Preventing pollution through the compensation for damage?
An appraisal of the European experience in the field of marine oil spills

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Abstract
This paper discusses the ability of liability and compensation mechanisms to provide adequate incentives for the prevention of accidental oil spills in marine ecosystems. The discussion is based on a retrospective analysis of the process of valuation and compensation of damages that followed several major pollution events in Europe in the last thirty years. We give evidence that efficiency in the implementation of the polluter pays principle in the context of oil pollution is limited by several factors. Firstly, assessment of the impacts of oil pollution on social welfare presents empirical difficulties which enhance the possibilities of strategic use of evaluations and controversy. Secondly, the compensation framework that applies in Europe, as defined by the international CLC/FUND regime, excludes several components of the social cost of oil spills from compensation in practice. Lastly, the settlement of oil pollution claims is likely to lead to procedural and litigation difficulties, which themselves deter claimants from pursuing compensation.

Keywords:
Liability, oil pollution prevention, damage assessment, compensation procedures

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1. Introduction

The deterrent function of liability rules in the field of accident prevention has been the focus of a growing body of literature in law and economics. Provided that several hypothesis hold, the use of liability mechanisms may result in the achievement of efficient levels of prevention by passing the overall social cost of damage to the person responsible for the accident (Shavell 1987). While this result has become a milestone in the economics of accident prevention, more recent works have challenged it, taking into account additional assumptions such as the possibility for the wrongdoer to avoid compensation payments (judgment proofness, capping of financial responsibility…), the involvement of several agents in the financing of compensation (third-party liability insurer, extension of liability to a financial or commercial partner of the polluting firm…), or the existence of asymmetric information (Pitchford 1995; Boyd and Ingberman 1997; Boyer and Laffont 1997). These works have significantly extended the scope of economic analysis of accident prevention, by exhaustively circumscribing the validity of the original results, and by establishing the possibly counterintuitive effects of liability (Beard 1990; Pitchford 1995). However, the robustness of theoretical results established in the literature contrasts with the limited number of published empirical studies in this area, in particular as regards the context in which liability rules are applied. As clearly demonstrated by Dewees (1992) and Dewees, Duff et al. (1996), this is likely to be a key issue in the discussions of the effectiveness of liability rules, as the impact of the tort system in deterring accidents differs significantly among substantive areas of law.

This observation applies in particular to the literature on the use of liability as a deterrent in the prevention of oil pollution at sea4. Existing works mainly focus on the general architecture of the liability regime and the principles by which this architecture may affect its effectiveness as a prevention tool5, while seldom referring to case studies. Gaining insights as regards the true effectiveness of liability rules as prevention tools in the specific case of oil spills requires a more in depth analysis of the actual process of damage valuation and compensation following accidents, taking into account the specificities of oil pollution at sea.

The objective of this paper is to assess the capacity for the current international liability regime concerning oil spills at sea to produce incentives encouraging better prevention of accidents. The assessment is based on the retrospective analysis of major spills that took place in European waters over the past thirty years. Emphasis is on the process of valuing and compensating for damages caused by pollution, a key issue in the internalization of the total cost of pollution through the use of liability mechanisms.

Section 2 presents the standard model of liability and its implications in terms of compensation of damages. Section 3 provides a brief presentation of the international regime for the compensation of oil pollution at sea. Based on the analysis of data available concerning damage valuation and compensation in six major European spills, and analysis of the extent to which the estimated social cost of these spills was compensated for under the liability regime is also presented. Section 4 discusses the key factors explaining apparent differences between estimates of social costs and compensation payments, therefore limiting the effectiveness of the liability regime as a deterrent of accidents. Section 5 concludes.

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5For an exhaustive discussion of the impact of the architecture of the international regime in terms of accident prevention, report to Faure and Hui (2006).
2. Liability as a prevention tool: key determinants

A simple model of liability allows us to review the key determinants of its effectiveness as a prevention tool. Following Shavell (1987), we consider an economic activity which entails a risk of accident, and associated damages to society. The social cost of damages if the accident occurs is called \( D \). The agent responsible for the economic activity has a priori no influence on this cost, but can control the probability that damages will occur by adopting preventive measures, the level of which is called \( x \). The probability of an accident is a decreasing function of \( x \):

\[
p(x) = p(0) = 1, \lim_{x \to 0} p = 0, \ p'(x)<0 \ \text{and} \ p''(x)>0 \quad \text{Equation 1}
\]

The cost of prevention increases with \( x \):

\[
c(x) = c(0) = 0, \lim_{x \to +\infty} c = +\infty, \ c'(x)>0 \ \text{and} \ c''(x)>0 \quad \text{Equation 2}
\]

Hence the risk of accident entails an expected social cost of \( c(x)+p(x) \cdot D \) which will be high for low levels of prevention efforts, due to high risks of damages, and for high levels of prevention efforts due to the cost of these efforts. The optimal level of prevention can be defined as that which minimizes the social cost of accidents associated to the activity:

\[
\min_x c(x)+p(x) \cdot D \quad \text{Equation 3}
\]

The socially efficient prevention effort \( x^* \) is that which renders the marginal cost of prevention and the marginal expected cost of damages equal:

\[
x^* | c'(x) = -p'(x) \cdot D \quad \text{Equation 4}
\]

If the agent is legally constrained to compensate for damages caused by accidents, by a financial payment \( I \), his prevention strategy consists in minimizing his expected private cost of accidents, which is equal to the sum of the costs of preventive efforts and of the expected compensation which will need to be paid in case of accident:

\[
\min_x c(x)+p(x) \cdot I \quad \text{Equation 5}
\]

The level of prevention adopted will thus be such that the marginal cost of prevention is equal to the marginal expected cost of compensation:

\[
\hat{x} | c'(x) = -p'(x) \cdot I \quad \text{Equation 6}
\]

It follows from equations 4 and 6 that the level of prevention effort adopted by the private agent will be socially efficient only if compensation payments \( I \) are strictly equal to the level of damages \( D \) in case of an accident. If the financial liability of the agent in case of accident is lower than the cost of damages, prevention efforts will be too low and risks of accidents too high, from a social point of view.

