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SEA OIL SPILL: AN APPROACH DIFFICULT TO OVERCOME BY INSURANCE AND INTERNATIONAL REGULATION

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ABSTRACT

Every form of human activities is yield to risk either by an accident or a disease, resulting in injury or death. Generating energy is not an exception. Although such a risk has been previously considered for conventional systems (coal, oil and nuclear), a similar analysis for the so-called alternative or non-conventional systems (solar, wind, ocean thermal and methanol) has been lacking. Nuclear power and natural gas has had the lowest risk rate, though.Risk is an important concept particularly in the fields of industry, environment, finance, law, health, and of course insurance. Knight Frank has proposed a distinction that distinguishes between risk and uncertainty: A risk can be assigned to mathematical probabilities but not to uncertainty. Risk is defined as the probability of occurrence of this event and the magnitude of its consequences (and hazardous issues). It can be applied to people, property, or the natural environment.We will examine the risk of oil pollution and its impact on sea environment.Our study will be oriented towards a new problem that has taken an increasingly important role and may become one of the major problems of our time: it is the pollution of our planet by artificial radio-elements resulting from the use of nuclear energy whose different applications are characterized by the appearance of radioactive waste, i.e. materials that spontaneously emitionizing radiation in which the radioactivity is artificially produced.

Keywords: Oil pollution, Insurance, Externality, Radioactive waste, Risk, Environment, Regulation

INTRODUCTION

It is impossible to explain what the term risk means without first understanding what a hazard is. A hazard is anything that can cause harm. Risk is the likelihood, big or small, that a person or a group of people may be harmed by.

In the markets, these risks can be transferred to those who will be more able to cover; until at the margin cost for someone who assumes the risk becomes equal to the benefit expected by the shipper..The operations of major industrialized economies are largely dependent on the availability of oil/nuclear resources. (LEROY, 1992). Places of production and consumption of

this raw material are often geographically total disconnected. The shipping of oil remains the least expensive means of transport. This activity is risky and complex. "Risky" since accidents are a source of environmental damage (and economic) considerably, large enough to obscure the rare nature of such disasters. It's "Complex", because there are many actors and intermediaries, often of different nationalities and sometimes difficult to identify. The management system runs the risk of both problems.The steady increase in the price of fuel/oil -- and the probable introduction of either carbon-emissions trading schemes or a related tax - now presents the possibility that nuclear propulsion could be more competitive.

The Discharge of Radioactive Waste into the Sea

The exact nature and duration of any impacts from an oil spill depends on a number of factors. These include the type and the amount of oil and its behavior once spilled; the physical characteristics of the affected area; weather conditions and season; the type and effectiveness of the clean-up response; the biological and economic characteristics of the area and their sensitivity to oil pollution. Typical effects on marine organisms range across a spectrum from toxicity (especially for light oils and other products) to smothering (heavier oils and weathered residues).

According to some experts, the practice of discharge into the sea and radioactive wastes including liquid wastes "cannot generalize without potentially representing an early contamination of the globe". They also come from preparation plants and nuclear fuel processing, isotope separation plants or factories processing of spent fuel and nuclear powered vehicles, and especially the marine gear. This raises the problem of disposal of these wastes. To this end, people are beginning to use the sea as part diluents. The nuclear risk is characterized in part by a very low probability of occurrence of a disaster due to the high level of quality control techniques of possible risks Because of its considerable size and immense volume, the sea (commonly regarded as the ideal discharge) may have seemed an ideal medium for the disposal of radioactive waste. We thought it was possible to dilute or disperse the waste in marine areas, without much danger, dilution and dispersion may be sufficient safe factors. In fact, "every day in several parts of the world, waste water containing small quantities of radio nuclides frequently discharged into the sea, specially designed containers containing radioactive wastes were dumped.

Problem of Externality

The externality characterizes a situation where the economic action of an agent provides benefits (positive or negative externalities) to one or more other agents, such interdependence finding no offset on the market. It's actually about all the phenomena of environmental pollution such as the theory of externalities finds its most interesting application. A company that pollutes a river creates negative externalities to all residents and business located downstream of the facility pollutant.

