A MULTILAYERED APPROACH TO COVER DAMAGE CAUSED BY OFFSHORE FACILITIES

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I. INTRODUCTION

On April 20, 2010, the ultra-deepwater, semi-submersible mobile offshore oil rig Deepwater Horizon exploded, caught fire, and sank in

the Gulf of Mexico off the shores of Louisiana. The rig was owned and operated by Transocean, a Switzerland-based offshore drilling contractor, and was leased to British Petroleum ("BP") PLC, one of the world's largest oil companies. The accident caused 11 fatalities and several injuries and occurred despite Deepwater's use of a blowout preventer ("BOP"), a type of preventive equipment specifically designed to avert this kind of oil spill.[1] The BOP failure left the well unsecured, causing oil to leak from the marine riser. It was not until July 15, 2010, 87 days after the initial explosion, that responders capped the well. Approximately 4.9 million barrels of oil had been discharged into the ocean by then.[2] This accident is the most significant oil-related disaster in history, and it has produced dramatic economic losses and considerable environmental damage. The total costs of this accident are not yet certain. To date, though, BP has paid more than $14 billion in clean-up operations and another $14 billion to compensate the government and private parties for their economic losses and other expenses.[3]

This catastrophe has triggered an intensive re-examination of existing regulatory and liability schemes for offshore oil and gas activities in the United States aimed at better preventing and responding to offshore accidents.[4] Scholars have analysed the liability rules applicable to the Deepwater Horizon accident, including the scope of compensation

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[1] Blowouts occur during offshore drilling operations when pressure exceeds the weight of the drilling fluid in the well, which results in an uncontrolled flow of oil. The oil flow could, *inter alia*, result in damage to or loss of the property at the drill site. *See* RAWLE KING, CONG. RESEARCH SERV., R41320, DEEPWATER HORIZON OIL SPILL DISASTER: RISK, RECOVERY, AND INSURANCE IMPLICATIONS 3 (2010).

[2] This amount was estimated by the government. A peer-reviewed paper estimated the total release to be slightly higher than the government—roughly 5.2 million barrels. The BP itself suggested the government's estimation to be 20 to 50 percent too high. *See* NATIONAL COMMISSION ON THE BP DEEPWATER HORIZON OIL SPILL AND OFFSHORE DRILLING, DEEP WATER: THE GULF OIL DISASTER AND THE FUTURE OF OFFSHORE DRILLING 167, (2011).

[3] JONATHAN RAMSEUR & CURRY HAGERTY, CONG. RESEARCH SERV., R42942, DEEPWATER HORIZON OIL SPILL: RECENT ACTIVITIES AND ONGOING DEVELOPMENTS 5–7 (2014).

[4] *See, e.g.*, Humphrey Douglas, *Gulf of Mexico Oil Spill: Likely Impact on UK Regulation and Contractual Arrangements*, 22 ENERGY & ENV'T 241 (2011); Iveta Stefankova, *International Regulation v. National Regulation on Offshore Oil Exploitation: The USA as an Example*, 3 ELSA MALTA L. REV. 126 (2013); Will Amos, *Development of Canadian Arctic Offshore Oil and Gas Drilling: Lessons from the Gulf of Mexico*, 20 REV. OF EUR. CMTY. & INT'L ENVTL. L. 39 (2011); Simon Marsden, *Regulatory Reform of Australia's Offshore Oil and Gas Sector After the Montara Commission of Inquiry: What about Transboundary Environmental Impact Assessment*, 15 FLINDERS L.J. 41 (2013); Kenneth M. Murchison, *Beyond Compensation for Offshore Drilling Accidents: Lowering Risks, Improving Response*, 30 MISS. C. L. REV. 277 (2011).

(accounting for employee deaths,[5] fishing industry losses,[6] pure economic losses,[7] and natural resources damage[8]), liability attribution,[9] and the possibility of increasing or removing the cap on liability.[10] Procedural issues such as mass tort claims[11] and the Gulf Coast Claims Facility[12] also attracted broad attention. The civil penalty[13] and criminal charges[14] against the responsible parties, and BP's possible defence strategies,[15] have also been discussed.

A question that deserves more attention, though, is how a major offshore-related accident like the Deepwater Horizon spill can be compensated in the future. Compensation is important not only because it provides relief to the victims and environmental restoration, but also

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[5] Ryan Linsner, *Ensuring Adequate Compensation to the Victims of the Deepwater Horizon Explosion: Who Says You Can't Teach an Old Dog New Tricks*, 45 J. MARSHALL L. REV. 515 (2011).

[6] Devin C. Kelly, Note, *Industry Overboard: How the Deepwater Horizon Oil Spill Affected the Gulf Coast Commercial Fishing Industry and Statutory Recommendations for Future Protection*, 16 DRAKE J. AGRIC. L. 463 (2011).

[7] Vernon Valentine Palmer, *The Great Spill in the Gulf . . . and a Sea of Pure Economic Loss: Reflections on the Boundaries of Civil Liability*, 116 PENN ST. L. REV. 105 (2011).

[8] Robert Force et al., *Deepwater Horizon: Removal Costs, Civil Damages, Crimes, Civil Penalties, and State Remedies in Oil Spill Cases*, 85 TUL. L. REV. 889, 911–927 (2010).

[9] Tim Taylor, *Offshore Energy Construction Insurance: Allocation of Risk Issues*, 87 TUL. L. REV. 1165 (2013).

[10] For example, Gabison proposed to increase the liability limit. *See* Garry A. Gabison, *Limited Solution to a Dangerous Problem: The Future of the Oil Pollution Act*, 18 OCEAN & COASTAL L.J. 223, 246–253 (2013). For proposals to remove the liability cap, see Joseph E. Aldy, *Real-Time Economic Analysis and Policy Development During the BP Deepwater Horizon Oil Spill*, 64 VAND. L. REV. 1793, 1812–1815 (2011); Kenneth M. Murchison, *Liability Under the Oil Pollution Act: Current Law and Needed Revisions*, 71 LA. L. REV. 917 (2010).

[11] *See, e.g.*, George W. Conk, *Diving into the Wreck: BP and Kenneth Feinberg's Gulf Coast Gambit*, 17 ROGER WILLIAMS U. L. REV. 137 (2012); Myriam Gilles, *Public-Private Approaches to Mass Tort Victim Compensation: Some Thoughts on the Gulf Coast Claims Facility*, 61 DEPAUL L. REV. 419 (2011).

[12] *See, e.g.*, Dale E. Hausman & Laura A. Foggan, *The Aftermath of the Macondo Discovery Well Spill: The Interplay of Claims to the Gulf Coast Claims Facility and Insurance Claims*, 23 ENVTL. CLAIMS J. 91 (2011); Alfred R. Light, *The Deepwater Horizon Oil Spill Trust and the Gulf Coast Claims Facility: The Superfund Myth and the Law of Unintended Consequences*, 5 GOLDEN GATE U. ENVTL. L.J. 87 (2011).

[13] Force et al., *supra* note 8, at 964–68.

[14] Faisal A. Shuja, *Federal Criminal Issues Presented by the British Petroleum Oil Spill*, 9 LOY. MAR. L.J. 115 (2011).

[15] William H. Rodgers, Jr. et al., *Stranger than Fiction: An Inside Look at Environmental Liability and Defense Strategy in the Deepwater Horizon Aftermath*, 1 WASH. J. ENVTL. L. & POL'Y 219 (2011).

because it guarantees cost internalization and incentivizes operators and stakeholders to prevent these types of spills.[16]

One upside of the Deepwater Horizon tragedy is that the responsible party was a major oil enterprise with deep pockets. Although BP would normally be able to invoke the liability cap clause in the federal Oil Pollution Act ("OPA") in order to limit its liability to $75 million plus removal costs,[17] the company committed shortly after the accident to compensate for total costs.[18] A smaller company causing a similar accident would probably go bankrupt, which would create serious impediments to victim compensation and environmental restoration. Proposals to increase or remove the liability cap have been made in both legislative bills[19] and academic articles.[20] But compensation instruments still need to be made available to cover increased liability. Existing literature focused on the limits in insurance cover and the possibility of requiring insurance to compensate at higher amounts.[21] It would be difficult or prohibitively expensive, however, for insurance alone to provide many billions of dollars in coverage.[22] A feasible and efficient compensation scheme needs to be based on the successes and gaps of the existing instruments and on the specific characteristics of offshore oil and gas activities.

This paper proposes a multi-layered compensation scheme for the potentially catastrophic damage caused by offshore activities, bearing in mind the dual goals of prevention and compensation. This paper is structured as follows: Section II introduces the industrial structure of offshore oil and gas activities. It also explores the possible consequences of offshore accidents, with some emphasis on major accidents that may lead to the insolvency of operators, posing serious

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16 From economic perspective, the primary goal of tort law is to minimize the total social costs, or in the other words, to create deterrence. *See* GUIDO CALABRESI, THE COSTS OF ACCIDENTS: A LEGAL AND ECONOMIC ANALYSIS (1970).

17 33 U.S.C. § 2704(a)(3) (2012).

18 Statement of BP Exploration & Production Inc. Re Applicability of Limit of Liability under Oil Pollution Act of 1990, In re Oil Spill by the Oil Rig "Deepwater Horizon" in the Gulf of Mexico, MDL No. 2179, 2010 WL 4151003 (E.D. La. Oct. 18, 2010).

19 *E.g.* Consolidated Land, Energy, and Aquatic Resource Act of 2010, H.R. 3534, 111th Cong., at 171–173 (2010); Big Oil Bailout Prevention Unlimited Liability Act of 2010, S. 3305, 111th Cong., at 1 (2010). These bills have been discussed in the House of Representatives or the Senate Committee, but they have not been adopted. The liability cap for offshore facilities under the OPA hence remains the same as before the accident.

20 *See supra* note 10.

21 *E.g.* Shane Bosma, *The Regulation of Marine Pollution Arising from Offshore Oil and Gas Facilities-An Evaluation of the Adequacy of Current Regulatory Regimes and the Responsibility of States to Implement a New Liability Regime*, 26 AUSTL. & N.Z. MAR. L.J. 89 (2012).

22 *See infra* Section IV.B.

challenges for the compensation scheme. Section III will sketch a few key elements of the liability rules for offshore accidents, providing the basis for the discussion of the compensation system. An overview of the existing instruments to cover the liability of offshore facilities is provided in Section IV, showing their limits in compensating the damage caused by a major accident. Section V discusses a few proposals with the potential to cover substantially higher amounts of damage. Section VI analyses the potential of those proposals to accomplish the dual goals of prevention and compensation. This Section also includes economic analysis to show the cost-internalizing potential of those proposals. Based on those analyses, Section VII proposes a new multi-layered compensation scheme and Section VIII ends with some concluding remarks.

II. OFFSHORE FACILITIES AND OFFSHORE-RELATED DAMAGE

A. The Structure of the Offshore Oil and Gas Industry

This paper focuses on offshore oil and/or gas activities, which means employing offshore facilities for the purpose of oil and/or gas exploration, exploitation, and production. Offshore facilities employed during such activities may include offshore platforms (fixed or floating),[23] offshore storage/loading systems, sub-sea facilities, wells, offshore pipelines, offshore drilling units and other associated offshore equipment, constructions, and installations.

Offshore activities play an important role in the world economy. It is estimated that offshore installations produce around 15.4 million barrels of oil per day globally.[24] In the US in 2013, there were 2,657 offshore installations.[25] These offshore installations provide approximately 5 percent of US domestic natural gas production and about 21 percent of domestic oil production.[26] In the EU and Norway, over 90 percent of the oil and over 60 percent of the gas produced comes from offshore

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[23] Fixed platforms can only be used in shallow waters where the depth is no more than 400 meters. Deepwater refers to a depth between 400 meters and 1,800 meters. Ultra-deepwater refers to a depth between 1,800 and 3,000 meters, or more.

[24] QUEST OFFSHORE, THE STATE OF THE OFFSHORE U.S. OIL AND GAS INDUSTRY: AN IN-DEPTH STUDY OF THE OUTLOOK OF THE INDUSTRY INVESTMENT FLOWS OFFSHORE 14 (2011).

[25] U.S BUREAU OF SAFETY AND ENVT'L ENFORCEMENT, INSTALLATIONS AND REMOVALS: OFFSHORE PRODUCTION FACILITIES IN FEDERAL WATERS, *available at*: http://www.bsee.gov/uploadedFiles/BSEE/Newsroom/Offshore_Stats_and_Facts/OCSPlatformActivity%20%201942-%202013final.pdf (last visited Aug. 10, 2015).

[26] U.S. BUREAU OF OCEAN ENERGY MGMT. (BOEM), *Oil & Gas Energy Program*, http://www.boem.gov/Oil-and-Gas-Energy-Program/ (last visited Aug. 10, 2015).

operations.[27] Almost 1,000 offshore installations are operating in EU waters.[28] Offshore activities are not only a prosperous industry now, but will also play an important role in decades to come. The U.S Bureau of Ocean Energy Management estimates that oil and gas resources in undiscovered fields on the Outer Continental Shelf of the US total about 89 billion barrels of oil and 398 trillion cubic feet of gas, which represented 69 percent of the oil and 26 percent of the natural gas in domestic undiscovered fields.[29] Many new oil and gas fields were also discovered in recent years in the EU and Norway.[30]

The world's largest oil companies, as well as some small and medium sized enterprises ("SMEs"), engage in offshore activities. Only very few offshore facilities operators are classified as "majors" in the Gulf of the Mexico (the main offshore oil field in the U.S.).[31] In the EU and Norway, a few large companies play a major role in offshore activities, while SMEs also control a substantial number of wells.[32]

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[27] *Commission Staff Working Paper, Impact Assessment, Accompanying the document, Proposal for the Regulation of the European Parliament and of the Council on Safety of Offshore Oil and Gas Prospection, Exploration and Production Activities*, SEC(2011) 1293 final, at 9.

[28] EUROPEAN COMMISSION, COMMISSION PROPOSES NEW RULES ON THE SAFETY OF OFFSHORE OIL AND GAS ACTIVITIES, MEMO/11/740, (Oct. 27, 2011).

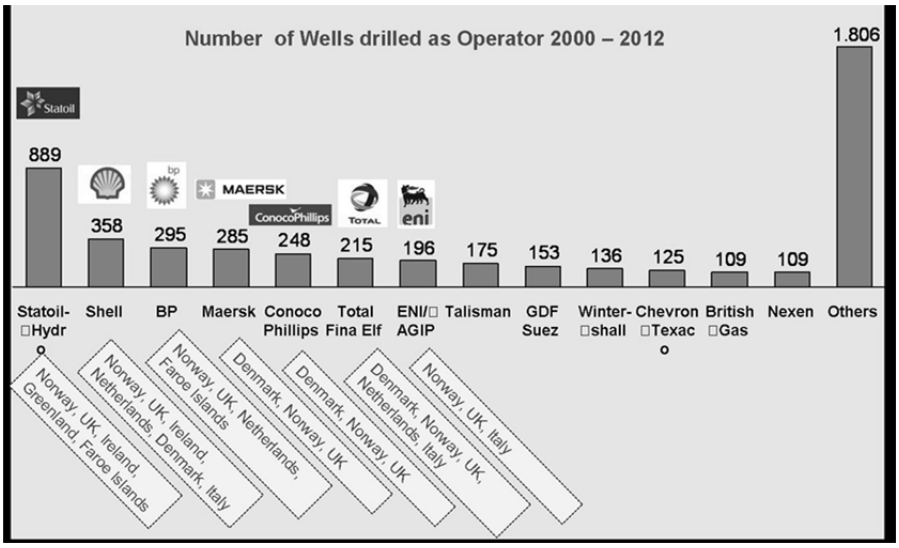
[29] *See* BOEM, *supra* note 26.

[30] The largest oil field found in the past few years is the Johan Sverdrup field, with total reserves estimated at 1.7 to 3.3 billion barrels of gross recoverable oil. *See Johan Sverdrup Field, North Sea*, OFFSHORE TECHNOLOGY, http://www.offshore-technology.com/projects/johan-sverdrup-field-north-sea (last visited Aug. 10, 2015). New discoveries of gas fields were also announced in the Black Sea. *See Exxon OMV Natural Gas Drilling Black Sea, Romaina / Drilling Agreements with Chevron*, ROCONSULBOSTON.COM, http://www.roconsulboston.com/Pages/InfoPages/Government/ExxonOMVGas.html (last visited Aug. 10, 2015).

[31] For a list of such companies and majors, see QUEST OFFSHORE, *supra* note 24, at A51–A65.

[32] *See* Figure 1. SMEs control 1806 wells as shown in the "Others" column.

Figure 1: Oil companies with exploration/production licences in Europe (operators)[33]



B. Historical and Future Magnitude of Offshore Accidents

1. Overview of Past Offshore Accidents

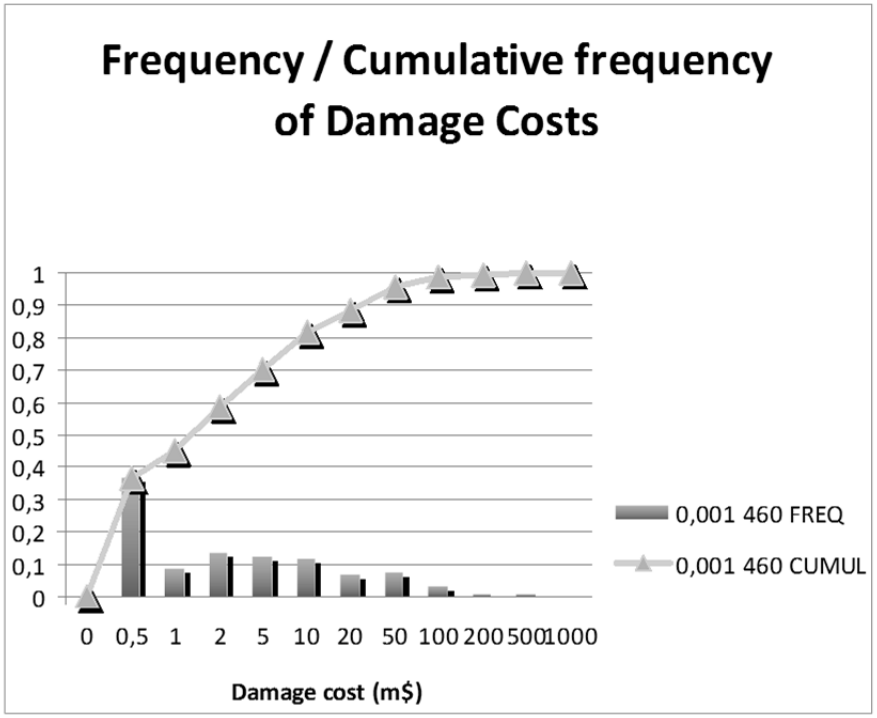
Many accidents have happened since the development of offshore activities. While a complete history of these accidents is not available, one of the most comprehensive databases for offshore accidents is the Worldwide Offshore Accident Databank ("WOAD"). This databank is operated by Det Norske Veritas ("DNV"), and it contains more than 6,000 incidents since 1975.[34] Out of the 6,173 accidents recorded in WOAD, information on damage costs is only available in 63 cases (or

[33] This figure was provided by Philipp Wassenberg of Munich Re.