3. The international regime for the compensation of oil pollution damage

The increase in the number of oil spills from tankers in Europe has led to the development of
an institutional framework for the compensation of damages following these pollution events. After the Torrey Canyon incident in 1967, a strict liability-based compensation regime was set up in two international conventions: the Convention on Civil Liability for Oil Pollution Damage of 1969 (known as CLC convention), and the Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage of 1971 (known as FUND convention). The former established the strict liability of ship-owners in case of an incident, limited to an amount per accident which is linked to the tonnage of the vessel involved, and associated to compulsory insurance. The latter set up a supplementary fund financed by oil importers established in member countries of the FUND convention, for the compensation of damages that could not be fully compensated under the CLC regime, up to a maximum. The FUND Convention set up an international organization, the International Oil Pollution Compensation Fund (IOPC Fund), to administer this unique international regime for the compensation of the costs of pollution damage.

Original conventions were amended in 1992, leading to the 1992 CLC and 1992 FUND conventions which, among other changes, significantly increased maximum available compensation amounts. In 2003, a Supplementary Fund Protocol was adopted, which also increased the total amount of compensation available per accident, for those countries that agreed to join this protocol. In these countries, the overall amount for compensation after an accident was thus set at SDR 750 Millions, or Euros 869 Millions\(^6\) (See Figure 1).

![Graph showing compensation amounts](image)

**Figure 1 - Maximum amounts of compensation available under the 1992 and 2003 Conventions (expressed in Special Drawing Rights)**

Between their establishment and the end of 2005, the international oil pollution compensation funds (both 1971 and 1992) have been involved in the settlement of claims arising from 129 events, and have paid compensation in the order of 740 Millions euros in current value\(^7\) (Anonymous 2005). 45% of this amount was spent for the compensation of damages arising from the six major European spills on which the analysis of this paper is based, namely: the Tanio (1980), the Aegean Sea (1992), the Braer (1993), the Sea Empress (1993), the Erika (1999) and the Prestige (2003) spills. A brief description of each accident and of the compensation process which followed is provided in table 1. For comparative purposes, the

\(^6\) Using the following exchange rate: 1 SDR=1,15856 euro at the date of November 21st, 2006. Source: [http://www.imf.org](http://www.imf.org)

\(^7\)A total of £501 Millions in current value was paid for damages caused by spills.
case of the Amoco Cadiz oil spill (1978) is also included in the following analysis, although compensation following this accident was not dealt with under the international liability regime.

Based on published and unpublished economic studies that were carried out with respect to these accidents, and available reports on the compensation process that followed the spills, global statistics were compiled concerning the (i) spill cost estimates; (ii) amounts of compensation claimed by the victims of the accidents; and (iii) final compensation payments made under the liability regime. In order to arrive at global estimates per accident, for each of these three category of figures, account was taken of the timing of the assessments / payments, and national price indexes were used as deflators to convert all figures into 2006 value. 2006 exchange rates between the currencies in which estimates were available were then used to convert all figures into 2006 Euro value.
Table 1 – Global cost estimates, compensation claimed and compensation paid in seven major oil spills in Europe, in October 2006 (Million Euros 2006)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Accidents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amoco Cadiz</td>
</tr>
<tr>
<td>Date of accident</td>
<td>21/03/1978</td>
</tr>
<tr>
<td>Quantity of oil spilled (tons)</td>
<td>220 000</td>
</tr>
<tr>
<td>Contaminated coastline (km)</td>
<td>350</td>
</tr>
<tr>
<td>Length of compensation process</td>
<td>14 years</td>
</tr>
<tr>
<td>Number of claims</td>
<td>≥ 900</td>
</tr>
<tr>
<td>Total estimated cost of damages</td>
<td>[767.2–880.7]*</td>
</tr>
<tr>
<td>(a) Total compensation claimed</td>
<td>837.6</td>
</tr>
<tr>
<td>Compensation paid to victims</td>
<td>163</td>
</tr>
<tr>
<td>Compensation paid by the insurer of</td>
<td>37.7</td>
</tr>
<tr>
<td></td>
<td>91.7</td>
</tr>
<tr>
<td>Maximum compensation available under</td>
<td>36.3</td>
</tr>
<tr>
<td></td>
<td>91.7</td>
</tr>
<tr>
<td></td>
<td>91.9</td>
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<tr>
<td></td>
<td>93.5</td>
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<tr>
<td></td>
<td>87.8</td>
</tr>
<tr>
<td></td>
<td>211.7</td>
</tr>
<tr>
<td></td>
<td>193.2</td>
</tr>
</tbody>
</table>

na: not available.

(a) and (b): values for the year of the accident, converted into 2006 monetary units based on official prices indexes for France, Spain and the UK, and converted into Euros using 2006 exchange rates.

(a): cost to third parties, excluding the cost of lost cargo and ship.
(b) to the exception of the Amoco Cadiz case, in which damages were compensated for outside the international liability regime, claims accounted for here are those submitted to the Fund and the vessel owner or his insurer, under the CLC-Fund rules. Claims presented in courts outside the civil liability regime (e.g. the penal procedures in the Erika case) are not included here.