When oil drain its tanks at sea, or a nuclear ship discharges its waste at sea or toxic fumes degrade the quality of the air, business leaders hinder sinners and people without spontaneously

defining any price for such nuisances.These people are no longer stowaways but what might be called «illegal hostages." Take for example a paper mill located on the banks of a river where it empties pollutants waste. The water of this river is treated by a plant located downstream that supplies water to the nearby town. The production of water treatment plant is adversely affected by the production of stationery. The "social" cost of stationery production is higher than its private cost. It deals with water treatment plant an additional cost (external cost) whose market system does not require its consideration.

The Development of the World's Nuclear Propulsion

The development of nuclear merchant ships began in the 1950s, but has generally not been commercially successful. The United States built the ship NS Savannah in 1962 but was decommissioned eight years later. It was a technical success, but not economically viable. A German merchant and research ship (Otto Hahn) sailed around 650,000 nautical miles (1,200,000 km) of 126 trips in 10 years has had no technical problems. However, it proved too costly to operate and was converted to diesel. The Japanese ship Mutsu was the third civilian ship. It was faced with technical and political problems and was a dismal failure. The above three vessels used reactor fuel to LEU. Sevmorput is the fourth nuclear merchant ship. It operated successfully in the specialized environment of the Northern Sea Route. Recently there has been a renewed interest in nuclear propulsion, and some proposals have been drafted. For example, the mountain of goods is a new design for a nuclear cargo. With the new micro nuclear reactors, other existing cargo ships could be converted to nuclear propulsion.

The Outline of the International Law

International regulations for the transport of radioactive material have been published by the International Atomic Energy Agency (IAEA) since 1961. These regulations have been widely adopted in national regulations as well as in the modal regulations, such as the International Maritime Organization (IMO) as Dangerous Goods. Regulation of shipments of radioactive materials is independent of the application for the material. Twenty million items -of all sizes - containing radioactive materials are regularly transported around the world each year on the roads, railways and ships At sea, they are usually transported in vessels built for this purpose. Since 1971 there have been more than 20 000 shipments of spent fuel and high-level waste (over 80 000 tones) over several million miles. There has never been an accident in which a container with highly radioactive material was deliberately damaged or lost in the sea The IAEA has regularly issued revisions to the regulation of transport in order to keep them updated. The final set of regulations was published as TS-R, Regulation of Transport of Radioactive Material, edited in 2009. The purpose of these regulations is to protect people and the environment against the effects of radiation during the transport of radioactive materials.

Oil Pollution and Marine Environmental Law

How is the environment integrated in our market economy? (Godard *et al*., 2002) .The traditional approach, consisting of regulating the most possible, has shown its inability to solve

environmental problems. A new approach, which is more flexible and more efficient in combining regulatory and economic instruments, should lead to improve both economic and ecological results to fight against pollution.

In the early 1970s, governments began to intervene in the field of environmental protection by using a regulatory arsenal and direct control. Parallel to this legislative process, a new – economic- approach appeared. It came out from the theory of externalities, by which the phenomena of pollution and environmental degradation are due to the lack of an adequate pricing of environmental resources: if we give a full price for these assets, their users (especially polluters) will take the necessary measures to limit their consumption and deterioration, rather than wasting them when they are "free".

Protection is Provided By:

• The isolation of radioactive material;
• Control of external radiation levels;
• Prevention of criticality;
• Prevention of damage caused by heat.

The basic principle applied to the transport of radioactive material is that protection comes from the design of the packaging, regardless of the material transported. The discharge of various fission products into the sea tends to spread and become more and more important. This generalization is likely to worry not only biologists and oceanographers, but also those who are concerned about the problems of the sea and in the first place, the coastal populations.

The Extent of Danger

According to some, the practice of discharge into the sea and radioactive wastes including liquid wastes "cannot be generalized without potentially representing an early contamination of the globe.

Legal Aspects

In view of positive international law, the discharge of radioactive waste into the sea does not seem a prior illegality.

The traditional laws of the sea bring here the limits to state action.