[34] Michails Christou & Myrto Konstantinidou, *Safety of Offshore Oil and Gas Operations: Lessons from Past Accident Analysis – Ensuring EU Hydrocarbon Supply Through Better Control of Major Hazards*, JRC SCI. & POL'Y REP. 77767, at 14 (2012).

5.83 percent).[35] In more than one-third of the incidents (38 percent), the cost less than $0.5 million.[36] Forty-five percent of the incidents had a cost of between $0.5 million and $1 million.[37] Only in 1.4 percent of cases did damage exceed $100 million.[38]

Figure 2: Frequency/cumulative frequency of damage costs[39]



[35] We are grateful to Michalis D. Christou of the Energy Security Unit, Institute for Energy and Transport of the European Commission Joint Research Centre for providing this information.

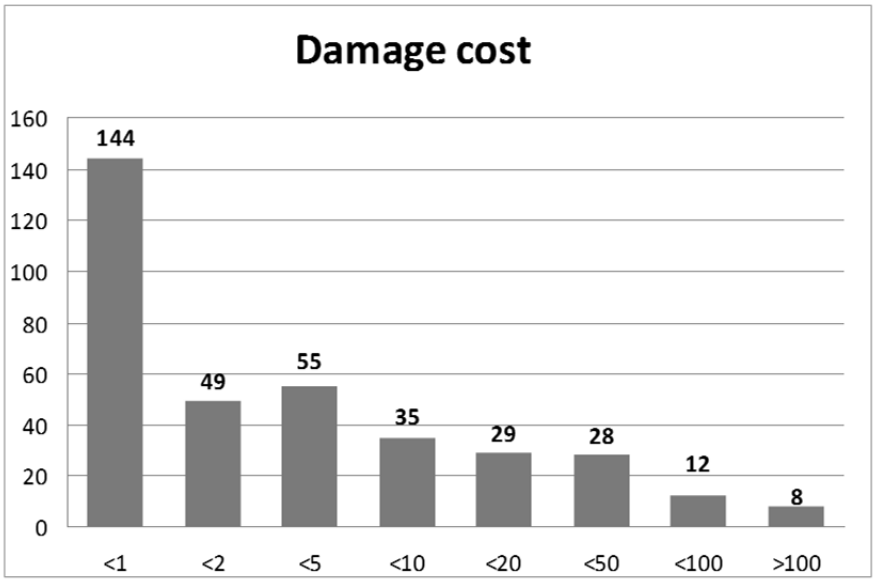
[36] *Id.*

[37] *Id.*

[38] *Id.*

[39] *Id.*

Figure 3: Damage costs according to the WOAD Database (1970-2010)[40]



It is worth noting, however, such records do not represent complete statistics nor are they an authoritative accidents register.[41] WOAD collects data from public domain sources such as Lloyds Casualty Reports, newspapers, and official publications.[42] However, many offshore accidents data are not publicly available. For example, the data maintained by the International Association of Oil and Gas Producers ("OGP") are only available for its participating members;[43] countries with a fully state-owned offshore industry do not disclose the information on offshore accidents to the public.[44]

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[40] *Id.* This chart does not include costs of the Deepwater Horizon accident.

[41] Christou & Konstantinidou, *supra* note 34, at 28.

[42] *Id.* at 14.

[43] *Id.* at 13.

[44] INT'L ASS'N OF OIL & GAS PROD., RISK ASSESSMENT DATA DIRECTORY: MAJOR ACCIDENTS, REPORT NO. 434–17, at 30 (March 2010).

Another major source of information is maintained by the insurers of offshore activities. Willis Energy Loss Database ("WELD") is maintained by the global insurance broker Willis, and it includes thousands of incidents since 1972 that have led to losses higher than $1 million.[45] The WELD also contains an overview of the ten most expensive Operators Extra Expense ("OEE") losses in history. [46]

Table 1: Overview of the ten most expensive Operators Extra Expense losses in history[47]

Year	Facility Type	Location	Country	OEE indexed (USD)
2010	Rig	Gulf of Mexico	USA	2,000,000,000
2005	Platform	Gulf of Mexico	USA	636,047,629
1989	Well	North Sea	Norway	396,419,527
2008	Platform	Gulf of Mexico	USA	384,080,640
2005	Platform	Gulf of Mexico	USA	341,560,173
1984	Well	Nova Scotia	Canada	320,593,818
1988	Platform	North Sea	UK	308,109,489
1987	Platform	Gulf of Mexico	USA	264,476,529
1975	Well	Dubai	UAE	246,250,219
2004	Rig	Mediterranean	Egypt	230,104,683

[45] WILLIS, ENERGY LOSS DATABASE 2 (2004).

[46] OEE refers to expenses associated with regaining control of a well, such as the costs to control operations, re-drill the well to its previous depth, and remove or clean seepage and pollution.

[47] WILLIS, ENERGY MARKET REVIEW (2011).

Another overview of high profile oil spills from offshore blowouts is also provided in a recent report from Lloyds.[48]

Table 2: High profile oil spills from offshore blowouts[49]

Date of Incident	Location	Incident and Spillage Details (estimated figures)	Insured Loss (USD)
Jan. 28 – Feb. 12, 1969	Santa Barbara, California	80,000 - 100,000 barrels	Not available
June 6, 1979 – Mar. 23, 1980	Ixtoc Well, Mexico	3.3 million barrels	22,000,000
Apr. 22 – 30, 1977	Ekofisk Norwegian Sector, North Sea	202,381 barrels	6,887,000
1980	Funiwa Niger Delta, Nigeria	200,000 barrels	53,554,000
Oct. 2 – 10, 1980	Arabian Gulf	100,000 barrels	1,300,000
Aug. 21 – Nov. 3, 2009	Timor Sea, Australia/ Indonesia	28,800 barrels of condensate oil	425,000,000
Apr. 20 – June 15, 2010	Gulf of Mexico	4.9 million barrels, plus 11 fatalities and 17 injuries	2,560,000,000

[48] ANDREW REES & DAVID SHARP, LLYOD'S, DRILLING IN EXTREME ENVIRONMENTS: CHALLENGES AND IMPLICATIONS FOR THE ENERGY INSURANCE INDUSTRY 17 (2011).

[49] *Id.* at 17.

Though the above data does not provide a complete picture of the offshore accidents, it shows some general characters: most accidents do not tend to be catastrophic, but a major accident may cause damage amounting to hundreds of millions, or even many billions, of dollars.

2. The Risk of Future Major Offshore Accidents

The Deepwater Horizon accident has led to tens of billions of dollars spent in cleanup and compensation. The question is the likelihood that an accident of this magnitude will happen again in the future. But predicting the nature or magnitude of catastrophic events is notoriously difficult.

The Deepwater Horizon accident happened while the rig was drilling the Macondo well under more than 1,500 meters of water in the Gulf of Mexico and about 4,000 meters of the sea floor. Deepwater drilling technology, which allows for drilling thousands of feet beneath the ocean floor, started to develop in mid-1980s. In the US, deepwater oil drilling activities mainly happen in the Gulf of Mexico,[50] where 700 wells have been drilled in waters deeper than 5,000 feet.[51] This technology creates new safety challenges, since pressure control becomes more difficult as the drill goes deeper,[52] and in cases of failure, there is no reliable technology to stop a catastrophic oil flow swiftly.[53]

Does this mean that an accident like Deepwater Horizon is less likely to hit the shallower wells? For example, in the North Sea, the main field of offshore activities in the EU, most drillings take place at a depth less than 100 meters.[54] Many experts, however, hold that the risks in shallow water offshore activities (like in the North Sea) are not necessarily smaller than those in the deepwater (like in the Gulf of Mexico), given the shorter time left for intervention to protect the coastline,[55] the

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50 REES & SHARP, *supra* note 48, at 9–10.

51 Jad Mouawad & Barry Meier, *Risk-Taking Rises as Oil Rigs in Gulf Drill Deeper*, N.Y. TIMES, Aug. 30, 2010, at A1.

52 Nat'l Comm'n on the BP Deepwater Horizon Oil Spill and Offshore Drilling, *A Brief History of Offshore Oil Drilling* 17 (Staff Working Paper No. 1, 2010).

53 *Id.*

54 Interview with Rachel Bonfante, OGP, Arjan Waayer, Belgian Shell N.V., Daniel Riesen, Risk and Insurance, Shell, Alexander Kerst, BP, in Brussels, Belgium (Feb. 25, 2013) [hereinafter *OGP Interview*] (on file with the author).

55 Nat'l Comm'n on the BP Deepwater Horizon Oil Spill and Offshore Drilling, *supra* note 52, at 16.

unfavourable climate conditions,[56] and potentially more personal injury associated with the gas facilities in the North Sea.[57]

An accident like Deepwater Horizon is catastrophic. The losses from catastrophes tend to have fat-tailed distributions where there is a nontrivial chance of extremely large losses.[58] The fat-tailed distributions have two important characteristics: first, the past may not be the prologue of future disasters. In other words, a future disaster can be many times worse. Second, "a single extreme outcome may readily account for most of the losses from a particular type of catastrophe."[59] Therefore, the one Deepwater Horizon spill that happened after the 50,000 wells that have been drilled since 1947 does not make it a 1/50,000 event. [60] It also does not mean an accident of the magnitude of Deepwater Horizon or even larger is not likely to happen in the future.

C. The Need for a Liability and Compensation Scheme

The Deepwater Horizon accident shows that an offshore facility accident can lead to billions dollars of damage. And there is no telling whether a similar, or even more catastrophic accident, may happen in the future. These accidents can easily leave most operators insolvent, producing environmental problems and many victims for the government and society to respond to.

If most oil companies will not be able to make full compensation after a catastrophe, can we expect them to take efficient precaution measures *ex ante*? Economic analysis of law shows that liability rules play an important role in prevention as well.[61] If there is a strict liability system in place and the responsible parties are not forced to pay for the full costs of their accident, either due to a cap on liability or the limited assets they possess, offshore operators will have insufficient incentives to take efficient precaution.[62] The following section shows that, in case of offshore activities, strict liability applies broadly.[63] Therefore, the risk

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[56] *OGP Interview*, *supra* note 54.

[57] *Id.*

[58] Kip Viscusi & Richard Zeckhauser, *Deterring and Compensating Oil-Spill Catastrophes: The Need for Strict and Two-Tier Liability*, 64 VAND. L. REV. 1717, 1733 (2011).

[59] *Id.* at 1734.

[60] REES & SHARP, *supra* note 48, at 28.

[61] Michael Faure & David Grimeaud, *Financial Assurance Issues of Environmental Liability,* DETERRENCE, INSURABILITY, AND COMPENSATION IN ENVIRONMENTAL LIABILITY: FUTURE DEVELOPMENTS IN THE EUROPEAN UNION 19 (Michael Faure ed., 2003).

[62] Louis Vissher, *Tort Damages*, *in* TORT LAW AND ECONOMICS 156-158 (Michael Faure ed., 2009).

[63] *See infra* section III.B.2.

of operators' insolvency in cases of catastrophes will not only fail to provide relief to the victims, but it will also disincentivize efficient prevention.

Even if there is no insolvency risk, it does not mean that the operators will automatically take efficient precaution. Behavioral research shows that people's decision making is subject to severe biases in valuing outcomes and in weighing probabilities.[64] Individuals are sometimes risk-preferring, rather than risk adverse, in valuing outcomes.[65] Therefore, they may not make enough of an effort to prevent environmental catastrophes, compared with other risks with greater probabilities of occurring and fewer consequences. Moreover, behavioral research shows that individuals are quite unresponsive to differences in probabilities.[66] In case of catastrophes with very small probabilities, individuals may hardly notice the reduction in risks,[67] or often adopt an "it will not happen to me" attitude.[68] Without intervention, those behavioral biases lead individuals to take insufficient precaution against the catastrophes.

This information shows that the risk for offshore activities to cause a catastrophe creates challenges for both prevention and compensation. Therefore, properly designing liability rules and compensation schemes is very important to reduce the inefficiencies caused by insolvency risk and behavioral biases. Liability rules need to allocate the risks efficiently; compensation instruments (such as insurance, risk sharing pools, or compensation funds) will help to relieve the insolvency risk and help the responsible parties to evaluate more objectively the risks they create.

III. EXISTING LIABILITY AND COMPENSATION REGIMES FOR OFFSHORE ACTIVITIES

Several jurisdictions have installed liability and compensation schemes for accidents caused by offshore activities. This section sketches briefly the existing legal arrangements, including international

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64 Daniel Kahneman & Amos Tversky, *Prospect Theory: An Analysis of Decision under Risk*, 47 ECONOMETRICA 263 (1979).

65 *Id*.

66 For example, one may view a ten percent probability 1.2 times as much as a five percent probability. *See* Kip Viscusi, *Sources of Inconsistency in Societal Responses to Health Risks*, 80 AM. ECON. REV. 257, 257 (1990).

67 Viscusi & Zeckhauser, *supra* note 58, at 1732.

68 Kate Burningham et al., *'It'll Never Happen to Me': Understanding Public Awareness of Local Flood Risk*, 32 DISASTERS 216 (2008); Michael Faure & Veronique Bruggeman, *Catastrophic Risks and First-Party Insurance*, 15 CONN. INS. L.J. 1, 21 (2008).

and regional regimes, as well as those in some state with substantial offshore installations (which increases their exposure to potential liability). The discussion is not aimed at a detailed comparison of the similarities and differences among various regimes. Instead, it describes some key elements of the liability rules and compensation schemes that are relevant to covering another catastrophic offshore accident in the future.

A. The International and Regional Regimes

1. The International Conventions

Many international conventions regulate offshore oil and gas exploration/production activities. The United Nations Convention on the Law of the Sea 1982 ("UNCLOS 1982"),[69] the International Convention for the Prevention of Pollution from Ships 1973, as modified by the Protocol of 1978, ("MARPOL 73/78"),[70] and the International Convention on Oil Pollution Preparedness, Response and Co-operation 1990 (known as the OPRC Convention)[71] are examples of international conventions. Until now, however, there has never been an international convention dealing specifically with compensation and civil liability for offshore oil pollution damage.[72]

There are some international conventions concerning liability for oil pollution, but these are restricted to vessel-based issues. For example, the International Convention on Civil Liability for Oil Pollution Damage 1969 ("CLC 1969")[73] and the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage 1971 ("Fund Convention 1971")[74] apply to sea-going vessels carrying oil as cargo.[75]

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[69] United Nations Convention on the Law of the Sea (UNCLOS), Dec. 10, 1982, 1833 U.N.T.S. 3.

[70] International Convention for the Prevention of Pollution from Ships, Nov. 2, 1973, 34 U.S.T. 3407.

[71] International Convention on Oil Pollution Preparedness, Response and Co-Operation, Nov. 30, 1990, 1891 U.N.T.S. 51.

[72] For a more detailed overview of the international conventions regulating offshore activities, see Brij Dimri, *Offshore Platforms: A Legal Overview in Indian Ocean Perspective*, 9 MAR. AFFAIRS: J. OF THE NAT'L MAR. FOUND. OF INDIA 80 (2013); Stefankova, *supra* note 4.

[73] International Convention on Civil Liability for Oil Pollution Damage (CLC 1969), Nov. 29, 1969, 973 U.N.T.S. 3, as amended by the 1992 Civil Liability Convention (1992 CLC), Nov. 27, 1992, 1956 U.N.T.S 255.

[74] International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage(1992 IOPCF), Nov. 29, 1969, 1110 U.N.T.S. 57, as amended by the 1992 Fund Convention, Nov. 27, 1992, 1953 U.N.T.S. 330.

[75] 1992 CLC, Art. I(1); 1992 IOPCF, Art. I(2).

However, when a well is discovered and drilling activities are scheduled to take place, a mobile offshore drilling unit ("MODU") will often be used. These MODUs qualify as ships because of their mobility. As a result, the CLC 1969 and Fund Convention 1971, or other conventions regulating damage resulting from maritime transport, may apply.[76] Additionally, national legislation, such as the US OPA,[77] covering damage caused by maritime transport may apply. In this paper, though, we concentrate on accidents resulting from pure offshore activities and not on MODUs.[78]

It is striking that an elaborate international regime does exist for civil liability and compensation related to vessel-based marine pollution, while these international legal frameworks are non-existent for damage caused by offshore activities. This raises the question why competent international organizations, like the International Maritime Organization ("IMO"), have not drafted a convention to deal with liability and compensation for offshore-related risks. This issue has been discussed within the IMO. At the 99th session of the IMO Legal Committee in April 2012, the Organization re-examined the possibility of a global liability and compensation regime for offshore oil and gas activities.[79] But the Legal Committee concluded that bilateral and regional arrangements are the most appropriate means to address the matter and decided there was not a compelling need to pursue an international regime.[80]

More recently, on February 22, 2013, the IMO's Legal Committee issued another statement concerning liability and compensation issues related to offshore oil exploration and exploitation activities,[81] which continues the efforts to develop liability principles. However, an expert at the IMO declared that there is generally very little appetite to

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[76] *Id.*

[77] Under the OPA, "'vessel' means every description of watercraft or other artificial contrivance used, or capable of being used, as a means of transportation on water, other than a public vessel." 33 U.S.C. § 2701 (2006).

[78] The liability rules and compensation instruments for mobile offshore installations are not discussed in this paper.

[79] This option was first proposed by the Indonesian delegation in September 2010 and followed the Montara offshore oil pollution incident that occurred in August 2009, where damage was caused in the Timor Sea. For an introduction on the Indonesian proposal, see Dimri, *supra* note 72, at 99–100. Stefankova, *supra* note 4, at 131–33.

[80] INT'L MAR. ORG. [IMO], *Legal Committee (LEG) – 99th session, 16 - 20 April 2012*, (Apr. 20, 2012), http://www.imo.org/MediaCentre/MeetingSummaries/Legal/Pages/LEG-99th-session.aspx.

[81] IMO. *Sub-Committee on Ship Design and Equipment (DE), 57th session, 18 to 22 March 2013*. (Mar. 22, 2013), http://www.imo.org/en/MediaCentre/MeetingSummaries/SDC/Pages/DE-57th-session.aspx.

properly address the issue at the IMO, since the Organization mainly focuses on shipping and litter key approach has been agreed on offshore liability framework.[82] Hence regional or bilateral arrangements are preferred to a truly IMO initiative.[83]

2. The Regional Arrangements

At regional level, more than 143 countries participate in 13 Regional Sea programs established under the auspices of United Nations Environment Programme ("UNEP").[84] In addition, there are five partner programs for the Antarctic, Artic, Baltic Sea, Caspian Sea and North-East Atlantic regions.[85] Many regional arrangements have been made in those areas, including conventions, protocols and action plans.[86] The regional seas programs mainly address the particularity of each individual sea area, mainly focusing on general principles like using best available technology/techniques and polluter pays structures.[87] The major goal of these regional programs is to establish cooperation among parties in the interest of the particular sea areas. They contain only very general provisions for establishing liability and compensation schemes for offshore-related pollution.[88]

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82 Email from Richard Mason, Accredited Representative of the European Commission to the IMO, to author, (Mar. 20, 2013) (on file with the author).