(cf#) values accounted for are those which were registered all along the compensation process, which were converted to 2006 value based on official price indexes for France, Spain and the UK, and converted to Euros using 2006 exchange rates.

(cl): compensation paid to victims. The figures here sometimes differ from the amounts paid by the ship owner, his insurer and the Fund (c2), due to the existence of other responsible parties which also contributed to compensation payments. Figures presented here also exclude compensation and financial support measures which were paid to victims by public organizations in addition to those paid under the liability regimes (legal suite in the Amoco Cadiz case, CLC-Fund conventions in the other cases).

(c2): compensation costs supported by the ship owner, his insurer and the Fund under the international liability regime.

(d): maximum compensation amounts available under the international liability regime, as determined after each accident, converted into 2006 monetary units based on official prices indexes for France, Spain and the UK, and converted into Euros using 2006 exchange rates.

*: Compiled from the following: OECD (1982); NOAA (1983); Bonnieux and Rainelli 1991.

**: Source: Moore, Footitt et al. (1998)

***: Source: Cabinet Mazars & Guérard (2001)

****: Source: Loureiro, Ribas et al. (2006)
Results as illustrated in table 1 show the existence of a divergence between estimates of the costs entailed by an accident, compensation claims by the victims, and compensation eventually paid under the liability regime. This divergence is observed both under the CLC-FUND regime, and in the case of the legal suit that followed the Amoco Cadiz accident.

First, in most cases where total damage assessment is available, this is only in terms of bracket figures for the cost of the accident, implying a fairly large degree of uncertainty as to the exact value of at least some categories of damages. Second, in several cases, total compensation claimed is lower than the estimated total costs of damages. While this is not always the case at the level of total accident costs, it is frequently observed at finer scales, for specific categories of damages. Third, a fairly large difference between the amounts of compensation claimed and those eventually paid to victims is observed: in five cases out of seven, less than 50% of the value of claims was compensated under the liability regime (25% on average in the six accidents covered by the international liability system). The actual cost of compensation to the responsible parties as defined under the CLC-FUND conventions was even lower, reaching at most 40% of compensation claimed in the case of the Braer, but only 25% on average in the five other accidents covered by the regime.

Overall, the analysis thus shows that following an oil spill, there can be fairly large discrepancies between the estimated cost of damages and compensation paid to the victims of pollution. Referring to the simple model of liability developed in the previous section, one would thus expect only limited efficiency in spill prevention to be achieved via the liability regime, in this case. The following section presents a detailed empirical analysis of the factors explaining differences between damage assessments, compensation claims and compensation payments.

4. Limits to the internalization of the social cost of oil spills through the CLC/FUND regime.

Analysis of each of the process of damage assessment and compensation, following each of the accidents considered, results to the distinction of three categories of factors leading to the existence of the differences observed in table 1. These difficulties relate: (i) to the assessment of damage costs itself and the associated uncertainty; (ii) to the legal limitations imposed by the liability regime in terms of acceptable claims; and (iii) to the extent to which victims can easily access compensation under the liability regime, all of which constitute limits to the ability of the international regime to fully compensate the cost of oil pollution.

4.1. Lack of accuracy in the assessment of oil pollution damage

Major oil spills usually impact significant portions of coastal ecosystems, affect thousands of people in many different ways. Aside from the costs linked to loss of ship and cargo, economic impacts of oil spills can relate to one, or several of the following categories:

- expenses are usually incurred in relation to preventive measures and clean-up operations

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8 For a detailed analysis of the process of damage assessment and compensation in the case of the Amoco Cadiz, report to Hay and Thébaud (2002).

9 As stressed in the footnotes of table 1, the figures considered in this analysis concerning compensation payments only account for payments made to victims under the liability regimes (legal suit in the Amoco Cadiz case, and CLC-FUND conventions in the other accidents). This excludes other financial assistance and compensation payments made by public institutions at local, regional, national and European levels.
- oil may pollute private and public property, entailing a reduction in the value of property;
- commercial businesses may be affected by the pollution, independently of whether they own property that has been polluted; and consumers may be affected by the spill either directly (loss of amenity, health effects), or indirectly (fish food market, tourism);
- finally, the ecological impacts of an oil spill may in themselves entail welfare changes. Such impacts often lead to undertake reinstatement measures.

As illustrated in Table 2, the proportion of each category in the overall estimated cost of damage is likely to vary from one accident to another, due to the specific characteristics of each pollution (type and amount of oil spilled, preventive and clean-up strategies, ecological and economical characteristics of the impacted coastline).\(^\text{10}\)

<table>
<thead>
<tr>
<th>Clean-up and response measures, damages to goods</th>
<th>Amoco Cadiz(^a)</th>
<th>Sea Empress(^b)</th>
<th>Erika(^c)</th>
<th>Prestige(^d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Losses of profit</td>
<td>36%</td>
<td>44%</td>
<td>33%</td>
<td>66%</td>
</tr>
<tr>
<td>Losses of amenities</td>
<td>14%</td>
<td>27%</td>
<td>61%</td>
<td>31%</td>
</tr>
<tr>
<td>Environmental damage</td>
<td>40%</td>
<td>24%</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
</tbody>
</table>

\(^a\) Source: Hay and Thébaud (2002)
\(^b\) Source: Moore, Footitt et al. (1998)
\(^c\) Source: Cabinet Mazars & Guérard (2001)
\(^d\) Source: Loureiro, Ribas et al. (2006)

Table 2. Breakdown of the estimated social cost of four major oil spills (share of each cost category expressed in percentage of total cost estimate, n.a.: not available)

Accuracy in the assessment of each category of damage is essential in the overall performance of a liability regime, both ensuring that victims get appropriate compensation for the damage they suffered and inducing polluters to exercise levels of precaution in relation with the harm they are likely to generate. The analysis of economic studies carried out following several European tanker accidents indicates that, although this typology of damages, and the principles of their measurement in terms of welfare losses are well-established from a theoretical perspective, the assessment of oil pollution damage faces ongoing challenges from an empirical standpoint (NOAA 1983; Grigalunas, Anderson et al. 1986; Bonnieux and Rainelli 1991; SEEEC 1998; Grigalunas, Opaluch et al. 1998; Loureiro, Ribas et al. 2006). In particular, it may prove difficult in practice to clearly circumscribe the overall impact of the pollution event. In addition, the empirical information required to assess the welfare impacts of pollution is often lacking, and methodological choices as to the best approach towards impact assessment may be controversial.