Thus the Geneva Convention on the High Seas of 29 April 1958, stipulated in Article 25, paragraph 1: "Every State shall take measures to prevent marine pollution caused by dumping of waste Radioactive the principle of the prohibition of pollution of the seas undoubtedly; this principle is now universally accepted by States users of the sea. However, it is relatively recent. It emerged gradually under the influence of economic and technical progress, partly because of the growing maritime transport of petroleum products and increasing the number of ships using oil as fuel. Its adoption was also encouraged by developments in the concept of freedom of the seas; it is now regarded less as a means of communication than a vast reservoir of natural resources. We

do not accept the opinion of today HW BRIGGS who felt that no general principle of international law prevents a coastal State to pollute its waters, the "Law of Nations".

RISK MANAGEMENT OF SHIPPING COMPANY

The attitudes to risk range from its rejection (fear of uncertainty), tolerance (no strong position) to risk-seeking (uncertainty accommodation). All these possible attitudes may be expressed in individual, collective, societal or national level. It is by recognizing them that we can diagnose and understand their influence on the process of risk management. (Grossman and Krueger, 1993).

The shipping company operates in an open global competitive context, said free rivalry (Ruffieux Bernard, 1975). The sea trade uses important means of transport (ships increasingly gigantic) but every year many ships perished accidentally and despite the technical and human resources in place, new risks emerge (pollution, insecurity) or reappear (risk of war), new international conventions follow these events by trying to govern together and unify the world through free trade. Maritime transport, which reports to the Maritime Law, is all about «sea risk, which requires solidarity (Handler, 2007) - (not legal in the sense of the word) -between participants in the maritime shipping and a risk division, particularly since more goods that carried risks have been expensive ".... In origin, the Maritime Law has a new and original character (positive law) remarkable implementing institutions such as the general average, insurance, and Bottomry loan (in-existing nowadays) The shipping company has always tried to protect its interests in its relationship with shippers, Brussels Convention and the Protocols are amended so as to limit its cargo liability .

Major maritime disasters have led States to react through international conventions: The Titanic disaster will lead to the SOLAS (Safety, ship classification and marine salvage), disasters lead to closer agreements on marine pollution, the introduction of the ISM Code and STCW regulations providing complementary constraints to the shipping.

ROLE OF OIL TANKERS IN WORLD TRADE

While transportation activities are of great economic value, especially the transportation of energy products by sea, they also carry many negative effects on the environment: emissions of greenhouse gas, local air pollution, pollution water, damage to biodiversity due to pollution, habitat destruction, etc... The current situation is unsustainable and new policies are needed. It must in particular encouraging technological advances especially for oil tankers in particular to improve energy efficiency.

Crude oil must be moved from the site of production to refineries and refineries to consumers. These movements are realized with different modes of transport.Crude oil and refined products

are transported in water by boats and barges or tankers or oil tankers called. These tankers are used to transport refined products. The large variety it is the Very Large Crude Carriers (VLCC), they are used in international trade of crude oil. The size of tankers that can be used in any type of trade (commercial voyage from a port of origin and destination) depends on the length of the tanker, the volume of the tanks and the capacity of loading and unloading of the ports. The larger vessels are used because they reduce transport costs of a barrel of crude oil.Oil tankers can have very different sizes. They are classified according to their transport capacity measured in tones of crude. In 2008, the equivalent of 54 million barrels, (about 7.2 million tons of oil) has circulated daily by sea. This equates to 2.6 billion tons of oil transported by sea this year alone, against 500 million in 1960 and 100 million in 1935! Thus, in response to a constantly increasing demand, the oil freight (transportation not only of crude but also fuel, or basic products for the petrochemical industry) continues to grow (AMIC *et al*., 2006).

