not new ones. However, the picture is not a wholly black and white example of the free market leading to negative externalities. In the UK there has for a long time traditionally been a small subsidy from low risk to high-risk households (O'Neill and O'Neill, 2012). The Association of British Insurers (ABI) calculated that over seventy per cent of homes at high risk of flooding are subsidised (ABI, 2011). This arrangement results in a market penetration rate for flood insurance of over 90% for owner occupied dwellings (DEFRA1, 2013). The figure for the rental and commercial sector is lower but still higher than in other countries.

Yet, for many UK low-income households, flood insurance premiums offered might be just about affordable but deductibles and other contractual provisions to transfer risk included in the policy can be

prohibitively high to discourage repeated claim making. It is unlikely such charges will incentivise lowincome households to invest in flood protection. A recently observed bubbling-over of public resentment might, however, galvanise the government into taking action to make sure that 'Flood Re' leads to more socially equitable than before, under the Statement of Principles.

3.10 Normative Perceptions

Over the last decade, due to rising insurance premiums, the future of the UK flood insurance has been at the centre of public controversy. In particular, there has been a national debate about the affordability of premium for homes labelled by the industry as high risk. Numerous local flood action groups have sprung-up in response. Recent building in floodplains has left approximately forty thousand properties at high risk of flooding (DEFRA1). While the building industry claim that development in floodplain incorporates flood resilient designs, often small-scale local measures are not effective in the case of serious flood events. This will have a disproportionate impact on flood insurance for many of the UK's most vulnerable communities that are housed in high flood risk zones. Without a change in the UK flood compensation policy, the national discourse in the UK will centre on issues of fairness for those at high risk being subsidised by those at low risk and around the question of affordability for communities least able to protect themselves.

3.11 Future Direction

In 2013, a consultation was convened between DEFRA, consumer representatives and the insurance industry. Its principal aim was not to reform the entire UK flood insurance market but an attempt to overcome a number of longstanding difficulties the UK has faced in attempting to balance both the needs of at-risk householders and the insurance industry. A small but significant number of households, which have been repeatedly flooded, were threatened with increased insurance premiums that for many became unaffordable. The insurance industry had made it clear to the British government that they would no longer be held to their previous commitment to continue to insure high-risk properties at affordable premiums. Consumer welfare associations claimed that this eventuality would expose a disproportionately high number of low-income households. The Association of British Insurers estimated that up to two hundred thousand homes would be left uninsurable if the Statement of Principles were to expire without a replacement agreement in place. This number is expected to increase as a result of two phenomena. First, an increasing number of properties are at risk of flooding due to more extreme weather patterns. Second, underwriters now have far improved flood risk assessment tools to enable them to assess risk and match premiums accordingly (ABI, 2011). In the UK, this has resulted in more accurate flood risk models and the redrawing of flood zone map boundaries. This situation quickly became a political priority to resolve.

After a lengthy and difficult parliamentary consultation, in June 2013, the UK Government reached a 'headline agreement' with the insurance industry for a replacement of the Statement of Principles. The new system is an insurance pool called **'Flood Re'**. The headline principle of 'Flood Re' are described in Box 1

Box 1: The Future of UK Flood Insurance for High Risk Properties: 'Flood Re'

In June 2013, one month before the Statement of Principles was due to expire, the Association of British Insurers (ABI) reached an agreement with the UK Government to create a not-for-profit flood insurance pool known as 'Flood Re' aimed at the approximate 500k UK homes that are

considered at high risk of flooding. The majority of the UK flood insurance market will not be affected by these changes. Premiums for homeowners not at high risk of flooding will continue to be risk based, and the market to sell such policies will be competitive.

After lengthy and public disagreements between the UK government and the insurance industry over the future of UK flood insurance, both sides agreed a new solution was necessary. The Statement of Principles, the already extended previous agreement, was intended as only a temporary measure and the industry had come to regard it as commercially obsolete. Under the Statement of Principles, insurers were only obliged to continue to offer flood insurance to existing customers while insurers new to the market had the advantage that they were able to 'cherry pick' low risk customers and refuse policies for at risk properties. From a consumer perspective the regime was also failing as it did not guarantee affordable premiums or low deductibles. As well as being a potential electoral hinderance the UK government feared the Statement of Principles was societally deleterious as the number of high flood risk households able to find affordable flood insurance dwindled. Over time, the status quo would reduce the economic efficiency of the UK flood insurance market if choices of both insurers and consumers alike continued to be artificially restricted.

The intention is that 'Flood Re' will set up a new flood pool to offer affordable flood insurance at a fixed price. Insurers will be able voluntarily to contribute to the 'Floor Re' pool any high-risk household they regard as not commercial to insure. The premiums within 'Flood Re' are capped based on Council Tax bands and are suggested to be £210 per year for the lowest band and £540 for the highest band. The premiums paid contribute to 'Flood Re' to pay for claims. In addition to revenue from capped premiums, it was agreed that all insurance companies with domestic policies would pay a levy of £10.50 per year on all home insurance policies. This is seen as cost neutral for consumers as under the Statement of Principles homeowners already contributed a similar sum as a cross subsidy from lower risk policies to higher flood risks. It is assumed that 'Flood Re' will begin operation in 2015. In the meantime members of the ABI will continue to honour their commitments under Statement of Principles. This means that cover will continue to be offered to existing policyholders where flood risk is assessed independently by the UK Department of the Environment to be not significant or where flood protection measures are planned to bring the risk below this level within a five year window. It is intended that 'Flood Re' will have sufficient reserves to cover losses up to a 1 in 200 year probability i.e. six times worse than in 2007 when the UK industry paid out record flood damages during what was described as the biggest peacetime civil emergency since the second world war. If there are catastrophic flood losses that 'Flood Re' cannot meet, it is not 100% clear what will happen. The MOU contained only a vague statement that the government would have 'primary responsibility for an effective response'. It is not currently clear where a limit the UK government's financial liability for 'Flood Re' lies.

With Flood Re, there are exclusions. To avoid incentivising house building in high-risk zones, homeowners who purchased houses built after 2009 will not covered even of they are high risk. This same restriction was applied under the Statement of Principles. Also the scheme is aimed at making flood insurance available to lower income households and will not cover high price homes in the highest council tax band.

Source: Securing the Future Availability and Affordability of Home insurance in Areas of Flood Risk (DEFRA1, 2013).

The 'Floor Re' insurance pool is aimed at making affordable flood insurance available for high-risk households. The terms of 'Flood Re' outlined in a Memorandum of Understanding will undergo a public consultation over the remainder of the summer 2013. The results of this public consultation were not yet available at the time this thesis was submitted. It is, however, already predicted that it may encounter problems with European competition laws (The Daily Telegraph, 2013). 'Flood Re' has many critics who regard it as a political fudge that fails to address the fundamental problem of flood insurance in the UK which is a lack of incentives for government to invest adequately in improved flood protection.

3.12 Chapter Conclusion

The UK flood insurance market is one of the most free in the world, yet over the last decades it has resulted in socially unacceptable outcomes which has necessitated intermittent government intervention in the form of various voluntary agreements. The Statement of Principles in the nineties attempted to ensure that flood insurance remained affordable. This regime, however, came to be seen as failing both households that faced steeper flood insurance costs as well as insurance companies that were left at a competitive disadvantage. Cumulative dissatisfaction from business, government and civil society led to an agreement in principle to create a new public-private reinsurance pool, 'Flood Re'. This pool is meant in principle to permit the affordable insurance of high risk properties that, without risk based premiums, are of limited commercial attractiveness. There are many critics of 'Flood Re' within and outside the industry who regard it as ignoring the UK's overall lack of public investment in flood protection measures.

A key lesson therefore to be learned for the introduction of private flood insurance to the Netherlands is that they must avoid the UK's lack of joined-up flood governance. As in the UK, there is a risk of moral hazard on the part of the government if public financial liability for flood compensation is reduced by private insurance involvement. It is imperative that public and private roles and responsibilities are clearly demarcated. It would seem prudent that the Dutch government remains responsible for the investment of public money in new flood protection and that they continue to fund maintenance of existing infrastructure. The insurance industry should also be properly regulated to ensure that they are not able to make excessive private profits on the back of decades of public investment in flood avoidance and protection infrastructure.

A final lesson from the UK is that a private flood compensation system based on purely free market principles is not likely to lead to economic and social benefits as without some kind of public intervention or regulation those households that cannot afford flood insurance would be left vulnerable. In the event of a serious flood, without a system of public compensation, recovery would likely be far slower and societal welfare losses far greater.
4 French Flood Insurance

4.1 Historical Context

Before 1982, natural catastrophes were excluded from French insurance policies. Three main reasons were cited by the industry for the difficulty in providing effective coverage (World Bank, 2012):

- Lack of reliable time-series data regarding the frequency and damage related to natural disaster phenomena.
- Severe correlated risk of a single event affecting large numbers of adjacent policyholders meaning that an insurer's loss exposure is hard to assess in advance.
- The commercial difficulty of providing affordable insurance premiums under conditions that do not discourage adverse selection of risk i.e. those most exposed to risk (or at least have high perception of risk) are willing to purchase insurance which results in high cost cover.

The occurrence of serious floods in 1981 and the difficulties experienced during the recovery increased public awareness of the lack of insurance and prompted the introduction of legislation upon which the national catastrophe¹¹ insurance regime (NAT/CAT) is based. It is ex-ante public-private insurance system that relies for successful operation on collaboration by both the insurance industry and the French state (ibid).

The NAT/CAT insurance guarantee is based on solidaristic principles to cover all 'uninsurable damage' caused by natural hazards. It is valid across France which has the advantage of enabling the pooling of risk between different natural perils. The NAT/CAT covers incidents of flooding, as well as other natural hazards including earthquakes, landslides, drought, and volcanic eruptions. Damage caused by wind, hail, snow, and crops are excluded (Paudel, 2012). This **risk pooling** is an essential component of the NAT/CAT that helps it satisfy the mutuality principle of effective insurance.

4.2 Public Private Balance

The NAT/CAT is an example of a multi-level public-private system. Private insurance companies are responsible for the day-to-day operation of the system, including claims management, in accordance with the insurance policy sold. They are able to retain a level of risk of their own books but often prefer to pass risk upstream to the French state. The *Caisse Centrale de Réassurance* (CCR) is a state owned reinsurance company. It offers unlimited reinsurance under the NAT/CAT system. However, the CCR is not the only player in this market; the French system permits insurers to reduce their risk exposure by buying reinsurance either from a private reinsurance market such as Lloyd's or from the publicly funded CCR. That relatively cheap public reinsurance is available creates a perverse incentive for the higher risk policies to be insured with the state owned CCR. If high risk policies alone accrue to the public sector and low risk policies are then cherry-picked by private insurers, the NAT/CAT insurance regime in France is at risk of becoming skewed in favour of private profit (Paudel, 2012). The regime has been criticised that its public-private structure results in situation where profits can be privatised while insurance losses are covered from the public purse in the form of state backed reinsurance. According to Paudel, this issue would not occur in a fully public system. For example, under the *Spanish Consorcio de Compensacion de Seguros* (2012) both high and low flood risk

¹¹ Flood risk is the main type of natural disaster (Swiss Re, 2012). Therefore it is valid to also analyse national natural catastrophe insurance systems to shed light on national flood insurance systems.

hazards are balanced within the same public financial system. It has been reported that legislative steps have been taken recently to address this anomaly (World Bank, 2012).

4.3 Mandatory or Voluntary Status

The NAT/CAT is considered a mature insurance regime (ibd). It functions as a quasi-mandatory system in that natural catastrophe insurance is legally required to be included in all French property and content insurance. The World Bank estimates that 97% of the French population is subscribed to the NAT/CAT (2012). The NAT/CAT guarantee also includes direct and indirect losses including **business interruption compensation.** The indemnity limits that are specified in each individual policy's terms and conditions. This high market penetration means that adverse selection of flood risk is not an issue (Swiss Re, 1998). There do not appear to be public legitimacy problems associated with the quasi-mandatory nature of system as the amount paid per year per person is relatively affordable and considered 'good value'¹².

4.4 Mitigation Incentives

Other than the application of insurance deductibles at the point of claim there are few incentives built into the French system to encourage policyholders to invest in flood protection or minimisation. This has the effect of reducing the potential economic efficiency of the system. Moreover, the state is expected to ultimately pay compensation except for high risk areas where state responsibility has been specifically rescinded. For example, there is a system in place for flood risk zoning to discourage development in high-risk areas (Kok & Barendregt, 2004 from Botzen & Van Den Bergh, 2008).

The state does, however, retain a high degree of control of public natural catastrophe compensation. Among several, one of its main tools is the decision to declare a public disaster. Flood compensation is only triggered when the state declares a flood disaster and the region a disaster zone. The decision is made by an inter-ministerial commission that attempts to make an objective assessment so that policyholders living in the same street will be treated equally regardless of their specific private insurance company's loss adjustment policy. As the conditions that trigger flood compensation payments are not objectively predefined and thus are contingent on a political decision process, the NAT/CAT has been criticised as **lacking public transparency**. In recognition of this weakness, legislative attempts have been made recently to more clearly define when a flood or other natural hazard phenomenon is a disaster of sufficient impact to merit state payouts (World Bank, 2012).

4.5 Risk Transference Mechanism

Public reinsurance is the main form of upstream risk transference. While a multi-level public private insurance system is in operation, the fact is that private companies retain only a small fraction of the flood risk on their own books. The majority of risk is backed-off to a public reinsurance company, the *Caisse Centrale de Réassurance* (CCR). The CCR receives half of all premiums paid but will then pay for half of the insured losses in return. The CCR acts a *de facto* insurance pool that balances the financial risk of natural disasters across all insurers. The CCR is backed by an unlimited state guarantee. This is effect an indirect state subsidy to the French insurance industry (Faure and Bruggeman, 2007). While this large public role in flood insurance is at the heart of the solidaristic aims of the NAT/CAT it can also is also a method of state influence on the private insurance sector. This may have market distortive effects that serve to reduce economic efficiency of the system.

¹² The average premium amount of a basic household insurance policy is approximately €220 per year. Therefore, the average additional premium amount of the NAT/CAT guarantee is about €25 per year for household (World Bank, 2012).

There is only one downstream risk transference mechanism. In 2001, a sliding scale was introduced to allow the NAT/CAT deductibles to reflect if a community has implemented prevention measures as setout in its "*plan de prévention des risques naturels prévisibles*" (PPRN). This prevention risk plan details what flood prevention and mitigation strategies are to be adopted. With a PPRN in place, the NAT/CAT deductible will be lower than if a community has not successfully applied for one (Faure and Bruggeman, 2007; World Bank, 2012). True to its solidaristic underpinning, there are no premium differentiation or discounts available to policyholders who have invested in flood protection. Mitigation incentives and other options for downstream risk transfer are, therefore, limited.

4.6 Financial Attributes

Under the NAT/CAT, the French government provides a sovereign guarantee to underwrite the regime. This means that if in a given year claims and payouts exceed the schemes reserves the NAT/CAT is supported by an unlimited state guarantee. In addition to the state guarantee, unlimited catastrophe coverage is available from a publicly backed reinsurance provider called the CCR (*Caisse Centrale de Re'assurance*).

The French state retains overall financial control of the NAT/CAT. It is responsible for setting how much policyholders have to pay to be covered through the Central Tariffs Office. The NAT/CAT appears to be a secure compensation system as the state guarantee offers protection to its citizens by making sure full compensation is received. It also contributes to the solvency of the national insurance system by capping the liabilities of private insurance companies (World Bank, 2012).

To participate in the NAT/CAT regime, the French state requires insurance and reinsurance companies to the build up their financial reserves through *Equalisation Reserves*¹³ to buffer years of high loss; the system is so financially strong that state's guarantee is rarely invoked (Paudel, 2012). Following years of high losses, due to a large number of mining related subsidence claims in the late nineties, the financial stability of the NAT/CAT was briefly threatened. The **government and the insurance market were, however, able to work together** to agree changes that successfully restored the financial stability of the system and they were able to agree voluntary measures to increase future risk prevention.

Insurance is for property related losses not indirect losses such as non-productive business days. Economic losses are not compensated by the NAT/CAT unless the specific terms of the insurance policy allow for these (Faure and Bruggeman, 2007).

4.7 Risk Assessment and Mapping Tools

Resilience to natural perils requires a risk management strategy based on **robust risk information**, **analysis**, **and modelling**. To this end, the NAT/CAT exposure data have been gathered from sources in both private and public sectors. **Data sharing is incorporated into the NAT/CAT legal framework**. The reinsurance contract each private insurance company signs with the public reinsurer requires insurers to confidentially supply the CCR with information on the risks insured and data on claims filed.

¹³ Under equalisation reserves, insurance and reinsurance companies are able to declare up to 75% of their annual profits tax free provided that the equalization reserves total does not exceed 300% of their annual income (World Bank, 2012).

Accordingly, the CCR has developed accurate models for each of the main French natural hazards (flood, drought, and subsidence) enabling both a deterministic and a probabilistic approach to risk underwriting.

In parallel, the French insurance industry has also further developed its data collection and risk mapping systems. The *Fédération Française des Sociétés d'Assurance* (FFSA), and the group of mutual insurance companies, *Groupement des Entreprises Mutuelles d'Assurance* (GEMA), launched a task force for natural risks, the *Mission Risques Naturels* (MRN). The MRN has developed a technical portal that allows better access to public data and projects including flood events (World Bank, 2012).

4.8 Principles of Social Justice

The NAT/CAT regime is deliberately based on principles of national solidarity in the face of the shared threat of natural disasters occurring (Paudel, 2012). It is an example of a solidaristic, risk insensitive national flood insurance system (O'Neill & O'Neill, 2012). While private insurance companies are indeed responsible for covering the first tier of flood risk, the government's role as regulator, reinsurer and guarantor attempts to prioritise fairness and national welfare above excessive private profits.

Furthermore, there are only limited market price signals in operation. For example, private underwriters use deductibles but it is a central public authority that sets the amount that can be retained by the insurance company. **Premium differentiation is not permitted;** instead premiums are determined centrally by a flat pricing mechanism (Paudel, 2012). Setting of premiums and deductibles centrally is meant to ensure affordability and social fairness. This reflects the national solidarity dimension of the NAT/CAT.

4.9 Normative Perceptions

Introduced almost three decades ago, the NAT/CAT has provided very broad coverage against damage caused by natural disasters including the most prevalent hazard¹⁴, flooding. It has demonstrated **efficiency and flexibility** for the insured, the insurers, and the government. Botzen & Van Den Bergh (2008) classified the NAT/CAT as quite effective compared to other European systems. They found that both policyholders and insurance companies are satisfied. The problem of negative public perception that can result from cross-subsidisation from low risk to high risk policies is less significant in France compared to other countries. This due to the inclusivity of multiple natural hazards under the NAT/CAT insurance regime. A city apartment dweller not at threat of flooding may well be content that they are insured against other natural perils such as earthquakes or heavy storms (Faure and Bruggeman, 2007).

4.10 Future Direction

A list of eligible natural hazards and their agreed definition is to be used by scientists to assess their intensity on a predefined scale. The hope is that predictability will be significantly improved along with greater transparency and fairness to policyholders. In order to keep premiums low, the flat pricing system for setting the NAT/CAT premium deliberately avoided calculation of individual risk exposure or actions they may have taken to increase their own risk resilience. There are no pricing signals to

¹⁴ The main NAT/CAT hazards in France are flooding (55% of the total claims, on average, over the past two decades) while 41% was due to subsidence caused by drought (World Bank, 2012)

incentivise policyholders to implement their own preventive efforts. This is egalitarian and the high penetration could lead to reduced overall economic losses if most business and homes that are flooded do have cover. But, according to free market proponents, lack of price signals are a fundamental weakness with regard to optimising economic efficiency.