The problem of causation of damage

The link of causation between damages and the pollution event seems easy to establish for some components of the social cost of oil spills (property damage, clean-up and restoration

\(^\text{10}\)For a discussion of the factors which have an impact of the overall cost of a spill in terms of compensation paid, report to White and Molloy (2003).
measures conducted in the polluted area). However, other elements of the social cost of spills can prove more difficult to relate to the pollution itself. This is the case of losses of profit due to pollution, which may be difficult to disentangle from the variations in profit due to other factors, both ecological (e.g. meteorological factors or hydrological factors affecting fisheries) and economic (e.g. changes affecting the wider market on which the private operators impacted by the spill operate). It is also the case for economic losses from longer–term residual environmental damages, or losses of amenity of a more or less widespread population affected in different ways by the spill.

Circumscribing the overall impact of a spill is therefore not always straightforward, at least for some components of the social cost which can be significant (cf. table 2). Where this is the case, assumptions must be made as to the contribution of the pollution event to observed variations in welfare, different assumptions potentially leading to significantly different results in terms of magnitude of estimated damage costs, hence the bracket values obtained in many cases.

**Availability of data and choice of valuation methods**

In addition to the problem of understanding the impacts of oil spills, investigators are often confronted with a lack of adequate information, which is either absent, too fragmentary or too costly to collect for all the agents affected in all the areas impacted by the spill. Prior knowledge of natural resources within the polluted area is usually a major difficulty, due to the lack of adequate monitoring programs (Laubier 1991). This is also the case for basic economic data concerning the economic sectors affected by spills, which is often lacking at the geographical and temporal scales required to assess damages (Bonnieux and Rainelli 1991; Edwards and Sime 1998). Similar observations can be made regarding the basic data required to assess losses of amenities, with only limited data being collected on people’s perception of ecosystem and landscape quality, and their associated preferences (NOAA 1983; Bonnieux and Rainelli 1991).

In practice, problems due to lack of economic data can be solved through the use of indirect economic indicators or of simplifying assumptions, thus leading to balance analytical rigor in the economic valuation of damages with empirical feasibility. For example, in the case of the Amoco Cadiz, lack of detailed information on the level of economic activity of firms operating in the tourism industry led economists to use indicators such as wages or local sales of flour to assess the global impact of the oil spill on this sector (Bonnieux and Rainelli 1991). As choice of the proxy variables used may influence the cost estimates, this creates uncertainty in the valuation process.

In some cases, the issue may extend to that of choosing between alternative valuation methodologies, themselves leading to different cost estimates. This seems to be particularly the case with respect to the valuation of non-market impacts of spills, for which different methodologies can be applied (travel cost, hedonic prices, contingent valuation, benefit transfer…). The study of oil spills after which several of these methods were employed shows that estimates of losses diverge according to the method used, thus also leading the production of bracket, rather than target, cost estimates (NOAA 1983; Bonnieux and Rainelli 1991; Moore, Footitt et al. 1998).

**4.2. Legal limitations regarding acceptable compensation**

In addition to the ease of assessing in monetary terms the overall impact of an oil spill, emphasis must also be placed on the way the latter is taken in account within the liability system in charge of compensating victims. This concerns the definition of both scope and
maximum amounts available for compensation, the impacts of which factors on the internalization of the social cost of pollution are considered successively hereafter.

The definition of ‘pollution damage’

The CLC and FUND Conventions define a number of rules and procedures for the treatment of claims. The compensation system operates on the basis of a definition of the notion of “pollution damage” which serves to delimit the domain of admissible claims\(^\text{11}\). As stressed by Jacobsson (1993), while the definition of pollution damage under the original Conventions was not entirely clear due to its general wording, the IOPC Fund developed certain principles as regards the interpretation of this term in practice, based on its experience. In particular, debates on this issue with respect to particular claims and in inter-sessional working groups of the Fund\(^\text{12}\) have led to the establishment of certain principles as regards claims. A close look at these principles and the past decisions of the IOPC Fund as regards the compensation of claims presented in the aftermath of European spills clearly indicates that some components of the total economic cost of oil pollution are well taken into account within the international liability framework, while others go uncompensated.

The cost of measures taken to clean shorelines and coastal installations, as well as to clean, repair or replace property that has been contaminated by oil is admissible within the international compensation framework, as long as they are considered reasonable and supported with pieces of evidence. Clean-up operations are considered as “preventive measures”\(^\text{13}\) and the requirement of their reasonableness is assessed on the basis of objective criteria available at the time of the decision to take measures. Emphasis is placed in particular on the technical feasibility of such measures, their chance of success, the adequacy between their costs and the benefits expected.