Oil Transport by Sea Pollution Causes Unavoidable Risk

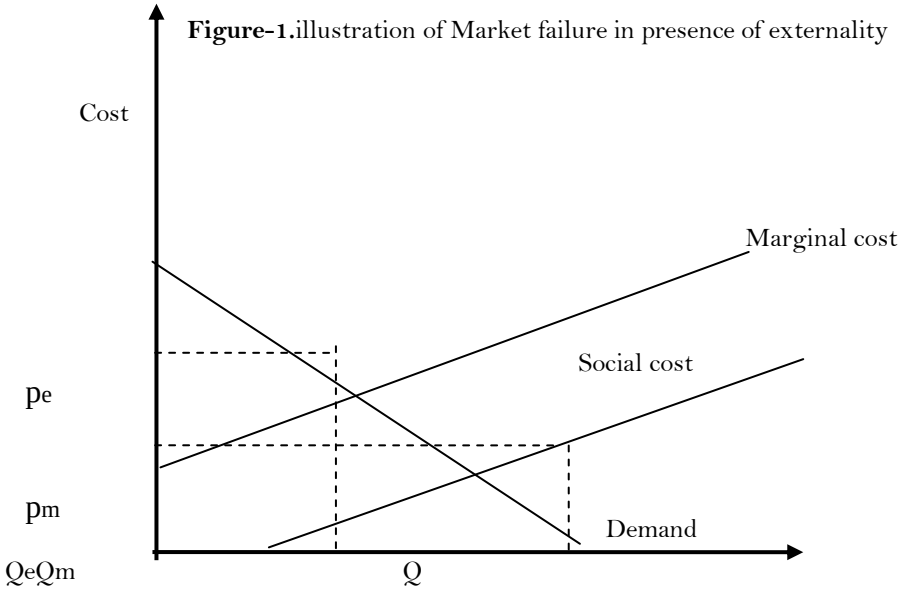
Pollution is part of one of the main problems of the environment. All economic transactions be they: trade, production or consumption by generating mechanical effects of various types of waste: liquid, solid, gaseous. When these operations generate waste, it is not without environmental impacts (Bertrand Alain-R, 2000). We then speak of "pollution" when environmental assets are degraded and damaged. Economic valuation of environmental assets, whether the calculation of damages in disasters is of natural origin or resulting from human activity of profits, and damage caused by the implementation of development projects. It now holds an important place in public decision making.There is an environmental economic concept that clarifies "pollution" that is the NAC (natural absorption capacity). This corresponds to the absorption edge of various discharges (solid, liquid, gaseous) of the natural environment without changing the intrinsic characteristics of nature. The term "threshold" is very important when we speak of "pollution", in fact, where there is pollution thresholds are exceeded. In this case the thresholds are exceeded, reversible and irreversible effects can be observed on different environmental assets.There is an environmental economic concept that clarifies "pollution" that is the NAC This corresponds to the absorption edge of various discharges (solid, liquid, gaseous) of the natural environment without changing the intrinsic characteristics of nature. (Copeland and Taylor, 2003).The term "threshold" is very important here, when we speak of "pollution". In fact, where there is pollution, thresholds are exceeded. In this case the thresholds are exceeded, reversible and irreversible.

Sea Pollution as an Externality Model

Take the example of oil drilling platform located on the banks of a river where it empties waste pollutants. The water of this river is treated by a plant located downstream that supplies water to the nearby town. The production of water treatment plant is adversely affected by the production of the platform. The social cost of production of the platform is higher than its private cost. (Kolm, 1971) It deals with water treatment plant as an additional cost (external cost) whose market system does not require it.Market failure leads to overproduction of goods generating

externality compared to its level of production; collectively optimal (which generally is not zero, the optimum does not require the removal of all pollution).(Idelhakkar, 2011).