83 *Id.*

84 These regional seas programs cover Black Sea, Wider Caribbean, East Asian Seas, Eastern Africa, South Asian Seas, POPME Sea Area, Mediterranean, North-East Pacific, Northwest Pacific, Red Sea and Gulf of Aden, South-East Pacific, Pacific and Western Africa. *See* U.N.ENVIRONMENT PROGRAMME, http://www.unep.org/regionalseas/about/default.asp (last visited Aug. 11, 2015).

85 *Id.*

86 For example, the Convention for the Protection of the Marine Environment of the North-East Atlantic of 1992 (OSPAR Convention) and the Nordic Environmental Protection Convention (Nordic Convention) regulates the activities in the North Sea. The Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention) applies to the Mediterranean Sea. Other regional arrangements include the Convention on the Protection of the Marine Environment of the Baltic Sea Area (Helsinki Convention), the Convention for the Cooperation in the Protection of the Black Sea against Pollution, and the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region.

87 *E.g.* Article 2(2)(b) and Article 2, Annex III of the OSPAR Convention, Article 3 of the Protocol to Barcelona Convention (Protocol for the Protection of the Mediterranean Sea against Pollution Resulting from Exploration and Exploitation of the Continental Shelf and the Seabed and Its Subsoil), Annex VI and Article 3 of the Helsinki Convention.

88 Examples include the polluter pays principle mentioned above, victims' access to justice (Article 3 of the Nordic Convention), and requiring member states to ensure the operators to maintain financial security to cover the damage they cause (Article 27 of the Protocol to Barcelona Convention).

Although the UNEP's regional arrangements do not provide detailed guidance on offshore liability and compensation schemes, one specific private regime set up by the Offshore Pollution Liability Association Limited (OPOL) includes more specifics. OPOL is supported by the oil industry, has been set up as a company limited by guarantee,and administers a voluntary strict liability compensation scheme. OPOL originated in the UK and came into effect on the May 1, 1975 as an agreement between all UK offshore operators.[89] In the UK, the government requires oil companies to participate in OPOL before a license to operate is granted.[90] The reason for creating OPOL was that at the time operators anticipated that there may be a convention or a regulatory duty that would be created. In the end the convention never came, but OPOL lasted.[91] OPOL has extended to cover offshore facilities in the North Sea and currently has 122 members.[92]

OPOL provides a mechanism for settling claims expeditiously and without disputes.[93] It establishes a duty to compensate pollution damage based on a strict liability rule.[94] A second feature of OPOL is that it guarantees that funds are available to meet claims since members of OPOL are required to provide proof of financial responsibility.[95] The overall limit on compensation is $250 million per incident.[96] In cases of member insolvency, or if a member fails to meet its financial obligations for some other reason, the other members of OPOL are responsible for making up the difference in payments by contributing in proportion to the number of relevant offshore facilities operated by it on the date of the incident in question.[97]

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89 OFFSHORE POLLUTION LIABILITY ASS'N (OPOL), http://www.opol.org.uk/index.htm (last visited Aug. 11, 2015).

90 *Id.*

91 Interview with Niall Scott, Managing Director, OPOL, & Collin Wannell, Chairman of The Board, OPOL, in Brussels, Belgium (Mar. 27, 2013) [hereinafter *OPOL Interview*] (on file with the author).

92 OPOL, *Report and Financial Statements for the year Ended 31 December 2013*, at 2, June 26, 2014, http://www.opol.org.uk/downloads/Report%20and%20Financial%20Statements%20-%20December%202013.pdf.

93 Offshore Pollution Liability Agreement, Pmbl., April 1, 2015 [hereinafter *OPOL Agreement*].

94 *Id.* at cl. IV(A).

95 *Id.* at cl. III.

96 *Id.* at cl. IV(A).

97 For more details on the pooling function of the OPOL, see *infra* section IV.C.

3. The EU Legal Framework

Another interesting regional arrangement is the EU legal framework for offshore activities. Offshore activities are an important concern for the EU not only because of the importance of offshore oil and gas resources, but also because of the offshore accidents that have occurred there in recent decades.[98]

Prior to the Deepwater Horizon spill, there was no separate European regime dealing particularly with offshore pollution issues. Since 2010, various legislative initiatives concerning different aspects of offshore activities were proposed and debated by many relevant stakeholders.[99] But it was not until June 2013 that the EU finally established a separate European regime for offshore safety—the Directive on Safety of Offshore Oil and Gas Operations ("the Offshore Directive").[100] The objective of the Offshore Directive is to reduce the major offshore accidents and to improve the response mechanism.[101] Therefore, it mainly concerns regulation rather than liability and compensation.

According to the Offshore Directive, the operator, together with the licensee, should always bear the primary responsibility for safely operating offshore, and these parties are prohibited from contracting around their responsibility; even when the accident was caused due to actions or omissions by contractors, operators still bear primary responsibility.[102] The Offshore Directive clarifies that offshore facilities are also covered by the Environmental Liability Directive ("ELD").[103]

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98 Examples include Alexander Kielland (1980), Piper Alpha (1988), Forties Alpha (2003), Gullfaks C (2010), and most recently, Gannet Alpha (2011), all incidents that occurred in the North Sea. For a detailed discussion on these accidents, see Christou & Konstantinidou, *supra* note 34, at 16–20.

99 *E.g.*, On Oct. 27, 2011, the Commission initiated two proposals, one for a Regulation on safety of offshore activities, *Commission Proposal for a Regulation of the European Parliament and of the Council on Safety of Offshore Oil and Gas Prospection, Exploration and Production Activities*, COM (2011), 688 final (Oct. 27, 2011) and the other for the accession of the EU to the Offshore Protocol of the Barcelona Convention, *Commission Proposal for a Council Decision on the Accession of the European Union to the Protocol for the Protection of the Mediterranean Sea Against Pollution Resulting from Exploration and Exploitation of the Continental Shelf and the Seabed and Its Subsoil*, COM (2011) 690 final (Oct. 27, 2011). *See also Commission Proposal for a Regulation of the European Parliament and of the Council on Safety of Offshore Oil and Gas Exploration and Production Activities* COM (2011), 1293 final (Oct. 27, 2011).

100 Directive 2013/30/EU of the European Parliament and of the Council of 12 June 2013 on the Safety of Offshore Oil and Gas Operations and Amending Directive 2004/35/EC, O.J. (L 178/66) [hereinafter *Offshore Directive*].

101 *Offshore Directive*, 2013 O.J. (L 178/66), pmbl. cl. 2.

102 *Offshore Directive*, 2013 O.J. (L 178/66), pmbl. cl. 11, 13, 36, art. 3.2 (noting that it concerns the responsibility to maintain safety and control risks, but not liability).

103 *Offshore Directive*, 2013 O.J. (L 178/66) art. 7 (noting that it concerns the responsibility to maintain safety and control risks, but not liability).

The Offshore Directive provides that "holders of authorisations for offshore oil and gas operations" are also the "operators" within the meaning of ELD and that they will be held liable for preventing and remediating environmental damage.[104] As for the operators' financial security, the Offshore Directive only has a general requirement: "the Commission should undertake further analysis and studies of the appropriate measures for damages relating to offshore oil and gas operations, requirements on financial capacity including availability of appropriated financial security instruments or other arrangements. This may include an examination of the feasibility of a mutual compensation scheme."[105]

After safety standards have been established for offshore activities in the EU, questions remain as to which direction the civil liability and financial security should take. An impressive impact assessment for EU legislative proposal also sketched the justification for EU action to clarify the scope of liability.[106] The European Commission has also designated research on possible approaches to a liability and compensation regime in the EU.[107]

B. Legal Regimes in Selected States

The above analysis shows that conventions and regional arrangements are not sufficient for evaluating the functions of various legal regimes on offshore activities. Therefore, an examination of individual states' national laws on offshore activities is necessary. This part of the article selects particular countries and analyzes their offshore regimes. Offshore oil and gas activities frequently take place in these countries, and catastrophic incidents involving offshore facilities have occurred in some of them. The UK, Denmark, Norway and Canada are states with strong offshore interests. Australia and the US have been selected since major offshore incidents have occurred there, triggering changes to their legal regimes. The discussion is mainly limited to developed countries with comparable economic and social backgrounds,

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104 The Offshore Directive clarifies that "holders of authorisations for offshore oil and gas operations" are also the "operators" within the meaning of ELD that will be held liable for the prevention and remediation of environmental damage. *Offshore Directive*, 2013 O.J. (L 178/66) pmbl. 11.

105 *Offshore Directive*, 2013 O.J. (L 178) pmbl., 63.

106 *Impact Assessment Accompanying the Document Proposal for the Regulation of the European Parliament and of the Council on Safety of Offshore Oil and Gas Prospection, Exploration and Production Activities*, SEC (2011) 1292 final, (Oct. 27, 2011).

107 D. SMEDT KRISTEL ET AL., CIVIL LIABILITY AND FINANCIAL SECURITY FOR OFFSHORE OIL AND GAS ACTIVITIES: FINAL REPORT (2013).

and similar compensation instruments. Moreover, the practice in these countries can provide experience for other jurisdictions to develop their own systems. Importantly, this discussion does not aim to give a detailed description and comparison of the regimes in those countries, but is geared toward showing some key elements of the liability rules and compensation schemes. This analysis will highlight the influence of compensation regimes in the face of potential catastrophe and various incentives for prevention. More specifically, the key elements we will address are the liable parties (whether liability attaches to specific parties and liability structures when there are multiple tortfeasors), the existence of liability cap, standards of liability (whether strict liability or negligence rules), and the requirement of financial security to cover the potential liability.

The countries we have selected have different legal regimes. In some countries, such as the UK and the US, civil liability for offshore activities consists of different layers. In other countries, the liability derives from rather easily identifiable primary and secondary legislation. In the UK, there is no specific legislation for offshore oil pollution liability. Since the membership of OPOL is mandatory for UK offshore facilities, it *de facto* provides the basis of liability rules. When the damages are not covered by the OPOL system, or when OPOL coverage is insufficient, claimants may still seek legal remedies, such as the Environmental Damage Regulations 2009[108] or common law tort actions. In the US at the federal level, offshore facilities are regulated under a series of statutes, such as the Outer Continental Shelf Lands Act,[109] the Clean Water Act,[110] the Oil Pollution Act ("OPA"),[111] the Energy Policy Act,[112] and others. The most important statute concerning civil liability in the United States is the OPA. But the OPA does not preempt state law;[113] therefore individual state laws still apply for offshore liability. In Australia, liability for offshore activities is regulated under the Offshore Petroleum Act 2006,[114] Oil and Gas Operations Act,[115] and the Oil and Gas Spills and Debris Liability

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[108] 2009 No. 153 (Eng.), 2009 No. 995 (W. 81) (Wales), 2009 No. 252 (N. Ir.), 2009 No. 266 (Scot.).

[109] 43 U.S.C. §§ 1331–1356(a) (2012).

[110] 33 U.S.C. §§ 1251–1388 (2012).

[111] 33 U.S.C. §§ 2701–2762.

[112] 42 U.S.C. §§ 13201–13574.

[113] 33 U.S.C. § 2718(a)(1).

[114] *Offshore Petroleum Act 2006*, (Cth) no. 14 (Austl.) (C2006a00014), *as amended by Offshore Petroleum Act 2014*, (Cth) no. 80 (Austl.) (C2014 C00504).

[115] Canada Oil and Gas Operations Act, R.S.C. 1985, c. O-7.

Regulations[116] provide the legal basis for the liability of Canadian offshore activities. Similarly, Norway has passed the Petroleum Activities Act[117] and Denmark is governed by the Subsoil Act.[118] All of these laws and liability regimes have common elements, which are summarized below.

1. Liable Parties

In most of these jurisdictions, liability for offshore pollution damage is imposed on the "licensee" or "operator." The legal basis can be found in section 7-3 of the Norwegian Petroleum Activities Act,[119] section 35 of the Denmark Subsoil Act,[120] section 569 (1) of the Australian Offshore Petroleum Act, and section 26 (1) of the Canadian Oil and Gas Operation Act. In the UK, operators are the liable parties under both the OPOL regime[121] and the Environmental Damage Regulations.[122]

The definition of liable party is broader in the US. The OPA imposes liability on the "responsible party" which is defined as "the licensee or permittee of the area in which the facility is located or the holder of a right of use and easement granted under applicable State law or the Outer Continental Shelf Lands Act (43 U.S.C. § 1301–56) for the area in which the facility is located (if the holder is a different person than the lessee or permittee), except a Federal agency, State, municipality, commission, or political subdivision of a State, or any interstate body, which as owner transfers possession and right to use the property to

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116 Oil and Gas Spills and Debris Liability Regulations, SOR/87-331 (Can.).

117 Petroleum Activities Act, Act 29 Nov. 1996 No. 72, *amended by* Act 19 June 2009 No. 104, and Act 24 June 2011 No. 38 (Nor.). Accessible at the website of Norwegian Petroleum Directorate, which has an unofficial English translation of the Act, *available at* www.npd.no/en/Regulations/Acts/Petroleum-activities-act/#1-1 (last visited Aug. 8, 2014).

118 Act on Danish Subsoil Exploitation (No. 293/1981) (Den.), *revised by* Consolidated Act on the Use of Danish Subsoil (No. 960/2011) (Den.), *available at* https://www.retsinformation.dk/Forms/R0710.aspx?id=138657 (last visited Aug. 8, 2014).

119 Petroleum Activities Act, Act 24 June 2011 No. 38, §7–3 (Nor.) ("The licensee is liable for pollution damage without regard to fault. The provisions relating to the liability of licensees apply correspondingly to an operator who is not a licensee when the Ministry has so decided in connection with the approval of operator status.").

120 Act on Danish Subsoil Exploitation, (No. 960/2011), §35(1) (Den.) ("A licensee shall be liable to pay damages for any loss, damage or injury caused by the activities carried on under the licence, even though such loss, damage or injury was caused accidentally.").

121 *OPOL Agreement*, *supra* note 93, at cl. IV(A).

122 The Environmental Damage (Prevention and Remediation) Regulations 2009, 2009, No. 153, § 13, 18 (Eng.); The Environmental Damage (Prevention and Remediation) (Wales) Regulations 2009, 2009 No. 995 (W. 81), § 2(1), 13, 18; The Environmental Liability (Prevention and Remediation) (N. Ir.) Regulations 2009, 2009 No. 252, § 2(2), 9, 15; The Environmental Liability (Scot.) Regulations 2009, 2009 No. 266, § 10, 12.

another person by lease, assignment, or permit."[123] Therefore, other parties who hold a right of use/easement by lease, assignment, or permit may also be held liable. This means that operators, co-venturers, and contractors may all bear the risk of liability. The Deepwater Horizon spill is an example of this shared liability. Although BP is most obviously a responsible party, and has paid most of the compensation, many other parties have also faced legal claims.[124]

If multiple parties are involved in causing the damage, joint and several liability is the general rule. This principle is iterated in section 10-9 of the Norwegian Petroleum Activities Act[125], Section 35 of the Denmark Subsoil Act,[126] Section 775D of the Australia Petroleum Act[127] and in Section 26 (1) of the Canadian Oil and Gas Operation Act.

In the UK, a company that plans to conduct exploration or production of offshore oil and gas activities must get a license from the UK government.[128] "The conditions of every issued licence are prescribed in a series of model clauses set out in Regulations in force when the licence is granted."[129] According to the model clauses, if there are multiple licensees, joint and several liability applies.[130] In the US, joint and several liability also applies, both in the OPA and in some states

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123 33 U.S.C. § 2701(32)(C) (2012).

124 *See* Hausman & Foggan, *supra* note 12, at 100. For example, in a civil lawsuit filed by the Department of Justice concerning the Deepwater Horizon accident, nine defendants were filed against, including not only BP, but also other parties, such as the co-venturers (Anadarko Petroleum Corporation and MOEX Offshore LLC) and contractors (Transocean, the owner of the rig, and Halliburton, the drilling contractor that cemented the well). Press Release, Office of the Attorney General, Attorney General Eric Holder Announces Civil Lawsuit Against Nine Defendants for Deepwater Horizon Oil Spill (Dec. 15, 2010), *available at* http://www.justice.gov/opa/pr/2010/December/10-ag-1442.html.

125 Petroleum Activities Act, 2011, §10-9 (Nor.) ("[T]he licensee shall be liable for damages to the same extent as, and jointly and severally with, the perpetrator and, if applicable, his employer.").

126 Act on Danish Subsoil Exploitation, 2011, § 35(1)–(2) (Den.) ("(1) A licensee shall be liable to pay damages for any loss, damage or injury caused by the activities carried on under the licence, even though such loss, damage or injury was caused accidentally. (2) In the event that the injured party contributed to the loss, damage or injury, either intentionally or through negligence, the damages payable may be reduced or lapse.").

127 *Offshore Petroleum Act and Greenhouse Gas Storage Act 2006* (Cth) no. 14 Part 9.6A s 775D (Austl.) ("(1) If: (a) this Act imposes an obligation on the registered holder of a petroleum title; and (b) there are 2 or more registered holders of the petroleum title; the obligation is imposed on each of the registered holders, but may be discharged by any of the registered holders.").

128 Petroleum Act, 1998, §3 (U.K.) (consolidating the Petroleum (Production) Act, 1934 (U.K.) and the Continental Shelf Act, 1964 (U.K.)).

129 Bosma, *supra* note 21, at 96.

130 *See* Petroleum (Production) Regulations, 1988, pt. II, 192, sch. 2 (U.K.), *as re-enacted in* Petroleum (Current

Model Clauses) Order 1999, pt. II, 192, sch. 2 (U.K.).

that have been affected by the Deepwater Horizon accident like Texas, Louisiana and Florida.[131]

2. Liability Standards

In most of the countries we are discussing, strict liability applies to damage caused while engaging in offshore activities. This is specified in many of the statutes mentioned above: Section 7-3 of the Norwegian Petroleum Activities Act, Section 35 of the Denmark Subsoil Act, Section 2702 of the OPA,[132] Section 569 (1) of the Australia Offshore Petroleum Act, Section 26 (1) of the Canadian Oil and Gas Operation Act.

In the UK, operators are strictly liable under OPOL.[133] If there is damage to the environment, the Environmental Damage (Prevention and Remediation) Regulations 2009 apply. This legislation provides for both strict liability and negligence rules. Environmental damage caused by a specified range of "occupational activities" (e.g. activities requiring environmental permits) is covered under strict liability.[134] Negligence rules apply to other type of activities that cause damage to protected species and habitats.[135] Offshore activities fall into the "occupational activities" category, and are covered under a strict liability regime.[136]

In the event of a fatality or personal injury, a claimant is likely to have rights to compensation under other UK statutes, regulations, and under the common law of torts. In some cases strict liability will apply and in others a claimant may have to establish fault.[137]

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131 33 U.S.C. § 2702(a) (2012); FLA. STAT. ANN. § 403.727 (West 2000); LA. REV. STAT. ANN. § 30:2275 (1999); TEX. HEALTH & SAFETY CODE ANN. § 361.276 (West 2009). *See* Vincent Foley, *Post-Deepwater Horizon: The Changing Landscape of Liability for Oil Pollution in the United States,* 74 ALB. L. REV. 515, 519–20, 525 (2010).