Concerning claims relating to loss of profits due to oil pollution, a distinction is made between consequential loss (ie loss suffered by users of property which have been polluted as a result of a spill) and pure economic loss (ie sustained by persons whose property has not been contaminated). Consequential losses are accepted in principle, as long as evidence is given that the pollutant affecting the victim is the one that was spilled and that the quantum of the claim is proved. As regards pure economic loss, claims are only accepted if a “reasonable degree of proximity” is established between the contamination and the prejudice for which compensation is claimed. In order assess if a claim for pure economic loss fulfills the criterion of reasonable degree of proximity, several factors are taken into account\(^\text{14}\):

- the geographic proximity between the claimant’s activity and the contamination;
- the degree to which a claimant was economically dependent on an affected resource;
- the extent to which a claimant had alternative sources of supply;
- the extent to which a claimant’s business formed an integral part of the economic activity.

\(^{11}\)The term is defined in the 1992 conventions as “loss or damage caused outside the ship by contamination resulting from the escape or discharge of oil from the ship, wherever such escape or discharge may occur, provided that compensation for impairment of the environment other than loss of profit from such impairment shall be limited to costs of reasonable measures of reinstatement actually undertaken or to be undertaken” (Jacobsson 1993). Pollution damage also includes preventive measures which are defined as “any reasonable measures taken by any person after an incident has occurred to prevent or minimize pollution damage”.

\(^{12}\)See reports of the 7th working group of the Fund, devoted to the analysis of general criteria for the admissibility of claims for compensation, published by the IOPC Fund in 1993 and 1994.

\(^{13}\)Following the CLC convention, « preventive measures » means any reasonable measures taken by any person after an incident has occurred to prevent or minimise pollution damage.

\(^{14}\)FUND/WGR.7/3.
within the area affected by the spill;
- the extent to which a claimant would mitigate his loss.

While these elements undoubtedly help to ascertain the link of causation between the pollution and the alleged claim, analysis of the experience of compensating pure economic loss (in particular after the Haven, the Aegean Sea and the Braer) shows that a claim needs to fulfill simultaneously these factors in order to be compensated. It appears in particular that claims for compensation of firms have been rejected either because they were considered as being based too far away from the spill area, or that do not contribute substantially to the local economy, independently of the capacity for the firms to establish a causal link between the contamination and an economic prejudice\(^{15}\). Thus, the criteria of reasonable degree of proximity seems adequate for compensating losses of profit suffered by those who depend directly on earnings from coastal or sea-related activities, such as fishermen or hoteliers and restaurateurs at seaside resorts. On the other hand, the criteria appears to be too restrictive when one considers the overall direct impact of oil pollution within the economic sector at the scale of a region affected by a spill, as shown in NOAA (1983), Bonnieux and Rainelli (1991) or in Loureiro, Ribas et al. (2006). Another feature of the CLC/FUND system is that a claim for compensation is not accepted on the sole criterion that the alleged loss would not have occurred but for the spill. Only the direct effects of a spill on an activity are accepted as compensable. Consequential damages are therefore excluded, although they sometimes account for a significant portion of the overall economic impact of oil pollution, in particular in maritime regions where sea-food industries and tourism are well developed (Bonnieux and Rainelli 1991; Garza-Gil, Prada-Blanco et al. 2006).

As regards damage to the environment, only “quantifiable elements” of damage to the marine environment, ie “damage to the environment in respect of which the value of the damage can be assessed in terms of market price”\(^{16}\), are accepted for compensation and that “non-quantifiable” elements would therefore fall outside the scope of compensation. This governing principle in claim compensation seems particularly restrictive from an environmental valuation point of view as the economic value of most of the injuries to natural resources and associated services cannot be directly derived from market prices. A similar problem applies to other non monetary costs such as losses of amenity and recreational benefits.

\(^{15}\)In the Sea Empress case, for example, claims for shellfish dealers and processors based several hundred kilometers away from the spill area were rejected in application of this principle (Maura 1998).

\(^{16}\)FUND/A.17/23, §7.3.5
Therefore, the position of the IOPC Fund is to compensate claims relating to the costs actually incurred in association with reasonable measures of reinstatement of the environment, in order to enhance the speed of natural recovery and to limit the residual impact of oil on natural resource (cf Figure 2). However, contrary to the procedures for natural resource damage assessments concerning oil spills in the USA (Adaire-Jones and Pease 1997; Ofiara and Seneca 2001), no reference is made under the international system to the compensation for the interim lost resource services from the date of the incident to recovery to baseline condition. Given the capacity of marine ecosystems to recover from oil spills\(^\text{[17]}\) (Laubier 1991; Bastien-Ventura, Girin et al. 2005), reinstatement measures are seldom adopted and most of the environmental damage, consisting in interim loss of services, is left uncompensated under the CLC and FUND conventions.

The impact of financial caps

As for most other international liability regimes in maritime transport, financial amounts available for compensating damage claims are limited to a maximum, defined by the conventions in force in the countries where spills take place (cf. Table 3).

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<tbody>
<tr>
<td>Tanker gross tonnage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 000</td>
<td>0.8</td>
<td>69.5</td>
<td>3.5</td>
<td>5.2</td>
<td>156.4</td>
</tr>
<tr>
<td>50 000</td>
<td>7.7</td>
<td>69.5</td>
<td>27.8</td>
<td>41.8</td>
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<td>100 000</td>
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<td>69.5</td>
<td>52.1</td>
<td>78.3</td>
<td>156.4</td>
</tr>
<tr>
<td>150 000</td>
<td>16.2</td>
<td>69.5</td>
<td>69.2</td>
<td>104</td>
<td>156.4</td>
</tr>
</tbody>
</table>

| Table 3. Evolution of maximum amounts of compensation available under the conventions (expressed in Millions Euros 2006, rates as at November 2006) |

\(^{[17]}\)For illustrative purpose, French scientists agree that it took over 8 years for the environment to recover fully from the Amoco Cadiz, and 4 years for the Erika spill. The general assertion does not hold for every oil spill, especially for the Exxon Valdez spill (Alaska, 1989).
From the economic perspective taken in this paper, placing limits on the overall amount dedicated to compensation is of no consequence on the efficiency of liability as a prevention tool, as long as the maximum amount enables full compensation of damages in practice. However, retrospective analysis of past oil spills in Europe shows that this was not always the case, as is illustrated in Table 4.