To address this point, a new law, the Reform Bill, proposes to introduce limited risk-based premium pricing for large businesses and local governments i.e. the stakeholders that are most able to implement transformational prevention works and can efficiently negotiate with the insurance companies (World Bank, 2012). It is seen as economically inefficient for households to implement mitigation measures. The CCR plans exist to incentivise risk prevention endeavours at the community level. There is no **disciplinary device** included in the Bill to incentivise mitigation investment, nor is it clear how actions will be **monitored and enforced** beyond the initial assessment. A public consultation in 2011 showed strong support for the central goals of the Reform Bill following an **inclusive consultation between the main stakeholders**: victims of previous natural disasters, consumers, local authorities, the business community, the insurers, and the construction industry.

4.11 Chapter Conclusion

A report on natural catastrophe insurance systems from the Word Bank in 2012 concluded that the NAT/CAT is:

- Comparatively affordable compared to other natural disaster insurance systems;
- The relationship between the insurer and policyholder is one of integrity;

- A very high penetration rate is achieved without many public subsidies. State intervention has only been necessary in a limited number of very severe catastrophes.

The World Bank in 2012 reported that the NAT/CAT regime is a financially viable and effective system. By way of illustration, the last two large floods that have occurred in France did not require a financial intervention by the government. The wide range of natural hazards covered by the NAT/CAT are to a greater or lesser extent experienced throughout the country. That the size of the insurance pool is very large contributes to the financial viability of the system. However, from a free market perspective, the de facto lack of choice to participate in the NAT/CAT could be regarded as a form negative redistribution (Faure and Bruggeman, 2007) and therefore lead to reduced economic efficiency.

The economic efficiency of the NAT/CAT relies less on market price signals, which are virtually absent, but instead on state regulation and control of most of the financial attributes of the system. This includes centrally set premiums that do not take account of actual risk and state organised risk mitigation incentives through community participation in community prevention risk plans (PPRN). The availability of commercially attractive public reinsurance to private insurers also contributes to the state's influence on the operation of the private sector.

Despite praise for the system, the drought of 2003 and the Xynthia windstorm, and subsequent flooding in the Var in 2010, revealed two weaknesses of the NAT/CAT. First, there is a perceived lack of clarity in the legal framework behind the NAT/CAT. It is seen as insufficiently transparent and, at times, policyholders have found it to be unfair. The second significant weakness is that there are not enough built-in incentives for risk prevention. The French government recently launched a Reform Bill to address both of these criticisms.

5 Belgian Flood Insurance

5.1 Historical Context

A natural disaster compensation fund has been in operation in Belgium since 1976. In 2003, compulsory flood cover was introduced as an add on to fire insurance. Initially set-up to provide cover for specific flood prone areas only, disagreements about the boundaries of the high-risk zones meant that this idea was eventually discontinued. This means that the compulsory coverage includes the whole country and not just zones considered high risk (Faure and Bruggeman, 2007).

The Waarborg Natuurrampen (WN) in its current form was established in 2005. Like the French NAT/CAT, it ties natural disaster coverage to a common type of first-party insurance. In the case of the WN it is specifically bundled with fire insurance policies rather than a broader range of property insurances, as is the case under the French system.

5.2 Public Private Balance

This is a public-private arrangement. It is strongly influenced by the solidaristic and collective risk sharing approach of the French NAT/CAT. The Belgian state provides a sovereign guarantee that is triggered if the WN fund's limits are exceeded in any given year. The state is as strong regulator of the WN. Private insurance companies are able to administer policies, cover a first layer of risk and are free to assess and tailor individual risk premiums within a pricing system set by a central tariff office (Paudel, 2012). Through various levels of government, the state is also responsible for investment in natural catastrophe protection measures, for example, flood defenses.

5.3 Mandatory or Voluntary Status

That it is automatically included as an addition to all fire insurance policies, which have themselves been compulsory since 2010, it is a *quasi*- mandatory catastrophe insurance. Penetration rates are consequently in the region of 90% to 95%.

5.4 Financial Attributes

Premiums under the Belgian WN are set by insurers on a risk basis. On average they are 12% of standard fire insurance policies for buildings and contents. This is a similar level to France and other European countries (Paudel, 2012). The WN pays out based on a formula based on the event and the premium income from fire cover received by each private insurer.

The annual upper limit is capped at €280 million for flood compensation. There are limits set for each individual insurer based on their risk exposure to prevent insolvency after severe event. This is termed the *ratio legis*. If in a year losses incurred exceed the WN limit the amount paid out per policy will be reduced on a pro-rata basis (Faure and Bruggeman, 2007). Insurance companies are motivated to increase capital reserves under the WN with tax-exempt equalisation status (Paudel, 2012).

5.5 Risk Transference

For upstream risk transference, private reinsurance is available. The Belgian state, however is the sovereign guarantor of the WN regime. In the event of a catastrophic incident that threatened the financial solvency of the system, the state would step in to provide necessary compensation.

Risk based premiums differ by region based on flood zones and are delineated by public flood maps. The Belgian state warns that new construction should not take place in highly exposed flood zones. People are free to choose to ignore this advice but may be excluded from the WN. No other downstream mitigation incentives are included (Paudel, 2012).

5.6 Mitigation Incentives

Premiums are mostly risk based being dependent on the history of flooding, flood probability, and the location of the insured property. An insurer will investigate the flood risk for each individual case and then

tailor premiums accordingly. Insurers, however, calculate risk premiums using different methods therefore a degree of competition to sell more attractive policies is possible (Faure and Bruggeman, 2007). A Tariff Office was created to advise private insurance companies on acceptable policy terms and also to set maximum premiums on high risk properties that would not have been covered prior to the WN. Deductibles are fixed by the state and relatively high at around €1000 per claim (CVMD, 2013).

5.7 Risk Assessment and Mapping Tools

A comprehensive flood model for Belgium has already been created. The Belgian government is responsible for updating flood risk maps. Private insurance companies however develop and operate their own flood risk models.

5.8 Principles of Social Justice

As a result of the WN public-private partnership. a variety of natural disasters that threaten Belgium are insurable. The system is based on social solidarity as all holders of fire insurance are part of the risk community. Coverage is therefore almost universal and compensation is paid in full with the exception of a fixed deductible that is set by the state. Many insurance policies will, however, only payout if the event is declared a natural disaster by the government of the day (BERLARE, 2013). There is, therefore, a level of uncertainty for individual incidents at the household level. Low income households without fire insurance would be dependent on ad hoc *ex post* compensation which may or may not be forthcoming for small floods if local politicians are not willing or able to successfully lobby for it.

5.9 Normative Perceptions

To broaden its general acceptance the WN incorporates as many of Belgium's citizens' natural risk circumstances as possible. In 2005, the scheme it was expanded to cover a wide range of perils beyond flooding including: earthquake, the overflow of public sewers, and landslide or subsidence (Faure and Bruggeman, 2007). **Expanding the risk community** in this way is regarded as a key reason that it is politically acceptable and socially legitimate national compensation system.

5.10 Chapter Conclusion

The main lesson from the WN in Belgium is the necessity to build a sufficiently broad insurance community to lend public legitimacy to any form of mandatory flood insurance system in which private

insurers are operating. In the WN they achieved this by expanding the number of natural disasters covered by the system in order to make it as useful to as many citizens as possible.

6 Practice Based Conditions for Effective Flood Risk Insurance

6.1 Introduction

Based on a comparative analysis of operating flood insurance systems in the UK, France and Belgium the previous chapter revealed each depends on many country specific components and attributes. All systems have relative strengths and weaknesses in delivering effective flood insurance. It is possible to use this data to understand what practice based conditions contribute to the effectiveness of private insurance in each system and therefore to identify the conditions for the introduction of effective private insurance system in the Netherland. This is a highly complex task in which there are many factors at play. To attempt to navigate through this complexity, the framework of flood insurance system components and the understanding of what it is to be effective from the first research step will again be used to make comparisons across systems. The following research sub-question will be answered in the next chapter:

SQ3: What conditions contribute to effectiveness of national flood insurance systems in practice?

This research step provides an understanding of the differences and similarities between the three cases and knowledge of how each system of flood insurance operates. The objective of the chapter is an assimilation of the underlying conditions that contribute to the effectiveness of private insurance across all three cases. The output will be structured using the analytical framework from the first research step. The information collected and the results of this section were verified through the indepth questions used during the expert interviews.

6.2 Differences and Similarities Between the Three Cases¹⁵

6.2.1 Public Private Balance

France and Belgium both operate mixed public-private compensation systems. The state has clear financial responsibilities and strong regulatory powers. The UK system in the past had involved a clear demarcation between the roles of private insurers that operate the flood compensation system, while the state is responsible for flood protection investment. This distinction is however changing in the UK with the introduction of the public-private 'Flood Re' insurance pool that ties public finances to the continued affordable insurance of high risk properties.

6.2.2 Voluntary Mandatory Status

In France and Belgium both systems are based on a form of mandatory flood insurance. Both systems involve automatically including flood insurance with other first-party property insurances. In France, the NAT/CAT is added to all property insurances. In Belgium the WN is added only to fire insurance. In theory, property insurances are possible to avoid, for example, by those on very low income who live in in private rental accommodation. In practice, regulations are such in both countries that most assets, be

¹⁵ In Appendix 4 there is a table comparing the Dutch flood compensation characteristics with the UK, France and Belgium

they public or private are insured against natural disasters including flood. Penetration rates are above ninety-five percent consequently.

The UK system is based on voluntary not mandatory flood insurance. It is often described as quasimandatory however as flood insurance is required by banks for the approval or mortgages. While flood insurance penetration rates are very high (above ninety percent) compared to global averages (twenty percent) there are a significant number of at risk properties without flood insurance compared to the more solidaristic French and Belgium systems.

6.2.3 Risk Transference Mechanisms

Reinsurance is the most common of several form of upstream risk transference. Reinsurance of flood risk is present in each of the national flood compensation systems that have been examined in the previous chapter. Private reinsurance is a key feature of the UK system where as in Belgium and France there are both private and public reinsurance options available.

6.2.4 Mitigation Incentives

Analysis of national flood compensation systems in the preceding chapter suggests that generally a system of flood insurance is more effective at reducing the potential for flood damage through the inclusion of downstream mitigation incentives to the level of policyholders. In all three systems there are financial incentives for flood protection and damage limitation present benefits for all stakeholders by de-risking the system and therefore increasing overall financial viability and hence economic efficiency of the systems over the long term (Paudel, 2012). For policyholders, mitigation incentives decrease flood damage, which, in a well functioning system, will lead ultimately to lower premiums - a form of collective return on investment. For insurers they result in fewer claims and therefore higher profits. The French and Belgian governments that are both responsible for some level of compensation are motivated to invest in flood protection measure to avoid this payment. This incentive is not in place in the case in the UK where the government has no direct responsibility for flood compensation.

All three case study countries did, however, include some form of downstream incentive mechanisms. The UK system has the most comprehensive range of financial incentives, or example differential premium pricing or with discounts on deductibles. In theory, UK citizens are encouraged towards flood avoidance and protection measures, which should make the whole system more economically efficient. By implication, systems that do not integrate all these mechanisms, for example, the French or Belgian compensation arrangements could be criticised as being less economically efficient. The UK is the freest market and involves the widest range of options. The French and Belgian systems, being public private arrangements, are more solidaristic but both do include differentiation either through deductibles (France) or premiums (Belgium).

Joint state responsibility for flood compensation (or a level of compensation) and flood protection also is a form of non-market incentive as government is motivated to invest in mitigation measures to avoid public payments. Both Belgium and France intertwine state and private responsibilities and incentives. The UK system is at risk of moral hazard on the part of the government as the responsibilities for flood compensation are in private hands.

The UK insurance system does not take into account or incentivise community based flood protection measures. This is an economic weakness. It is very often more efficient for flood defenses to be built

and paid for collectively at the community level. The French system has incorporated some level of **community incentives for flood prevention.** If a community has not adopted a "prevention of risk plan" the deductibles charged will be higher than if they had one. The NAT/CAT therefore also provides incentives for voters to lobby local politicians to implement these plans within their communities (Faure and Bruggeman, 2008).

6.2.5 Financial Attributes

The UK system is self-financing and does not rely on public guarantees or reinsurance. Insurance companies are however encouraged to divert profits into capital reserves with tax breaks from the UK government. In France and Belgium the state has a financial role to play. In France it is through unlimited public reinsurance of private insurance company risk. In the case of Belgium the state will cover losses above a limit. As insurers are not charged for these interventions in any of the three countries, they are in effect subsidies and could be said to distort the operation of the markets (Faure & Bruggeman, 2008).

A point of difference between the French and the Belgian compensation systems is that the regulator fixes premiums in France, whereas in Belgium insurers fix the premiums on a risk-based basis. In France, premiums do not take into account the risk policyholders face. Under the French system the level of premium the state decides in part limits the revenues of the insurers. Competition can still occur between insurance companies competing for new customers by offering more attractive property insurances, but the flood premiums they can charge will be the same as their competitors. In Belgium insurers can compete on the premiums they feel able to charge. The UK system is a total free market and outside of the defunct Statement of Principles insurers can charge what they assess to be appropriate and more attractive than the terms their competitors are offering.

6.2.6 Risk Assessment and Mapping Tools

All three cases have shown that it is possible to map and assess flood risks accurately with today's technology. This information can be used to identify properties and areas at higher risk and therefore direct spatial planning policy and ensure that building standards are also tailored to local flood risks. From his comparative study Paudel (2012) finds that risk assessments arrangements are probably most effective when they combine the actuarial skills of private insurers with the state's land use planning powers and public infrastructure investment programmes. This is the situation found in the UK, French and Belgian arrangements.

6.2.7 Principles of Social Justice

Even when there is a high degree of penetration, as is the case in the UK, under a voluntary private system, there is a serious risk that a significant numbers of households cannot afford flood insurance. However, even in mandatory systems, after very serious floods, insured policyholders often find that they inadequately covered for actual losses incurred and ambiguity whether compensation will be paid or not still exists. There is a concern in Belgium that the wording of individual insurance policies excludes compensation if certain conditions are not met in. For example, the definition of natural disaster varies from policy to policy.

6.2.8 The Future

Going forward, the France and Belgium are likely to retain their mixed public-private flood compensation systems. There are small reforms planned in both countries to introduce more market orientated flood risk mitigation incentives. In Belgium this takes the form of more freedom for risk based premium setting and price competition among private insurance companies. In France, there is a reform bill to propose limited risk-based premium pricing for the insurance of large businesses and local governments. At the community level there are also plans to increase incentives for risk prevention through the CCR plans. The French reform bill has, however, been criticised by the World Bank (2012) as not including any disciplinary device and for lacking adequate tools for monitoring and enforcement.



Figure 2: Future Direction of National Flood Insurance Systems (DEFRA1, 2013)

The UK is going through of systemic change however. Like most national flood insurance systems it too is moving towards introducing a greater role for government (as the above chart highlights). The UK government is ideologically committed to attempt to maintain the as much of its free market attributes as possible. Given the social welfare problems that have arisen around unaffordable insurance premiums and lack of willingness by the private insurance industry to continue to offer flood insurance regardless the number of times of property has been flooded in the past, the government has been forced to intervene.

6.3 Lesson from the cases: evidence based conditions

In all three national cases, the insurance systems are operating to a greater or lesser extent effectively i.e. conferring both economic and social benefits. Evidenced by the recent public controversy over affordable flood insurance premium for high-risk properties the UK free market system is probably the one with the most difficulties, which may or may not be resolved with the introduction of the insurance pool, Floor Re, in 2012. Nevertheless, there are important lessons that can be use derive conditions for

effective private flood insurance that can be applied to the Dutch context. The next section will examine assimilate practice based evidence from the three case as to what the most important of these conditions might be.

6.3.1 Public Private Balance

According to Jongejan and Barrieu (2008), a major role for government will always be necessary in mitigation and recovery phases of flood management and therefore their role should be incorporated into any effective flood insurance system's design. It is the government's role to ensure adequate on-going investment in the first line flood defences. As private insurance companies cannot capture the benefit of reduced compensation payouts, this role naturally falls to government that benefits both politically and economically (Paudel, 2012). However, the discourse around the UK flood compensation system would imply that the government is not fulfilling its responsibility to invest in flood defenses and the costs of this inaction are felt to be passed on to both the insurance sector and, in the case of those households with no or inadequate insurance, private citizens. A primary condition for effective private flood insurance is therefore, **an active financial role for government**.

In the UK, due to the separation of public and private responsibilities, with only private entities are responsible for flood compensation, there is great scope for government moral hazard compared to France and Belgium where the state has a financial incentive to avoid floods. Over the last twenty years, the UK insurance industry accused the government of underinvestment in flood protection and relying too heavily on *ex post* compensation from the private insurance sector rather than investing in flood protection infrastructure. In both Belgium and France, a public entity - a government department or public insurance organisation - that retains responsibility for both flood protection and some proportion of flood compensation reduces temptation for government to avoid or delay flood protection infrastructure investment. A condition for effective private flood insurance is therefore involves **clear boundaries for public and private sector responsibility**. Monitoring and enforcement mechanism should be in place to ensure all main stakeholders, government, industry and policyholders, do what they are supposed to.

Moreover, in the absence of a suitable state guarantee, as is the case in the UK with the collapsed of the Statement of Principles, private insurers are wary of committing to fully covering risks that are both uncertain and where it is difficult to assess the extent of losses in advance (Paudel, 2012). This inherent challenge to insure flood risk is lower in France and Belgium as clear public-private financial boundary exists. The state has responsibility and is incentivised to maintain the solvency of the entire insurance system through involvement in form of multi-level public-private insurance arrangement. This could be as sovereign guarantor of a level of risk beyond the capacity of the private sector as it the case in Belgium. Or as a public reinsurer and sovereign guarantor as happen in France. A form of public-private partnership is desirable for the effectiveness (financial viability) of the flood governance system as a whole. It lowers the risk of moral hazard on the part of the state. It can also permit private insurance companies to hedge their levels of risk more cheaply than through private means alone. A recommended condition for the introduction of an effective private flood insurance system is that the **government acts as sovereign guarantor or public reinsurer** for a least a layer of risk in the event of a catastrophic flood.

6.3.2 Mandatory Voluntary Status

Faure and Bruggeman (2008) observe a European trend towards the implementation of mandatory catastrophe insurance. They explain this tendency as a reaction by governments to the need to shed

financial liabilities in times of shrinking public budgets. The first country to introduce this kind of system was France with the NAT/CAT where a catastrophe provision is automatically supplied on all property insurances. This system has been criticised from an economic perspective as not optimising social utility when particular groups not exposed to risks such as flooding are forced to purchase this kind of indemnity regardless. Insurance companies under the NAT/CAT are not permitted to set risk-based premiums but do have limited options to set different levels of deductibles. These are of limited value as flood mitigation incentives as they are only applied after flood damage has already occurred. Variable flood insurance premiums are more effective as they are applied (and felt by the policyholder) each time the insurance contract is renewed.

It is technically possible that compulsory insurance is combined with risk reflective premiums. This is the case in Belgium where policyholders facing different types and levels of risk are charged differing premiums. Although a mandatory system, it has been designed so that Belgium insurance companies are able to adjust risk premiums for each policyholder's own circumstances. This offers both more opportunity for incentivising flood mitigation but also greater revenue generating potential for insurance companies. It would be seen by economists as leading to higher levels of overall utility than in a system that operates with flat rate premiums.

A recommended condition is that the **insurance community is as large as possible**. Globally, evidence suggests that a high market penetration for flood insurance is only found in systems, be they public, private or mixed, which have a mandatory element. Without a large enough insurance community the basic principles of insurance concerning financial viability and mutuality will not be met and the insurance system will likely become insolvent.