132 33 U.S.C. §2702(a).

133 *OPOL Agreement*, *supra* note 93, at cl. IV(A).

134 The Environmental Damage (Prevention and Remediation) Regulations 2009, 2009, No. 153 § 5(1) (Eng.); The Environmental Damage (Prevention and Remediation) (Wales) Regulations 2009, 2009, No. 995 (W. 81), § 5(1); The Environmental Liability (Prevention and Remediation) Regulations (N. Ir.) 2009, 2009, No. 252, § 3; The Environmental Liability (Scot.) Regulations 2009, 2009, No. 266, § 4.

135 The Environmental Damage (Prevention and Remediation) Regulations 2009, 2009, No. 153 § 5(2). The Environmental Damage (Prevention and Remediation) (Wales) Regulations 2009, 2009, No. 995 (W. 81), § 5(2); The Environmental Liability (Prevention and Remediation) Regulations (N. Ir.) 2009, 2009, No. 252, § 3(2)(b); The Environmental Liability (Scot.) Regulations 2009, 2009, No. 266, § 4.

136 Directive 2013/30/EU, of the European Parliament and of the Council of 12 June 2013 on safety of offshore oil and gas operations and amending Directive 2004/35/EC art. 7, 2013 O.J. (L 178) 78.

137 For a general introduction on the liability standards in the UK, see CEES VAN DAM, EUROPEAN TORT LAW, 228, 230, 297–306, 444–46 (2013).

3. A Cap on Liability?

In both Norway[138] and Australia, no cap exists for liability related to offshore activities. Offshore facility operators in Denmark need to obtain licenses from the regulators. General regulations are guidelines set out in the model licenses developed by the Danish Energy Agency.[139] Section 38 of the model license provides that the licensee "shall indemnify the State against all claims whatsoever which may be made by any third party against the State as a consequence of the Licensee's activities."[140] Therefore, licensee liability should cover the actual amount arising from "all claims" and is likely to be unlimited. However, the Merchant Shipping Act applies to all mobile offshore installations.[141] In that case, shipowner liability is capped.[142]

In the US, the OPA establishes limits on pollution liability according to different types of facilities. The liability of the responsible party for an offshore facility is capped at "all removal costs plus $75 million."[143] In comparison, the liability of a responsible party for onshore facilities and deepwater ports under OPA is limited to a total amount of $350 million.[144] With the exception of an offshore facility (non-deepwater port), a cap is established for the total sum of removal costs and damages.[145]

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138 Joris Janssen, Preventing a Next Deepwater Horizon? Evaluation of the Regime for the Prevention of and Response to Accidental Oil Spills from Drilling Platforms at the North Sea 236 (Mar. 2012) (unpublished MSc Thesis, Utrecht University), *available at* http://dspace.library.uu.nl/handle/1874/237084.

139 Danish Energy Agency, *A Guide to Hydrocarbon Licences in Denmark: Exploration and Drilling Activities*, at 11 (2011), *available at* http://www.ens.dk/sites/ens.dk/files/undergrund-forsyning/olie-gas/koncessioner/guide-oliegas-koncessioner/GuideToHC.pdf.

140 *Id.* at 21.

141 Consolidated Act on Safety, etc. for Offshore Installations for Exploration, Extraction and Transport of Hydrocarbon (Offshore Safety Act), 2013, § 69 (Den.).

142 *Id.* ("By applying the rules in Part 9 of the Merchant Shipping Act on mobile offshore installations during exploration and extraction activities, the shipowner shall be liable when the liability is limited, regardless of the size of the installation by up to 50 million special drawing rights (SDR). For injury to a person this amount is increased by 30 million SDRs.").

143 33 U.S.C. § 2704(a)(3) (2012).

144 *Id.* § 2704(a)(4).

145 Under the OPA, a distinction is made between removal costs and damages. Removal is defined as "containment and removal of oil or a hazardous substance from water and shorelines or the taking of other actions to minimize or mitigate damage." *Id.* § 2701(30). The term "damages" includes: natural resources, real or personal property, subsistence use, revenues, profits and earning capacity and public services. *Id.* §2702(b)(2). Removals are taken immediately after or in the case of a substantial threat of discharge to prevent/mitigate the damage. Only when there is still damage left after the removals, it is necessary to make natural resources damage assessment to quantify the remaining damage and to restore the environment.

A responsible party may still be liable for damages over and above the caps if the incident was caused by "gross negligence or wilful misconduct of, or the violation of an applicable Federal safety, construction, or operating regulation."[146] A responsible party may also face unlimited liability if it fails to report an incident, fails to provide requested cooperation in connection with removal activities, or fails to comply with an order of the President.[147] Even when a responsible party can revoke the limitation under the OPA, it may still face unlimited liability if the applicable state statutes require so.[148]

The Canadian Oil and Gas Operations Act provides that a party may be liable up to prescribed limits.[149] The Oil and Gas Spills and Debris Liability Regulations spell out the specific amounts of the limitation, tailored to different areas where the accident occurs.[150]

In the UK, the compensation from OPOL is limited to $250 million.[151] The limit includes a maximum of $125 million for "remedial measures" incurred by public authorities and another maximum of $125 million for "pollution damage."[152] If the claims in one category have not reached the cap, the surplus may be used to meet unsatisfied claims in the other category.[153] If the total claims in a category exceed the cap for that category, and the surplus from the other category has been fully exhausted, the compensation is pro-rated among the claimants.[154] It is important to remember that OPOL does not preclude a claimant from seeking redress in court for losses that exceed the OPOL Agreement caps, or those beyond the scope of OPOL.[155] The general principles in the UK law do not impose statutory limitation on the liability of an offshore operator.[156]

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146 *Id.* § 2704(c)(1).

147 *Id.* § 2704(c)(2).

148 *See* Kenneth Murchison, *Liability under the Oil Pollution Act: Current Law and Needed Revisions*, 71 LA. L. REV. 917, 932 (2011); NATHAN RICHARDSON, *DEEPWATER HORIZON* AND THE PATCHWORK OF OIL SPILL LIABILITY LAW 4 (2010).

149 Canada Oil and Gas Operations Act, R.S.C. 1985, c. O–7 § 26(1)(a).

150 Oil and Gas Spills and Debris Liability Regulations, SOR/1987–331 (Can.).

151 *OPOL Agreement*, *supra* note 93, at cl. IV(A).

152 *Id.*

153 *Id.*

154 *Id.*

155 OPOL, GUIDELINES FOR CLAIMANTS 1, http://www.opol.org.uk/downloads/opol-guidelines-oct10.pdf (last visited Aug. 10, 2015).

156 As mentioned earlier, offshore oil pollution liability in UK can be established according to Environmental Regulation of 2009 or common law. The Regulations exlicitely state that they "are without prejudice to the right of an operator to limit liability in accordance with the Convention on Limitation of Liability for Maritime Claims 1976." Environmental Damage (Prevention and Remediation) Regulations, 2009, 2009, No. 153 § 7(2). The Convention on Limitation of

4. Financial Security

All of these countries require that the operator provide financial security. In the UK, the operator must establish and maintain its financial capability to meet claims that arise under OPOL by producing evidence of insurance, self-insurance, or other satisfactory measures.[157] Operators are also responsible for covering the financial capabilities allocated between the operator and non-operators under a joint operating agreement.[158]

In Norway, the Petroleum Activities Act requires the licensee to prove financial security according to the license being granted.[159] However, it does not specify the type of financial security or other details, such as how to decide on the amount of financial security. The Petroleum Activities Regulations mandate insurance for licensees producing petroleum, but are silent on exploration activities.[160]

In Denmark, the model license requires the licensee to seek insurance coverage for its liability under the Subsoil Act.[161] But the model license leaves the amount of insurance up to the Danish Energy Agency's discretion.[162]

In the US, OPA provides that the financial responsibility for offshore facilities is $35 million for those located seaward of the state's territorial sea and $10 million for those located landward.[163] This amount can be set higher when necessary, but it should not exceed $150 million.[164] The regulations implementing the OPA financial responsibility requirement further provide that the amount of financial responsibility shall be decided based on a worst-case scenario oil spill discharge volume.[165] Therefore, different amounts are required for different worst-case discharge volumes and also when offshore facilities

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Liability for Maritime Claims 1976 only covers liability for vessels, and not for offshore facilities. International Maritime Organization, Convention on Limitation of Liability for Maritime Claims, art. 1, art. 15, Nov. 19, 1976, 1456 U.N.T.S. 221. Therefore, the operators of facilities under the UK jurisdiction are subject to unlimited liability beyond their US$250 million limit under the OPOL arrangement.

157 OPOL, RULES OF THE OFFSHORE POLLUTION LIABILITY ASSOCIATION LIMITED 14 (2015), *available at* http://www.opol.org.uk/downloads/OPOL-Rules-From-1-April-2015.pdf.

158 *Id.*

159 Petroleum Activities Act, Act 29 No.72/1996, §10-7 (Nor.).

160 Petroleum Activities Regulations, Royal Decree 27/1997, § 73 (Nor.).

161 Subsoil Act, Act No. 960/2011 § 30(1) (Den.).

162 *Id.* at § 30(2)(3).

163 33 U.S.C. § 2716(c)(1)(B) (2012).

164 *Id.* § 2716(c)(1)(C).

165 30 C.F.R. § 253.13 (2011).

are located in the outer continental shelf.[166] To demonstrate financial responsibility, OPA provides that parties may show evidence of insurance, surety bond, guarantee, letter of credit, or qualification as a self-insurer, among others.[167]

Australia mandates that licensees have insurance.[168] Canada allows more flexibility in proving financial capacity, including "a letter of credit, a guarantee or indemnity bond or in any other form satisfactory to the National Energy Board, in an amount satisfactory to the Board."[169]

IV. HOW IS LIABILITY FOR OFFSHORE ACCIDENTS COVERED?

This section provides an inventory of the instruments that are currently used to cover liability following a major offshore incident. These instruments include: self-insurance by the operators, (re)insurance, risk pooling schemes, fund, and various combinations of these. We pay particular attention to the extent that each instrument can provide coverage for a catastrophic accident and whether they are easily available for different types of operators. Though we focus on liability, it is worth noting that *de facto* many of these instruments are also used to cover the property damage suffered by the operator and the costs of well control.

A. Self-Insurance

Self-insurance is an instrument used by larger market players to cover their own risks. Self-insurance can take different forms. It can be merely a reserve for potential losses, whereby operators use their balance sheet to guarantee payment in case of a major accident,[170] or act as a captive.[171] The captive functions as an insurance company which "only insures all or part of the risks of its parent".[172] Instead of shifting the risk to a commercial insurer (and hence paying premiums) the oil company could create a captive where its profits and losses are kept.

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166 *Id.* (the required amount varies from $10 million to $150 million).

167 33 U.S.C. § 2716(e).

168 *Offshore Petroleum Act 2006* (Cth) (Austl.).

169 Canada Oil and Gas Operations Act, R.S.C. 1985, c. O–7, § 27(1).

170 MICHAEL FAURE & TON HARTLIEF, INSURANCE AND EXPANDING SYSTEMIC RISKS, POLICY ISSUES IN INSURANCE, 144 (2003).

171 *See, e.g.*, PAUL BAWCUT, CAPTIVE INSURANCE COMPANIES, ESTABLISHMENT, OPERATION AND MANAGEMENT (1991); TONY DOWDING, GLOBAL DEVELOPMENTS IN CAPTIVE INSURANCE (1997).

172 PAUL BAWCUTT, CAPTIVE INSURANCE COMPANIES: ESTABLISHMENT, OPERATION AND MANAGEMENT 1 (1991).

Most majors engaged in offshore activities use self-insurance.[173] It can either be a reserve or a captive.[174] Usually the majors do not use the commercial insurance market.[175] These operators argue that it would make little sense to shift their risks to insurance companies that would force them to pay high costs with little added value in terms of financial security.[176] This is true with some majors that have higher credit ratings than the insurers, particularly when the number of insurance companies rated as high as major oil and gas companies is relatively limited. A second reason that many majors self-insure is that stakeholders believe that insurance is a relatively costly alternative to hedge risks, compared to using the captives.[177]

Self-insurance can also be used by SMEs to cover a first layer of liability. The first layer is a so-called retention, and insurance coverage would only be required for higher amounts that the particular operator cannot itself support.[178] It is reported that the use of self-insurance may (at least partially via retentions) even be increasing.[179] One reason is that there is limited insurance capacity available in the market after Deepwater Horizon.[180] Besides, almost all insurance solutions will include a retention (or deductible).

B. (Re) Insurance

Traditional insurance is also used to spread the risks and guarantee compensation. By aggregating and spreading risks among a large number of market participants, the utility of risk averse individuals can be improved.[181] Though insurance has the potential to cause moral

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173 *OGP Interview*, *supra* note 54.

174 Interview with Alexander Kerst, Paul Lawson, Patrick Daniel & Colin Wannell, BP, Brussels, Belgium (Mar. 26, 2013) [hereinafter *BP Interview*] (on file with author). For example, BP created a captive Jupiter Insurance Ltd. The captive has no staff but is managed by Willis, a large insurance broker. The captive is 100% owned by BP. In its underwriting policy, BP is assisted by AIG who consults the captive on insurance practice, but carries no risk.

175 *Id.*

176 *Id.*

177 *Id.* For example, BP refers to a loss experience of 30%. This means that for every 100 dollars BP would pay in insurance premiums, it would also receive 30 dollars back in compensation for losses; the remainder would either go to transaction costs or profits to the insurance company.

178 *Id.*

179 Interview with Bernard Tettamanti & Pierre Henri Francfor, Swiss ReInsurance Company (Feb. 11, 2013) [hereinafter *Swiss Re Interview*] (on file with author).

180 *Infra* at Part IV.B.

181 *See* STEVEN SHAVELL, ECONOMIC ANALYSIS OF ACCIDENT LAW 190 (1987).

hazard[182] and adverse selection,[183] experienced insurers can control these problems through risk differentiation and retentions.[184]

Existing insurance coverage for offshore activities mainly covers physical damage and liability exposures. Operators may be liable for construction, physical damage, removal of wreckage, control of the well, and general liability.[185] Typical offshore insurance policies include:

- Offshore physical damage coverage: indemnifies the insured for all risks associated with physical loss or damage to fixed offshore drilling, production and accommodation facilities.[186]
- Operators' Extra Expense ("OEE"): offered to oil and gas companies that provides coverage for expenses associated with regaining control of a well, typically covering the cost to control operations, to re-drill the well to a previous depth, and to remove or clean seepage/pollution.[187]
- Environmental/Pollution liability: it provides coverage for bodily injury, property damage, and clean-up costs as a result of pollution incident.[188]
- Business interruption/ loss of production income: provides coverage for energy businesses against loss due to temporary interruption in oil and gas supply from an offshore facility.[189]

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182 Gerhard Wagner, *(Un)insurability and the Choice between Market Insurance and Public Compensation Systems*, *in* SHIFTS IN COMPENSATION BETWEEN PRIVATE AND PUBLIC SYSTEMS 95 (Willem van Boom & Michael Faure eds., 2007) (noting that moral hazard means that the insured's motive to prevent losses changes after he obtained coverage, since the risk of paying a large amount of damages is removed from him.).

183 George Priest, *The Current Insurance Crisis and Modern Tort Law*, 96 YALE L.J., 1521, 1541 (1987) (stating adverse selection refers to the fact that "the tendency of persons with relatively greater exposure to risk to seek insurance protection.").

184 Keith Crocker & Arthur Snow, *The Efficient Effects of Categorical Discrimination in the Insurance Industry*, 94 J. POL. ECON. 321 (1986); Kenneth Abraham, *Environmental Liability and the Limits of Insurance*, 88 COLUM. L.REV. 942, 949 (1988).

185 Interview with Phil Bell, Group Casualty Director, RSA Insurance, (Feb. 26, 2013) [hereinafter *Bell Interview*] (on file with author).

186 *See* Claude L. Stuart, III, Offshore Energy Insurance Coverage: Physical Damage and Business Interruption/Contingent Business Interruption 1–2 (2008).

187 *See* INT'L RISK MGMT. INST., *Operators Extra Expense*, http://www.irmi.com/online/insurance-glossary/terms/o/operators-extra-expense-oee.aspx (last visited Aug. 11, 2015). (The International Risk Management Institute ("IRMI") provides a definition of OEE insurance, which states that OEE insurance is a "specialized policy available to oil or gas well operators that covers the cost of regaining control of a wild well. Coverage for pollution, stuck drill stem, evacuation expense, and care, custody, or control ("CCC") exposures can be added by endorsement.").

188 Kyriaki Noussia, *Environmental Pollution Liability and Insurance Law Ramifications in Light of the Deepwater Horizon Oil Spill, in* THE HAMBURG LECTURES ON MARITIME AFFAIRS 2009 & 2010, 137, 151–154 (Jürgen Basedow et al. eds., 2012).

- Comprehensive general liability: provides coverage for claims an energy business is legally obligated to pay as a result of bodily injury or property damage to a third party.[190]
- Workers compensation/employers liability: provides coverage for claims arising out of employee injuries or deaths incurred while an employee is on the job.[191]

Operators usually take out property damage coverage for offshore facilities. A casualty program covering clean-up and third party liability can be added to the property damage insurance. In practice, usually one limit is used for the whole insurance policy. This may create a challenge for compensating for third party liability. For example, if there is a major offshore blow-out causing pollution, most of money paid to the operator will be used to repair the oil rig. Those repairs may consume most of the money paid out by insurance, with very little left to cover pollution damage.[192]

Many companies provide insurance coverage to offshore facilities. Most of these policies include casualty insurance, specific offshore insurance plans covering platforms, and marine insurance (usually covering tankers, but in some cases also offshore and even onshore installations).[193] Several estimates show that coverage of between $500 million to $1.5 billion is available for third party insurance in the market.[194]

Insurers report the capacity for offshore-related risk is volatile, so the billion dollars in coverage is not always available in the market and the insurance availability is often decided on a yearly basis.[195] Few insurers are willing to provide coverage for a catastrophic accident since the calculation of a fair premium is difficult. This is because the risk of a catastrophic accident is low, because insurers have insufficient

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189 Kenneth Abraham, *Catastrophic Oil Spills and the Problems of Insurance*, 64 VAND. L. REV. 1769, 1774–1775 (2011).

190 *Id*.

191 BOOZ ALLEN HAMILTON, THE OFFSHORE OIL AND GAS INDUSTRY REPORT ON INSURANCE – PART ONE 16 (2010), *available at* http://www.eoearth.org/files/172301_172400/172373/insurance_report_part-one_oct_5_4-pm_r1.pdf .