Figure-1.illustration of Market failure in presence of externality



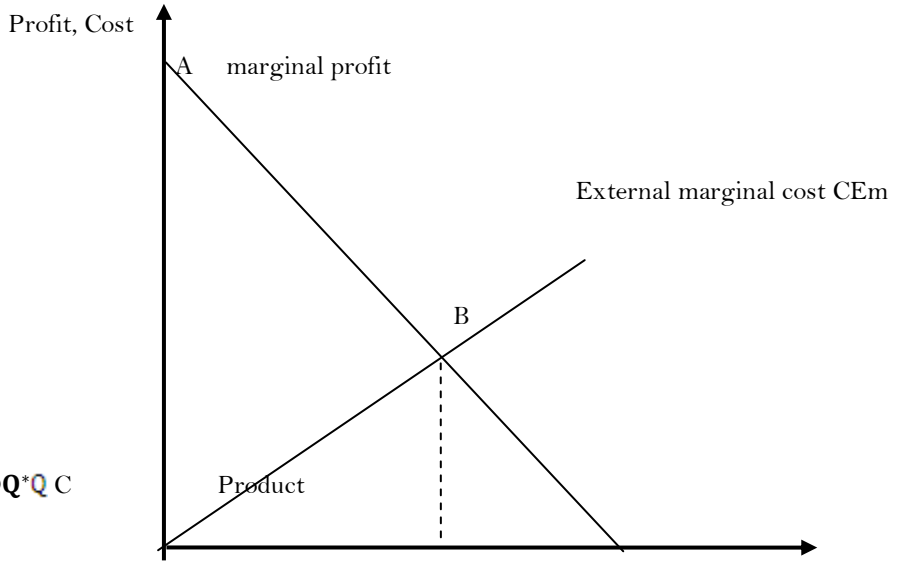
The horizontal axis represents the level of production of the oil drilling platform (ie the pollutant) and. the vertical axis shows the costs for each level of production.In the above diagram, the equilibrium (Pm, Qm) is the market equilibrium and (Pe, Qe) is the socially optimal equilibrium if the external costs of its activities are taken into account by the polluter agent mechanism This market failure leads the agent (source of the externality) to produce a quantity of petroleum product Qm exceeds the socially optimal level of production: resource allocation in the presence of negative externality results in over-production optimal. Thus, there is a contradiction between the optimal behaviour of the issuer of the negative externality (which equals marginal private cost and market price) and conditions of a Pareto optimum (assuming an equality between the market price of the property and its marginal social cost). This market failure usually arises from the fact that scarcity of resources has not been translated into a cost on the market. Theoretically speaking, the existence of a right of ownership must resolve this type of failure attributed to a private or public officer, who then has the right to charge for the use of the scarce resource. The holder of the property rights then holds an annuity against the right to use its ownership and the functioning of the market leads to the optimum. The development of the property right and a user charge is an internalisation of the externality (that is to say) that incorporates the external cost (difference between the social cost and private cost) in production costs of the issuer of the externality.

Solutions to the Problems of Externalities

Where any production generates a negative externality (e g the drilling platform that pollutes the sea or river, or the ship that discharges its waste tank), the social cost (to society) is higher than

the private cost (to the producer). As the producer looking for maximum profit and considers only the private cost, he is led to choose a production volume greater than that which would correspond to the socially optimal (or Pareto). Take the case of an offshore oil exploration company (the drilling platform) whose production activity is accompanied by emission of toxic gases (S02, for example) in the atmosphere, and is capable of draining wastes during the loading of oil on tankers. On the following graph, the horizontal axis represents the level of production of the platform and the vertical axis embodies the profits and costs of each level of production.

Figure-2.illustration of External marginal cost



The line AC represents the marginal benefit of polluting drilling company. If we do not take account of environmental externalities (if the private welfare coincides with the well-being), the company maximizes its total profit in OC production (beyond its marginal profit is negative and the total profit decreases). The maximum total benefit is then equal to the area OAC. However, this platform and its activities involve a social cost to the community. We represent this by a straight external diseconomies reflecting increasing damage with increasing production levels, that is to say a growing marginal external cost (Cern). Determining the level of polluting production which is socially optimal is determined by maximizing the overall surplus of the company, defined by the profit of the company minus the cost caused by pollution. The socially optimal level of production is equal to OQ* denotes the point of equalization of CEm and the marginal private benefit.

Several observations can be made about the optimum pollution.

- 1 the socially optimal level of production is lower than that which maximizes the profit of the firm (OQ* <OC). This can cause problems for resource allocation and the terms of the social optimum. It is not always the firm that bears the pollution abatement costs (direct cost of the program of remediation and indirect costs related to reducing its activities).

- 2 an optimum pollution defined by economic theory (on the graph, the surface OBQ *) is not equal to zero. In other words, the maximization of social welfare implies accepting a certain level of pollution. There are exceptions, however: it does infinite damage functions corresponding to intolerable and irreversible damage (mercury into a river, radioactive waste, nuclear power plant without a safety device,...). But in most cases, the goal of "zero pollution" which may be that the radical environmentalists is a borderline case.(Etkin, 1999).