6.3.3 Risk Transference Mechanisms

Private reinsurers have to charge high prices to make it commercially attractive for them to cover low probability, high impact events. When compared to public reinsurance in France and Belgium, where the flood insurance systems are backed by state guarantees and access to public reinsurance, the UK flood insurance premiums are much higher (Paudel, 2012). In Belgium and France with the state ultimately responsible for flood compensation and given its favourable access to capital, plus its tax raising authority, though an option for insurers, it is difficult to imagine a situation that would make private reinsurance of flood risk more economically attractive than a public reinsurance other than under the market distorting conditions of 'cherry-picking'. A recommended condition, which is related to market penetration, principles of social justice and the size of the insurance community is **the availability of affordable basic flood insurance**.

6.3.4 Mitigation Incentives

In Botzen's analysis (2010), private insurance arrangements as found in the UK, when compared to public ones found in Belgium and France, are better able to limit total national economic losses from flooding because they create price incentives for both citizens and the state to undertake loss mitigating measures. Public and mixed public-private insurance systems rarely incorporate as many financial incentives for flood risk mitigation. Also, voluntary insurance systems compared to mandatory ones will be less effective at limiting flood risks because of the low penetration rate (Paudel, 2012). The case for the introduction of private insurance arrangements is also justified as offering superior policy tools for climate change adaptation. In addition Botzen (2010) claims that social welfare could be improved if the individual uncertainty associated with flood losses under an ad hoc public system could be reduced through the contractual promise of private flood insurance policies. A condition for effective private flood

insurance is **the inclusion of price signals and regulated free market conditions** in the sale and purchase of flood insurance policies. Without free competition between insurers sub-optimal scenarios such as adverse selection and cherry-picking will reduce economic efficiency of the system.

In the three cases, it has been shown that with both private and public arrangements it is possible that flood compensation systems can be designed to provide sufficient incentives to households and businesses to invest or change behaviour to reduce overall flood losses. Without political support and joined-up government other public policy areas, such as land use planning law and the setting of building codes might not mitigate flood risk and therefore distort insurance incentives. For example, in recent decades, the UK government implemented policy that promoted the building of new houses in floodplains. DEFRA, the ministry responsible for flood protection at the time, along with the insurance industry warned against the increased flood risk this entailed. Eventually the contradictions in the system became too great to ignore and the insurance industry pulled out of its promises to keep insuring high-risk properties at affordable prices. Evidence from the UK highlights that when public policies are not joined-up, well integrated incentives for flood mitigation can fail. A recommended condition is that **the insurance system has political support.** Without this, it is probable that other policy initiatives might distort or clash with the price signals proved by private insurance systems,

6.3.5 Financial Attributes

Little was found in the literature about the relative costs to the nation of running the different systems in the above case studies. In a private or public private system financial incentives can flow downstream to policyholders that should promote efforts to reduce individual risk. For example, avoiding high flood insurance premiums by building or buying a house in a lower risk area. Operating a system of premium differentiation or offering tailored discount to individual policyholders to reflect their individual risk is more costly than a flat fee system but should result in lower claims and hence lower running costs over the longer term (Paudel, 2012).

Premiums in the UK are however quite expensive compared to other countries studied in part due to a lack of public reinsurance (Paudel, 2012). The French NAT/CAT solves this issue of affordability as premiums are set at fixed percentage and risk-based differentiation is not permitted. The presence of public reinsurance also keeps the system affordable compared to the UK. This solidaristic component reduces the major financial viability challenge for commercial insurance companies covering natural hazards that cause highly correlated losses.

6.3.6 Risk Assessment and Mapping Tools

The French NAT/CAT has the most advanced arrangements for sharing flood risk data between private and public actors. It will be more economically efficient if public and private data were built into risk maps. The state would be better able to carry out public sector investments in mitigation and protection works in addition to flood protection such as early warning systems, risk awareness programmes and the implementation of zoning and building code standards if data is shared from the private sector. Paudel regards these tasks as public goods because the benefits of flood prevention are shared across the wider community and could not be easily captured by an individual insurer in a competitive market (2012). The French state financial influence on private insurers encourages them to develop flood assessment tools themselves and to confidentially share data through various public intermediary organisations. A key learning point is flood compensation is more effective if data is shared between public and private spheres. **A stand alone national flood model** is a prerequisite for accurate flood risk assessment and risk-based premium calculation and is a further recommended condition for effective private flood insurance

6.3.7 Principles of Social Justice

From a social welfare perspective, it can be argued that the French and Belgian systems that maintain a public component are far better at optimising a broad society-wide recovery after a flood compared to the more laissez faire UK system. A system that incorporates a financial role for the state is less constrained by short-term commercial considerations and liquidity constraints that can shackle private insurance companies when faced with major natural disasters. Government operates in a democratic and political domain it therefore has a fundamental self-interest in recovering the situation as fast and as comprehensively as possible compared to private insurance companies, that, by their nature, will be concerned with honouring their insurance contracts with payments as low as they can legally justify. Botzen and van den Bergh (2008) in their criticism of public flood insurance do not draw attention equally to cases where private insurance arrangements have resulted in protracted and costly disputes (EP, 2013). Disputes over flood compensation take place all the time in the UK. As has been demonstrated recently in negotiations regarding the successor to the Statement of Principles, the UK government often is politically compelled to intervene to ensure social welfare is taken into account of. A condition for the functioning of effective private flood insurance, even within a free market framework, is some kind of strong independent industry regulator or ombudsman to minimise market distortions and to ensure social welfare is also taken into account.

The major drawback of the UK system is the absence of principles of social justice with correspondingly low penetration of flood insurance among low-income households. Even in the supposedly free market UK system, the government of the day would have to make a political judgement whether to step-in. If a large enough number of people are affected by a flood - as has happened in Germany twice in the last decade and in the US after storms Katrina and Sandy - it is probable that the UK government would have to offer financial support to those who find themselves underinsured and for those without insurance who are frequently poor or elderly members of society. An unintended consequence of a government offering financial compensation to uninsured flood victims is the expectation that the government will step-in which crowds out the private insurance offer. In the German voluntary system, despite the impact of large recent flood, the market penetration of flood insurance is still below twenty-percent. A condition for effective private flood insurance is therefore **the removal or reforms any parallel system of public flood compensation**.

6.3.8 Normative Perceptions

Research by reinsurance company Swiss Re (2012) suggests that while flooding is the most common natural disaster to befall people, in general the perception of flooding is low relative to other common natural hazards. The **perception of risk** is a significant factor when individuals choose to invest in precautionary measure against natural disasters or give their support to policies that aim to reduce the risk of such perils. Flood risk mitigation incentives and risk transference mechanisms only will be effective at the system level if a sufficient proportion of the population are appreciative or exposed to the flood risk. Without fear of flood there is likely to be little interest or demand for flood insurance. If flood insurance were only purchased by a handful of the population made up of those who had the greatest fear of flood, whatever actions or investments they were incentivised to achieve would make very little difference to the total system and a situation of adverse selection would arise.

In all three case study systems there are mandatory mechanisms in place by government to ensure a possibly misplaced low perception of flood risk does to lead to low demand for flood insurance and inadequately sized flood community necessary for the system's mutuality and financial viability. Due to

risk myopia, no flood insurance system is able to rely on the collective actions of individual policyholders to form a critical mass of the population with insurance. Otherwise, after a flood, if policyholders saw that even those without insurance were compensated, they are unlikely to renew their insurance contract in the next year. There has to be advantages associated with purchasing flood insurance compared with not buying it. This is achieved in the French and Belgium systems as flood insurance is subsidised and seen as good value and therefore worth having (particularly because it is combined with other natural perils). The UK system is more problematic. Flood perception is, however, high in the UK as evidenced by the media prominence given there to floods and the difficulties of flood insurance. Still, without flood insurance being required by banks for mortgage lending it is likely demand for flood insurance would be closer to the global average of about twenty percent.

6.3.10 The Future

In the UK in 2013 a form of minimal public-private partnership has been agreed that will be based on the concept of insurance pools. These are relatively new frameworks and are increasingly popular approach to reducing the systemic risk of insuring high impact, low probability events. One of the first insurance pools, called 'Pool Re', was designed to ensure that the UK insurance industry would continue to be able to offer cover for damage caused by the increasing number of acts of terrorism in the UK during the 80s and 90s. During those years, losses from terrorism like those from catastrophic flooding were becoming seen as an open ended and, therefore, an uninsurable risk. There are therefore parallels with the challenges of providing flood insurance. This theme is discussed in more detail in Box 2.

There are many concerns, however, with this trend towards insurance pools. Many in the industry worry that insurance pool as a sort of public-private 'fudge' used when no one can decide what to do with commercially unattractive bad risks. Putting a 'very large number' as the capital in the risk pool gives a patina reassurance to the public. Given the high costs of setting-up and running a new risk pool company, and the unknown nature of many of the risks that are included in them, how successful a pool such as 'Flood Re' will be in the medium term is questioned (EP, 2013) Whether they will properly serve well any of the stakeholders - the government, the insurers and the insured – is doubtful as the high risks they contain will still have to be financially underwritten and paid by one entity or another either publicly or privately.

Box 2: Insurance Pooling - The Future Direction?

Pool Reinsurance Company Limited (Pool Re) was formed in 1993 following a series of terrorist incidents in the UK related to the situation in Northern Ireland. Like the problem of insuring floods, the high potential cost of terrorism losses and the lack of any reliable method of estimating the future loss made it difficult to insure commercially. In the UK, insurers rely on reinsurers for financial cover should very large claims occur. Consequently insurers and reinsurers alike came to the conclusion they could not continue to offer terrorism cover using traditional underwriting methods.

Retraction of terrorism insurance would have potentially had severe consequences for the UK economy. A new mechanism was required for providing this type of insurance while at the same time not exposing both insurers and reinsurers to potentially huge losses for which there was no reliable method of accurately pricing premiums. It became clear that any new approach would require the involvement of both government and insurance sector. Following a lengthy consultation period, Pool Re was brought into been operation and has already covered substantial incidents of terrorism. For example, it paid out £234m after the centre of Manchester was destroyed by a huge terrorist bomb

attack. Its success rests on several innovations that - given similarities with the problems covering natural disaster insurance, (also high impact and low probability) - may offer guidelines for designing a national flood insurance system, perhaps based also on a public-private insurance pool.

The first innovation for the UK insurance industry was the legal commitment from the government that if losses from terrorism exceeded the substantial reserves (paid for by premiums) held by Pool Re, the British Treasury would cover the shortfall. The transfer would, however, have to be repaid from future income.

A second novel part of the approach was to limit cover to only commercial property. Domestic cover is excluded. Direct and indirect losses (for example lost business days) are included in the indemnity. The cover may be bundled as part of an existing property policy or as a separate policy. This provides brokers flexibility to structure the contract optimally for each client.

Third, while each insurer must pay losses up to a threshold, when losses exceed that threshold, which differs for each member, the insurer can claim upon reserves accumulated by the insurance industry on a mutual basis within a separate company. Pool Re asks its members to reimburse them the cost of claims they pay to their policyholders under the terrorism cover they chose to provide. This is subject to a loss retention (a type of reinsurance deductible) that they must pay themselves. The Pool Re company is financed by the premium paid to it for the cover insurers received. The retention differs between members depending upon the size of their terrorism insurance portfolio.

Fourth, as Pool Re involves rules within its arrangements that could be construed as working counter to principles of a competitive market i.e. might restrict or distort competition within the United Kingdom, the rules gained an individual exemption from the Chapter I prohibition of the Competition Act 1998 (Office of Fair Trading, 2004).

Source: Adapted from a history of Pool Re (2013)

6.5 Chapter Conclusion

The above chapter has examined the operation of three different national flood compensation systems. Using the analytical framework built in Chapter 2, the components and attributes of each system have been identified and where possible relationships and interactions have been captured. As each system included private insurance companies, although with differing roles and responsibilities, particularly with regard to the financing of flood risk, it has been possible to extract a number of underlying conditions that pertain to their effective operation. The research question posed at the beginning of this chapter has been adequately answered:

The conditions contribute to effectiveness of national flood insurance systems in practice, in no particular order, include the following:

- 1) A Free Market in Flood Insurance
- 2) Removal or Reform of Public Flood Compensation
- 3) Sufficient Size of Insurance Community
- 4) Political Support
- 5) An Active Financial Role for Government
- 6) Clear Boundaries for Public and Private Sector Responsibility
- 7) Public Reinsurance or State Guarantee
- 8) A Standalone National Flood Risk Model

9) Affordable Basic Coverage

- 10) Strong Independent Industry Regulator
- 11) Price Based Incentives to Overcome Adverse Selection
- 12) Community Level Mitigation Incentives
- 13) High Perception of Flood Risk (Demand)

In the next chapter these conditions will be further analysed to address the research objectives regarding the introduction and operation of effective flood insurance to the Netherlands. An understanding of the current characteristics of flood risk compensation in the Netherlands in relation to these objective is the next research step.

7 Feasibility of Private Flood Risk Insurance in the Netherlands

7.1 Introduction

To understand whether a private flood insurance system could be beneficial to the Netherlands, it is first necessary to know the characteristics of the current flood risk compensation there, including recent proposals to change the system. The first section of this chapter will apply the research framework that was used previously to analyse the three national case studies to better understand the characteristics of current flood risk compensation in the Dutch context. Using the same research framework facilitates cross-country comparisons to better address the research objectives of this thesis. The second part of this chapter will attempt to answer the question whether the conditions are present for effective private flood insurance to be introduced. How these conditions contribute to effective private flood insurance is also reflected upon. The following research sub-question is therefore addressed.

SQ4: Are the conditions present to introduce a private flood insurance system in the Netherlands?

The data used in this chapter is based on the theoretical and empirical insights from the previous chapters. This information will be assimilated to elucidate conditions for potentially changing the flood compensation system in the Netherlands towards a system that includes a role for the private insurance sector.

7.2 Characteristics of Flood Risk Compensation in the Netherlands

One of the world's most densely populated countries, approximately two thirds of the Netherland is said to be vulnerable to flooding. Flood has been, and continues to be, the greatest physical threat to the Netherland's ongoing prosperity. Consequently, flood risk is a central to the Netherland's history. To understand whether private flood insurance should be introduced to the Netherlands, it is therefore essential to first understand the development context of the current public system of flood compensation.

7.2.1 Historical Context

From centuries-old practices of building dunes and dikes to more recent advanced modern engineering solutions such as the Delta Works, the Dutch have developed great expertise in flood protection. To appreciate its full extent, it is necessary to understand a little about the history of water governance in the Netherlands. From the thirteenth century to this day the Dutch water boards have been heavily involved in local flood protection. As independent, democratically elected local institutions they are credited with being the basis for the decentralised nature of the current Dutch political system. Their purpose was twofold: first, to maintain drainage of what would otherwise be bog land so that it could be



productively used for agriculture; and second, to protect the land from the ever-present threat of river flood or sea incursion. Twenty-four water boards remain today. Among their primary responsibilities is the management and maintenance of water barriers such as sand dunes, dikes, and levees

(Waterschappen, 2013). Once able to issue fines, the water boards today are still able to levy local taxes which has the effect of limiting the possibility of free-riding behind publicly financed flood defenses (Jongejan & Barrieu, 2008). At the heart of public investments in substantial flood protection are a series of dike rings built to protect the conurbations at flood risk. Depending on flood risk and economic impact the dike rings are built to different safety standards. These are shown in the below map.

Figure 3: Flood Ring Safety Standards in the Netherlands (Jak and Kok, 1999)

Today, central government has a key role in directing public investment in flood protection. On average the Dutch spend €550 million per year against national

coast and river flooding. If the recommendation from the Delta Commission and the National Water Plan are implemented, annual spending may increase to between €1.2 and €1.6 billion, of which a large proportion will be spent on strengthening flood protection measures in anticipation of severe weather events expected to result from climate change. Responsibility for flood defence is shared between national and regional public authorities. At the national level, it is the Ministry of Transport, Public Works and Water Management and its executive agency, the Directorate General for Public Works and Water Management. At the regional level, three different authorities are involved: the water boards and the provincial and municipal branches of local government (European Commission, 2009).

In the decades following the 1953 flood successive governments have reassured the Dutch public that everything necessary was being done to protect the country from future flood catastrophes. This public commitment to reducing flood risk led to numerous public infrastructure projects to protect the country against flood that culminated in the famous Delta Works. That many citizens consider the Netherlands to be practically flood proof is testament to the societal embeddedness of this narrative. In juxtaposition to this reassuring public message the insurance industry has been more equivocal with regard to the flood risk the country faces (EP, 2013). In 1954, due to the large losses incurred after the previous

year's flood, members of the precursor organisation to the Dutch Association of Insurers unanimously withdrew their flood insurance products from the Netherlands. The given reason at the time was that the threat of flood is so high and that the extent of losses incurred would be so high to be uninsurable on a commercial basis. This withholding of flood insurance in the Netherlands continued until instances of flooding in the early 1990s prompted the Dutch government in 1995 to enter into a consultation with the Dutch Association of Insurers (Verbond van Verzekeraars) to examine the possibility of creating a new flood compensation arrangement.

Instances of flooding in the early 1990s prompted the Dutch government in 1995 to begin negotiations with the Dutch Association of Insurers (Verbond van Verzekeraars) to examine the possibility of creating a new flood compensation system arrangement with private sector involvement. The result of the consultation was a proposal to create a natural calamities fund to be financed by levies on existing property insurances by bundling flood risk with fire insurances. Under this system, as it is necessary to take out fire insurance in the Netherlands to secure a mortgage, flood insurance would have been a quasi-mandatory insurance. This proposal was, however, rejected by the Council of State on the basis of Article 21 of the Dutch constitution that states that government is responsible for the 'habitability of the land'. In their objection they drew attention to the risk of moral hazard from government. The Council had concerns that if the government were able pass such a fundamental public responsibility to the private sector they might neglect their duty to invest in flood defenses. Failing to invest in flood defenses and an over-reliance on private flood insurance as has been observed in other countries, most notably the UK has been suspected of this (Botzen, 2010). The Council also cautioned against excessive premiums and the profit motive of the private insurance sector. It also doubted the principle of flood risk being added to fire insurance. Following the Council's negative advice, the proposal was dropped and the members of the Dutch Association of Insurers (95% of the Dutch insurance industry) have continued to exclude flood coverage from their standard insurance portfolios (Jongejan and Barrieu, 2008).

In 1998 the covenant by members of the Dutch Association of Insurers not to underwrite flood risk was rescinded due to European Union competition law. Under pressure to clarify flood compensation arrangements, the Calamities Compensation Act (WTS) was enacted in the same year. As primary legislation, the WTS was introduced to put an end to the uncertainty around how the government would respond to large-scale natural disasters including flooding. Compensation through the WTS is limited to freshwater floods. Sea floods, for example, storm surges, are specifically excluded by the WTS as the risk is regarded too large and unpredictable. Though floods have been technically privately insurable in the Netherlands since 1998, flood insurance has not been readily available to the general public. Consequently, even though it explicitly excludes damages that could have been privately insured (EP, 2013), the WTS has been invoked by politicians on several occasions following the few flood incidents that have occurred in the Netherlands since the law was enacted.

If public compensation were not paid out by the WTS, individual households and businesses in the Netherlands would have to shoulder losses privately. Compensation from the WTS is meant to be triggered only when two specific criteria are satisfied: 1) when a flood leads to major disruption; 2) When a coordinated response is required. When floods have occurred the WTS triggers have been interpreted quite loosely (EP, 2013). When in 2003 a dike was breached near Wilnis when 1,500 inhabitants were evacuated (Gemeente De Ronde Venen, 2004). Though the flooding was relatively small scale, local politicians were able to persuade the relevant government minister to declare it a national emergency and the WTS was invoked (EP, 2013).

7.2.2 Public Private Balance

Currently the system of flood compensation can be characterised as public. It is not an insurance based system with one exception. In 2012, a private insurance company, Neerlandse, began selling a form of flood insurance to the Dutch public. No members of the Dutch Association of Insurers sell mainstream flood insurance services. The Dutch government has periodically looked towards the possibility of introducing private flood insurance to run alongside or to replace the WTS. Although this is not the current government priority (EP, 2013), it this possibility that inspired this thesis.