192 *Bell Interview*, *supra* note 185.

193 *Swiss Re Interview, supra* note 179.

194 Bosma, *supra* note 21, at 106; *Swiss Re Interview*, *supra* note 179; *Bell Interview*, *supra* note 185; *OGP Interview*, *supra* note 54 ("for large companies it is in fact fairly easy to obtain coverage") (confirmed via E-mail from Rachel Bonafant, OGP, to author (May 13, 2013) (on file with author)).

195 Interview with James Walmsley, Lindsey Donnithorne & Philip Sandle, Lloyds, London, England (May 1, 2013) [hereinafter *Lloyds Interview*] (on file with author).

information about these types of accidents, and because solvency regulations may force insurance companies to freeze large sums of capital for those unlikely catastrophic accidents that cannot be used in other more profitable ways.[196]

The Deepwater Horizon accident shocked many insurers since initially it seemed as if the losses would be totally covered by BP's self-insurance. However, many victims also filed claims against parties other than BP, like co-venturers and contractors;[197] BP itself also sought redress from these parties.[198] Some of these parties did have liability coverage.[199] As a result, and contrary to initial expectations when the Deepwater Horizon incident occurred in 2010, insurers still paid part of the Deepwater Horizon-related losses, not as insurers of BP, but as insurers of some of BP's subcontractors.[200] But this experience created a greater awareness within the market of accumulated liability for future accidents of this kind, and has produced a more cautious attitude among insurers.[201] Starting shortly after the accident, premiums for insuring deepwater operations have increased by 25-30 percent;[202] premiums for deepwater drilling have increased by 100% or more.[203] However, the full impact of the increased insurance premiums was not felt until January 2011 when operators began to re-insure themselves. Some oil and gas companies immediately purchased more insurance than they had previously, and some even doubled their coverage.

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196 *E.g.*, *Bell Interview*, *supra* note 185 (the so-called Basel I and Basel II regulations in the EU).

197 *See In re* Oil Spill by the Oil Rig "Deepwater Horizon" in the Gulf of Mexico, on April 20, 2010, Transfer Order, 731 F.Supp.2d 1352 (2010); Hausman & Foggan, *supra* note 12, at 100.

198 Peter Cameron, *Liability for Catastrophic Risk in the Oil and Gas Industry*, 6 INT. ENERGY L. REV. 207, 209 (2012).

199 Hausman & Foggan, *supra* note 12, at 100 ("Transocean, the owner of the Macondo Well and drilling operations, has $950 million in limits for liability. Halliburton, the well cementer, has $600 million in general liability coverage, and Cameron International, the manufacturer of the blowout preventer, has $500 million in general liability coverage.").

200 Interview with Philipp Wassenberg, Munich Re, Brussels, Belgium (May 6, 2013) [hereinafter *Wassenberg Interview*] (on file with author).

201 *See* Robert O'Connor, *Update: Lloyd's Offshore Energy Market Draws Lessons from Deepwater Horizon*, INSURANCENEWSNET.COM (Mar. 16, 2012), http://insurancenewsnet.com/oarticle/2012/03/16/Update-Lloyds-Offshore-Energy-Market-Draws-Lessons-From-Deepwater-Horizon-a-334831.html; *Swiss Re Interview, supra* note 179.

202 BOOZ ALLEN HAMILTON, *supra* note 191. *See also* Julia Kollewe, *Oil Industry Set for Surge in Insurance Premiums after Deepwater Disaster*, THE GUARDIAN (Sept. 20, 2010, 7:05 PM) http://www.theguardian.com/ business/2010/sep/20/deepwater-oil-rigs-insurance-costs.

203 Kollewe, *supra* note 202.

C. Risk Pooling Schemes: OPOL and Others

As discussed earlier, OPOL provides guarantee for offshore facilities in the North Sea. It provides a mechanism for settling claims expeditiously and without disputes because it creates a duty to compensate for pollution damage based on strict liability. OPOL also mandates that its members provide proof of financial responsibility to meet claims, including costs of remedial measures and pollution damage.[204] The total limit on compensation is $250 million per incident.[205] Therefore, OPOL is not a compensation fund, but it is a regulatory scheme that guarantees payment in cases where OPOL members fail to meet their financial obligations.[206]

OPOL is not a risk sharing pool in the traditional sense. It does not mutualize the risks of liability directly, but covers the risks of insolvency. But there are some mutual insurance arrangements that pool offshore risks in a more traditional way. Two of the most known mutual insurers are Oil Insurance Ltd. ("OIL") and Oil Casualty Insurance Ltd ("OCIL").[207] OIL was formed in 1972 by 16 energy companies in response to two large industry accidents that occurred in the 1960s.[208] OIL is owned and operated for its shareholders, all of whom are engaged in energy operations.[209] It provides coverage for physical damage, costs of well control, and third party liability.[210] The third party liability coverage includes "legal liability (including punitive damages) or contractual liability of members for personal injury, loss of or damage to property arising from a seepage, pollution or contamination incident."[211] The limit of third party liability coverage is $300 million.[212] The operators must also indicate a deductible for their coverage by OIL, which should be not less than $10 million.[213]

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204 *OPOL Agreement*, *supra* note 93, at cl. IV(A).

205 *Id.*

206 *Id.*

207 Regis Coccia, *Munich Re Outlines Liability Coverage for Offshore Oil Risk*, (Sept. 12, 2010), *available at* http://www.businessinsurance.com/article/20100912/NEWS/100919977.

208 The two incidents were a well blow out off the coast of Santa Barbara in Southern California in 1969, and a refinery explosion in 1967 in Lake Charles, Louisiana. OIL INSURANCE LTD., *OIL History*, https://www.oil.bm/about-oil/at-a-glance (last visited Aug. 11, 2015).

209 OIL INS. LTD., *Current Members*https://www.oil.bm/membership/current-members (last visited Sept. 3, 2015).

210 OIL INS. LTD., *All Risk Physical Damage*, https://www.oil.bm/products/all-risk-physical-damage (last visited Aug. 11, 2015).

211 OIL INS. LTD., *3rd Party Pollution Liability*, https://www.oil.bm/products/3rd-party-pollution-liability (last visited Aug. 11, 2015).

212 *Id.*

213 OIL INS. LTD., *Premium Indication Request Form*, at 2, (Feb. 2015), *available at* https://www.oil.bm/images/stories/policies/PIRF%20-%20February%20%202015.doc.

OCIL was founded in 1986 "as an insurance provider owned by companies in the energy industry to pool similar risks."[214] The company's goal was to "limit exposure to the often volatile commercial insurance and reinsurance market."[215] It provides excess general liability insurance and is exclusively dedicated to servicing energy companies.[216] At the time OCIL was created "commercial markets had ceased to provide adequate insurance coverage for liability risks."[217] The company was created by the members of OIL who recognized the need to create a special industry-owned vehicle specializing in liability insurance.[218] It is not necessary to become a shareholder to be insured by OCIL.[219]

D. Fund

In the US, a compensation fund called the Oil Spill Liability Trust Fund ("OSLTF") is available to cover the removal costs and damages caused by an oil spill.[220] The OSLTF is available to pay for: the removal costs incurred by federal or state governments; the costs to the government in assessing natural resource damages as well as developing and implementing restoration plans; uncompensated removal costs and uncompensated damages; and administrative costs related to the oil spill.[221] The OSLTF covers not only oil spills from offshore facilities, but also spills from vessels.[222]

The OPA limits payment of the OSLTF for removal costs and damages in each incident to $1 billion.[223] A sub-limit for natural resources damages payments is set as $500 million per incident.[224] The per-incident limit for removal costs and damages was increased to $2.7 billion under the Energy Policy Act of 2005.[225]

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214 OIL INS. LTD., *Casualty Insurance Ltd. Annual Report 2011*, at 6, *available at* http://www.ocil.bm/images/PDFs/OCIL%202011%20ANNUAL%20REPORT%20ELECTRONIC%20VERSION.pdf (last visited Aug. 11, 2015).

215 *Id.*

216 OIL CASUALTY INSURANCE LTD, http://www.ocil.bm/ (last visited Sept. 3, 2015).

217 BERMUDA BUSINESS DIRECTORY, http://www.netlinkbermuda.com/Articles/OIL.html (last visited Aug. 11, 2015).

218 BERMUDA BUSINESS DIRECTORY, http://www.netlinkbermuda.com/Articles/OIL.html (last visited Sept. 3, 2015).

219 OIL INS. LTD., *Overview*, http://www.ocil.bm/about-ocil/overview (last visited Aug. 11, 2015).

220 33 U.S.C. § 2712(a) (2012).

221 *Id.*

222 The OSLTF covers removal costs and damages under the Oil Pollution Act, which establishes liability to both vessels and offshore facilities. 33 U.S.C. § 2704(a) (2012).

223 26 U.S.C § 9509(c)(2) (2012).

224 *Id.* § 9509(c)(2)(A).

225 Energy Policy Act of 2005, Pub. L. No. 109-58, 119 Stat. 594, 1058–1059, 1361.

There are several financial sources for OSLTF funding: the tax on crude oil imported to or produced in the US, the transfers from the previously existing pollution funds, interest on the Fund principal from US Treasury investments, recoveries of costs and damages from responsible parties and guarantors, as well as penalties.[226]

E. Combinations

In practice it is rare that only one type of liability or compensation instrument is used. While majors who effectively self-insure or use captives will not combine those insurance structures with other schemes, most other offshore operators will use a combination of hedging strategies. As an example, a middle-sized operator may choose a retention (self-insurance) of around $5 million and could then choose insurance or a risk pooling scheme to cover the excess risk. Moreover, the operator could (and in the UK, it must) also choose to be a member of OPOL, in which case it would use the combination of self-insurance and insurance as proof of financial security. The type of combination that operators choose is to an important extent dependent upon their size. This means number of assets, but also the type of risks to which they are exposed as well as the relative costs to the operator of the various risk mitigation strategies.

F. The Insufficiency of the Existing Instruments

So far, this paper has shown that globally there are many instruments already in use to cover offshore liability. Each has its own strengths and weaknesses. Self-insurance provides a low-cost solution to provide guarantee for future losses. It is most often used by the majors, who argue that shifting risks to insurers with lower credit ratings than itself is nonsensical. Using self-insurance also has the advantage of controlling moral hazard, because taking a substantial retention still exposes operators to some risk. However, self-insurance cannot provide a waterproof guarantee against insolvency. That could only happen if regulation guaranteed that the money set aside for covering offshore-related losses would only be used for that specific purpose.[227] Moreover, SMEs with limited financial assets have very limited capacity to provide

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[226] 26 U.S.C. §9509(b).

[227] Michael Faure, *Alternative Compensation Mechanisms as a Remedy for Insurability of Liability*, 29 GENEVA PAPERS ON RISK & INS. 455, 459 (2004).

self-insurance. Usually, SMEs take out only around $5-10 million as self-insured retention.[228]

Insurance is another broadly used instrument to cover offshore liability. It can increase the utility of risk-averse operators. If a risk-dependent premium applies, it also creates incentives for the operator to take precaution.[229] However, compared to self-insurance, insurance is costly. Premiums charged by insurance companies covering offshore accidents are higher than actuarially fair value of the risk because of high transaction costs and the profit margins earned by the insurers.[230] The existing amount of insurance coverage available for offshore operators is therefore limited and quite volatile. Insurers who cover property damage and liability in the same policy may also dilute the amount of coverage available to compensate for third party liability.

A risk sharing pool is proposed by many as a good candidate to cover less predictable risks with the potential for high-magnitude damage.[231] These pools require less information: as long as the risk levels of pool members can generally be figured out, *ex ante* information on the magnitude of damage is no longer necessary.[232] It does not require money to be pooled *ex ante*, and hence has the potential to save costs.[233] Moreover, it gives members incentives to conduct mutual monitoring.[234] OPOL, OIL and OCIL all provide different forms of risk pooling. OIL and OCIL pool the risks of energy companies directly, while OPOL only intervenes in case of insolvency.

OPOL, though, is generally limited to the UK[235] and in reality only applies to offshore activities in the North Sea.[236] And OPOL's cap of

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228 *OGP Interview*, *supra* note 54.

229 Gerhard Wagner, *Tort Law and Liability Insurance*, *in* TORT LAW AND ECONOMICS, *supra* note 62.

230 *Id*.

231 *E.g.,* Göran Skogh, *Risk-sharing Institutions for Unpredictable Losses*, 155 J. THEORETICAL & INSTITUTIONAL ECON. 505 (1999); Norbert Pelzer, *International Pooling of Operators Funds: an Option to Increase the Amount of Financial Security to Cover Nuclear Liability*, 79 NUCLEAR L.Q. BULL. 37 (2007).

232 Göran Skogh, *A European Nuclear Accident Pool*, 33 GENEVA PAPERS ON RISK & INS. 274, 282 (2008).

233 Michael Faure & Karine Fiore, *The Coverage of the Nuclear Risk in Europe: Which Alternative?,* 33 GENEVA PAPERS ON RISK & INS. 288, 301 (2008).

234 For a discussion on the advantages of risks sharing pools, *see* Faure, *supra* note 227; Michael Faure & Göran Skogh, *Compensation for Damages Caused by Nuclear Accidents: A Convention as Insurance*, 17 GENEVA PAPERS ON RISK & INS. 499 (1992); Skogh, *supra* note 231; Skogh, *supra* note 232.

235 Membership of OPOL is mandatory to obtain a license.

236 *OGP Interview*, *supra* note 54; Interview with Wendy Kennedy, Head of Offshore Oil & Gas, U.K. Department of Energy and Climate Change ("DECC") (Apr. 29, 2013) (on file with author) ("OPOL is our thing" (referring to the fact that it is UK-based)).

$250 million is not much considering the high costs of a catastrophic offshore accident.[237] Moreover, it only provides coverage in cases where one of the OPOL members and its guarantors becomes insolvent.[238] In fact, OPOL coverage has never actually been used in practice.[239]

OIL and OCIL work more like traditional risk sharing pools. However, many majors are not very enthusiastic about joining OIL and OCIL for risk pooling.[240] They argue that their loss experience is better than the average risk and that the mutuality in these risk sharing pools leads to negative redistribution.[241] Compared to commercial insurance, the standard rates charged by OIL and OCIL do not sufficiently reflect different risks.[242] For the smaller companies the high deductibles (around $10 million) makes membership unattractive. This limits the range of operators interested in OIL and OCIL to those of a medium size.[243] Moreover, offshore accidents are low probability, high magnitude risks. Therefore, even when the premium correctly reflects the actual risk each company faces, the difference would not be that large. High-risk operators could simply pay the contribution and still free ride on good risks that have to contribute after an accident. Therefore, pools provide smaller operators, which often have limited balance sheets, some kind of safety net against potential liability whereas risk differentiation is simply not sufficient to incentivize them to take desirable precaution.[244]

In the United States, a compensation fund is used to cover offshore liability. It can provide coverage up to $1 billion.[245] Its largest financing source is a tax that is based on the volume of oil imported or produced in the country.[246] The volume-based contribution, however, does not reflect the actual risks to each offshore facility. Therefore, it does not

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237 It is difficult to estimate the potential costs of a major offshore accident. But the case of Deep Horizon accidents showed that the loss can reach billions of dollars. See RAMSEUR & HAGERTY *supra* note 3.

238 *See supra* section IV,C.

239 Interview with David Petrie, John Rintoulen & Paul Dymond, representatives of UK Oil & Gas, London, England (May 1, 2013) [hereinafter *UK Oil & Gas Interview*] (on file with author).

240 Interview with Daniel Riesen & Gerald W. Kok, Shell International BV, Rotterdam, the Netherlands (Mar.14, 2013) [hereinafter *Shell Interview*] (on file with author).

241 *Id.*

242 *BP Interview*, *supra* note 174.

243 *Id.* For the smaller companies, the high deductibles (10 million USD) do not make membership attractive.

244 *Shell Interview, supra* note 240.

245 I.R.C. § 9509(c)(2) (2012).

246 I.R.C. § 9509(b). JONATHAN RAMSEUR, CONG. RESEARCH SERV., OIL SANDS AND THE OIL SPILL LIABILITY TRUST FUND: THE DEFINITION OF "OIL" AND RELATED ISSUES FOR CONGRESS 1 (2015).

create inefficient incentives for them to prevent future damage.[247] Moreover, substantial administrative costs and improper allocation inefficiencies are often associated with the use of these contribution funds.[248]

V. PROPOSALS TO COVER CATASTROPHIC OFFSHORE ACCIDENTS

While many instruments are available to cover liability arising from offshore accidents, they are usually capped at between several hundred million to a few billion dollars. But the Deepwater Horizon accident demonstrated that an offshore catastrophe can cause damage over tens of billions of dollars. The majors may be able to cover this type of catastrophe through self-insurance; however, most SMEs will not be able to find sufficient coverage from the market. This will not only affect victim compensation, but also create insufficient preventive incentives for smaller offshore companies. In light of this situation, several proposals emerged after the Deepwater Horizon accident that attempted to provide a risk mitigation system with higher coverage for potential catastrophe.

A. Self-guarantee through Tax

Viscusi and Zeckhauser proposed a two-tiered compensation scheme to cover offshore liability.[249] For the first tier, the responsible party should be able to pay through the financial security and its own assets.[250] The amount of the first tier should be decided according to that operator's past loss experience, or according to an estimation that there would only be a less than 1/100 chance that it would be exceeded in the next decade.[251]

The second tier would be the low probability catastrophe that might happen. This will be covered by the firms' annual payment to a federal fund.[252] "For example, if government regulators thought that a deepwater well in the Gulf had an annual one in one thousand chance of imposing losses beyond $20 billion, and if the expected magnitude of total losses in such a case were $50 billion, then the well operator would

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247 Wang Hui & Michael Faure*, Civil Liability and Compensation for Marine Pollution—Lessons to be Learned for Offshore Oil Spills*, 3 OIL, GAS & ENERGY L. INTELLIGENCE 1, 24–26 (2010).

248 Gabison, *supra* note 10, at 243.

249 Viscusi & Zeckhauser, *supra* note 58.

250 *Id.* at 738.

251 *Id.* at 1738.

252 *Id.*

pay $30 million annually into the fund, which is (1/1000) x ($50 billion - $20 billion)."[253] In this structure, there is no risk spreading in this second layer of compensation because each individual party will be solely responsible for paying for the potential damage though the accumulation of his taxes. These payments would be affordable since the chances that a large accident beyond an operator's financial capacity happens are very low.