<table>
<thead>
<tr>
<th>Pollution</th>
<th>Year</th>
<th>Available amounts for compensation under the FUND convention</th>
<th>Settled claims</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tanio</td>
<td>1980</td>
<td>FF 244 Millions</td>
<td>FF 348 Millions$^a$</td>
</tr>
<tr>
<td>Haven</td>
<td>1991</td>
<td>Lit 102 634 Millions</td>
<td>Lit 117 600 Millions$^b$</td>
</tr>
<tr>
<td>Aegean Sea</td>
<td>1992</td>
<td>£ 37 Millions</td>
<td>£ 67 Millions$^c$</td>
</tr>
<tr>
<td>Braer</td>
<td>1993</td>
<td>£ 50 609 280</td>
<td>£ 51 938 938$^d$</td>
</tr>
</tbody>
</table>

$^a$: Source: Fontaine (1993)
$^b$: Source: 71FUND/EXC.61/2
$^d$: Source: 71FUND/AC.9/13/1

Table 4. Compensation limits under the FUND convention and settled claims in selected accidents in European waters; monetary amounts in current national monetary units the year of the spill.

The adverse effects of setting inappropriate financial caps are of different kinds. The most obvious one lies in the fact that internalization of the social cost of pollution through the liability system is likely not to be achieved in the case of the most harmful pollutions, which account for a significant proportion of the overall costs of oil spills worldwide.

The principle applied under the international conventions is that all claimants should be treated equally with respect to the consequence of this limitation on their individual claims. In practice, the implication is that accepted claims are only compensated up to a percentage defined by the ratio of the global payment limit to the total accepted claims. This policy often leads the IOPC Fund to delay or/and limit payments in the early stages of the compensation process, until it became fairly certain what the total amount payable would be, and what final percentage of accepted claims could be safely paid.

Although this way of settling claims seems careful and fair, ensuring that every victim whose claim was accepted receives compensation, the Fund only makes reference to the current value of a claim and does not allow compensatory interests in order to take into account the loss of purchasing power of the currencies over time. Given that it generally takes several years before the financial amounts likely to be settled are known with sufficient certainty and definitive payments are made to victims, this delay between the occurrence of damages and the payment to victims can significantly reduce the real value of compensation eventually received (cf. Box 1).

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Box 1 - The impact of the compensation process on the real value of compensation paid: examples of the Aegean Sea (1992, Spain) and of the Braer (1993, UK)

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$^8$For a detailed discussion of the issues at stake when capping financial responsibility, report to Faure and Hui (2006).
Comparison of the Aegean Sea and Braer oil spills illustrates the impacts of the compensation process given compensation limits under the Fund convention. The two spills occurred almost at the same time. Damages were compensated under the same conventions (1969 CLC and 1971 Fund), thus with comparable compensation limits. The Fund almost compensated claims up to these limits in both cases\textsuperscript{20} and final payments were made the same year (2002). As shown in figure 3, compensation for claims was paid more quickly after the Braer than after the Aegean Sea: more than 90\% of the settled amount after the Braer spill were paid to victims three years after the pollution whereas less than 20\% of the compensation amounts available under the 1971 FUND convention were paid to the victims of the Aegean Sea some 9 years after the accident. When expressed in constant value, Spanish victims received installments from the tanker owner and the IOPC Fund up to 2006€ 64,9 Millions whereas the compensation limits were set at 2006€ 91,7 Millions. In the case of the Braer, victims received compensatory amounts up to 2006€ 93,1 Millions, for a limit of 2006€ 93,5 Millions.

As shown in Table 3, compensation limits have significantly increased in Europe since the early days of the international regime, in particular after the entry into force of the Supplementary Fund. Hence the above limitations of the regime have to some extent been compounded. However, oil spills in Europe appear to be increasingly costly, with the growing use of coastal areas for industrial, commercial, residential, recreational or environmental protection purposes\textsuperscript{21}. Even though compensation limits now reach approximately 870 million Euros 2006, there is thus a risk that this would be insufficient to cover the costs of large accidents. Indeed, a recent study carried out by Loureiro, Ribas et al. (2006) showed that the overall cost of the Prestige spill in Spain, expressed in 2006 value, attained the same magnitude as the new compensation limit. Even the IOPC Fund seems aware of this risk: according to its own wording in a press statement in 2005, “one important effect of the Protocol will be that, in practically\textsuperscript{22} all cases, it will possible to pay compensation at 100\%\

\textsuperscript{20}In the case of the Aegean Sea, available resources for compensation was set at Pesetas 9 513 473 400. The tanker owner and the IOPC Fund made payments up to Pesetas 9 000 Millions.

\textsuperscript{21}The European experience with oil pollution shows that, apart from the Amoco Cadiz (1978 ) and the Tanio (1980), the most harmful oil pollutions occurred during the 1990’s and 2000’s.

\textsuperscript{22}Emphasis added.
of the amount of the damage agreed between the Fund and the victim.23

4.3. Lack of incentives to pursue compensation claims

Another key determinant of the effectiveness of liability as a prevention rule is the capacity for victims of accidents to actually claim damages, so that the latter have a counterpart in terms of compensation. Decision to make a claim is influenced by several factors, such as the standing for a victim with respect to compensation, ease of access to the compensation procedure, elements of costs and fees incurred when making a claim or difficulties of proving causation or amounts claimed (Dewees, Duff et al. 1996). These various elements are likely to influence both the expected costs and benefits of making a claim, hence the decision by individual victims to pursue compensation.