7.2.3 Mandatory or Voluntary Status

The WTS is neither a mandatory or voluntary system of flood compensation because applies to property across the Netherlands. It is paid from general taxation, therefore it is not possible for individuals to opt in or out of it. It is not an insurance system as it is triggered only after a flood has been declared a national disaster by the government. It is an ad hoc system of compensation payment based on actual property losses not on a predetermined formula or contract as would be found in a normal flood insurance policy.

7.2.4 Risk Transference Mechanism

Under the WTS there are no upstream no risk transference such as private reinsurance beyond the normal financial capacities of the Dutch state. There are also no downstream risk transference mechanisms included in the WTS. Dutch citizens technically do not have to take personal account of the their own flood risk. In practice, land use planning rules curb building in very high flood risk areas to prevent unnecessary and potentially expensive risks being taken.

7.2.5 Mitigation Incentives

It is official policy that homeowners and businesses are encouraged to take flood mitigation steps but there are at present, other than normal planning rules and building regulations, no additional incentives included in the WTS for people to engage in their own flood resistance or resilience measures. The absence of mitigation incentives and the apparent lack of certainty and clarity are seen by critics as weaknesses in the WTS when compared to compensation systems based on private arrangements (Botzen, 2012).

Under current arrangements, the Dutch government is limited to enforcing planning laws to control where development occurs. It also can use building regulations to promote flood protection and resilience. This, however, is an effective tool only for new buildings, which represent only a small proportion of Dutch property each year. In the absence of market price signals that a private flood insurance could introduce, this type of planning might be considered a form of micro-management or even social engineering. Some would question whether this oversteps the role of government in a modern liberal democracy. In the Netherlands, for historical reasons, there is a broad acceptance of a strong role for national and local government. If the state determines that houses have to be demolished because they are considered at too high a flood risk, then the state has a right to move the occupants (Metz, 2012). While such decisions are frequently contested they normally go-ahead after a period of negotiation.

7.2.6 Financial Attributes

Under the WTS current flood compensation has an annual cap of 450 million euros and is designed to pay out on an ad hoc basis when a natural disasters occurs. No actual capital fund exists to pay for the WTS. Payments are from normal government expenditure and as such are funded from general taxation. There are no special charges or other taxes to pay for the WTS.

7.2.7 Principles of Social Justice

The current Dutch approach to flood insurance can be framed as the ultimate **social flood insurance system.** In essence all Dutch citizens are policyholders in the WTS. In a private market based flood insurance system, as in the UK, that is based on an assessment of 'pure actuarial fairness' (O'Neill and O'Neill, 2012) a large proportion of properties would be either uninsured or uninsurable without government intervention. Under the current Dutch system, for the vast majority of businesses and households, flood insurance is not thought about because of the collective assurance that the state will compensate if the worst happens. Regardless of their risk actual exposure or personal wealth each member of Dutch society benefits from public flood protection and the WTS compensation promise. When a risk is as collective as flooding is in the Netherlands, it is wrong that the democratically elected government of the day is held responsible. A primary function of government is the security of the nation.

Proponents of the current system argue that given the collective nature of the threat, the whole nation should share the cost of flood compensation through general taxation as a form of social solidarity. In O'Neill and O'Neill's classification based on principle of social justice, the Dutch system is one of extreme solidaristic and risk-insensitive insurance. The state is responsible for all aspects of flood management and flood compensation in the Netherlands. The risk of moral hazard falls squarely on the public that bears no direct consequence for their decision to build or live in a high or low risk flood zone.

While the current compensation system has worked to bring about social welfare and economic stability in the past, those critical of the current system point out that the WTS is unsatisfactory from a social welfare perspective for two reasons: first, the criteria for triggering a compensation payment are not clear; second, how much will be offered in compensation is unknown. This is scarcely surprising given the absolute lack of fixed reserves to pay for the WTS, which is, in effect, only a paper guarantee and therefore ambiguous until triggered (EP, 2013).

7.2.7 Risk Assessment and Mapping Tools

There is a great deal of public flood data and flood maps available in the Netherlands. Research had ascertained that only the start-up private insurance company Neerlandse has converted this information into a basic flood model that is now being used assess household flood risk premiums on their website (EP, 2013). According to the Association of Dutch insurers, one of the key benefits accruing from their proposal for mandatory flood insurance would be the opportunity for its member to share what they consider to be the very high costs of developing a comprehensive flood risk model for the Netherlands. In other words, a comprehensive fully functional flood risk model does not currently exist and will be expensive to develop for individual insurance companies if they were to sell flood insurance on a voluntary rather than mandatory basis.

7.2.8 Normative Perception

To understand how individual and households respond to high impact low probability flood risk in the Netherlands, Botzen (2010) looked into whether they consider insurance cover to be an appropriate response for and how much they would be willing to pay (WTP) to achieve a desired level of protection

(2010)¹⁶. He identified a misplaced perception of risk that suggests that the Dutch attach little value to new investment in flood protection. It is likely such antipathy would also apply to purchasing flood insurance.

7.2.9 The Future

According to the Dutch Association of Insurers, it is the concentration and correlated risk of flooding in the Netherlands that has been the greatest barrier to offering a workable low cost flood insurance solution. For the last decade, the Dutch Association of Insurers has been part of a government taskforce charged with looking at options for making flood risk widely insurable by the private sector. In 2008 an attempt was made to introduce a more concrete form of flood insurance system. This proposal involved the public sector with the state still keeping responsibility for an upper layer or risk in the role of sovereign guarantor. The idea was that this would remove previous objections that the government of the day might be tempted to transfer too much risk to the private sector. As mentioned previously, this proposal was rejected.

At the Dutch Association of Insurers' general assembly in December 2012 a third proposal was approved (the details of this latest proposal are set-out in Box 3 below).

Box 3: Dutch Association of Insurers Flood Insurance Proposal

The following summarises the proposal that the Dutch Association of Insurers put to the Dutch Authority for Consumers and Markets (ACM) for an informal ruling on whether their proposal for basic compulsory flood cover might be in violation of Dutch competition rules.

The Dutch Association of Insurers represents over 91% of the value of fire insurances sold in the Netherlands. They proposed a new insurance structure that would have automatically bundled flood insurance with existing household and business fire insurance policies.

They claimed that it was responding to a desire from the government for flood insurance to be introduced to reduce the public financial liability that the WTS presents. It was also said that they were fulfilling an unmet demand for flood insurance from within Dutch society. They claim that based on data from Belgium, where a similar system is already in operation, the required participation of insured people must be at least in the range 80-90 per cent penetration in order to create a financially sustainable insurance system. The mandatory inclusion of flood coverage with all fire insurances gets around the problem of too low initial demand associated with the low flood risk awareness in the Netherlands. Blanket cover also removes the destabilising effects that adverse selection can cause under voluntary arrangements.

The basic coverage under this insurance structure was as follows:

- Coverage for domestic insurance: buildings to €250,000, contents to €25,000, with an excess of €500;
- Coverage for business insurance: buildings to €500,000, contents (with inventory) to €1250,000, with an excess of €5,000;
- The total coverage would be capped at €5 billion per year. If the total damage in any year exceeded €5 billion the money would be distributed proportionally to victims;
- Not covered are: risks in river floodplains, non-material damages (e.g. lost business hours), costs for evacuation, the costs of remediation or any costs related to a dike breach.

A new reinsurance company (NHO) would be created to act as re-insurer for the flood coverage. All fire insurers that are members of the Association would be required to link fire insurance with basic flood cover coverage. Non-members would be able to participate and purchase reinsurance from NHO.

¹⁶ In a survey of 1000 Dutch homeowners Botzen (2010) found that most people expected a lower flood return period than the return period that is used to set dike safety standards.

The expected costs of the reinsurance for flood would be between 5 and 10 per cent of the existing premium for fire insurance. In addition, the administrative costs from the implementation of individual insurers would be chargeable and individual insurers would be free to decide how the costs are passed on to their policyholders. A form of premium differentiation would be encouraged as firms would be free to offer higher or lower 'own risk' clauses on top of the basic cover.

The Association argued that compulsory insurance is a necessary condition to make previously uninsurable flood coverage insurable. The un-insurability of flood risk in the Netherlands is, according to the Association, due to the following factors: too low initial demand for flood insurance in the Netherlands due to a lack of public awareness of actual flood risk; the catastrophic nature of the risk, high upfront investment in setting up the system, risk model etc.; high political and moral risk. These factors are elaborated below:

- The potential catastrophic impact of a large flood exceeds the financial strength of smaller domestic insurance companies. In the Netherlands, the risk of extreme flood damage is correlated i.e. flood risks are highly cumulative. Furthermore, the consequences for policyholders are difficult to overcome by individual prevention measures alone. This makes insuring the risk, in the opinion of the Association, currently unmanageable.
- The purchase of affordable reinsurance capacity for the smaller individual insurers would be difficult. This is partly to do with the fact that at present no risk model exists. The development of a risk model and the collective purchase of reinsurance capacity would make procurement significantly cheaper for all members of the association. Insurers consider such an investment justifiable if flood insurance is mandatory.
- They claim that there is a lack willingness by insurers unilaterally to provide voluntarily flood insurance due to the high political risk of doing so alone. The obligatory nature of the Association's proposal is therefore regarded as a way to guarantee participation of its members.

The Association claims that offering a comprehensive and affordable coverage is of direct benefit to policyholders. In the face of they point out is still a substantial flood risk, the compulsory nature of flood insurance will effectively guarantee the continuing solvency of its members.

The majority of the association's members agreed to propose a new private only compulsory flood insurance scheme. Backed by a private reinsurance and insurance pool the new arrangement that would bring in private actors to take over a segment of flood compensation. The 2013 proposal did not involve the government i.e. it was a purely private. As set out in a letter from the Association to its members, it proposed an obligatory level of flood protection within all existing home insurance policies. The intention was that it would have operated alongside current public arrangements and would not have replaced the WTS. The Association's proposal was put before the Dutch Authority for Consumers and Markets (ACM) to seek an informal ruling¹⁷ whether it contravened Dutch competition laws. Various organisations from the Dutch government and civil society were asked to contribute their opinion of the proposal.

The consultation concluded in mid June 2013. The outcome was that the ACM reached an informal ruling that found that imposing mandatory catastrophe insurance on all home insurance policies would be in violation of current competition laws. A spokesman for the Authority for Consumers and Markets summarised the reasoning behind their decision:

"What we want to look at is if insurance companies have the freedom to come up with other products that differ from this advised product. We want to see if there are companies interested in promoting such as product and to investigate if there is already a market for it. We want to find out what the relationship is

¹⁷ An informal ruling is not a formal legal decision. It is issued to offer greater clarity to market participants regarding a particular area of legal doubt.

between this product and the obligations that the government has in creating safety for flooding and other disasters that could occur. We also want to know what the costs are." (Insurance Insight, 2013)

The ACM concluded there was insufficient public support for compulsory flood insurance. Neerlandse, the single provider of flood insurance in the Netherlands, were set against the proposal from the Association and lobbied against it. Following the consultation, van der Kooy Versteg, one of the founders of Neerlandse was quoted as saying:

"Other insurers have to (and will) follow Neerlandse by offering flood insurance. Not in an obligated way, but on an individual risk based and differentiated voluntary basis. So that every Dutchman can decide whether or not to buy flood coverage." (Insurance Insight, 2013)

In response to the ACM ruling, the Dutch Association of Insurers issued a press statement on their website. This statement implied that the ACM ruling had failed to take into account the real flood risk that the Netherlands faces and not taken into account the benefit that a basic system of affordable coverage based on 'principles of solidarity' would bring to the Netherlands. The association cited the case of Germany where there were significant floods in 2013. According to the Association, because Germany has a voluntary private system of flood insurance the risk community is limited to those who perceive flood risk as high. This adverse selection leads to expensive premiums. Corresponding low rates of flood insurance penetration rates means that uninsured flood losses have to be covered either by victims themselves or by the German state. In the opinion of the Dutch Association of Insurers neither of these attributes offer a financially viable approach compared to a mandatory system.

The association also countered the opinion of the Dutch Authority for Consumers and Markets that the proposed system was not sufficiently market based, stating in a press release that:

"Insurers retain all possibilities to offer additional coverage, premium differentiation and deductibles. In addition the insurers are free to determine the premium for the basic coverage in a fully competitive market," (Verbond van Verzakeraars, 2013).

Regarding the slow update uptake of their flood insurance product, van der Kooy Versteeg is reported to blame the low risk awareness of flooding in the Netherlands. He claims that since the great flood of 1953, the government led discourse on flood risk has misled the public resulting in misplaced awareness of the actual flood risk.

"I do not believe that other insurers think it is not economically viable to offer flood cover on a voluntary basis. In fact, we know that other Dutch parties will enter the market. The only thing other parties need, is a good risk model tool." (van der Kooy Versteeg, from Insurance Insight, 2013)

Correspondence with the Association confirmed that the consultation is now on hold and that they are waiting for a political intervention to possibly bypass the informal ruling by the Dutch Authority for Consumers and Markets. It is probable, however, that after three rejected attempts at getting approval for a mandatory flood insurance, the members of the Association will look to see if it is commercially worth their while to launch flood products individually (EP, 2013).

7.3 Conditions to Introduce Private Insurance

Botzen (2010) and others have made an argument for private insurance that under particular conditions it could be beneficial to the Dutch if private insurers were to take responsibility from the public sector for flood compensation. This pro-privatisation case rests largely on improved economic efficiency through the private sector's alleged superior capacity to spread risks, segregate risks, encourage loss reducing measures, and monitor and control policyholder risks (Botzen and van den Bergh, 2008). The next section explores the conditions under which effective private flood insurance operates as was identified

in UK, French, and Belgian case studies in previous chapter. Differences and similarities in the operation of private flood insurance between the case studies in relation to the Dutch context will be explored to understand which of the conditions for effective private flood insurance are currently present. To help frame different options for the introduction of effective private flood insurance to the Netherlands a matrix is used to explore different potential scenarios based on two of the most important attributes identified in national flood compensation systems.

7.3.1 Options for the Introduction of Private Flood Insurance



Figure 2: Public-Private and Voluntary-Mandatory Scenario Matrix

On the X-axis is the extent of private sector involvement in flood compensation. On the Y-axis is whether flood compensation arrangements are voluntary or mandatory. As can be seen in the above matrix there are six core scenarios (S1 - S6) for introducing private flood insurance to the Netherlands. These are described next:

S1: A public flood compensation system that covers all citizens automatically. Private flood insurance products are free to enter the market and compete for policyholders under this scenario. However, unless the private system could offer insurances with significant benefits over the public system, the public arrangement would probably crowd out the private offer in a free market. This is very close to the current situation with the WTS in the Netherlands.

S2: A private flood insurance system that is voluntary to join with no alternative public compensation arrangement. This scenario is the free market option that would offer a level playing field for private insurance companies to compete for flood insurance policyholders. This is the case in the UK.

S3: A mandatory public compensation system. Private insurers would probably not want to enter a market with a comprehensive public compensation system. Unless the mandatory state backed compensation scheme was inadequate, it is not likely that households would choose to purchase private flood insurance cover as well. This is the case in Spain.

S4: A mandatory private flood insurance system. This would be the optimal scenario for the introduction of private insurance as households and businesses would be legally forced to purchase flood insurance from a private insurance company. This is the scenario proposed by the Dutch Association of Insurers but it was rejected by the Dutch Competition Authority on anti competitive grounds.

S5: A mixed public private national flood compensation system that is voluntary to join. This is the case in the USA with the National Flood Defence Program. Their flood insurance policies are administered and sold by private insurers for a fee but the actual actuarial risk is borne by the US Federal Reserve.

S6: A mixed public private national flood insurance system that is mandatory or quasi-mandatory. This arrangement is in operation in Belgium and France where flood insurance is bundled with first party property insurances that are sold by private insurers. Up to a predetermined level, the risk remains with the private insurers. If losses exceed that level then the state will become liable either via public reinsurance or a sovereign guarantee.

Without a significant number of changes to the current flood compensation system in the Netherlands, S1 is the scenario that most closely reflects current reality and is therefore taken as the baseline scenario against which the following conditions will be compared.

7.3.2 A Free Market in Flood Insurance

In all three case study countries there exists competition between private insurance companies even in Belgium and France where there is also an active role for government and mandatory flood insurance. If the Dutch government wishes the private sector to takeover a portion of flood risk from the public sector it should concentrate on creating the conditions for the free market in private flood insurance to flourish.

The evident scarcity of private sector flood insurance in the Netherlands begs the question if there are significant structural or regulatory barriers to selling private flood insurance there¹⁸. Since 1998 there have been no legal or major regulatory barriers preventing the sale of flood insurance by private companies in the Netherlands. Even after the 1998 European competition ruling, members of the Dutch Association of Insurers, which control approximately 95% of the insurance market, have individually chosen to not sell this particular product. Examining the membership structure and powers of the Association is beyond the scope of this thesis, however, it might not be an unreasonable conclusion to draw that the influence of the Dutch Association of Insurers has not encouraged their members to individually launch flood insurance products (EP, 2013). The Association has, however, on three occasions attempted to introduce private flood insurance on a collective basis for its members but each proposal has been rejected. A change of policy away from collective bargaining by the Association would perhaps be a condition for more private flood insurance is sold by its members unilaterally. This change in attitude is not a necessary condition, however. The entry of *Neerlandse* into the Dutch market in 2012 proves that outside of the Dutch Association of Insurers there has been some sort of dormant free market. Although in 1998 the European Union competition laws were enforced, the

¹⁸ This question has to a limited extent been answered by recent changes in the Dutch insurance market. In 1954 a voluntary agreement was made among Dutch insurers that none would offer flood insurance. This collective agreement was overruled by European competition in 1998. Soon after, a Dutch Lloyd's 'coverholder', EuroLloyd's, began selling flood insurance as part of a catastrophe risk policy. This product was withdrawn around 2008 when this family business was taken over by Delta Lloyd's - a member of the Dutch Association of Insurers (Insurance Magazine, 2008). No private flood insurance was then available until December 2012 when Neerlandse, a new entrant to the market, launched a private flood insurance product aimed at the Dutch domestic market

decision by individual members of the Dutch Association of Insurers not to sell flood insurance continues on voluntary basis regardless.

If the Dutch system followed the UK model of more free market or voluntary private insurance, to ensure high enough penetration, the Dutch public might be required to take out flood insurance to qualify for a mortgage. This would make flood insurance a quasi-obligation but still maintaining more customer choice and competition compared to the Belgian or French system where insurance is automatically bundled with other insurances with no active choosing on the part of citizens. In the UK, insurance companies have to compete under almost free market conditions to sell their products to potential policyholders. There appears to be great deal of variation and consumer choice of flood insurance offers - the market is highly competitive even though most households are obliged to buy flood insurance to qualify for a mortgage. The question therefore is whether it is possible for a similar level of competition between Dutch insurance companies selling flood insurance.

7.3.3 Removal or Reform of Public Flood Compensation

At present, if the WTS is to continue alongside private flood insurance, the private sector will surely find it difficult to convince the Dutch public to pay for what would be regarded as an additional and unnecessary insurance product. A second problem is that many Dutch believe, erroneously, that any flood damage would already be covered - if not by government - by home contents insurance (EP, 2013). Therefore, to make the market for flood insurance easier to understand for consumers and to level the playing field for private insurers, it would be a helpful condition if the WTS was either removed from law or was rewritten to be more explicit what is does and does not provide for.