B. Mandatory Insurance and the Munich Re Proposal

Another approach is to increase the capacity of insurance and make it mandatory. Cohen *et al* proposed to use mandatory insurance in place of the financial responsibility requirement under the OPA.[254] These commentators prefer insurance to other instruments under the OPA and argue that insurers can effectively monitor offshore company behavior and impose risk-based premiums.[255] The current insurance market provides only around one billion dollars in coverage for offshore liability. The Cohen paper proposes that insurers be required to raise adequate capital in order to provide substantially higher amounts of coverage for offshore accidents.[256] This constitutes a major challenge to the insurance market.[257]

Nevertheless, a similar proposal to provide substantially higher levels of coverage also arose within the insurance industry. Shortly after Deepwater Horizon, the insurance company Munich Re presented a plan to create a facility that would be able to generate substantial capacity for offshore-related risks, referred to as Sudden Oil Spill ("SOS").[258] The model presented by Munich Re called for annual aggregate limits of between $10 billion and $20 billion on a rig-by-rig basis for companies

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253 *Id*. at 1738–39.

254 Mark Cohen et al., *Deepwater Drilling: Law, Policy, and Economics of Firm Organization and Safety*, 64 VAND. L. REV. 1853, 1899 (2011).

255 *Id.*

256 *Id.* at 1909–1913.

257 Some argue that it is impossible for energy insurers to raise coverage of 10 billion USD, given the unpredictability of offshore accidents. *Hearing on the Liability and Financial Responsibility for Oil Spills Under the Oil Pollution Act of 1990 and Related Statute Before the H. Comm. on Transp. & Infrastructure*, 111th Cong. 22 (2010) (statement of Robert P. Hartwig, President and Economist, Insurance Information Institute).

258 Press Release, Munich Re, Aon Benfield to Bring Together and Manage New Re/Insurance Consortium for Sudden Oil Spills in U.S. Waters (Dec. 21, 2010), *available at* http://www.munichre.com/en/media-relations/publications/press-releases/2010/2010-12-21-press-release/index.html.

engaged in offshore oil exploration.[259] Munich Re discussed three different models under which this facility could work:

- a consortium of insurers and reinsurers, each providing uniform prices, conditions, and fixed capacity;
- traditional insurance or reinsurance on a subscription basis, with flexible pricing, conditions, and limits;
- a pool for oil drilling companies with contributions reflecting market share.[260]

This facility is designed specifically to cover drilling operations in the United States, and the Gulf of Mexico more particularly.[261] This plan would require current limits under the OPA to be raised substantially.[262] Moreover, coverage would only be provided above a retention of $1 billion to $1.5 billion.[263] Munich Re itself would commit as much as $2 billion.[264] Together with the contribution from two other companies, that will raise the potential pool of the facility to around $10 billion.[265] According to Munich Re, approximately 40 other insurers have shown interest in this model and have agreed to participate if the model works.[266] This would produce an additional $6 billion, and with retentions of the oil companies the total coverage available under the new model would come close to $20 billion.[267]

Today, separate coverage can be provided for separate installations, but this is not why much higher amounts of insurance capital can be generated. The high amounts can only be provided if the cover is used for natural catastrophe ("natcat") cover by adopting parametric trigger-coverage.[268] This means that coverage is triggered by particular events that have been specified beforehand.[269] These types of triggers are

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259 Press Release, Munich Re, Munich Re Develops New Insurance Solution for Oil Catastrophes (Sept. 12, 2010), *available at* http://www.munichre.com/en/media-relations/publications/press-releases/2010/2010-09-12-press-release/index.html.

260 Coccia, *supra* note 207.

261 Jon Gay, *Munich Re First to Create Potential Pollution Liability Solution,* REINSURANCE (July 20, 211, 12:45 PM), http://reinsurancemagazine.com/article/munich-re-first-create-potential-pollution-liability-solution.

262 *Wassenberg Interview*, *supra* note 200.

263 *Id.*

264 *Id.*

265 *Id.*

266 *Id.*

267 *Id.*

268 *Id.*

269 This is the case with the natural catastrophic coverage. It is, for example, determined that when a hurricane with scale 5 hits and/or winds of 150 km/hr take place, coverage will be provided. *Id.*

binary—either there is trigger or there is not; it is all or nothing.[270] Although de facto third party liability would still be covered, the construction of the facility would be different. The cover would still follow the liability but to a modest extent.

With a normal liability cover for offshore there is indeed on average only one billion dollars in available coverage.[271] This is because those liability covers are potentially long tail liability risks, which create a lot of uncertainty for shareholders. The new facility transforms long-term risks into short-term risks, as is the case with natcats.[272] This will generate much higher-than-traditional liability cover.[273] In addition, unlike traditional insurance, providing coverage to all oil company installations in the new facility will require it to evaluate the drilling operations on an individual basis and provide corresponding coverage.[274] This would limit, for example, liability coverage to all BP installations in the North Sea, rather than all liability risks of BP worldwide.

In terms of controlling moral hazard, Munich Re said it would not conduct monitoring itself, but rely instead on industry self-interest to prevent accidents and governmental safety regulation with strict enforcement.[275]

After Munich Re proposed this type of facility, many stakeholders raised concerns. Some insurance experts consider it more as a balance sheet protection product rather than traditional insurance, since the cover is no longer based on liability.[276] Moreover, it will not be able to cover long-tail losses, which is a serious concern for offshore accidents.[277] Another worry is that Munich Re would be able to raise sufficient money for the facility.[278] This proposal was made shortly after the Deepwater Horizon accident, but has not started to function since then. Such a system can only work if a large amount of insurers and operators are prepared to join, which is not very likely.[279] Insurers generally do not like highly unpredictable risks. Major oil companies like BP prefers self-insurance, considering their high credit rating and

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270 *Id.*
271 *Id.*
272 *Id.*
273 *Id.*
274 Munich Re, *supra* note 259.
275 *Wassenberg Interview*, *supra* note 200.
276 *Swiss Re Interview*, *supra* note 179.
277 *Id.*
278 *Id.*; *Lloyds Interview*, *supra* note 195; *BP Interview*, *supra* note 174.
279 *BP Interview*, *supra* note 174.

high costs associated with commercial insurance.[280] Another point influencing the incentives for operators to join is the potentially high premium. The new facility provides coverage on a rig-by-rig basis; hence the operators will need to buy coverage for every well they have, putting the potential premium very high.[281]

In response, Munich Re has argued that oil companies are systematically underestimating risks and damages, and that they are too optimistic about their capping technology.[282] It further argues that a regulatory duty to take high amount of insurance would be necessary for its proposal to work.[283]

C. Risk-sharing Pools

A risk-sharing pool has the potential to cover risks of low probability and high magnitude, and therefore is a good candidate for offshore liability coverage. A few risk-sharing possibilities exist, including expanding existing instruments and establishing a new one.

1. Expanding OIL-OCIL

As discussed above, OIL and OCIL are only attractive to middle-sized operators. Smaller operators are confronted with the too-high retention, and larger operators prefer self-insurance. Especially when the opinions of the majors are taken into account, there does not seem to be much demand for expanding the current risk sharing agreements.[284] Risk-sharing pools are criticized by the majors for being based on solidarity and mutualization.[285] For them, joining those pools is not attractive since that they would essentially subsidize the presumably higher risks posed by smaller and medium sized operators.[286] In addition, even when risk differentiation can be made according the risks that individual members create, insufficient incentives will exist for the bad risks.[287] To some extent, this is unavoidable because the probability of an accident occurring is relatively low, so the marginal difference between good and bad risks may be small. That is a major difference

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280 *Id.*

281 Interview with Gary Maddock & Jerry Stevenson, Noble Energy, Inc. (Mar. 6 2013) [hereinafter *Noble Energy Interview*] (on file with the author).

282 *Wassenberg Interview*, *supra* note 200.

283 *Id.*

284 *BP Interview, supra* note 174; *Shell Interview, supra* note 240.

285 *BP Interview*, *supra* note 174.

286 *Id.*

287 *Shell Interview*, *supra* note 240.

with risk sharing pools in other sectors, such as for vessel-based pollution. The P&I Clubs provide coverage to pollution damage caused by vessels.[288] In P&I Clubs, shipowners who gather together bear generally similar risks.[289] In the offshore market, all operators pose different levels and types of risks.[290] These different risk profiles make the pooling arrangement very difficult.

2. Expanding OPOL

OPOL provides guarantee in case that one of its members is insolvent. It is limited to the North Sea and is only important in the UK. The current limit under OPOL is only $250 million,[291] a moderate amount considering the losses a major accident may cause. Therefore, different options exist for expanding OPOL—either by geographical scope or by the amount of compensation OPOL can provide. For example, the geographical scope of the current OPOL can be expanded beyond the North Sea, or a similar arrangement may be created in other regions of the world (e.g. for the Baltic, the Black Sea and the Mediterranean). This approach is criticized because offshore accidents in different regions pose divergent risks.[292] Pooling different risk levels together will create cross-subsidization.[293] Another approach is to make OPOL membership mandatory in more legal systems, but this will depend on local regulators and cannot solve the problem of limited amount of guarantee. Attempts to raise the amount of coverage of OPOL will therefore suffer from the same problems as are currently being experienced in OIL and OCIL.

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288 *Id*.

289 The P&I Clubs impose some safety-rated conditions to the vessels to ensure the comparable risks of insured ships. Usually the Clubs require the entered vessels remain "classed with a classification society approved by the managers." STEVEN HAZELWOOD & DAVID SEMARK, P&I CLUBS: LAW AND PRACTICE 37 (2010). The Clubs also require members to notify the classification society of any incident with the potential to give rise to damage, and to comply with the rules, recommendations and requirements imposed by their classification societies. *Id.* In addition to the requirement concerning classification societies, many Clubs also "demand more stringent condition survey reports on new entries." *Id.*

290 *Impact Assessment Accompanying the Document Proposal for the Regulation of the European Parliament and of the Council on Safety of Offshore Oil and Gas Prospection, Exploration and Production Activities*, SEC (2011) 1292 final, (Oct. 27, 2011). The risks of offshore facilities can be very different, depending on factors, such as location, type of oil, season/weather, clean up response/method and so on. *Id*.

291 *OPOL Agreement*, *supra* note 93, at cl. IV(A).

292 *BP Interview, supra* note 174; *UK Oil & Gas Interview*, *supra* note 239.

293 *BP Interview*, *supra* note 174; *Shell Interview*, *supra* note 240. *See also OPOL Interview*, *supra* note 91; *UK Oil & Gas Interview*, *supra* note 239.

3. Noble Energy Proposal

Another way to organize the risk sharing pool is proposed by Noble Energy, a medium-sized American oil and gas producer.[294] Noble proposes establishing different arrangements for third party claims and damages as well as cleanup and response costs.[295] Under the OPA, third party liability and damages of the offshore facilities are capped at $75 million.[296] Removal costs are not capped.[297] The OSLTF has been established to provide compensation for governments' response and restoration costs and third parties' uncompensated response costs and damages.[298] The response and restoration costs of responsible parties are not covered. However, a potential catastrophe can also dwarf the operators' capacity to take response and cleanup measures. Therefore, the Noble Energy proposal tries to make different arrangements for third party liability and response costs.

For the third party liability, compensation will still follow the line of the OPA: a first layer of coverage is provided by financial security instruments and a second layer is paid by the OSLTF.[299] However, the amount of both layers should be substantially increased beyond the OPA level. The first layer of coverage could vary—depending upon risk—between $150 and $750 million.[300] Some criteria used to determine risk could be whether drilling takes place in deep water or shallow water.[301] In addition to the $750 million, OSLTF would intervene with a substantially higher amount of $5 billion.[302]

Another vehicle is proposed for clean-up and response costs.[303] Again, a first layer of between $150 and $750 million would be paid by responsible parties (depending on risks) for which operators would seek insurance coverage.[304] Importantly, however, for the second layer, a fund run by the United States Treasury intervenes.[305] They pre-finance (via loans to the fund) compensation if the damage is higher than the first layer.[306] That second fund (of potentially $5 to $10 billion) would

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294 *Noble Energy Interview, supra* note 281.
295 *Id.*
296 33 U.S.C. § 2704(a)(3) (2012).
297 33 U.S.C. § 2702.
298 33 U.S.C § 2712(a).
299 *Noble Energy Interview*, *supra* note 281.
300 *Id.*
301 *Id.*
302 *Id.*
303 *Id.*
304 *Id.*
305 *Id.*
306 *Id.*

be based on mutualization.[307] The members are only called on to pay premiums after an accident with costs in excess of the first layer, resembling the retrospective premiums under the Price-Anderson Act.[308] Hence *ex-ante* immobilization of capital is not necessary. Moreover, it is estimated that the Noble proposal would only impact on average 1 percent of the revenues that oil companies currently make in the Gulf; in that sense it can be considered reasonable.[309] These retrospective premiums would be risk dependent: bad risks pay higher contributions than good risks.[310] Of course some more detailed aspects of the plan need to be worked out, like how such a pool would be managed. A pool like this should be managed by an organization that has sufficient information to be able to apply risk differentiation, taking into account differences in safety culture for example. OGP may be a good candidate, but there may be others as well.

Noble Energy proposes a scheme that provides substantially higher amounts of compensation compared to the OPA.[311] The existing legal cap $75 million is considered too low for a potential major accident. If another major accident were to happen in this post-Deepwater Horizon world, and no sufficient compensation were available, there is a serious risk that politicians would begin to call for shutting down offshore drilling in the Gulf of Mexico altogether. With this in mind, Noble Energy is in favor of a pro-active approach and insists on regulating potential future losses even though the political turmoil after Deepwater Horizon has calmed down.[312] However, there are still concerns that the majors do not have the incentives to join such pools because they can easily rely on self-insurance and do not like to be pooled together with other companies with higher risk of offshore accidents.

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307 *Id.*

308 Under the retrospective premiums scheme, if an accident leads to nuclear damage in excess of the maximum amount available from the insurance market, all qualified nuclear operators are obliged to pay the retrospective premiums up to $121.255 million. For an introduction on the retrospective premiums under the Price-Anderson Act, *see* Michael Faure & Tom Vanden Borre, *Compensating Nuclear Damage: a Comparative Economic Analysis of the US and International Liability Schemes*, 33 WM. & MARY ENVTL. L. & POL'Y REV. 219, 240–45 (2008); LIU JING, COMPENSATING ECOLOGICAL DAMAGE: COMPARATIVE AND ECONOMIC OBSERVATIONS 244–46 (2013).

309 *Noble Energy Interview*, *supra* note 281.

310 *Id.*

311 *Id.*

312 *Id.*

D. The Role of Government

A few market solutions for offshore liability have been discussed above. The question can still be asked whether, to the extent that the market would fail, government should intervene in providing compensation. This could (at least theoretically) take a variety of forms. One possibility, often applied in practice in case of catastrophes, is outright compensation of victims by government on an *ex post* basis. Another possibility, becoming increasingly popular, again in the area of (natural) disasters and terrorism is a role for government as reinsurer of last resort.[313] A role that is most often mentioned in environmental liability is the creation of a compensation fund.

In the Noble Energy scheme discussed above, the coverage of the OSLTF would increase substantially to provide a second layer of compensation for third party liability. The literature also reflects this approach.[314] Gabison argues that such a fund has the advantage to reduce "transaction costs associated with litigation of small and medium spills".[315] However, a major accident in the future may easily deplete the OSLTF.[316] Further, it is estimated that the current tax rate under the OSLTF is set too low.[317] A proposed legislation has advocated raising the tax from the current 0.08 USD per barrel to 0.34 USD per barrel—adjusted for inflation—[318]in order to provide sufficient compensation in the event of a major accident.[319] The Coast Guard would be authorized to provide "an annual refund of the taxes levied on particular oil companies displaying good behavior each year".[320] This will create an incentive for oil companies to maintain higher safety standards and reduce their potential losses.

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313 *See* Michael Faure, *Financial Compensation for Victims of Catastrophes: A Law and Economics Perspective*, 29 J. L. & POL'Y 339, 347–48 (2007); VERONIQUE BRUGGEMAN, COMPENSATING CATASTROPHE VICTIMS: A COMPARATIVE LAW AND ECONOMICS APPROACH 185–209 (2011).

314 Gabison, *supra* note 10, at 242–46.

315 *Id*. at 243.

316 *Id.*

317 Ian W.H. Parry & Kenneth Small, *Does Britain or the United States Have the Right Gasoline Tax?,* 95 AM. ECON. REV. 1276, 1283 (2005).

318 Gabison, *supra* note 10, at 245.

319 *See, e.g.*, American Jobs and Closing Tax Loopholes Act of 2010, H.R. 4213, 111th Cong. (2010).

320 *Id.*

VI. ECONOMIC ANALYSIS

The question arises how the proposals for effective compensation should be constructed and how they should be evaluated from a policy perspective. In order to answer that question, this section will draw upon the economic analysis of accident law. This approach uses liability rules as a tool to provide incentives to operators to minimize the total sum of accident costs. From this viewpoint, an effective liability and compensation scheme would be one that optimally aligns incentives to minimize costs of offshore accidents. This section first sketches principles of efficient compensation and liability rules (A), then focuses on the optimal design of said rules (B), as well as on the importance of combining liability rules with financial security (C). Finally, the section reviews the comparative benefits of a variety of compensation instruments (D).

A. Principles of Efficient Compensation and Liability Rules

Before looking at efficient liability rules and compensation systems in a more normative manner, this section describes the principles on which such analysis will be based. From the economic view of accident law, the goal of liability rules is to reduce damage to efficient levels, more precisely, to minimize the total sum of accident costs.[321] These rules benefit compensation schemes and also promote relief for victims without compromising incentives structures.

In subsequent analysis of the various possible instruments of compensation, a few general rules will be used to analyze the strengths and weaknesses of the various instruments. The first important principle is that no matter how compensation is organized, the incentives for preventing damage caused by offshore incidents should always remain intact. In principle, the duty to compensate should rest upon the party who actually contributed to the risk so that potential wrongdoers are incentivized to mitigate damages. A second, related, principle is that a duty to contribute to such compensation should also be based on the degree of risk that entrepreneur contributed. This is the mechanism by which collectivize compensation could be divided between different offshore enterprises. If such a risk differentiation is used, potential offshore contributors will have greater incentives to prevent accidents. The third principle is that solutions should be introduced at the lowest administrative cost possible. Fourthly, a competitive market solution may be preferable to bureaucratic intervention by government. The

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321 *See* Calabresi, *supra* note 16; Shavell, *supra* note 181.

market will usually be able to provide coverage at lower costs than government organizations[322]However, there may still be some cases where a government monopoly in the provision of disaster insurance could provide better results than competitive markets.[323]

B. Liability Rules

The question arises how liability rules should then be optimally designed. Generally, channeling liability should be avoided (1). However, joint and several liability systems may be advantageous in that they provide incentives for mutual monitoring by operators (2). Strict liability has the advantage that incentives for optimal care and optimal activity levels will be provided to operators (3). This strict liability scheme should in principle be unlimited with no cap on potential liability (4).