In the graphic example, this target would imply a zero output, that is to say the absence of any economic activity.

- 3 However, the determination of the collective optimum cannot be done without taking into account external effects. This is known as internalization mechanism whereby it is to correct market failures by incorporating externalities in the calculation of economic agents, thus advancing the economic optimum. But for this, two steps are necessary:

- There must be an assigned monetary value to these externalities; (Harper *et al*., 1995).That is to say the right assessCErn. This type of evaluation is problematic and often contested because the externalities are defined as non-market relations.

- The internalisation of external costs also assumes the establishment of mechanisms for their effective consideration in calculating economic agents. Two competing designs by a bet, economists in favour of active intervention of the state (Pigouvian tax or regulatory approaches) and on the other hand, economists advocating free negotiations between polluters and the polluted (contractual approach and mechanism of pollution rights). We will discuss these different approaches in turn.

Externalities and the Regulatory Approach

An important solution to the problem of environmental pollution is based on a conception of the kingly state. It advocates to the use of administrative regulations of activities causing externalities through taxation permissions

The British economist Arthur C. Pigou (1877-1959) proposed to tax externalities in the environmental field. It aims to internalise the external costs or damages that the firm imposes on society and -the environment. With this tax, beard in mind, is not a tax but a price, the producer takes into account not only its individual costs of production but also its social costs (externalities) caused by its operations. The problem of course is to quantify the damage in monetary units. This estimate is very difficult in practice and the Pigouvian tax, optimal theoretical tool, cannot be applied in this form. The concept, however, provided a theoretical basis for economic instruments increasingly used in OECD countries, such as taxes, fees, deposit systems, the financial markets or the creation of a "permit to issue "(" rights to pollute "). All these instruments have the advantage of giving a price to the pollution and thus lead to a better allocation of resources. However there are two opposite views here, on the one hand, economists

in favour of active intervention of the state (tax or regulatory approaches) and on the other hand, economists advocating free negotiation between polluters and the polluted (Contractual approach, and mechanism of pollution rights).

- If there is uncertainty about the future effects of a suspicious activity, the precautionary principle is applicable only to avoid irreversible catastrophy. This principle is to take protective measures without waiting for scientific certainty (to the greenhouse effect, immediate ban on CFCs, for example).

-A lower overall cost of fighting against pollution in relation to the establishment of pollution norms: tax is individually applied to the activity level of each firm, while the norms are uniformly applied, without taking into consideration the marginal costs of each firm. Compared to the standard, the tax is a permanent incentive to reduce emissions. So when the state imposes an emission standard, the polluter-friendly law has any ambition to achieve this standard. In this case, the polluter has no incentive to do better than the standard (except for matters of commercial images).In contrast, the tax provides a double permanent incentive struggle against pollution and technological innovation in this field. On the one hand, the tax induces a further reduction of emissions so that technical progress no longer benefits as a single polluter, but the community too. On the other hand, in the presence of tax, technical progress allows the polluter to perform a dual economy. (Cost-saving treatment and tax saving):

The Free Negotiation between the Agents

Ronald Coase established that government intervention is not automatically required; he also highlights the true foundation of such an intervention. The state action is justified when the high number of partners and / or complexity of externalities involve entail transaction costs so that no mutually beneficial agreement and establishing the optimal allocation of resources cannot be spontaneously negotiated.

The Coase Theory also is read as follows. If property rights are fully defined, if transaction costs are zero and if the information concerned is perfect agents, negotiation among these agents enables a situation of Pareto-optimal. In addition, if the distribution of property rights does not generate income effect, the optimum obtained will be the same, whatever the structure of property rights is. The invalidity of the income effect related to the allocation of property rights: suppose that the Stationery initially owns a River. If this right is removed to be attributed to the water treatment plant, it sees its economic situation improve (increase in its "income" in the broadest sense). Say that the income effect is zero; this change has no effect on its marginal willingness to pay for a less important pollution. Under these conditions, bargaining between the two firms will lead to the same result (Pareto optimal) as Stationery has the right to pollute the river or the treatment plant has the right for a clean river. Coasian solution to the problem of externalities is a “market" procedure of the internalization of externalities-, which means that a market of externality rights has to be created. This procedure relieves the state to intervene, apart from

ensuring respect for property rights. So as this bargaining can take place, it is necessary that the rights of agents are clearly defined. In the case of the factory that pollutes a river, it is about who owns the rights to the river water. Do they belong to river users, who are then entitled to a clean river? Or do they belong to the company, which then has the right to pollute the river? If property rights are well