7.3.4 Increased Public Flood Risk Awareness

The Dutch public could be better informed by the industry themselves about the risks they face and what damages they are, or are not, covered for. The very low level of flood risk awareness amongst the Dutch public does not make this an easy task for the government or insurance companies. Consumer willingness to purchase (WTP) survey of homeowner living in a river delta area of the Netherlands conducted by Botzen (2010) found that in the sample questioned most Dutch people rated the probability of flooding as 'low' or 'very low'. It was also ranked low alongside other common risks such as house fire. His results suggest that a significant proportion of the Dutch believe that there is low probability of a flood occurring and would choose not to buy flood insurance. However his research found that fewer households would neglect flood risk if the probability of flooding increased with climate change. He suggests that the withdrawal of the WTS state flood compensation scheme could increase the uptake of domestic flood insurance (Botzen, 2010). It should be noted that awareness can, however, be achieved with other policy tools without the high cost to Dutch society of introducing a full flood insurance system be it private, public or, most likely, a combination.

7.3.5 Sufficient Size of Insurance Community

The Dutch Association of Insurers was correct in its assessment that to offer affordable flood insurance to the Netherlands, a large insurance community is a probable condition for success. Building a large enough risk community is a key contributory factor in meeting the basic insurance principles of mutuality and economic viability. Mutuality is achieved if a sufficient number of people see a benefit great enough to voluntarily enter into the insurance system. A form of private insurance system would also been regarded as more publicly legitimate if its mutual base is larger. A system with a larger risk

community will have more revenues from which to pay for future losses, which is clearly important for long-term financial viability. In the Netherlands, as things stand, despite the fact that sixty to seventy per cent of houses are theoretically at high risk of flooding, private insurers will not find it easy to build a large risk community under a voluntary flood insurance scenario. This is borne out by the experience of the only private insurer of floods, Neerlandse, which is not selling its insurance policies in particularly large volumes (EP, 2013). Without sufficient demand for flood insurance private flood insurance will be the preserve of the most risk adverse members of Dutch society or those who have recently been exposed to flooding. Without an increase in demand, flood insurance will be a relatively small-scale business sector for the foreseeable future.

7.3.6 Political Support

If the Dutch market is to include a role for private flood insurance in the future, political support is necessary to create the market conditions for success. For example, to reform or repeal the WTS would require significant political backing. As a spokesman from Dutch Association of Insurers stated in personal correspondence after their proposal for mandatory flood insurance was rejected:

"[w] e are no longer working on the development of this insurance solution and wait for the government and politics to make a move." (EP, 2013)

In the current political environment politicians prefer to talk about flooding in the Netherlands in the context of how safe the country. Flood risk is highlighted when politicians make a case for more public spending on flood protection. But selling the idea of, for example, mandatory private flood insurance would be not make a politician popular in the Netherlands. Indeed, at present, political support for changing flood compensation arrangements is not high. Previous governments have been keener on changing the status quo with the fiscal goal of reducing the extent of state's liability for flooding. It was the government that originally approached the Dutch Association of Insurers to reconsider selling flood insurance again at the start of the global financial crisis in 2008 (EP, 2013). The Association's first response was a public private arrangement where the state would retain responsibility for losses above a limit but this was rejected as not transferring enough financial responsibility. This enthusiasm for change seems to have worn off.

Today's politicians appear not to be interested in reforming the current arrangements. The key role the UK government played in negotiating the replacement to the Statement of Principles is in contrast to the situation in the Netherlands where it appeared that the government played very little role in the consultation on the Dutch Association of Insurers proposal. It can be assumed therefore that they were either neutral and did not care about the outcome or were content with the status quo. The situation with regard to the WTS is not helped as responsibility for this law lies with three different ministries: Finance, Infrastructure and Internal Affairs (EP, 2013). It is unlikely in the current climate of austerity that the government will push for changes that will lead to citizens paying more. Already the insurance premium tax has gone up from 9.7% to 20%. On top of this, it would not be popular for the government to push for new mandatory flood insurance charges as well.

7.3.7 An Active Financial Role for Government

If the Dutch system for flood compensation were to change to include a greater role for private insurance in flood compensation, the state should retain responsibility for an upper tier of risk so it still has 'skin in the game'. Keeping the government partly liable for flood losses is that moral hazard on the part of the government can be limited. This has been an ongoing problem in the UK.

The Dutch Governments could also help create the conditions for a viable private flood insurance industry. Botzen (2010) calls for an active role of the government to overcome market failures that typically challenge private insurance of natural disasters which include capital shortages, risk prevention incentives, enforcing strict building and planning regulations and setting up condition to achieve sufficient market penetration to keep premiums affordable. For example, the Dutch could follow the UK model and French NAT/CAT by encouraging companies to build up capital reserves through tax exemptions - so called equalisation reserves. This helps stabilise potential yearly fluctuations in losses and mitigates against insurance companies going bankrupt. Policies that lead to a financially robust private flood insurance sector could mean that it is less likely that public funds would be used after a major flood. How far private insurance displaces public compensation is disputed. After all the recent natural catastrophes huge amounts of public money have been channelled to the victims by governments (Jongejan and Barrieu, 2008; EP, 2013). The extent to which private insurance is of benefit after a major catastrophe is an exciting avenue for further research. An on-going and active role for the state in a role that does not crowd but supports private sector initiatives is a strong condition for the viability of future of private flood insurance in the Netherlands.

7.3.8 Clear Boundaries for Public and Private Sector Responsibility

In most countries where there is a public flood insurance system that is either mandatory, quasimandatory, or even voluntary, private insurance, while not impossible, will likely struggle to gain market share. Private flood insurance could slot under the Dutch WTS in a multi-level public-private system, but this could lead to problems. A private insurance offer would suffer from being crowded out if the promise remained that the state would also pay compensation. This is indeed a likely scenario. While the WTS includes an annual maximum limit to the amount of flood compensation the state could theoretically pay out in flood compensation each year, it is unlikely that this figure would be adhered to. If the flood were severe enough to merit higher levels of emergency aid or public compensation, it is probable that the government of the day would opt to offer greater amounts of flood compensation as refusing to do so would be politically unwise. The WTS in effect a relatively minor part of the actual unwritten guarantee the Dutch state provides for flood along with other perils, that threaten the country's security or future prosperity. Demand for private flood insurance will be curtailed while the WTS is in operation in its current slightly ambiguous form. Clear boundaries, particularly lower limits, for government involvement would be recommended in the Dutch context, as is the case in the multi-level Belgian and French arrangements. In the UK system, the government has no financial responsibility for flood compensation so the boundaries are very clear and there is no danger of crowding out private sector insurance products.

7.3.9 Public Reinsurance or State Guarantee

The case can be made that private flood insurance will be most successful within a public private system where there is a form of division of labour between the state and the private sector. Paudel recommends that systems that integrate public and private risk transference mechanisms will more likely lead to long term financial solvency, more affordable premiums and reduce the need for the state to step in with ad hoc public compensation.

Under a multilayer system usually private firms are only liable for smaller and more common claims while the state is responsible for losses above a certain level. Paudel research concludes that public private systems are more cost efficient that public systems because they are able to take advantage of the skills of private insurance companies to sell and administer flood insurance policies and contribute

loss assessment expertise and tools. While the state can contribute financial resilience, without a public guarantee any private insurance systems can be destabilised by a flood larger than anticipated.

Tax-exempt capital accumulation by insurance companies, as in the UK model, can make the correlated risks on the Netherlands more attractive to insure. In France, the same is achieved publicly with the state in the role of reinsurer. To further increase financial stability and economic viability, a feature of a private Dutch system could include the use of other financial instruments to hedge against flood risk, such as catastrophe bonds and options. These can be issued either by private insurance companies, by the Dutch government, or by both.

7.3.10 A Standalone National Flood Risk Model

To date, according to Milan Simic, managing director of catastrophe modelling firm *AIR Worldwide*, there has been no demand for a risk model because no company has been offering commercial cover (Insurance Insight, 2013). If flood insurance is to be a viable product in the Netherlands it will have to be back by sophisticated models. This will be expensive to develop. Given the economics of selling flood insurance it might be preferable. If these cost could be shared among the industry rather than each company developing or buying a proprietary flood risk model and assessment tools (EP, 2013). Sharing these costs was a justification from the Association of Dutch Insurer to offer a mandatory insurance product through its members. As this proposal was rejected, it remains to be seen if private insurers individually see sufficient market potential to follow the lead of Neerlandse and invest in building their own model for the Netherlands. Without such a model it will be very difficult for companies to offer risk based premiums and they would have to rely on some form of flat rates instead. Individual insurance companies would probably have to underwrite flat rates themselves as finding a Lloyd's underwriter (or other reinsurer) could be difficult if the premiums are set at rates considered affordable in the Dutch market (EP, 2013).

7.3.11 Affordable Basic Coverage

If there is to be no compulsory coverage for reasons of competition or lack of popular legitimacy, the cost of basic flood coverage has to be affordable for it to be attractive for people to voluntarily insure themselves and therefore to build a sufficiently large risk community. In voluntary private insurance systems (S2) penetration of private insurance is very low and the government has had to step-in with ad hoc public compensation after the floods along the Danube and Elbe rivers in summer 2002 and again in 2013. Affordable coverage is the bedrock for a more solidaristic system, as low-income households should not be excluded. The Dutch Association of Insurers point to research by the World Bank that purports to show that societies recover faster after a flood when insurance coverage is higher. Without affordable premiums private flood arrangements will be less effective at limiting flood risks (Paudel, 2012) because with if a low public uptake is achieved, only a small percentage of the population will be affected by the price mechanisms and mitigation incentives on which private arrangements for their advantage over public systems.

7.3.12 Market Incentives to Overcome Adverse Selection

A key difficulty for voluntary private flood insurance in the Netherlands is the risk of adverse selection. It is suggested that, in the Netherlands, this issue may be overemphasised. A survey indicated that latent demand for flood insurance from those in high exposure areas was not demonstrably greater than from those in less vulnerable areas (Botzen, 2010). It is improbable that Dutch citizens would have more insight into their own flood risk than insurance companies (EP, 2013). Overcoming adverse selection is only a minor condition for the viable private flood insurance in the Netherlands.

7.3.13 Community Level Mitigation Incentives

Compared to the current Dutch WTS, it could be inferred that the Belgian and French systems which include mitigation incentives not only to increase economic efficiency but also to enhance social welfare. They do this by encouraging private citizens and communities to take an active role in protecting against their own flood risk rather than depending only on public spending or awaiting a push from governmental regulation to do something. The introduction of some form of incentive system to stimulate the Dutch to contribute more to the country's flood resilience may not only be economically beneficial for the state if more flood losses are absorbed privately, but from a welfare perspective: incentives might lead to greater awareness of flood risk and climate change. This awareness could be harnessed to generate and build public legitimacy for, inter alia, necessary long-term public infrastructure spending on stronger flood defences.

7.3.14 High Public Flood Risk Awareness (Demand)

The absence of a clear and present danger of flooding in the public's mind militates against any form of national flood compensation based on mandatory contributions and would probably encounter public resistance. In their submission to the Consumer and Market Authority (ACM) the regarding the 2013 Verbond proposal a the Dutch Consumer Association (Consumentenbond) and the Association of Home Owners (Vereniging Eigen Huis) did not show any support for compulsory insurance. They recognised the value of flood insurance in particular circumstances, but that it should be a choice based on individual household risk factors (EP, 2013). The Dutch public perception of flood risk could change in the future if flooding became more common due to lack of dike maintenance or climate change. Whether private insurance companies would continue to offer cover under these circumstances is a potential weakness in private flood insurance systems and is a question this thesis will address in the next chapter.

7.4 Reflections on Insurance Effectiveness

The three national insurance systems are all working effectively within their own national contexts. The next section will reflect on the theoretical conditions drive the effectiveness of private flood insurance in practice. This assessment is based on the key principles of insurance from Swiss Re (2012): financial viability; mutuality; assessability; and randomness.

7.4.1 Financial Viability

Designing a compensation system to meet large loss scenarios can now be achieved more accurately than even two decades ago when no probabilistic assessment models were available. Despite this, many national flood insurance systems will, without the correct upstream risk transference in place, find it difficult to finance a "once in one hundred year" flood event (Swiss Re, 2012). Global reinsurance markets are able to permit insurers - public or private - to absorb the loss from this kind of catastrophic flood by spreading the risk across borders. Expanding the risk community upstream in this way reduces the impact of local correlated losses when they inevitably occur during a large flood. Public insurance schemes can also make use of international risk spreading options and have the option of spreading risks temporally (Jongejan and Barrieu, 2008). Risk can also be transferred downstream to the policyholders through the use of deductibles (known as excesses in the UK), caps, and exclusions that

allow insurers to adjust their portfolio to their individual risk appetite. New underwriting methods and tools and risk transference mechanisms such as the issuance of catastrophe bonds (CAT bonds) or improvements to building codes (to incorporate flood protection) could, in the opinion of Swiss Re, help countries to more easily achieve the financial viability principle.

Comprehensive flood insurance in the Netherlands is said to be beyond the capacity of the private insurance sector and therefore could only be insured by the state. The financial capacity of the Dutch government is very high, though now it is a member of the Eurozone it would have to rely on borrowing in international markets or from the European Central Bank in the event of a very large flood. Previously, when it controlled its own currency and interest rates, it had more sovereign options to pay for catastrophic damage than it does now. New underwriting methods and tools and risk transference mechanisms such as the issuance of catastrophe bonds (CAT bonds) or improvements to building codes (to incorporate flood protection) could, in the opinion of Swiss Re, help countries to more easily achieve the financial viability condition.

7.4.2 Mutuality

The greatest challenge in designing an economically sustainable national flood insurance system is to build a sufficiently broad risk community. A large enough risk community is necessary to meet the interrelated conditions of **mutuality** and **financial viability**. There are several options for insurers to build an appropriate sized risk community comprising the necessary cross-section of policyholders to meet these two conditions.

A first option is for the insurance sector to offer comprehensive natural disaster insurance packages that ties flood risk to other natural perils. This is the case in the Belgian WN and the French NAT/CAT where flood insurance is offered with other natural hazards such as earthquake and hail. As the main natural peril the Dutch face is flood, it could be politically difficult to combine a high risk flood population with less exposed groups to build a sufficiently broad risk community. The example of the Belgian WN might be followed. In order to make the catastrophe insurance more relevant to city dwellers, and, therefore more widely legitimate, the compulsory WN was in 2005 expanded to cover losses related to sewer overflows as well. What the equivalent expansion would be in the Netherlands is open for discussion.

A second option is to bundle flood insurance with other simpler risks such as fire insurance in order to expand the risk community sufficiently that the overall insurance package becomes acceptable and affordable for a large enough population (Swiss Re, 2012). This was the intention under the proposal from the Association of Dutch insurers to add 5% to 10% to existing fire insurance policies to cover certain forms of flood damage. As discussed in the Dutch case study, the Dutch Authority rejected this proposal for Consumers and Markets as technically violating competition rules. In their informal ruling they also cited the lack of choice for Dutch citizens who were not exposed to flood risk. This highlights the potential political resistance to the imposition of compulsory insurances, particularly when introduced by the private sector rather than by a not-for-profit public body.

The task is harder for natural catastrophe insurances. Studies have found that people are very reluctant to purchase insurances for very low probability high damage natural events (Swiss Re, 2012). This is not only about a lack of information and cognitive limitations in calculating real rather than perceived risk probabilities. Faure and Bruggeman (2008) refer to research that suggests that the decision process when buying insurance involves certain "heuristics and biases" that put people off paying a premium for

a low probability event when there is a high possibility they will never receive any return on what is considered to be a form of long term investment rather than straightforward insurance.

A third option is through changes that make flood insurance mandatory either through legislation or as a quasi- obligation. For example, in the UK, it is not possible to secure a mortgage without sufficient building insurance that includes flood protection as standard alongside other risks such as fire. The UK flood insurance market is quite mature and to date has not relied on significant legislation but instead on voluntary agreements between the insurance industry and the government.

When insurance is mandatory or quasi-mandatory, the risk is shared on a more collective basis than when insurance is not mandatory. In countries that operate without a form of mandatory insurance, after a flood, the victims who chose not to purchase insurance have to rely on their own savings if the state is not prepared to offer them financial relief. In order to achieve sufficiently high penetration rates and to build a risk community large enough for premiums to be affordable, the proposal from the Dutch Association of Insurers to replace the current system emphasised the necessity of making flood insurance mandatory.

7.4.3 Assessability

The limits of insurability have also been extended with the use of new computer driven flood models. For example, in the UK investment in flood risk models has meant insurers have a better understanding of the parameters of flooding. Nevertheless, Swiss Re report that despite better models, flood risk is still often underestimated and can strike in unanticipated ways. It should be appreciated that flood risk is not static and can change for many different reasons year on year. For example, even in land located away from flood zones, extreme rainfall and reduced absorption capacity can create conditions for a flash flood. Of relevance to the Dutch context, Swiss Re conclude that viable flood insurance systems with affordable risk based premiums will be difficult to achieve in countries without either precise flood assessment tools or models. These models and tools are both currently underdeveloped in the Netherlands due to the lack of the insurance industry's interest in offering mainstream flood insurance.

7.4.4 Randomness

As for the principle of **randomness**, it is simpler for insurers to satisfy this condition in the Netherlands. Dutch insurers can opt out of offering insurance on properties that are at high risk of recurrent flooding. This has the effect of excluding high-risk properties from the risk community, which increases the randomness factor. Removing risk with a high flood return period into a separate community or pool (as has been proposed in the UK with 'Flood Re') also enhances the condition of mutuality i.e. members of the same risk community are exposed to similar levels of risk and the rules under which they might be compensated are also comparable. This is important for an insurance system to be regarded as fair and legitimate by its participants.

It might, however, be argued that flood risk in the UK is far less correlated than in the Netherlands. The principle of mutuality is therefore easier to achieve there. Compared to the Netherlands, the risk of flooding in the UK is far lower; however, due to the UK topography and relatively lower investment in flood protection, floods occur more frequently. Riverine floods are the most common types of flood in the UK, particularly compared to the Netherlands where unplanned river floods are rare (Kok & Barendregt, 2004, from Botzen & Van Den Bergh, 2008).
Another option to increase the randomness principle is to deal with outliers in risk communities by bringing down their risk to that which is in line with the majority. In such cases it would be more economically efficient for the government or communities to invest in collective flood protection measures rather than cross-subsidising highly exposed properties. This has been the chosen option in the Netherlands where the public policy priority has focused on bringing the possibility of flood as close to zero as possible for all members of the risk community. Thus in the Netherlands the condition of randomness of a flood event occurring is enhanced by the construction of flood protections that - up to a point - protect all members of the Dutch flood risk community equally. Whether floods that are caused by lack of maintenance are truly random events is a question peculiar to the Dutch context. In such cases it is a preventable man-made failure that has been exposed by extreme weather. Whether this type of flood would be insured under private arrangements is not clear. It was excluded from the Association's 2012 proposal (EP, 2013).

High or unaffordable premiums without state subsidy are the price signals that free market enthusiasts point out are necessary to persuade policyholders to self-select out of high risk properties. Without such signals the efficient operation of a free market in flood insurance is hampered. This market signal confusion is a potential problem with mixed public private compensation systems where the conditions upon which the principles of insurance should operate can be inconsistent. For example, in mandatory flood insurance systems without premium differentiation, and where strong government planning controls are missing, homeowners who choose to live in high risk areas are in effect being subsidised from the premiums collected from policyholders who live in lower risk zones.

7.4.5 Extending the Limits of Insurability

The extreme Dutch flood risk has traditionally been seen by the industry as a difficult risk to insure. However, it is claimed by that recent technological advancements have extended the range of insurability to include even flood risk in the Netherlands (Swiss Re, 2012). For instance, the availability of satellite data combined with improved computing power has resulted in more accurate flood modelling capabilities, meaning that it is easier to accurately understand and assess flood risk than it used to be. It is doubtful, however, how far these changes would contribute to extending the limits of insurability for flood risk in the Dutch context. Regardless of new underwriting methods, there would have to be limits to exposure for private insurers. A large flood could still lead to commercial insurers becoming bankrupted or them withdrawing coverage as happened in the aftermath of the 1953 losses. Some form of state guarantee or public reinsurance is necessary in a country where potential flood losses above a threshold would be of a scale beyond the capacity of domestic insurance companies, particularly the smaller ones even with risk transference mechanisms such as reinsurance.