While claim settlement is an important element in understanding the efficiency of liability rules in terms of pollution prevention24, few empirical studies have attempted to quantify its role in practice. Several reasons may explain this, in particular data gathering difficulties as regards transaction costs incurred when making a claim. Some of the relevant pieces of information for studying the decision to make claims (time spent, stress linked to the negotiation process, individuals’ perception of the chances of success) may be difficult to ascertain, especially as major accidents impact a large and heterogeneous population.

In this section, we appraise the situation of victims of oil spills under the international liability regime, based on the available information concerning the way in which claims have been compensated in the wake of European spills. Data concerning the costs of pursuing claims for compensation following major oil spills shows that such costs may act as strong deterrents for potential claimants, thus leading to partial non-compensation of damages. While this is obvious in the context of legal suits, it also appears to occur in the context of the international liability regime, in spite of the efforts made to facilitate claims.

Access to compensation

Until the entry in force of the CLC and FUND conventions in the 70s, little protection existed as regards oil pollution damages (Wu 1994; Wren 2000). Due to the lack of an international compensation system dedicated to oil pollution and to the transboundary character of maritime transport, victims were likely to face significant legal difficulties in obtaining compensation.25 Hence, few attempts were made to claim compensation. Analysis of two major spills which impacted the French coastline, the Torrey Canyon (1967) and the Amoco Cadiz (1978), and for which the international liability regime did not apply, shows that although significant attempts were made by victims to obtain compensation, they faced major difficulties and ended in only a limited proportion of the overall cost of pollution being compensated (cf. Box 2).

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24 According to Dewees, Duff et al. (1996), barriers to claims are likely to be high in environmental cases, as such cases only rarely lead to compensation procedures, and polluters thus escape a significant portion of the social cost of their activities.
25 Some of the problems victims were likely to encounter were, for instance, the relevant national law to be applied in a particular case (law of the country of the victims? of the flag state?), the establishment of a negligence in order to get compensation, as well as the enforcement of a legal decision against a company who is likely to be domiciled in a foreign country. Even if they would have overcome these complex issues, victims wouldn’t even have the insurance to be fully compensated, as the potentially devastating consequence of oil pollution are likely to exceed the wealth of the responsible party.
Box 2 - Obtaining compensation for oil pollution damage outside the international liability regime: the Torrey Canyon and the Amoco Cadiz experience.

Following the Torrey-Canyon spill (March 18th 1967), only public bodies attempted to obtain compensation of a significant share of spill costs. French and British Governments had to place pressure on the owner of the ship, seizing two of his ships several months after the spill, in order to settle an agreement allowing refunding of some of the costs incurred following the spill.26

Following the Amoco Cadiz accident, victims decided to sue the Standard Oil Company, engaging in a long, risky and costly venture. Given that Standard Oil Company was American, legal actions were taken in a Court of Chicago. Victims were hoping that this would circumvent limitation of liability, as the USA had not signed the CLC convention, and would help obtain enforceable legal decisions (N’Dende 1992). As the trial lasted 14 years, no compensation was recovered from the responsible party until 1992. According to judge McGarr, who ruled most of the trial, the case of the Amoco Cadiz was at that time one “of the most complex and lengthy cases to be addressed by the United States courts. […] The liability aspect of this case, which was tried separately, was, though lengthy, a traditional trial; the almost year-long damage trial which followed was not” (United States District for the Northern District of Illinois Eastern Division, 1988). French local authorities which took action under a joint structure incurred an overall amount of 130 Millions French Francs, while they obtained 1992FF 230 Millions in the final settlement. The Standard Oil Company, who was imposed to pay 1992FF 1,15 Billion to French plaintiffs, spend over FF 400 Millions on defence-related costs (Hay and Thébaut 2002).

These factors above impacted in a significant manner the decisions of victims to file claims in the aftermath of the spill. French local authorities decided to limit their action in appealing the judgement due to insufficient financial resources. Moreover, less than a hundred claims discussed by the Court were filed by local businesses, for an overall amount of 1978FF 15 Millions. These numbers seem low when related to the geographical scope of the spill and the magnitude of the impact of the pollution on the regional economic sector, assessed at a minimum of 1978FF 125 Millions (Bonnieux and Rainelli 1991).

When compared to the situation prior its entry in force, several features of the CLC/FUND regime indicate that oil pollution victims now have a stronger incentive to claim for the damages they suffered.

On the one hand, expected benefits of making a claim have been increased through:
- the definition of a clear and specific standing for being compensated27;
- ensuring more certain and significant compensation amounts (strict liability nature of the regime, financial responsibility coverage requirements, existence of complementary compensation fund…).

On the other hand, expected costs of making a claim have been reduced through:
- the definition of a strictly liable party in case of a spill, which avoids victims to initiate long, risky and complex legal procedures in order to be compensated;
- the ability for victims to recover some of the expenses linked to their claims28;
- the clear ambition of the IOPC Fund to compensate claims as much as possible through amicable settlement, with the intende purpose to avoid taking costly and time-consuming legal actions29;

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26 Approximately FF 80 Millions.
27 Potential claimants under the CLC and FUND conventions include anyone who has suffered pollution damage in a State that is Party to one or both convention, in particular private individuals, companies, private organisations and well as public bodies.
28 In the case that some victims would seek help from advisers in making their claim, the international liability regime allows them to recover under certain conditions the cost of receiving such assistance.
29 Significant efforts have been made over the years in that purpose: better information to the victims about the characteristics of the liability system and the rules governing the compensation of damage (publications of
the pragmatic attitude of the IOPC Fund, which takes into account particular circumstances of the claimant, industry or country concerned, thus allowing some flexibility when referring to pieces of evidence.