The Rights to Pollute

Like the introduction of a tax, a system of negotiable emissions permits also to achieve a certain level of pollution, which is more effective than direct controls. An environmental authority, as the "Environmental Protection Agency (EPA) in the United States, can put for sale the property rights for a certain amount of polluting emissions. These rights are sold and redeemed at a price reflecting supply and demand which will tend to stabilise at a cost rate [in marginal terms] antipollution to all polluters. Indeed, each polluter will purchase rights until the price of these rights will be equal to the (marginal) cost of pollution reduction, and beyond this, it would become more expensive to buy rights than to pollute. The overall cost to the community will be minimal, while the effectiveness, at least in theory, would be maximal. This system worked, albeit with some success in the United States in the field of air pollution.In conclusion, we note three advantages of economic instruments to fight against pollution in relation to direct controls.

The mechanism of prices will encourage the owners of tanker fleets to find the cheapest way to reduce pollution. Thus, the less they pollute, the less they will pay for licences or taxes.

CONCLUSION

We showed in this study the incidence of oil maritime risk on the performance of oil shipping in general. This study was made on the basis of an analysis of the concepts of risk and performance. And the risks of maritime oil transport are globally considered as new risks that, we do not know how to cover them by the classical methods of prevention, insurance (or investment). The difficulty of covering oil risk insurance concerns its component “risk of oil/nuclear pollution”. We highlighted the problem raised by the compensation ceiling that does not seem to promote effective prevention. A current solution, in coverage of marine oil/Nuclear pollution risk, resides in a partnership that refers to a mixed hedge, through the IOPC Fund.

Insurers are accused of lacking rigour to insure ships under standards.
It is justified to advocate the participation of insurers in the management of the oil transport quality. (Idelhakkar, 2011). The marine hull insurers and public liability are the only ones affected, in terms of oil carrier, taking into account the hull risk and public liability risk for marine pollution. The insurance policy towards under substandard ships is to get rid of them by leaving the serious risks. How?

By becoming more coercive on the imposed insurance clauses, insurers have introduced, in conjunction with the brokers, a clause that provides for the exclusion of vessels over 20 years, and the access to the classification registry. Tankers' hull insurers benefit from the support of London Joint Hull Committee, who introduced the policy. Condition Warranty, used by the marine hull insurers when insurers have doubts about the structural integrity of a ship. If faced with the will to manage the quality of maritime oil transport, insurers choose to eliminate under-standard ships. They also have the will to tax others. These insurers intend to give priority to oil quality tonnage.

The insurance of nuclear risks is niche insurance but whose object is the heart of the insurance business: pooling several entities located or operating in different countries, leave the possible charge over several years and actively participate through networks that can mobilize the insurance management compensation.In fact, the insurance- as a taken measure to face certain hazards- must be regarded as an investment. Admittedly, it does not produce guaranteed income as a Treasury bill, but it can yield a substantial compensation when a disaster would occur

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ACRONYM

IMO International Maritime Organization

ISM CODE INTERNATIONAL SAFETY MANAGEMENT CODE

OECD: RGANIZATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

SOLAS SAFETY OF LIFE AT SEA

STCW STANDARDS OF TRAINING, CERTIFICATION AND WATCHKEEPING FOR SEAFARERS.

UN UNITED NATIONS

MARPOL MARINE POLLUTION CONVENTION

EU EUROPEAN UNION

OECD: Organization for Economic Co-operation and Development

VLCC: Very Large Crude Carrier

(IOPC funds) - The International Oil Pollution Compensation Funds

IFCP FIIPOL - International fund for compensation for pollution

IAEA International Atomic Energy Agency