7.5 Chapter Conclusion

The characteristics of the Dutch flood risk compensation, past, present and potential future, have been explored in some detail in the above chapter. This analysis has compared the conditions for the introduction and operation of effective private flood insurance based on the output of three national case studies. While two of the entry conditions are already found to be present in the Netherlands, many significant entry conditions necessary for the introduction of private flood insurance are absent. There are also a number of conditions that would become relevant for the effective operation of private flood insurance once introduced.

Entry conditions currently present:

A Free Market in Flood Insurance Sufficient Size of Insurance Community

Entry conditions currently absent:

High Public Flood Risk Awareness (Demand) Removal or Reform of Public Flood Compensation Political Support A Standalone National Flood Risk Model A Strong Independent Regulator

Operational conditions for effective private flood insurance:

An Active Financial Role for Government Public Reinsurance or State Guarantee Affordable Basic Coverage Market Based Incentives to Overcome Adverse Selection Community Level Mitigation Incentives Clear Boundaries for Public and Private Sector Responsibility

Based on the preceding analysis of the conditions for the introduction of private flood insurance to the Netherlands, the next chapter will attempt answer the main research question of this thesis.

8.0 Discussion and Conclusion

8.1 Introduction

The previous chapter outlined a set of conditions necessary for the introduction of effective private flood insurance to the Netherlands. The remaining step of this research is answer the main research question of this thesis by also considering the potential social and economic benefits that private flood insurance might contribute to the Netherlands. To reiterate the main research question of this thesis is:

Can the introduction of private flood insurance to the Netherlands be socially and economically desirable and under what conditions might this take place?

The following chapter will answer this question based on the results from the previous research steps. A conclusion to the thesis will be given. The justification behind the conclusion will be presented in the form of a discussion. To provide a full picture to the reader, the limitations of the chosen research methodology will also be presented along with ideas for potential future research.

8.2 The Incorporation of Private Flood Insurance in the Netherlands

8.2.1 Conclusion

To answer the main research question, it has to be approached in two parts.

First, in the previous chapter, the recommended conditions necessary for the introduction of private insurance were identified. It was then ascertained whether or not these conditions are currently to be found in the Netherlands. The result of this analysis is as follows:

Entry conditions currently present:

A Free Market in Flood Insurance Sufficient Size of Insurance Community

Entry conditions currently absent:

High Public Flood Risk Awareness (Demand) Removal or Reform of Public Flood Compensation Political Support A Standalone National Flood Risk Model A Strong Independent Regulator

Operational conditions for effective private flood insurance:

An Active Financial Role for Government Public Reinsurance or State Guarantee Affordable Basic Coverage Market Based Incentives to Overcome Adverse Selection Community Level Mitigation Incentives As can be seen, at present only two of the entry conditions for the introduction of effective private insurance can be identified. It can be inferred, therefore, that the conditions are not ideal in the current Dutch flood risk compensation context. Significant changes and reforms to the current system would be required if the conditions for effective private flood insurance are to be created.

The second part of the main research question concerns whether private flood insurance would deliver social and economic benefits to the Netherlands. Private flood insurance is said to be effective when it is both financially viable and economically efficient. Several of the conditions identified above (high demand for flood insurance; reform of the WTS public flood compensation system and a standalone national flood risk model etc.) are necessary if private flood insurance in the Netherlands is to be effective, yet they are currently not present.

Pulling the two parts of the answer together, it can be concluded that the introduction of private flood insurance to the Netherlands will not contribute significant social or economic benefits because the conditions for it to be effective are currently not optimal.

As a policy recommendation, if the Dutch government would like to reduce the public sector's financial liability for flood risk, rather than relying on mandatory regulation to force the uptake of private flood insurance, it should instead foster the necessary economic and political conditions for the effective operation of the sector. If, however, the Dutch government were prepared to remove the WTS public compensation entirely then the introduction of some form of mandatory private flood insurance would be both legitimate and beneficial for the Netherlands socially and economically. The rest of this chapter will critically discuss the argumentation behind the conclusion.

8.3 Discussion

8.3.1 The Economic Efficiency Argument

The above conclusion conflicts with the result of the comparative study of national flood compensation systems undertaken by Botzen and van den Bergh (2008). In their study, Botzen and van den Bergh (2008) propose that the Netherlands should incorporate a multi-layered insurance public-private flood insurance system. For them, such a system can best provide adequate incentives to limit flood losses and overcome capital shortages in insuring large flood losses. It is argued that private flood insurance increases economic efficiency due to the presence of premium pricing, leading to what Botzen (2010) calls 'optimal loss-reducing incentives'. For Botzen and van den Bergh (2008), the main weakness in the French and Belgian systems is the absence of premium differentiation that reduces overall economic efficiency by failing to incentivise flood mitigation investments or deter housing development in high-risk flood zones.

The economic efficiency argument implies that more private flood insurance in the Netherlands could be one strategy to cope with increasing climate change risks. Individual actions are however far less economically effective than when flood mitigation measures are taken at the collective level. Currently, it is primarily the Dutch government - national and local - that is responsible for public flood avoidance and protection infrastructure. Other than voluntary investments, building codes and planning rules are the main tools that government has available to encourage or force private households or businesses to take flood risk into account in private properties, both current and new. Nevertheless, it has been known for centuries in the Netherlands that taking collective measures for flood avoidance makes more economic and social sense than individual ad hoc arrangements for flood mitigation or insurance.

In other countries where floods are more frequent events, annual flood losses will fluctuate between good and bad years. In the UK or France, on average, there are about £400 million insured losses per year (EP, 2013). As the public system of flood prevention in the Netherlands has been so effective since the last great floods in the 1950s, there have been only a handful of floods since that time. The last medium scale flood was in 2003. Against this background, it might be considered unnecessary and economically and socially superfluous (and therefore inefficient) to introduce an entire multi-million euro insurance system and bring into play risk transference and mitigation incentives down to the level of private householders. A fully operational ex-post public or public-private compensation system would also be unnecessary given the small volume of claims that would have to be handled each year in the Netherlands (EP, 2013).

8.3.2 Financial Viability

Governments have much deeper and lower cost access to financial markets than private insurers. This advantage of government is cited by Botzen as a reason why public private systems are more effective. In a private system, for example the UK system, as there is no state guarantee or a lower cost public reinsurance option, all the risk is with the private sector. This has resulted in higher priced premiums than those found in the Belgian and French systems where the private sector risk is limited (Botzen & Van Den Berg, 2008). A state guarantee offers greater financial stability and resilience compared to a system without one. In effect the private insurers in France and Belgium rely on the public sector to function. It might be more economically efficient in the Netherlands where the number of floods is tiny to not involve the private sector. For one off flood incidents, the costs faced by the government and the insurance system will be far greater than for the government to put into play an ad hoc flood compensation arrangement as and when it is needed. This organisation can of course use personnel who have developed their skills in the private insurance industry or can sub-contract to a single private insurer to administer claims and assess losses on behalf of the government for the duration of the crisis recovery period.

8.3.3 Private Insurance vs. Public Compensation Effectiveness

Private insurance systems will not function if there is a belief that flood damage will be covered by the government. This is the case in Germany where not only is public compensation anticipated but private insurance premiums are expensive, possibly because of a lack of public reinsurance. Botzen, van den Bergh and others have however criticised this arrangement as economically inefficient and potentially detrimental to societal welfare. This might be true if post flood social and economic recovery slowed down due to public sector inefficiency compared to an inherently better organised private sector. There is no hard evidence to support this market-orientated bias. If fact, after major floods, it is the public sector that is most heavily involved in the recovery phase, financially as well as operationally (EP, 2013; Paudel 2012; Jongejan and Barrieu, 2008). By way of an example, this difference in outlook became apparent in the expert interviews when the aftermath and recovery after the Wilnis flood was raised.

After the 2003 flood in Wilnis when 1,500 inhabitants were evacuated (Gemeente De Ronde Venen, 2004) about one hundred homes were seriously affected with total costs estimated at some fourteen million euros. One expert interviewed said that it took nearly eight years for some homeowners to

receive their compensation from the WTS. This was cited as a typical example of the inherent public sector inefficiency of the WTS. Another expert, also with knowledge of the Wilnis flood, contradicted this presentation of the facts. He pointed out that under the WTS immediate payments were made based on calculation by the (private sector) loss adjusters contracted by the government to do this job. Inevitably, there were a few disputes between the victims and the government regarding the extent that losses should be compensated. This necessitated the involvement of the courts which then took a few years to resolve. This example raises the question as to how this case would have been different under a private insurance system. Many people who have been flooded in the UK and had difficulty reaching settlements with private insurance companies might not agree with this assertion of private sector efficiency and fairness

8.3.4 Increasing Demand for Flood Insurance in the Netherlands

Reversing the general low interest in flood insurance among the Dutch is therefore a commercially desirable condition for private insurers to sell flood insurance in the Netherlands. As with other natural disasters, demand for insurance peaks dramatically following a severe incident. Then typically it tapers off over time until the next incident reminds people why taking out that particular type of insurance might be a prudent investment. Unfortunately, for the private flood insurance sector at least, there have been no very serious floods since the 1953 Great North Sea flood. Data is surprisingly difficult to locate, but according to Watervragen (2013) there have been seven notable flood events and a small handful of 'near misses' when people were evacuated but the dike held. No data could found on possible smaller floods.

	Sea Floods	River Floods	Dike Breaches	Rain
	1953	1984 (Maas)	1960 (Tuindorp)	1998
		1993 (Maas)	2003 (Wilnis)	
		1995 (Rhine)		
Total Incidents	1	3	2	1

Table 4: Floods in the Netherlands since 1	1953	(Watervragen,	2013)
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Notwithstanding the overall cost of the damage these floods inflicted, for a country that is as exposed to flood risks as the Netherlands, it is impossible to dispute that this is a very low number. Extensive public investments in flood protection infrastructure and water management expertise in general are behind this impressive track record. That the Dutch today have a low perception of flood risk is not surprising. If demand for private flood insurance is to increase the Dutch public will either have to be exposed to far more flooding or, as is suggested by (Botzen, 2010) encouraged into purchasing flood insurance through public or private informational campaigns that inform them of the risks they face from the spectre of pending climate change. Such public informational campaigns have met with limited

success and are reported to have little impact due to a lack of personal connection to the main messages being put across (EP, 2013).

8.3.5 Climate Change

The next section discusses why climate change should not be used as a condition to justify the introduction of private flood insurance to the Netherlands. Most academic papers on flood insurance, including this one, begin with a reference to climate change and the anticipated resultant increase in flooding. In that vein, Botzen and van den Bergh (2008) constructed their justification for the introduction of multi-level public private flood insurance in the Netherlands by citing recent IPCC reports concerning the likelihood of sea level rises, increased storm surges and more precipitation in the future. While this is not an unreasonable argument in countries that have minimal flood defenses, this is generally not the situation in the Netherlands. Their paper makes little reference to the extent the Netherlands has successfully adapted to manage current and predicted future flood risk. While there is of course a calculable probability of a serious flood in the Netherlands, if it is accepted that the Dutch flood defenses have been built to agreed safety standards, the probabilities are much lower than in other less well defended countries. This raises two current challenges and one future problem for private insurers entering the Dutch market for flood insurance.

First, flood risk related to future climate change is very difficult to assess (being low probability and high impact). If climate change is taken into account by private insurers, it translates into insurance premiums priced much higher than probability alone would dictate. Private insurance companies operate in a world of imperfect information. If they are asked to insure climate change risk, it is still necessary that, as private insurance companies, they make a sufficient yearly return to justify taking on an unknown and open-ended risk. If probabilities are very low it is very difficult to persuade an underwriter to take on that risk. Underwriters prefer more known risks such as fire hazard, which follow a more predictable pattern. It allows them to build such future losses into their models. They will not 'bet the house' for only a small fee (EP, 2013). Private insurance companies are not well equipped to assess uncertain future risk. Their expertise is in assessing current or near term risk. Pricing of flood insurance to include future climate change risks is very difficult and an area of risk modelling that insurance companies are not adept at. If or when flooding becomes a more frequent event, private insurance companies may assume greater importance as organisers for sharing mutual risk.

Second, flood insurance is only taken out if there is an expectation, however small, that in the next year a flood might occur. Policyholders get no financial return or extra protection by buying flood insurance cover years in advance of an anticipated threat. However well meaning, paying an insurance company does not reduce the risk from climate change. It would make more sense for an individual to spend the money on investments to reduce their own personal risk - protection from flood proofing a house will not cease when payments stop. Or through paying into a fund for collective flood protection. The latter is essentially the case in the Netherlands today. Indeed from a national perspective it would be more economically efficient and socially equitable if money were spent improving flood defences in line with climate change predictions rather than repeatedly paying private insurance companies each year to cover potential losses resulting from a flood that should never happen . Add to this the promise of government compensation through the WTS in case of flooding using climate change is therefore not a good reason or a condition the entry of private insurance into the Netherlands.

Third, if climate change increases flood probabilities beyond a certain point, it may become unprofitable to offer flood insurance (Botzen, 2010). Private insurers will only be interested in continuing to sell flood

insurance while they can make a sufficient return. While many say climate change offers new opportunities for businesses, this is true for insurance companies only up to the point when flood incidents become too numerous or costly to insure commercially. This was the industry's response after the last great floods in 1953 and would likely be the same if the Netherlands were hit by another huge storm leading to widespread and costly flooding. Sustaining private natural disaster insurance models is very difficult after a serious event. First, premiums will rise, which will reduce demand. Secondly, most often governments will have to step in to compensate uninsured losses in order to speed-up overall recovery times (Paudel 2012; Jongejan and Barrieu, 2008). This phenomenon combined with higher premium will act as a disincentive for individuals to renew their next insurance policy. Private insurance of large flood events without government backing does not work (Paudel, 2012). The NAT/CAT works because private companies retain a small layer of risk; the rest is reinsured by the state. In the Belgian WN, the exposure by private insurance companies is very small relative to potential losses. The UK system is breaking down because insurance premiums are rising unsustainably - hence the need by private industry for the 'Flood Re' insurance pool. 'Flood Re' is as much about offering affordable flood insurance to high-risk homeowners as it is about insurance companies transferring unprofitable flood insurance policies to a state backed company (EP, 2013).

8.3.6 Lessons from the Dutch Association of Insurer's Proposal

The 2013 proposal from the Dutch Association of Insurers involved setting up a private reinsurance company to spread the Dutch flood risk beyond member companies and across national borders. Four billion euros of risk capital was agreed in principle from a Lloyd's syndicate. A further billion was earmarked from the members' own reserves. This kind of private reinsurance is usually quite expensive to arrange (Paudel, 2012). Hence, the Dutch Association of Insurers proposal did not appear to be a very economically efficient way of bringing private flood insurance to the Netherlands. It was, however, according to the Association, one of the only ways that a comprehensive, affordable basic flood cover could be achieved within the private sector without a significant financial role for the Dutch state. What should be avoided is a mixed arrangement like the NAT/CAT where both public and private reinsurance are available. The problem here is one of cherry-picking leading to the highest risk policies being stacked in the public domain while the most profitable customers are cherry-picked by the private sector.

Under the Association's 2012 purely private arrangement proposal, it could be expected that a not insignificant part of the premiums raised would go to paying the Lloyd's syndicate for the reinsurance cover. Given the high fees Lloyd's would charge for this kind of reinsurance, the inclusion of mandatory flood insurance would be a necessary condition if the insurance was to be generally affordable. In a voluntary system, the reinsurance fees would not be spread over large enough risk community to make them affordable. The choice of private reinsurance does raise the question: why did the Association's proposal require reinsurance rather than being funded directly from the industry's own capital reserves. Is flood risk still considered to be too high for the Association's members to risk more of their own money?

The Dutch Association of Insurers proposal did not call for a change to Dutch law, instead it relied on the fact that approximately 95% of home insurance in the Netherlands is handled by the Association's members. This is in effect a form of cartel operation (EP, 2013) that has high market influencing capabilities, should they be permitted by Dutch regulatory authorities. Under the Association's proposal, the WTS catastrophe compensation law would have continued. Dutch citizens might question why this should be the case as, in essence, they would be paying for a form of flood compensation through general taxation and again through first-party insurance. If the flood insurance proposal from the

Association were not mandatory it is likely that demand for coverage would be low as Dutch citizens might expect to be compensated by the WTS - despite its supposed weaknesses frequently alluded to by Botzen et al. In the event of the large flood, it would probably be politically irresistible to compensate flood victims in excess of the limits written in the WTS. With this public compensation system in place and without any mandatory underpinning, it is unlikely that private flood insurance would have mass-market appeal.

8.3.7 Lessons from the First Private Flood Insurer

Industry players cite Neerlandse, an emergent private insurance company offering flood cover, as an example why it is not commercially economic to sell private flood insurance in a free market. Frequently people have referred to their product as quite expensive and also limited. Neerlandse, however, set premiums that are based on their own flood risk model and therefore are differentiated. Their insurance products are underwritten and based on a commercially sound business model (EP, 2013). Granted it only covers domestic property up to seventy-five thousand euros, but leaving that to one side, the demand for their product since the launch in December is rumoured to be quite slow (EP, 2013). Perhaps, given the generally low perception of flood risk in the Netherlands, consumers do find it too expensive. An outstanding question remains though. Given Neerlandse are the only company offering a mainstream consumer flood insurance product, i.e. there are no direct comparator products on the market, the relative value of their product is not easy to ascertain (EP. 2013). It cannot be directly compared with flood insurance in other countries, for example France or the UK, as the flood risk profile for the Netherlands is completely different. Making such comparisons between countries that face such different risks and that operate different flood compensation arrangements does not make much sense. The prices that Neerlandse charge are presumably as close to the lowest they could arrange with Kiln, their Lloyd's underwriters, plus the operational fees and costs of selling and marketing such a product. A free market is likely to lead to lower prices compared to a cartel-like operation that the Dutch Association of Insurers has attempted to create. If more companies began selling private flood insurance, it is probable that prices would go down due to competition and as the Dutch flood context is better understood by underwriters (EP. 2013).

8.3.8 Private Flood Insurance Social Benefits Netherlands

An implication for Dutch policy makers is that if they withhold public flood damage compensation, they can stimulate, (or at least not crowd-out) private flood insurance products (Botzen, 2010). It might be surmised that a key condition would be to make flood insurance mandatory. Indeed, the proposal from the Dutch Association of Insurers was predicated on this scenario. They proposed flood insurance be automatically included as a percentage mark-up on every fire insurance policy in the Netherlands. The justification for mandatory insurance contained within their proposal was justified by the need to build a sufficiently large risk community for flood insurance premiums to be affordable and to pay for the apparent high start-up costs, including developing a comprehensive flood risk model for the Netherlands. Commercially, this option would make a lot of sense for the insurance industry as they would be guaranteed substantial industry-wide revenue uplift in the first year alone of in the region of between **155 and 310 million Euros** (ACM, 2013). This considerable amount of money, if rarely paid out for flood insurance claims - a likely scenario given recent flood history in the Netherlands -, will profit the insurance sector but not help protect the Netherlands against future flooding. It would be more economically efficient if this money were spent by the government on strengthening the nation's flood defences.

While a popular option for the insurance industry, objections from consumer groups could be expected, as in fact was the case. Any mandatory charge would also not be popular among the electorate given current perception of flood risk and would therefore not receive the necessary political backing. In fact, before the requested change could be significantly tested 'in the court of public opinion', the Association's proposal was rejected on the grounds that it violated Dutch competition laws. For reasons of public legitimacy and competition, making flood insurance mandatory while commercially desirable, is not a realistic condition for the introduction of private insurance to the Netherlands. A free market in flood insurance, as ruled by the ACM Dutch competition authority, is probably the only acceptable route for private flood insurance to gain a foothold in the Netherlands.