1. Channeling of Liability

Channeling liability means that only one party can be held liable, excluding the liability of other potentially responsible parties. The channeling regimes have been defended as facilitating easier recovery by victims who only need to focus on one party. For operators, channeling facilitates their insurability since only one party would have to carry insurance coverage. Despite the potential benefits, economics literature generally views channeling as inefficient. It relative impacts the incentives of one party to take care more than all other parties who could equally influence the risk of accident.[324] This inefficiency was demonstrated by the Fukushima nuclear accident in Japan in 2011. According to the Japanese law, the operator, TEPCO is the only liable party for nuclear damage, though the flawed design of the Fukushima Daiichi power plant by GE was also an important factor leading to the

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322 *See* Veronique Bruggeman, Michael Faure & Karine Fiore, *The Government as Reinsurer of Catastrophic Risks?,* 35 GENEVA PAPERS ON RISK & INS. THEORY 369, 381 (2010).

323 This would more particularly be the case in Switzerland. For a discussion, *see* Winand Emons, *Imperfect Tests and Natural Insurance Monopolies*, 49 J. INDUST. L. ECON. 247 (2001); Thomas Von Ungern-Sternberg, *The Limits of Competition: Housing Insurance in Switzerland*, 40 EUR. ECON. REV. 1111 (1996); THOMAS VON UNGERN-STERNBERG, EFFICIENT MONOPOLIES: THE LIMITS OF COMPETITION IN THE EUROPEAN PROPERTY INSURANCE MARKET (2004).

324 *See* Michael Faure & Wang Hui, *Economic Analysis of Compensation for Oil Pollution Damage*, 37 J. MAR. L. & COMMERCE 179, 188 (2006); Tom Vanden Borre, *Channeling of Liability: A Few Juridical and Economic Views on an Inadequate Legal Construction*, *in* CONTEMPORARY DEVELOPMENTS IN NUCLEAR ENERGY LAW: HARMONIZING LEGISLATION IN CEE/NIS, 13–39 (Nathalie Horbach ed., 1999); Michael Faure, *Environmental Liability*, in TORT LAW AND ECONOMICS, *supra* note 62.

accident.[325] Although GE was reportedly be aware of the problematic design a few decades ago, it had no incentive to remedy the error without fear of potential liability.[326] Although the operators could take their own recourse against the other responsible parties if such is provided in the contract,[327] the bargaining power of the operators may be weak relative to the plant's designers.[328]

In offshore drilling, the issue of power imbalance is less problematic for channeling liability. In many cases, the operators and licensees of offshore facilities are major oil companies, which have greater market power compared to the contractors they hire. As a result there is likely a more balanced liability arrangement in the contracts between them.[329] The oil companies usually have technical expertise and on the field knowledge to control the operation.[330] The oil company also selects and approves various contractors, controls operations of the contractor, and verifies the results of the contractors' work.[331]

An alternative to legal channeling would be to impose the responsibility to seek financial security coverage on one party, referred to as economic channeling.[332] In this case, the operator acquires insurance, which extends to the potential liability of the contractors. One example of economic channeling is the nuclear liability regime under the Price-Anderson Act ("PAA") in the United States. The PAA does not channel liability to nuclear operators, but instead requires those operators to seek financial coverage for the potential liability from nuclear damage.[333] The nuclear liability insurance is provided by American Nuclear Insurers ("ANI"), which has omnibus coverage to cover the liability of the contractors of nuclear operators, as long as the

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325 *See* Michael Faure & Liu Jing, *The Tsunami of March 2011 and the Subsequent Nuclear Incident at Fukushima: Who Compensates the Victims?,* 37 WM. & MARY ENVTL. & POL'Y REV. 129, 189 (2012).

326 For a more detailed analysis of the Fukushima accident and the problem of channeling liability, see *id.* at 179; Mark Ramseyer, *Why Power Companies Build Nuclear Reactors on Fault Lines: The Case of Japan*, 31 THEORETICAL INQUIRIES IN LAW 457, 466–67 (2011).

327 Paris Convention for the Protection of Industrial Property, Mar. 20, 1883, art. VI(f); Vienna Convention on Diplomatic Relations, Apr. 18, 1961, Arts. II(5), X.

328 Vanden Borre, *supra* note 324.

329 For the risk allocation between operators and the contractors in the contracts, see Cameron, *supra* note 198, at 207–11.

330 Viscusi & Zeckhauser, *supra* note 58, at 1748–49.

331 Cameron, *supra* note 198, at 207.

332 Tom Vanden Borre, *Shifts in Governance in Compensation for Nuclear Damage: 20 Years After Chernobyl*, *in* SHIFTS IN COMPENSATION FOR ENVIRONMENTAL DAMAGE 300 (Michael Faure & Albert Verheij eds., 2007).

333 42 U.S.C § 2210(e) (2012).

damage is caused by the insured risk.[334] Under such an arrangement, the contractors no longer need to seek independent expensive insurance coverage, while at the same time, the preventative incentive remains in the potential liability for a nuclear accident.

2. Joint and Several Liability

Under joint and several liability, joint tortfeasors can be held liable for the entire damage caused to the victim, even if their behavior only contributed to a portion of the harm. Joint and several liability regimes have been introduced often to relieve the burden of proof for victims. These victims can then collect the entire damage from one of the contributing tortfeasors while that tortfeasor could in turn exercise an action in recourse against the other liable tortfeasors. Joint and several liability is beneficial in that it provides incentives for mutual monitoring by potential injurers.[335] Joint and several liability is nonetheless of debatable merit since a party could be held liable for damages it in fact did not cause.[336]

Joint and several liability has, however, been criticized from an insurance perspective, since it increases the necessity to purchase insurance coverage by all parties involved.[337] However, these negative effects could be mitigated if an economic channeling, as discussed above, were to be introduced.

3. Strict Liability

The choice between strict liability and negligence has been studied extensively in the law and economics literature.[338] In case of a unilateral accident, when only the behavior of the injurer influences the risk, both strict liability and negligence can lead to efficient outcomes. Even though a clear-cut test is difficult to provide, Landes and Posner describe several factors which may lead to a preference for a strict liability rule.[339] These elements are: 1. high expected accident costs; 2.

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334 *See* AMERICAN NUCLEAR INSURERS, NEED FOR NUCLEAR LIABILITY INSURANCE (2013).

335 *See* Tom Tietenberg, *Indivisible Toxic Torts: The Economics of Joint and Several Liability*, 65 LAND ECON. 305, 305 (1989).

336 For this reason, joint and several liability in case of environmental harm is, for example, opposed by Lucas Bergkamp, *The Commission's White Paper on Environmental Liability: A Weak Case for an Easy Strict Liability Regime*, 9 EUR. ENVTL. L. REV. 105 (2000).

337 *See* FAURE & HARTLIEF, *supra* note 170, at 127.

338 For an overview of the literature, *see* Hans-Bernd Schaffer & Frank Muller-Langer, *Strict Liability versus Negligence*, *in* TORT LAW AND ECONOMICS, *supra* note 62, at 3–45.

339 William Landes & Richard Posner, *The Positive Economic Theory of Tort Law*, 15 GA. L. REV. 851, 907–08 (1981).

more care by the injurer would not reduce the accident risk; 3. the impracticability to constraining the victim's activity in favor of the injurer's and 4. the desirability to reduce the risk of an activity.

The offshore accident is a bilateral accident. However, the injurers have a much larger influence on the potential accident than the victims. In that case economic analysis predicts that the advantage of the strict liability rule is that it will give the injurer an incentive both to adopt an optimal activity level and to take efficient care. The victims of course cannot influence the occurrence of the incident itself, but they can take measures to mitigate the damage. In order to provide optimal incentives to take preventive measures to victims as well a comparative negligence rule, taking into accounts the victim's behaviour, should be added to the strict liability rule. This will allow reductions in the compensation due the victim to the extent that the victim's behaviour contributed to the loss.[340]

4. Cap on Liability?

Economic analysis strongly supports the arguments against financial caps on liability. From that perspective it is most efficient for the potential injurer to be fully exposed to the social costs of his activities, especially in case of strict liability.[341] The above analysis has shown that strict liability applies broadly for offshore damage, which is also sound from an economic perspective. [342] Capped liability does not only influence the victims' right to compensation, but also leads to under-deterrence of the potential liable parties. Moreover, another effect of a financial limit on liability is that it would constitute an indirect subsidy of the industry enjoying a particular limit on liability.

After the Deepwater Horizon Accident, many proposals have been made to remove the liability cap under the OPA for offshore accidents.[343] Opposition to this idea argues that imposing this requirement will prevent the small business from engaging in offshore activities.[344] However, as Viscusi and Zeckhauser argue, "there is no sound rationale for permitting firms to engage in activities that threaten the risk of catastrophic harms that will not be addressed."[345] Moreover,

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340 Vissher, *supra* note 62, at 155–56.

341 *Id.* at 153–56.

342 *See supra* Part III.B.2.

343 *See supra* text accompanying note 19.

344 Joseph Guajardo, Comment, *Deepwater Horizon: Rethinking OPA's Liability Limitations in the Wake of Environmental Disaster*, 48 HOUS. L. REV. 625, 627–28 (2011).

345 Viscusi & Zeckhauser, *supra* note 58, at 1748.

exposing them to full liability will provide them incentives to organize their activity carefully and take greater precautions.

C. Mandatory Financial Security

Even when liability is not capped, the liable party may not need to internalize all social costs. Offshore accidents can lead to a catastrophe worth billions of dollars. These losses may easily outnumber the assets of the majority of companies. In this case, the polluter will only have incentives to take precautionary measures to prevent damage within a magnitude of its own assets, and so the problem of under-deterrence arises. One way to alleviate this problem is to impose an obligation on the potential liable parties, more specifically the operators, to seek financial security coverage.[346] Mandatory financial security will at least ensure that a certain level of compensation is available in case the damage materializes.

The financial security should be sufficient to cover the potential damage that may result from an offshore accident. Many factors influence the risk of offshore accidents, and not all offshore activities create the same risks.[347] The magnitude of a future damage may vary significantly from case to case. To require a uniform level of financial security via the legislation may be inefficient. Ideally, an individual approach can be used, tailored to the risks of each offshore activity. It can also be linked to the existing system. For example, in many jurisdictions, companies are required to prepare a response plan, anticipate the environmental impact and estimate the worst-case discharge volume before getting the permit.[348] This can serve as the basis to determine the required financial security coverage. Such a tailored approach gives broad discretion to the regulators.

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346 For the advantages of mandatory financial security systems, *see* Alberto Monti, *Environmental Risk: A Comparative Law and Economics Approach to Liability and Insurance*, 9. EUR. REV. PRIVATE L. 51 (2001); Jeffrey Kehne, Note, *Encouraging Safety Through Insurance-Based Incentives: Financial Responsibility for Hazardous Waste*, 96 YALE L.J. 403 (1986); Eberhard Feess & Ulrich Hege, *Environmental Harm and Financial Responsibility*, 25 GENEVA PAPERS ON RISK & INS. 220 (2000).

347 REES & SHARP, *supra* note 48, at 10.

348 *E.g.*, In the US, this is part of the BOEME permitting process. *See* U.S. DEP'T OF THE INTERIOR, NTL NO. 2010-N06, INFORMATION REQUIREMENTS FOR EXPLORATION PLANS, DEVELOPMENT AND PRODUCTION PLANS, AND DEVELOPMENT OPERATIONS COORDINATION DOCUMENTS ON THE OCS (2010); U.S. DEP'T OF THE INTERIOR, NTL NO. 2010-N10, STATEMENT OF COMPLIANCE WITH APPLICABLE REGULATIONS AND EVALUATION OF INFORMATION DEMONSTRATING ADEQUATE SPILL RESPONSE AND WELL CONTAINMENT RESOURCES (2010).

Another important issue would be which instruments can be used to provide financial security. Many have proposed mandatory insurance as a solution to the insolvency problem.[349] When under a duty to purchase insurance and exposed to full liability, the insured will have incentives to control his behavior. Via the traditional instruments for the control of moral hazard, the insurer can make sure that the injurer will take the necessary care to avoid an accident with the real magnitude of the loss.[350]

However, limiting financial security solely to insurance may also create risk. If moral hazard cannot be controlled, then mandatory insurance may even make the situation worse.[351] State imposed high market demand would raise premiums and this could equally reduce the incentives of insurers to control the moral hazard risk.[352] This could create an undesirable situation whereby insurers would become de facto licensors of the industry, which could be questionable from a policy perspective. That may be a strong argument towards a flexible approach, which allows the market itself to suggest a wide variety of financial and insurance instruments, as long as they can guarantee compensation when the accident happens.

D. Compensation Instruments

We will now review the various proposals that were presented above and analyze those in the light of economic theory. First we discuss a proposal made in the literature to finance accidents via a self-guarantee paid by taxes (1). Next, mandatory insurance and the proposal formulated by Munich Re will be critically reviewed (2). Then, we will point at the comparative advantages of risk sharing pools between operators (3) and finally, it will be argued that the most effective way for government to intervene in compensation is as reinsurer of last resort, rather than by providing direct compensation or creating a compensation fund (4).

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349 Peter Jost, *Limited Liability and the Requirement to Purchase Insurance*, 16 INT'L REV. L. & ECON. 259 (1996). A similar argument has been formulated by Polborn and by Skogh . Skogh has also pointed out that compulsory insurance may save on transaction cost. *See* Mattias Polborn, *Mandatory Insurance and the Judgement-Proof Problem*, 18 INT'L REV. L. & ECON. 141 (1998); Goran Skogh, *Mandatory Insurance: Transaction Costs Analysis of Insurance*, *in* ENCYCLOPEDIA OF LAW & ECONONMICS, II, CIVIL LAW & ECONOMICS 521–37 (B. Bouckaert & G. de Geest eds., 2000).

350 *See supra* Part IV.B.

351 Steven Shavell, *The Judgment Proof Problem*, 6 INT'L REV. L. & ECON. 45 (1986).

352 *See* Monti, *supra* note 346.

1. Self-guarantee though Tax

Viscusi and Zeckhauser proposed to cover a potential catastrophe through an annual tax tailored to the risk that a disaster would happen beyond the capacity of the responsible party. Hence no risk sharing between offshore companies takes place. They have to internalize the complete social costs, which can lead to efficient precaution.

However, this imposes a high requirement on the regulators to determine the potential risk of each offshore company. The tax should correspond to the company's risk profile, which is an extremely difficult task for the regulators. The administrative costs of implementing this proposal may also be huge. If the tax cannot reflect the risk accurately, it will affect "only the decision of whether to drill, not the degree of care with which drilling actually occurs."[353] Moreover, this proposal accumulates the amount through an annual tax. If, however, a catastrophe happens in the early years of such an accumulation, full compensation will not be guaranteed.[354]

2. Mandatory Insurance and the Munich Re Proposal

Insurance policies, when designed carefully can provide coverage for risk averse individuals and maintain sufficient precaution incentives. Mandating insurance, by forcing majors to remain in the pool, can alleviate the adverse selection problem, and provide substantial coverage. Although many doubt whether high amounts of coverage could be made available, Munich Re proposed an arrangement with the ambition to provide coverage between ten and twenty billion USD.

Parametric-trigger coverage has an advantage in dealing with unpredictable, high magnitude risks. In that case, trigger is no longer liability, but the occurrence of pre-determined situations. The uncertainties created by liability rules and the judges are to some extent precluded. The problem caused by long-term risk is no longer relevant. Moreover, the new facility assesses the risks on a rig-by-rig basis, so premiums can be more risk-tailored.

Thus far that proposal has largely remained theoretical and many stakeholders doubt that it will ever be brought into practice. It is especially designed for the US, where more detailed data are available. Although Munich Re argues that a similar arrangement can also be made for the EU, that would only be possible if more data and models

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353 Kenneth Abraham, *Catastrophic Oil Spills and the Problem of Insurance*, 64 VAND. L. REV. 1769, 1789–90 (2011).

354 *Id.* at 1790.

are available on the basis of which a model could be implemented.[355] Moreover, a substantial amount can only be raised if sufficient insurers and operators would join the scheme.

To mandate all offshore operators to seek insurance coverage can substantially raise the available amount. However, it deprives the operators of the choice to cover their liability through other instruments. For example, for the majors who often have better credit rating than the insurance companies, little added value will be created by forcing them to join a commercial insurance pool. Mandatory insurance also involves the risk of creating a highly concentrated market, which will lead to high premiums and insufficiency risk differentiation.[356] Moreover, insurance alone cannot provide full coverage for all liability. The new facility proposed by Munich Re adopts a parametric trigger that is not directly linked with liability. Traditional liability insurance also has limitations, such as providing coverage only to sudden and accidental incidents. Other instruments will be necessary to fill in those gaps.

In spite of this limitation, the Munich Re proposal at least provides a possibility to cover substantially higher amounts of offshore related damage. Although introducing mandatory coverage creates many downsides as well, requiring operators to provide substantially higher amounts of financial security will increase the need to seek insurance coverage. Such a regulatory duty could stimulate the development of market solutions.

3. Risk-sharing Pools

Theoretically, risk-sharing pools have the advantage of providing incentives for mutual monitoring and to promote risk preventive investments by all members in the pool. Therefore membership in the pool could increase safety levels.[357] However, this only works under two important conditions: 1) risk differentiation is possible to such an extent that real differences in contributions can be made that do provide substantial incentives to operators to invest in risk prevention measures and 2) the risk posed by the different operators are at least of a similar nature.[358] It may be difficult to meet both conditions in the case of risk pooling for offshore-related liabilities.

One the one hand, the probability of an offshore incident is so low that the difference between the relative contribution of a high risk

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355 *Wassenberg Interview*, *supra* note 200.

356 Faure & Grimeaud, *supra* note 61, at 186.

357 Skogh*, supra* note 231; Faure & Fiore, *supra* note 233 at 302.

358 *Id.*

operation compared to a low risk may be too small to provide appropriate incentives for investments in risk prevention technologies. If that were the case, risk differentiation would not work and high-risk operators would simply prefer to pay the marginally higher contribution to the pool. The second condition may also not be met in the case of offshore related risks given the largely different nature, not only of operators, but also the risks related to different types of wells. Theoretically, technological information is available to distinguish risks on objective grounds.[359] This could then also constitute the basis for differing contributions to a pool. However, the problem would still exist that there could be substantial differences between operators as far as their assets and credit rating are concerned. If that is the case, smaller operators—who are more likely to be insolvent—could free ride on the pool by shifting the risk to other members with higher credit ratings. That may obviously have negative consequences for the incentives to invest in prevention.

It is therefore not surprising that the majors show little interest in joining the pooling arrangements mentioned above. Noble Energy proposes a mandatory retrospective risk-pooling scheme, similar to the requirement from nuclear operators under the Price Anderson Act. Because contribution will only be made retrospectively, there is no large immobilization of capital *ex ante*. However, a major difference between nuclear operators in the US and offshore installations in Europe is that nation-wide safety regulation in the US guarantees similar minimum nuclear safety standards for the entire country.[360] That reduces the task of mutual monitoring of the members in the pool and reduces free riding. However, it would be difficult for policy makers to force unwilling operators into such a European-wide risk pool. Given the substantial difference between operators and risks and the absence of EU-wide high safety standards, a mandatory pooling could lead to perverse incentives for high-risk operators who could externalize their risk to the lower risk members in the pool. A mandatory pooling scheme could, if adequate risk differentiation and safety regulation could fail to

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359 *Shell Interview*, *supra* note 240.