Therefore, difficulties for victims to get compensation currently lie mainly in their ability to establish the appropriate link of causation between the alleged claims and the pollution as well as the quantum of the claim.

**Claims settlement experience under the CLC-Fund regime**

Available information concerning the regime shows that, although it has allowed to significantly reduce the complexity and uncertainty of compensation procedures, the process of compensation following spills, particularly following large accidents such as those considered in this analysis, remains in some cases a lengthy and costly process.

![Figure 4 - Settlement of claims submitted to the IOPC Fund](image)

Figure 4 shows that, although being much shorter than under the legal conditions which pre-existed the liability regime, compensation for a significant share of the damages caused by large oil spills still requires a minimum of 3-4 years, and full compensation requires a much longer period of time, due to the existence of legal procedures for a limited proportion of claims (most of them being settled on an amicable basis – see table 5). Despite their limited number, some litigation cases brought before national courts have had the effect of disrupting to a significant extent the overall compensation process, because of the uncertainty of the outcome. In cases like the Haven, the Aegean Sea or the Braer, long and complex legal procedures were initiated before national courts, with the effect of delaying the payment in full of compensation, and pushing the time required to compensate all claims above 10 years (cf Table 1). In several cases, litigations between claimants and the Fund have reached such an impasse that the explicit intervention of national public authorities was required in order to overcome obstacles. In the case of the Braer and the Sea Empress, the British Government played an important role both in standing last in the queue and in publicising information about the functioning of the IOPC Fund, in order to avoid misunderstandings with victims, to accelerate claim settlements and to increase the percentage of payments of settled claims. In the case of the Aegean Sea and the Haven, national authorities took the initiative to negotiate with the Fund, the ship-owner and the insurer a global agreement in order to have payment eventually made by the Fund.

claims manuals, establishment of claims offices in the polluted areas), efforts to maintain individual relations with claimants, in particular in explaining the basis of each decision that was made as regards claims compensation (amount of compensation offered, rejection of claim...).
<table>
<thead>
<tr>
<th>Spill</th>
<th>Claims submitted (a)</th>
<th>Legal actions taken against the Fund (b)</th>
<th>(b)/(a) in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Braer</td>
<td>2270</td>
<td>270</td>
<td>12</td>
</tr>
<tr>
<td>Sea</td>
<td>1034</td>
<td>194</td>
<td>19</td>
</tr>
<tr>
<td>Empress</td>
<td>6997</td>
<td>796</td>
<td>11</td>
</tr>
</tbody>
</table>

Table 5. Number of legal action taken against the IOPC Fund

Expenses incurred by the IOPC Fund in relation with the compensation of damages, while a limited proportion of the compensation amounts eventually paid, remain significant (cf. figure 5). The annual amounts of expenses incurred by the IOPC Fund from 1994 to 2004 in relation with the compensation of claims reached 2006€ 5.9 Millions in the case of the Aegean Sea, 7.7 Millions in the case of the Sea Empress, 7.2 Millions in the case of the Braer, 19.8 Millions in the case of the Erika and 3.7 Millions in the case of the Prestige, that is respectively 9%, 13%, 8%, 16% et 3% of the compensation amounts paid after these pollutions. While data concerning the costs to claimants of compensation procedures is not available, it may be assumed that such costs entail strong incentives against pursuing compensation, given the degree of uncertainty which surrounds the outcome of claims at the individual level.

![Figure 5 - Claims related expenses incurred by the IOPC Fund](image)

5. Conclusion

The aim of the paper was to discuss the ability of the CLC/FUND responsibility regime to compensate in full the social cost of oil pollution, a key determinant of its effectiveness as a pollution prevention tool.

Based on the examination of practical examples, the analysis identifies several factors which tend to limit the regime’s effectiveness in this respect. First, oil pollution damages are difficult to assess in monetary terms. Impacts of oil spills on the environment and the

30Cost of hiring experts and travelling to the polluted sites.
31In the case of the Erika and the Prestige, percentage are likely to evolve given that the compensation process are still on-going.
Economy may be difficult to circumscribe, and the relevant information required for their economic valuation is often not available. Second, portions of the social cost of oil pollution are left uncompensated within the international liability regime, either because of a restrictive conception of “pollution damage” or due to limited compensation possibilities. Third, while there has been a clear improvement in the position of oil pollution victims as regards access to compensation under the CLC and FUND conventions came into force, major difficulties are still likely to happen, with the effect to deter victims from claiming compensation.

Conclusions derived from this analysis are twofold. On the one hand, it is possible to identify measures likely to improve the performance of the international regime. Clearly, non-monetary losses should be taken into account as they consist sometimes in a significant proportion of the social cost of oil pollution. In addition, rules of compensation should be relaxed as regards pure economic losses. Furthermore, unlimited compensation amounts would have the beneficial effect for victims of both increasing compensatory instalments and accelerating claims settlements, thus limiting the opportunity for victims to bring legal actions. On the other hand, other limiting factors cannot be addressed by making alterations to the existing system, such as the accuracy of damage valuation, the widespread distribution of oil pollution damage or the specific social context of crisis following a major spill. These factors weaken the efficacy of the international liability regime and give support to the idea that appropriate oil pollution prevention is unlikely to be achieved on the sole use of liability mechanisms, but rather through the joint use of liability and regulatory approaches.

6 References


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