8.3.9 The Future of Public Flood Compensation in the Netherlands

The WTS - or revised form of it - could be beneficially integrated with a free market in private flood insurance. As a sovereign guarantee to cover losses that exceed the commercial capacity of private insurance markets, it would lead to more affordable premiums and greater financial resilience in the sector. Public private multi-level arrangements work well in both France and Belgium. In theory a multi-level PP system integrating a form of the WTS, could, as proposed by Botzen and van den Bergh (2008), combine the strengths of both private and public actors to overcome the challenges of providing flood insurance in the Netherlands. However, leaving the WTS in its current form would probably not be conducive to introducing private flood insurance. Therefore, a condition would be to replace or reform the WTS in order to complement and not crowd out private insurers from entering the Dutch market. Supporters of a true free market n flood insurance would not agree that a public sector level of risk transfer is necessary and would argue that it will only lead to market distortions and cartel behaviour as private companies collude to capture more profits by passing bad risks 'up' to the public's purse.

8.3 Limitations of Research

This thesis did not set out to test a hypothesis – it was more exploratory by design. Given the high number of variables involved in research at the national level it is not wise to generalise beyond the facts of this research at the time the study was undertaken. For example, if, in the future, the Dutch Association of Insurers proposal for mandatory private flood insurance is eventually accepted, then the conclusion that current conditions are not sufficient for effective private flood insurance would no longer hold true. Furthermore, if there are more flood events in the future and the Dutch public awareness of flooding increases, the market for private flood insurance could expand rapidly alongside the WTS even when it is not reformed.

A second limitation of this research involves the research design. The conditions for effective private flood insurance were identified using a comparative cross-case methodology. The cases were chosen to be as geographically and culturally contiguous as possible. The matching of cases attempted to increase the internal validity of the research. However, cross-country comparison will have very limited external validity and limited scope to generalise the results beyond the cases and geographic regions studied. It is never the case when making inferences from national police that one is comparing apples with apples. Given the historical, cultural, political and topographic differences between countries, a one size fits all solution or policy recommendation is not sensible. This study's design tried to minimise difficulties with cross-case comparisons through the identification of common compensation system components and then triangulation of the results using expert interviews based on standardised questions. The inherent weakness, however, remains.

8.4 Suggestions for Future Research

Due to the evident practical difficulties in creating the conditions for a viable and sustainable private flood insurance market that have been described in this thesis, it might be considered an easier and more profitable route to introduce flood insurance to the business sector first (EP, 2013). Business interruption costs after floods have far more impact on individuals' wealth and on the economy as a whole than domestic damage from which it is relatively inexpensive and simple to recover as losses are far less interrelated. Selling insurance products that hedge flood risk exposure within the Dutch business sector, both domestically and internationally, may be more a more viable choice for private insurance companies as well as being more socially useful for the Netherlands as a whole. This could be a fruitful avenue for future research.

A possible observation of wider relevance to the study of sustainable development that can be inferred from the above conclusion concerns the reason why the most recent proposal from the Dutch Association of Insurers was rejected. Competition laws often restrict private companies if they seek to operate (and make profit) in domains that have been traditionally seen as the preserve of the public sector. Dubbink (2003) predicted this difficulty would occur when society moves from a 'direct' to 'indirect' responsibility model of environmental governance. In asking for mandatory flood insurance, the Association was in essence seeking quasi-governmental powers which, as predicted by Dubbink, encountered resistance on grounds of competition. If the private sector is to share more responsibility with the public sector for environmental governance, for example, offering private flood insurance for climate change adaptation, it would be interesting to understand different ways of framing the private sector's involvement. If accusations of excessive profit seeking by private actors operating inside the public domain are to be avoided, changes will be necessary in both the law and in public discourse.

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Appendix 1 Informal opinion on compulsory private insurance construction for flood coverage

Introduction

1. The Dutch Association of Insurers (hereinafter the Association) requested an informal opinion to the Consumer and Market Authority (hereinafter: ACM) in late 2012 on mandatory private insurance structure for flood coverage (hereinafter: the construction insurance), which they will introduce in 2014.

2. An informal opinion is a preliminary assessment of whether the proposed plan of ACM companies / associations may or may not be in breach of the Competition Act (Hereinafter: Act). ACM has decided to grant the request of the Association to an informal opinion. The ACM will assess whether the insurance construction that Association stands for will cause a restriction on competition, and if so, whether this competition restriction is justified.

3. This informal opinion is, as usual, largely based on facts and conditions provided by the applicant, the Association. ACM assumes that this information is correct. In addition to the information of the Association ACM – and to a lesser extent - various market and stakeholder consultation. This is to gather information about this insurance structure and the context in which this knowledge was realized.

4. This informal opinion is not binding. The Board of ACM is at liberty to judge differently at all times. In addition, any other national and / or European legislation on insurance structure are applicable, and therefore, one or more other authorities are competent. These other agencies are not bound to this view.

5. Chapter 2 sets the proposal of the Association. Chapter 3 gives a market description, and Chapter 4 assesses the insurance structure.

Proposal Association of Insurers

6. The Association is an association of private insurers in the Dutch market. The Association is an independent association that is controlled and paid by their members. Submissions from the Association show that members of the Association represent 91 per cent of the premium volume for fire insurances and 95 per cent of the premium volume for indemnity insurance in the Netherlands.

7. The insurance structure that the Federation stands for, is a basic coverage to enter for Flood risk, and should be mandatory for all private linked Tenancy and household insurances and business inventory and building insurances (Hereinafter regular fire insurance) that the members of the Association offer to both business customers as well as individuals.

8. The basic coverage under this insurance structure is as follows:

• Coverage for private insurance: Tenancy to EUR 250,000, EUR 25,000 to contents, with an excess of EUR 500;

• Coverage for business insurance: Tenancy to EUR 500,000 to EUR 250,000 and inventory, with an excess of EUR 5,000;

• The total coverage is capped at EUR 5 billion per year. If the total damage in any year in the Netherlands exceeds EUR 5 billion, money will be distributed proportionally to victims;

• Not covered are: risks in river floodplains, non-material damage (loss), costs for evacuation, costs of remediation, impact by breaching of dikes.

9. In connection with the basic coverage for flood, a Dutch Reinsurance Company for Flood Damages NV (NHO) is set up to act as reinsurer for coverage. All fire insurers who are members of the Association, are required to link the fire insurance with their basic coverage, and are also required to participate and pay to the NHO. Non-members

may connect voluntarily.

10. Expected costs of the reinsurance will be 5 to 10 per cent of the existing premium for fire insurance. Additional to the cost of reinsurance are the costs of coverage from implementation of individual insurers.

11. Individual insurers according to the Federation decide how the costs are passed on to the policyholder; there is room for Association premium differentiation in the Association. Insurers must offer their customers at least a basic coverage, but may offer higher and / or lower own-risk. It would require insurers to arrange reinsurance by themselves.

12. The Association argues that this compulsory insurance construction makes a previously un-insurable flood, insurable. The Association believes that with its proposal a sustainable insurance structure is created in which coverage for flood risk can be offered. According to the Association this is a desire of the government and many Dutch. With this construction the Association also expects to create a market for additional coverage.

13. The insurability of the risk of flooding is - according to the Federation - caused by a (too) low (spontaneous) demand, the catastrophic nature of the risk, high investment and political moral risk. These causes are briefly explained, which also describes why the Association considers that a mandatory insurance construction offers a solution.

14. According to the Association, there is a (too) low (spontaneous) demand for flood coverage due to low risk perception and adverse-selection. The Association states - based on data from Belgium, not the Netherlands - that the required participation of insured people must be at least 80-90 per cent in order to achieve a sustainable insurance construction. With mandatory inclusion of flood coverage at all fire insurance, the problem of the (too) low (spontaneous) question would be obviated. In addition, the Association in conjunction with this obligation wants to extend risk awareness.

15. The Association also claims that the potential catastrophic impact of a (large) flood exceeds the financial strength of particularly smaller individual (fire) insurers. In the Netherlands, the risk of extreme flood damage, which risks are correlated (cumulative risk) and the consequences for individual parties can hardly be overcome by prevention measures. This makes insuring the risk, in the opinion of the Association, currently unmanageable.

In the insurance structure that the Federation stands, this catastrophe risk is limited by the basic coverage to maximize the benefit for each risk and address certain risks to close, which, as mentioned, is also a market for supplementary coverage is disclosed. The capacity / coverage per year, as mentioned, capped at EUR 5 billion.

16. According to the Association brings individually ensuring the flood (too) high investment costs. The purchase of (affordable) reinsurance capacity for an individual insurer impossible. This is partly to do with the fact that there are for the Dutch situation, no risk model exists and needs to be developed so that high (initial) investment costs. The Association indicating that insurers the risk that this insurance is unsuccessful (due to the expected low demand) to large to start, itself a costly development process. For the same reason, according to the Association large reinsurers and reinsurance brokers at this time no insurance risk model and product have been developed. It states that the Association joint investment by the cost per individual insurer are lower and that makes collective purchase of reinsurance capacity procurement significantly cheaper. Insurers consider such an investment, however, only justified if there is a certain degree of mandatory. For this reason, the construction of insurance the Association is mandatory.

17. Finally, according to the Association, a low participation willingness of insurers to provide a voluntarily and individually insurance exists due to high political moral risk. The Association will make this insurance construction obligatory to guarantee participation of the insurers.

18. With the insurance structure for the Association state, according to the Association, a balance between the direct benefit of policyholders by offering a comprehensive and affordable coverage and the importance of continuity of the industry. It offers the customers clarity about the wide range of basic compulsory insurance and is a guarantee for maintaining adequate solvency of the members of the Association fire insurers.

Context: Market Description

Background

19. As a result of the flood in 1953, the flooding of primary and secondary river and sea dikes in the Netherlands could no longer be insured. A precursor of the Association forbade its members from 1955 on coverage for the flood to offer insurers regular fire insurance, because the risk due to the catastrophic nature would be uninsurable. Around 1998, through the intervention of the European Commission, the binding decision of the Association was replaced by a free advice. This, however, has changed little in practice, on almost all regular fire insurances flood coverage is still excluded.

20. Early 90s on several occasions the sector (the Association) consulted with the government to qualify for the reimbursement of a (collective) ability flood damage. Several (public-private) proposals emerged that eventually were all not feasible and / or desirable. It has led to the creation of the Allowances Act catastrophes (hereinafter WTS) in 1998. On the basis of this law, the government compensates victims (partly) for flood damage.

21. In the period 2006 - 2010 the government and the insurance (the Association) discussed again to find a way to insure the risk of flooding. For possible replacement of the WTS the possibility of a public-private flood insurance is explored. However, the government noted in 2010 that a public-private flood insurance has some inherent limitations and would lead to a burden in times of economic crisis, and is therefore not desirable. Since then, the Association works on its own (collective) insurance structure.

The current market for fire insurance

22. In the insurance structure that the Federation created, the flood with a mandatory basic coverage is accommodated within the regular fire insurance.

23. The regular fire insurance in the Netherlands provided coverage against risks such as fire, theft, storm, rainfall or overflow of sewage. In almost all fire insurances, floods are now excluded from coverage. Proceed to number 31 and further on this view.

24. The fire insurance (and SMEs) individuals are often standard products that are usually signed through the regular 'provincial markets'. Large business customers, but also wealthy individuals, often require customized solutions tailored to their needs. These products are closed with the intervention of an insurance broker and sometimes using their own risk manager on the 'co-assurance market' and / or foreign providers.

25. The market for the standard fire insurance is particularly national. The market for customized products appear larger, possibly internationally. This appears from the limited research ACM in this view.

26. Insurers may compete on different parameters for the favour of the policyholder, who is free in his choice by which insurer he signs his fire insurance and flood insurance. Thus, insurers differentiate on price, for example, by offering competitive prices and / or (collective) discounts. Furthermore they can compete on the composition of the coverage (custom made). Besides that, fire insurers compete on quality of service delivery / handling your claim, and the creation of a proper name by means of marketing.

27. Data from the Association shows that the premium volume (gross earned premium) for fire insurance in the Netherlands in total, the private and business market jointly, amounted to EUR 3.7 billion for the year 2011. Out of this, EUR 3.1 billion from regular fire insurance, broken down by EUR 1.8 billion of private buyers and 1.3 billion of business customers. The remaining part is composed of fire insurance for valuables, reconstruction damage, business interruption and environmental damage.

28. Fire insurance for individuals under the Association has a high penetration. In 2010, 96.4 per cent of households had contents insurance, and 58.5 per cent of households have a home insurance. The lower penetration of property insurance can be explained by rental houses mostly in the business market or via an association of

owners where they are insured. The home insurance is otherwise made obligatory by the mortgage.

29. According to the Association, the fire insurance on the business market has lower penetration rates than the private market. The Association estimates the penetration inventory insurance at 40-80 per cent and for building insurance on 30-50 per cent.

Flood Coverage

30. Nearly 50 per cent of the Dutch population lives in areas that can flood. In these flood prone areas, also insured people live with no or less risk, for example when their homes were built higher. Part of these regions, the floodplains, is excluded from coverage in the insurance structure that the Association stands for. For 50 per cent of the Dutch there is no risk of flooding.

31. For both individuals and companies there are insurance options for flooding in the current market. Although on most regular fire insurances coverage is excluded, there is a limited supply of separate catastrophe insurances where the floods are covered. In addition, some insurance companies, especially in the non-standard products, do cover fire insurance. The government will also (partly) compensate victims in certain cases for flood damage based on the WTS.

32. For individuals with a property it is currently possible to take on a catastrophe insurance through Assuradeur Neerlandse. This insurance exists since September 2012 in cooperation with Association Eigen Huis. Coverage is provided by Lloyd's of London. Besides, this flood insurance covers damage caused by earthquakes, terrorist attacks and explosions of explosive material from World War II. Neerlandse uses a (innovative) growth model, by region a maximum number of people insured. With enough entries in the first round, enrolment for round two will start.

33. In the past (from 1995), LugtSobbe / Eurolloyd offered a catastrophe insurance for individuals. In 2007 the policy taken off the market when Eurolloyd was acquired by insurer Delta Lloyd (one of the members of the Association).

34. On the (large) business market the supply of flood coverage is bigger. Wealthy individuals and (large) companies can close flood coverage through an insurance broker on the stock exchange and / or abroad, and some insurers offer flood coverage itself. Especially large, wealthy companies seem to have good access to flood coverage, partly due to their strong negotiating position.

ACM Review

Considerations regarding insurability Introduction

35. As mentioned, the main reason for the Association to propose the insurance structure is the noted uninsurability of flood risk. This risk would be made insurable if the insurance construction of the Association was introduced, in particular the fact that it is mandatory would make the risk insurable. In relation to this view, the Association put forward reasons for this alleged uninsurability.

36. This section discusses the noted uninsurability and the construction the Association sees as a solution. Whether or not the insurability of flood plays a role in the competition assessment (the necessity and effectiveness of cooperation between members of the Association) of this insurance structure is discussed.

37. If the risk to individual insurers is uninsurable, but only insurable by cooperation between insurers, it may be that this cooperation has no restriction of competition. The European Commission, in the context of insurance pools, provides for cooperation between insurers, under certain conditions, which does not lead to a restriction of competition to the extent that cooperation (pooling) is necessary for these insurers to enable a kind to offer that they would only be able to supply insurance. Cooperation could lead to a new provider for the benefit of customers who need such coverage.

More generally, the European Commission, in the context of horizontal cooperation agreements, provides for cooperation between competitors, not leading to a restriction of competition if the activity to which competitors cooperation concerns, not on the basis of *objective factors* may independently perform, such as the limited technical capabilities of the parties, unless the parties could do the project by less restrictive means.

Insurability

38. An insurance creates (in advance) the financial security that reimburses damage in the future. There is "uninsurability" if no insurance is offered or when the premium coverage ratio as such is regarded unfavourably by potential customers so as not to use the insurance. A risk is regarded 'insurable' when the commercial premium for insurance from an economic perspective and the buyer from his perspective is acceptable.

39. The Association argues that it is currently not financially viable (acceptable) to offer individual insurance coverage for flood. However, as footnotes of this view show, at present a (limited) range of flood coverage by individual insurers does exist. Therefore, in the opinion of ACM, there is some degree of insurability, albeit not through the traditional model.

40. Furthermore, it should be noted that it is not inconceivable that the fact there are only limited insurance-options from individual insurers, is caused by the fact that flood was excluded from the Association coverage until late 90s, and the fact that the Association since then has been working for several years with initiatives for (collective) insurance possibilities.

41. With regard to the high investment costs, which among other things, entails the development of a risk model, ACM again points to the existing insurance options. Current providers of flood insurance proved to be able to independently develop risk model and policy conditions. Also Lugt Sobbe / Euro Lloyd has worked independently in the past.

42. ACM notes that the Association has not substantiated that in the Netherlands there is a political moral hazard, such as the Federation argues. After all, the Association itself states that in the Netherlands, prevention measures are laid down in the Deltalaw and that there are also international agreements on the management of flood risks.

If there is a question of whether or not fear of a political moral hazard is justified, then other solutions are thinkable. In this context, the ACM points to the possibility to link insurance premium to the condition of the dikes, which makes overdue maintenance visible and the moral hazard limited.

43. Regarding the low (spontaneous) demand for flood coverage; conversations ACM conducted with marketparties showed the demand for such insurance, the specific and also limited. These demands can be met based on existing (new) possibilities. To 'create' demand, it is - in the perspective of ACM – not necessary that the flood coverage is linked to the mandatory fire insurance. The fact that perhaps there is a low awareness of the risk of flood, and therefore (too) little demand, can also be addressed in other ways, for example by providing information and advertising.

44. Furthermore, it should be noted that the construction of the Association insurance makes flood risk not fully insurable. Except maximisations per risk address and exclusions of some of the risks, the coverage in any year is capped at EUR 5 billion.

45. Besides ACM notes that although insurers argue that there is a desire from the government to affect the proposed construction insurance, but this is in no way substantiated. After consulting the ministries concerned, it shows that there is no support of these ministries for this insurance construction. Insurance companies have no statutory duties or obligations to cover the flood. No objective need is shown for (in this way) covering the flood.

46. The composition of the Association that there is a social need for a flood insurance coverage and that it is a desire of many Dutch is, is not objectively justified and seems inconsistent with the statement of the Association that right now there is little (spontaneous) demand for such coverage. From consulting interest organisations for consumers – 'Consumentenbond' and ' Vereniging Eigen Huis' and interest organisations for entrepreneurs - SME Netherlands and VNO-NCW35 – it shows- based on the arguments put forward, that there is no support for the

construction insurance.

Conclusion insurability

47. There is currently, on a limited scale, coverage for flood. The insurable risk is difficult, but there are several solutions conceivable to make the risk (better) insurable. The insurance construction of the Association, which is based on a mandatory and cooperation between insurers, is one of the possibilities. In the opinion of the ACM mandatory nature of the insurance that is included in the insurance construction of the Association is not necessary for making flood (more) insurable)

Assessment initiative under the Competition Act

Introduction

48. The ACM Association has asked its proposed construction insurance to be tested by competition law. The following is a test based on Article 6, first and paragraph, Mw, while also addressing the Block Exemption Regulation for the insurance sector (hereinafter the Block Exemption Regulation).

Article 6, paragraph 1, Competition

49. The Association represents the interests of private insurers and is therefore an entrepreneur organisation in the sense of Article 6, paragraph 1 Mw. The members of the Association, private insurers, are undertakings within the meaning of the Competition Act. They do political activities. The advocacy by the Federation to make flood coverage a mandatory part of the fire insurance, can be seen as an expression of the will to coordinate the behaviour of its members and therefore as a decision of an association of undertakings within the meaning of the competition law. On the market for fire insurances, the members of the Association competitors. Surveyed members in favour of a voluntary insurance were 20% for compulsory insurance, 9% had no opinion.