360 For a discussion on the possibility to introduce a nuclear pooling system in the EU, *see* Norbert Pelzer, *International Pooling of Operators' Funds: An Option to Increase the Amount of Financial Security to Cover Nuclear Liability*, 79 NUCLEAR L. BULL. 37 (2007); Simon Carroll, *Perspective on the Pros and Cons of a Pooling-Type Approach to Nuclear Third Party Liability*, 81 NUCLEAR L. BULL. 75 (2008); Simon Carroll, *European Challenges to Promoting International Pooling and Compensation for Nuclear Reactor Accidents*, (Nonproliferation Pol'y Educ. Ctr., Working Paper, 2009).

sufficiently distinguish good risks from bad risks and even lead to decreased safety levels.

Under those circumstances, policymakers should refrain from mandating pooling between operators of offshore installations. The only thing a policymaker could do is encourage the creation of industry-wide pooling by providing high standards of safety regulation. Such regulation could facilitate and assist mutual monitoring by operators and encourage pooling arrangements.

4. The Role of Government in compensation

a. Direct Compensation by the Government

The government has the potential to provide high amounts of compensation after a catastrophe, since it can diversify the risks over the entire population and even across generations.[361] Besides, the prospects of large-scale payments in the aftermath of an offshore-related disaster might encourage the government to take cost-benefit justified precautions long before disasters strike.[362] However, the direct intervention of the government has its disadvantages. If government de facto provides compensation to victims, then it effectively provides a subsidy to the industry by allowing it to externalize the social costs of its activity. It will dilute the incentives for the polluters to take precautionary measures and lead to higher risk.

On the basis of this reasoning, direct compensation by government should not be a preferred option to deal with offshore-related damage. That is not to say that there is no role for government in the aftermath of a disaster caused by an offshore-related incident. Relief measures and coordinating disaster management in the immediate aftermath of the disaster are undoubtedly tasks where the government can play an important role. However, the cost of the damages should ultimately be placed on the responsible, liable party. This corresponds to sound economic principles of costs internalization and to the polluter-pays-principle.

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361 This argument has been strongly made in Howard Kunreuther & Erwann Michel-Kerjan, *Challenges for Terrorism Risk Insurance in the United* States, 18 J. ECON. PERSP. 201, 210–11 (2004).

362 *See* Saul Levmore & Kyle D. Logue, *Insuring Against Terrorism and Crime*, 102 MICH. L. REV. 268–310 (2003).

b. Reinsurer of Last Resort

It is possible that without state intervention, insurance coverage for disasters would simply be insufficient.[363] Reinsurance by the state can then be considered as an adequate method to resolve the coverage gap.[364] A condition is of course that the government charges an actuarially fair premium for its intervention, and so still provides preventative incentives to avoid a negative redistribution.[365] State intervention in the form of a reinsurer may avoid the "catastrophic responses to catastrophic risks" problem.[366] This is used very often to cover natural hazards and terrorism. [367]

However, for the case of offshore-related damage the arguments in favor of such an intervention by government as reinsurer of last resort do not seem compelling. One important condition for such an intervention would be that a market solution is largely failing. That may be the case for terrorism and natural hazards,[368] but it is doubtful whether this is the case for liability risks created by industry. Insufficient insurance coverage on traditional insurance markets may only arise for the catastrophic incidents. However, various proposals have been formulated by commercial entities to create market solutions, which would enable coverage also for these disastrous types of offshore-related incidents. In this respect we can refer both to the proposal formulated by Noble Energy[369] as well as to the proposal formulated by Munich Re.[370] Even though these proposals may not have materialized yet, the government reinsurer of last resort is not the

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363 This is a point strongly made by Howard Kunreuther, *Mitigating Disaster Losses through Insurance*, 12 J. RISK & UNCERTAINTY 171, 180–83 (1996); Scott E. Harrington, *Rethinking Disaster Policy*, 23 REG. 40, 40–42 (2000); *c.f.* Reimund Schwarze & Gert. G. Wagner, *In the Aftermath of Dresden–New Directions in German Flood Insurance*, 29 GENEVA PAPERS ON RISK & INS. 154, 154 (2004).

364 These public-private initiatives to cover extreme risks are also supported by OECD recommendations. *See* Alberto Monti, Organization for Economic Cooperation and Development, *Disaster Risk Financing in APEC Economies–Practices and Challenges* (Sept. 20, 2012).

365 Michael Faure, *Financial Compensation for Victims of Catastrophes: A Law and Economics Perspective*, 29 L. & POL'Y 339, 358 (2007).

366 *See* Richard Epstein, *Catastrophic Responses to Catastrophic Risks*, 12 J. RISK & UNCERTAINTY 287, 291–92 (1996). *See also* Howard Kunreuther & Mark Pauly, *Insurance Decision-Making and Market Behavior*, 1 FOUND. & TRENDS IN MICROECONOMICS 63 (2005) (arguing that this government's role in assisting the supply side allows avoiding the inefficiencies and inequities associated with disaster assistance).

367 Kunreuther & Michel-Kerjan, *supra* note 361, at 203–04, 207–08.

368 For further details, *see* Veronique Bruggeman, Michael Faure & Tobias Heldt, *Insurance Against Catastrophe: Government Stimulation of Insurance Markets for Catastrophic Events*, 23 DUKE ENVTL. L. & POL'Y F. 185, 185 (2012).

369 *See supra* Part V.B.

370 *See supra* Part V.C.3,

answer, but rather a duty imposed on industry to provide adequate coverage. As a result, the industry will and shall develop market solutions to provide appropriate coverage. There is also criticism on the fact that these public-private partnerships in practice do not always work in the way they should, more particularly because the government may have the tendency to shift too much of the costs to private insurers.[371] Notwithstanding the advantages of this model in the area of terrorism and natural hazards, for offshore-related risks there is no reason yet to discuss the option of an intervention of government as reinsurer of last resort since it is unclear still whether market solutions can provide adequate coverage.

c. A Compensation Fund

OSLTF, a compensation fund, is used in the US to cover oil pollution damage arising from vessels and oil facilities. Increasing the current tax that is collected from oil producers and importers could enhance the capacity of OSLTF. Compared to solutions like insurance, the fund has the disadvantages of lacking risk differentiation and causing high administrative costs.[372]A volume-based tax cannot reflect the risks each offshore facility creates. Gabison proposes a tax refund policy to reward the better record keeper, therefore creating better risk differentiation. This may not totally solve the problem, however, since the OSLTF pools together risks of vessels and fixed platforms, which are by nature different risks. Moreover, the chance that a catastrophic offshore accident happens is small. A safe record in the last year would not necessarily be an indicator that the facility constitutes a lower risk. Risk differentiation concerning offshore activities is already difficult for an insurer, who usually specializes in doing so. Fund managers would have an even more difficult task in accurately differentiating risk profiles.

VII. RECOMMENDATIONS: TOWARDS A MULTI-LAYERED APPROACH

The development of new technology makes the offshore exploration and exploitation activities go deeper and further. The need for oil and gas resources from these activities will remain large in the coming decades. Increasing energy needs together with the risks associated with

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371 *See* Dr. Anselm Smolka, Head of Geological Risk Research, Munich Re., Presentation at Conference on Regulating Disasters Through Private and Public Law in Haifa (Jun. 16, 2013).

372 For the comparison between insurance and compensation funds, see Michael Faure, *Environmental Liability*, *supra* note 324, at 268–69; LIU JING, *supra* note 308, at 142–54.

offshore activities make a proper liability and compensation design in cases of accidents a serious concern.

A. Liability Rules and Financial Security

According to economic analysis, a few principles need to be followed in the future design of liability rules. In most jurisdictions, strict liability is imposed on the licensees or operators of offshore facilities. This, however, should not be explained narrowly to exclude the potential liable parties who may also contribute to the risks. Law and economics scholars usually oppose channeling of liability, since it will not provide incentives to other risk creators to take preventive measures. Admittedly, in the case of offshore activities, the operators can still shift part of the liability to their contractors through contractual arrangements and monitor the subsequent behavior. Liability should not be capped, since capped liability, together with strict liability, will create insufficient incentives for the injurers to take preventative measures.

The Deepwater Horizon accident showed that offshore accidents may cause damages worth up to tens of billions of US dollars. BP, a major oil company with big reserves was liable in that instance. However, should such an accident happen at the well of an SME, the company could easily have gone bankrupt in its payment of damages. Though the liability itself is not capped, the insolvency problem will make the liability de facto limited to the assets a company has. A financial security requirement can help to relieve that problem. Ideally, the amount of financial security should be able to cover the potential damage an offshore facility can create. The depth of well, distance from coast, climate, and other factors all contribute to vastly different risk profiles for various facilities. A general amount of financial security set in the legislation could not be tailored to specific situations. Leaving discretion to regulators can make a financial security cap more specific, based on the specific risks each offshore facility constitutes. This advantage needs to be balanced against the risk of public authorities being lobbied and serving private interests. Setting a minimum standard, provide criteria to determine the financial security cap in legislation, and to allow flexibility for regulators to decide the specific amount and suitable instruments to realize the obligation is a possible solution.

B. Compensation: A Scenario-based Approach

Even when a perfect financial security cap could be determined, the question still remains which type of instruments should be used by the potential liable parties to provide sufficient coverage. This section presents a few proposals to improve the instruments for offshore

liability coverage after Deepwater Horizon. Whether or not more regulatory action is needed strongly depends on the type of accident and the solutions that could be employed for each specific situation:

1. For smaller accidents, a mandatory financial security is required in many regimes. For example, in the US, the required financial coverage of offshore facilities varies from 10 to 150 million USD. Another private scheme, OPOL mandates and complements financial security up to 250 million USD. However, OPOL has multiple limitations:
    - only applicable to the North Sea;
    - only mandatory in the UK;
    - only providing solvency guarantees;
    - never applied in practice and hence no practical experience;
    - no risk differentiation and hence no incentives for prevention.

    OPOL relies on a variety of instruments, such as self-insurance or guarantees, but a solution will be necessary even in this lower category of accidents for the cases and territories where neither OPOL nor mandatory financial security apply.

2. For medium-size accidents, even if they go beyond the limit required by law or provided by OPOL insurance, solutions available on the commercial market can still be used as well as pooling arrangements like OIL and OCIL. The estimate of the available amount on the insurance market varies from 500 million USD to 1.5 billion USD. Considering the volatility of insurance market for offshore facilities, a moderate damage estimation: 750 million USD is used here to signify the limit of medium-size accidents.

3. Only for the category of large accidents, where damage is above 750 million USD, will insurance possibly be unavailable or only partially available. In those cases, only majors would be able to provide coverage based on the balance sheets via either self-insurance or captives. In the US, a compensation fund is available to provide compensation up to 2.7 billion USD. However, in many other jurisdictions, a fund with such a high compensation limit is not always available. Moreover, the compensation fund is criticized for lacking efficient preventative incentives for the potential liable parties. A broad use of a fund cannot be recommended, unless risk dependent contributions could be charged, which in turn creates high administrative costs.

This could either lead to a regulatory recommendation to use risk assessment in order to determine the potential damage resulting from particular operations. One consequence may be allowing only majors to engage in activities that could lead to large damages or suggesting that small and medium-size operators engage only in joint ventures with majors. This suggestion, however, would not be politically feasible given competition considerations.

The second best solution would be to use different types of instruments to cover potential liability, depending on different scenarios of potential damage. A distinction can be made between: (1) small accidents up to 250 million USD, where the existing financial security requirement or OPOL has provided a solution; (2) medium-size accidents between 250 million USD and 750 million USD, where the damage is higher than existing financial security requirement/OPOL limit, but still insurable on the commercial market; and (3) catastrophic accidents above 750 million USD, where no financial coverage via the regular commercial market can be obtained.

The starting point for each scenario is that mandatory financial security should always be provided, but that the instruments utilized can vary. The scenarios and specific instruments that can be used in each case will be briefly outlined here.

Scenario 1: damage maximum 250 million USD

UK/North Sea: OPOL	Other areas: Other regional arrangements (to be developed)[373]
Mandatory financial security via: • self-insurance[374] • insurance • industry pooling (like OIL/OCIL or comparable pooling mechanisms)[375] • other	

For small accidents, many instruments can provide financial security coverage. The majors may prefer self-insurance, given the potential

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373 *See supra* Part V.C.

374 *See supra* Part V.A.

375 On the condition that risk dependant contribution schemes can be developed, *see* discussion *supra* Parts V.C, VI.D.3.

costs-saving possibilities. Commercial insurance can be used by SMEs, usually together with a lower amount of retention. Industry pooling provides another choice, either by existing pools such as OIL and OCIL, or by establishing other comparable pooling mechanisms.

OPOL provides coverage in the North Sea. Similar schemes can also be developed in other regions, by pooling similar risks together. It is worth noting that OPOL does not provide direct coverage, but requires its members to cover their liability up to 250 million USD themselves. It intervenes only when the member or its guarantors are not able to provide compensation.

Scenario 2: damage between 250 million USD and 750 million USD[376]

UK/North Sea*:* OPOL	Other areas: Other regional arrangements (to be developed)[377]
Mandatory financial security via: • self-insurance • insurance • industry pooling (like OIL/OCIL or comparable pooling mechanisms) • other	

For these medium size accidents, the available compensation instruments are similar to scenario one. However, in this case, the existing limit of OPOL or a potential similar arrangement in other regions may be exceeded. In this case, the operators can still resort to the commerical insurance market or self-insurance. The other possibility is to expand the amount available from OPOL or other pooling systems. However, this approach is strongly opposed by majors, which argue that the different risks between operators are large, and mandatory pooling will lead to cross subsidization from good risk to bad risk operations. Although a mandatory pooling is thus not desirable, an increased financial security requirement can enhance the capacity of the pooling system as a solution for SMEs.

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376 As can be noticed, this scenario is basically the same, as far as the instruments to be used are concerned, as scenario 1 with the difference that the OPOL limits do not apply.

377 *See supra* Part V.C.2.

Scenario 3: damage above 750 million USD

Mandatory financial security until risk related amount[378]
First best: • Majors: self-insurance/captives[379] • Others: less risky activities[380]
Second best:[381] • Munich Re facility[382] • Noble Proposal (a retrospective pooling scheme)[383] • Expanding other pooling systems[384] • Fund with risk-related contributions[385] • Government as reinsurer of last resort[386]

In case of a catastrophic accident, the existing instruments on the market are not able to provide sufficient coverage. The majors may be able to cover the potential damage independently through self-insurance. However, the SMEs will be insolvent and so will have no incentives to take sufficient care at all. The approach limits SMEs to less risky offshore activities and so is not politically possible. Another solution is to rely on the market for the new emerging arrangement. After the Deepwater Horizon accident, a few proposals have been made

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[378] As argued in Part V.C., in principle, mandatory security should be provided to the amounts of the expected damage. The damage expectation can depend upon the nature and type of the offshore exploration and should hence be based on objective risk-related criteria, to be decided by the licensing authority.

[379] Majors, i.e. those oil and gas producers that can in principle cover also disastrous losses through their balance sheet, should remain flexible to choose their own hedging strategies to finance future losses, but of course need to be supervised by licensing authorities.

[380] To the extent possible, smaller OGPs should be licensed for less risky activities, i.e. drilling activities with less potential damage (drilling of wells with less pressure, no deepwater drilling, not close to the coast, etc.). Thus it is avoided that they create risks of causing damage above 750 million Euro and hence externalize a risk to society.

[381] All these possibilities are in fact "second best" since they all have (considerable) disadvantages and are also largely rejected by the stakeholders involved, which may make implementation (politically) impossible.

[382] *See supra* Part V.B.

[383] *See supra* Part V.C.3.

[384] *See supra* Part V.C.1–2.

[385] To the extent risk-related contributions can be charged, a fund should not be problematic. However, in practice such a fund is often financed through a flat tax, which leads to negative effects for prevention and to negative redistribution. *See supra* Part VI.D.4.

[386] Also, this is generally not a viable solution since it may (if government does not charge market conform premiums) lead to a subsidization. Hence, for man-made (technological) disasters, this does not seem like an ideal solution. *See supra* Part VI.D.4.b.

to provide coverage up to 10-20 billion USD, including insurance, a retrospective pooling system, a fund and government as reinsurer of last resort. The initiators of the insurance and pooling systems argue that a legal obligation to join them will be necessary to secure enough capacity. However, the analysis above shows that offshore facilities possess substantially different risks. Forcing all parties to join the same pool will create insufficient incentives across all operations. Instead of making them mandatory, the government should take measures to promote their development. A compensation fund is also proposed as a solution, however, risk-related contributions are important to ensure sufficient precaution from the potentially liable parties. Government can act as reinsurer of last resort in covering many catastrophic risks, but that solution may be less suitable for the offshore industry.

VIII. CONCLUDING REMARKS

The structure of an efficient liability and compensation regime for damage resulting from offshore installations has been high on the political agenda worldwide for a few years, triggered by the Deepwater Horizon incident. American victims were relatively "lucky" to have been confronted with an operator—BP—that could provide US$ 20 billion to be distributed inter alia via the Gulf Coast Claim Facility ("GCCF") managed by Ken Feinberg. There are a large number of operators in the US that are substantially smaller than BP and that may not be able to similarly compensate victims. The problem of how to realize compensation when losses could have a potentially catastrophic character not only arises in the US—where at least there is some liability regime via the Oil Pollution Act—but also in the European and global marketplace. The European Union prescribed that licensing authorities must verify whether operators of offshore installations have the financial capacity to guarantee compensation in case of an accident. How licensing authorities should verify this financial capacity has not been further regulated yet. At the international level the lack of any regime concerning liability and compensation for offshore related damage is striking, especially in the light of the fact that since the 1960s there has been a detailed international framework for vessel based pollution.

We have argued in this contribution that it is important to work out a detailed liability and compensation regime and that such a regime should take into account the differentiated character of operators, offshore activities, and the potential damage that could result from those activities. We have, based on a review of legal and economic literature, but also on the basis of many interviews with relevant stakeholders,

reviewed and critically analyzed a variety of possibilities to generate high amounts of compensation, even for catastrophic losses. Those high amounts should not be available for all types of operators and offshore-related activities. It is for this reason that we propose a multi-layered approach whereby, depending upon a careful risk assessment by licensing authorities, different demands are placed on different types of operators and operations. Stakeholders from the financial and insurance industry make clear that cover can also be provided for the catastrophic Deepwater Horizon type incidents. However, stakeholders also made clear that without a regulatory duty to force stakeholders to provide that type of financial security, it is unlikely that those types of solutions will emerge from the market. High coverage can be provided, but there is an unavoidable price to be paid by operators. That price will lead to a correct reflection of the risk represented by offshore installations and will be passed on by operators in the prices paid by the end users. The lesson is therefore that if at the policy level there is a willingness to work out a regime *ex ante* to guarantee adequate compensation to victims, the necessary step is unavoidably the imposition of a regulatory duty to provide financial coverage for catastrophic losses.