50. The compulsory insurance structure that the Association stands for, in the opinion of ACM, to the extent that they can, based on the information available at this time and context, suitable to restrict competition. By requiring all existing fire insurances to expand with flood coverage, insurers themselves cannot fully compete in the composition of their proposal.

They cannot independently determine whether or not to offer flood coverage and in what form they want to offer it, i.e. essentially supply constraints by the insurance arrangement, the space on the market for the provision of single flood insurance significantly reduced. Hereby the market is foreclosed to parties that offer such a product (like). Insurers obtain this requirement also ensures that other insurers will not meet any customer demand for fire insurance without flood coverage or to a separate flood coverage.

51. Also, the users of this compulsory fire insurances, by the compulsory coupling of the fire insurance can not choose between the yes / no of covering floods in their fire insurance. In almost all cases, the customer receiving fire insurance would be obliged to take this coverage - even if this recipient is not in any risk of flooding - and have to pay for it. There may indeed be assumed that the cost of reinsurance is 5 to 10 per cent of the existing fire insurance insurers, and these costs will be passed on to customers in the form of partially premium increase.

52. In the opinion of the ACM competition is noticeably reduced by this insurance structure. The information provided by the Association shows that in its affiliates, approximately 91 per cent of the market for regular fire insurance represent measured in premium volume. This is a significant part of the market. Only a small part of the market does not fall within the scope of the Association's proposed scheme.

Semi- conclusion

53. Based on the known information at ACM, we find that the structure the Association stands for causes an appreciable restriction of competition within the meaning of Article 6, paragraph one of the Competition Act.

European block exemptions

54. There is a number of European block exemptions that inapplicable explain the prohibition in Article 101, first paragraph ' Treaty on the Functioning of the European Union (TFEU)'. These group exemptions also work by the Dutch competition law, as we can see from Articles 12 and 13 of the Competition Act. These block exemptions can

therefore make Article 6 of the Competition Act inapplicable for explicit agreements with which it may be presumed to comply with the conditions of Article 6, paragraph Mw.

55. For the insurance industry is, as mentioned in marginal 48 of this view, a Block Exemption Regulation. Prior to the discussion of these Block Exemption Regulations, we wish to note that the insurance structure that ACM stands for, is a combination of different types of agreements, treated as separate topics, namely in the Block Exemption Regulation drawing up a risk model and the formation of a co- (re) insurance pool.

56. The Block Exemption Regulation for the insurance shows that the insurers under certain conditions are allowed to work in the field of gathering together data for the calculation of the average cost of covering a specific risk (risk model). This makes it possible to improve the knowledge of risks and facilitates the rating of risks for individual companies, which facilitate market access and can be beneficial for consumers. This benefits also the joint development of a risk model for flood. This exemption would create a joint risk model the flood detention, but is in no way a justification for the proposed by the Association construction insurance where the risk component model of it. ACM also refers to marginal 60 and also of this, which insurance structure is assessed under Article 6, paragraph, Mos.

57. Also shows the BER for the insurance that insurers under certain conditions is allowed to work together through a co (re) insurance pool that meets the conditions for exemption as mentioned in Chapter III of the Block Exemption Regulation. It must involve agreements concluded with a view on common coverage of a specific risk.

58. ACM points out that exemption for this common coverage is only relevant if they meet the cumulative conditions of Article 7 of the Block Exemption Regulation. This shows among other things that the rules of the pool Participating companies may not require the type of risk covered by the pool to insure all or part of the pool and also should not prohibit to ensure these risks outside the pool. In the opinion of ACM the insurance structure of the Association does not meet these conditions. After all, the members of the Association are required to participate in the NHO for coverage of the flood, which is also linked to all fire insurances.

59. Additionally ACM points out that otherwise do not meet the conditions for this exemption are met, now there is no question of a 'new risks ' within the meaning of the BER and the combined market shares of the top insurers the threshold of 20 to 25 per cent true.

Article 6, 3th paragraph Competition

60. Now that we see the conditions of the Block Exemption Regulation for the insurance are not met, we should look at Article 6, paragraph Mw, which tested a statutory exception to the prohibition on cartels. In order for such exception to qualify, four conditions must be met. This means that when one or more conditions are not met, an action on Article 6, paragraph Mw cannot succeed. ACM notes that in the case of an (almost) market coverage scheme, as the Association stands, there is not likely the applicability of provisions of Article 6, paragraph Mrs. It is further noted that ACM tests only to Article 6, paragraph Mw when the parties concerned requested so. The proof is in this context with the Association.

61. It is likely that the insurance structure the Federation stands for, and how it is designed, can bring along economies of scale. This does not mean however, that the scheme therefore meets the requirements of Article 6, paragraph Ms. In the opinion of ACM at least two of the above mentioned conditions (the indispensability of the restrictions and not substantially disabling some of the competition) are not met. The Association has, in the opinion of ACM not (adequately) demonstrated that all four cumulative conditions apply this.

62. The third paragraph of Article 6 of the Competition shall not apply if the elements of the insurance construction of the Association and the restriction of competition that come with it brings, are not indispensable. It should be assessed whether the contents of the insurance structure that the Federation stands for, are necessary. In the opinion of ACM, the imposition of this construction- also being discussed in 38-46 of this view - is not indispensable. There are other, less restrictive, possibilities to cover flooding risks. The Association did not present facts in this matter that lead to a different conclusion.

63. The scheme of the Association is almost covering the whole market. The mandatory introduction in the fire insurance policy, insurers may not cover the flooding in some form and will not bring more independence on the market. This arrangement thereby limits the competition for a substantial part of the products concerned.

64. Assessing the other two conditions, in view of the above, is no longer necessary. About these conditions ACM notes the following. There could be efficiency gain, but to test this must be better described by the Federation than is been done right now. However, it is doubtful whether the benefits arising from the efficiency gains, benefit a fair share of the customers.

To this end, the increased costs of fire insurance compared with the real value of a record flood coverage in fire insurance for users. In this context it should be noted that a significant proportion of the customers are not in risk of flooding (for individuals 50 per cent), and thus has no advantage, while they probably share in the cost increase.

Semi-Conclusion

65. ACM believes that the four cumulative conditions of Article 6 paragraph Mw sets for the non-application of the prohibition are not met.

66. On the basis of the known information now at ACM, we find that the structure the Association stands brings about an appreciable restriction of competition within the meaning of Article 6, paragraph of the Competition Act. ACM believes that they have not fulfilled the conditions of the Block Exemption \ Regulation for the insurance and has not met the four cumulative conditions of Article 6, paragraph Mw suggests for the non-applying of the cartel prohibition.

Conclusion

67. Based on the facts and circumstances presented by the Association, and (limited) study of ACM to the context of this case, ACM comes to the conclusion that compulsory insurance structure that the Federation stands for, is not in line with the Competition Rules. Introduction of this insurance structure provides an appreciable restriction of competition.

Appendix 2 Expert Interview Questions

The below questions were emailed to members of the expert panel in advance of interview. It was also used to steer the discussion in a semi-structured interview format. The format of the email was as follows:

Background

My thesis research framework is based on an evaluation of the strengths and weaknesses of public and private flood compensation schemes to determine **under which conditions might private flood insurance be incorporated in a redesigned Dutch flood risk compensation system or policy?**

At present in the Netherlands a government backed flood compensation system is in operation and limited private flood risk insurance is available. As severe weather events become ever more frequent compensation payments may put government under increasing financial strain. Some consider this system to be inefficient and no longer appropriate. In light of this, European flood risk governance is currently being reassessed. The EU Floods Directive (2007/60/EC) and the UNIDSR Hyogo framework both call for a diversification of flood risk strategies across Europe to strengthen and harmonise flood risk governance. It is therefore timely to examine whether the Dutch collective and public approach to flood compensation is still central to maintaining flood resilience in light of increased flood risk currently experienced globally."

A summary of the research framework in included as an annex to this survey.

The Survey

Find below questions pertaining to the design and functioning of national flood insurance systems. Questions can be answered either in general or related to a specific country's system of flood compensation. Specifically the countries included in this research as case studies are the US, the UK, Belgium and the Netherlands. The role the European Union is however a key dimension with regard to the future of flood compensation in the Netherlands.

Responses can be provided in person through a face-to-face interview either by Skype or in person. Written responses and other supporting data are also more than welcome. My email address is gareth.wakeling@gmail.com. My mobile number is +31619907801

1.0 FLOOD INSURANCE PENETRATION

Key Concept:

The aim of this question is to try to understand how different national flood insurance systems influence insurance supply and demand and hence insurance availability and coverage (penetration).

Q1.1) Do you have a view on the penetration rate of flood insurance in the UK, Germany, Belgium, France or the European Union as a whole? Please provide any details or data to support your answer.

Q.1.2) Would product bundling with so-called 'simple risks' such as household fire insurance be an acceptable way to extend flood insurance coverage? Is mandatory bundling appropriate?

Key Answers

Mandatory product bundling is quite restrictive and has competition and legitimacy issues if policyholders are not consulted nor given a choice to opt in or out nor a choice of products? Are there other appropriates ways to increase insurance coverage against flood risks?

2.0 MANDATORY FLOOD INSURANCE

Key Concept:

A compulsory flood insurance policy can be achieved in two ways: bundled with other mandatory insurances or through the government legally obliging insurance companies to provide cover. In NL flood insurance is currently available but is not mandatory. Flood insurance penetration rates are very low across all sectors.

Q2.1) Should there be compulsory national flood insurance in NL?

Q2.2) Should compulsory flood insurance allow for the customer to opt for more or less flood insurance coverage or should it be fixed or capped. Is this different between private and public systems?

Q2.3) Should premiums be differentiated? What are the advantages or possible drawbacks?

Key Answers

To get around the problem of risk myopia i.e. those who do not feel the threat of flood risk chose to opt out of purchasing flood insurance and the opposite problem adverse selection i.e. those who feel threat of flood are the only one purchasing insurance which has the effecting of driving up insurance premiums and unbalanced risk profiles by insurers compulsory flood insurance ensures high market penetration and a large pool of insured properties. On top of this problem of free riding is lower as the risk is spread across the whole population that benefits from the insurance. Reliance of *ex-post* government compensation is also reduced, as all households will have some level of flood insurance.

3.0 PUBLIC VS PRIVATE

Key Concept:

The NL government considers the current state back flood compensation to be insufficient or an unacceptable financial burden in the event of a large flood. In NL the insurable flood risk has in the past been viewed too high for the private insurance industry to offer acceptable products. For example, after the floods in the early 1990s the Dutch government asked that private flood insurance for fresh water incidents be made available but this was rejected by the industry (de Vries 1998, in Botzen 2008). It is instructive to understand why this was the case and whether the status quo has recently changed and in what ways can the Dutch national flood insurance system be reformed to overcome this barrier.

Q3.1) How can public compensation (e.g. the WTS in NL or the National Flood Insurance Program in the US) avoid crowding out private insurance?

Q3.2) Are the other or more effective mechanisms for loss-reducing incentives under private compensation schemes than public ones? What about those who cannot afford to participate in private schemes?

Q3.3) Do government/public backed compensation schemes subsidise and incentivise people to take on risk e.g. move to high flood risk areas compared to private arrangements as in the UK

Q3.4) In what ways can a private (or quasi private) flood insurance programme be more effective at reducing moral hazard than a pure public one?

Q3.5) How can a public (re-) insurance programme be designed to prevent or reduce the problem of moral hazard in the private sector?

Key Answer:

Different kinds of insurance terms and exclusions can be employed as part of insurance contracts to reduce the risk of moral hazard.

- Deductibles or excesses
- Co-insurance
- Coverage limits

Q3.6) Who has authority after a flood to provide emergency response funds, then loss adjustment, and rebuilding. Is it private or public responsibility i.e. what is the role of government versus private actors after a major flood event?

Q3.7) How can public compensation e.g. WTS, avoid crowding out private insurance?

Q3.8) Do government backed compensation schemes subsidise and incentivise people to take on risk e.g. move to flood risk areas. But this happened in the UK under private arrangements!

Key Answer: make it mandatory

4.0 PARTNERSHIPS

Q4.1) What types of partnerships with the private sector and the public institutions for flood insurance (pre and post flood event) are possible?

5.0 FLOOD INSURANCE AS RISK TRANSFERENCE MECHANISM

Q5.1) What is the role of the reinsurance sector if the NL system remains public?

Q5.2) Can flood insurance act as a price or market-based incentive to promote risk awareness prevention and mitigation?

Q5.3) What are the risk transfer mechanisms?

Q5.4) Are there different risk transference mechanisms available in public, private or mixed systems?

Q5.5) Would variable pricing of flood risk insurance motivate consumers and insurers more or less to take flood risk reduction and management measures?

Q5.6) Would the impact of risk-based flood insurance pricing be affected If flood insurance was mandatory?

Q5.7) In countries where there are adjustable premiums, e.g. the UK, do insurers adequately adjust premiums following the implementation of flood risk prevention measures? Do premiums really reflect actuarially correct pricing?

Q5.8) What risk transference options are there for low-income consumers who might otherwise be excluded from flood insurance products and thus reduce effectiveness of the scheme through low penetration?

Q5.8) What steps other than insurance premium differentiation can be taken to reduce the effects of moral hazard through encouraging risk-mitigating behaviour? What mechanisms are in place to reduce moral hazard? For example what data exists to prove that deductibles, excesses co-insurance and other exclusions are indeed effective at reducing moral hazard?

6.0 SOCIAL SOLIDARITY

Key Concept:

Research suggests that people tend not to purchase insurance against low-probability and high-severity events (Joint Research Centre). This is referred to risk myopia. The low uptake of flood insurance in low-income populations when flood insurance is not mandatory is marked.

Q6.1) Are there alternative flood insurance products (e.g. different terms and conditions) for insured parties on low incomes who have few choices for whom flood insurance would be economically not viable (and hence reduce penetration and flood insurance penetration)?

7.0 INFORMATION AND DATA

Key Concept:

Extremely low-frequency events may also be considered uninsurable as insurers often lack actual data to accurately assess flood risks.

Q7.1) In NL specifically how can gathering data on the impacts of past and future floods be improved?

Q7.2) In NL specifically, what steps are being taken to build an accurate flood risk map of current and projected/future risks?

Answer: The Floods Directive

Q7.3) How could better sharing of data, risk analysis and risk modeling methods be encouraged in NL specifically and in the EU generally? Should the available data be made public? Should the EU take action in this area?

Key Answer:

Through a classical underwriting process insures seek adequate information to correctly calculate risk to avoid adverse selection. Without information about the risk, risk-based premiums are hard to calculate. A general lack and ambiguity of data is a

8.0 ROLE OF EUROPE

Key Concept:

Given lack of harmonisation and great difference in national flood insurance systems across the EU there might be room for improvement. Very quickly after this year's floods in Europe the EU ran out of emergency funds and seemed somewhat unprepared.

Q8.1) What is the role of the European Union to effectively help countries to create solutions for financial protection against floods and what should be the priority actions.

Key Answer:

Given lack of harmonisation and great difference in national flood insurance systems across the EU there is vast room for improvement.

Q8.2) What European wide lessons can be learned from the post flood emergency responses after Katrina, Sandy and in German recent floods.

9.0 PUBLIC VS PRIVATE ADMINISTRATION POST FLOOD

Key Concept:

Loss assessment and adjustment after a disaster necessitates coordinated and rapid reaction often between nation states and local and regional government agencies and private actors. It is vital that there is sufficient administrative capacity to process a large number of claims from a vulnerable population that has likely suffered physical injury as well as economic losses. Q9.1) How effective is government at loss adjustment, emergency funds disbursement, rebuilding compared to the private insurance sector?

Q9.2) Are there specific aspects of loss adjusting which would benefit from more harmonisation across public and private spheres of influence and across national and other administrative borders?

10.0 OTHER QUESTIONS

Q10.1) Affordable private insurance is contingent on not getting flooded - please discuss.

Q10.2) Other than traditional indemnity-based insurance, what innovative approaches to assessing and compensating flood risk is now available? What are the advantages and disadvantages of these?

Question Sources

A number of academic papers have been used to develop these questions. Specifically the Green Paper on the insurance of natural and manmade disasters (Strasbourg, 16.4.2013 COM (2013) 213 final). To avoid completely re-inventing the wheel this paper been was used an underlying guide for this survey. Questions are however tailored to the specificities of flood insurance.

Appendix 3 Expert Interview Details

The details of the experts interviewed for this thesis are given below. If more information is required concerning their contact details or other relevant data, requests can be sent to gareth.wakeling@gmail.com.

Name	Organisation/ Company	Position	Method	Anonymity Requested
Kosta Keramopoulos	Neerlandse	Founding partner of the only private flood insurance provider in NL	Face to face	No
Matthijs Kok	HKV Consultants and TU Delft	Founding Partner/Professor and part-time chair of Flood Risk.	ding Face to face Face to face Face to face Face to face	
т.s.	Lloyd's Syndicate 1	Senior Property Underwriter	Face to face	Yes
J.W.	Lloyd's Syndicate 2	Broker (Senior V P)	Face to face	Yes
Youbaraj Paudel	VU University Amsterdam	PhD Dutch climate change risk insurance and adaptation	Face to face	No
Wouter Botzen	VU University Amsterdam	Assistant Professor Environmental Economics	Face to face	No
Marko van Leeuwen	Dutch Association of Insurers (Verbond van Verzekeraars)	Spokesperson	Email exchange	N/A

Table 5: Expert Panel Members

Appendix 4 Comparison of Components of National Flood Compensation Systems

	THE NETHERLANDS	<u>THE UNITED</u> <u>KINGDOM</u>	FRANCE	BELGIUM
GENERAL COMPONENTS				
Name	WTS	Statement of Principles	Catastrophes Naturelles (NAT/CAT)	Waarborg Natuurrampen (WN)
Year of Operation	1998 to present	1986 - 2013 (extended to 2015 while 'Flood Re' is organised)	1982 to present	2005 to present
Insurance System Type	Public	Private	Public Private	Public Private
Standard Disaster Return	Data not available	1/75	1/100	1/100
Market Penetration	>0.001% or 100%	75% - 90%	92%	95%
Public Sector Responsibility	Flood protection, mitigation, financial compensation	Flood protection and mitigation	Reinsurance by public body (CCR), state guarantee, prevention and mitigation	Tariff office, prevention, state guarantee
Private Sector Responsibility	Currently limited to one private insurance company: Neerlandse	Flood insurance system	Cover the risk, issue and administer policies. Private reinsurance an option.	Cover the risk, issue and administer policies
Compulsory Insurance	Through general taxation and water board tax	No	Yes, with property	Yes, with fire

	<u>THE</u> NETHERLANDS	THE UNITED KINGDOM	FRANCE	BELGIUM
FINANCIAL COMPONENTS				
Hazard(s) Covered	Fresh water flood only (storm surge excluded)	Flood	Flood, earthquake, volcano	Flood, earthquake, sewer overflow
Finance Source	General Taxation	Premiums + reserve equalisation subsidy	Premiums + government guarantee	Premiums + government guarantee
Damage Covered	On property not otherwise insured	Property and contents	Property, contents, personal injury	Property and contents to max limit
Premium (risk based or fixed)	N/A	Risk	Set by state (CTO), collected by insurers	Risk based, set and collected by insurers, maximum set by state
Reinsurance	No. Theoretical limit of Euro 450m per year	Private	With CCR, unlimited state guarantee	Private with state guarantee
Official Trigger	Yes	No	Yes	No
ASSESSMENT AND MITIGATION TOOLS				
Risk Zoning and Risk Maps	Yes	Yes	Yes	Yes
Incentives on Premiums or Deductibles	Not applicable	Premiums & Deductibles	Deductibles	Premiums
Comprehensive National Flood Risk Models	No	Yes	Yes	Yes

Table 3 General Components of National Flood Compensation Systems. Source: Adapted from Paudel (2012)