THE LIMITS OF RISKS HEDGING IN AQUACULTURE: THE CASE OF SHELLFISH FARMING IN FRANCE.

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ABSTRACT

Shellfish farmers make their production decisions in an environment characterized by multiple uncertainty. As shellfish farming is done in an open area, producers face a large number of risks: e.g. biological, environmental, pollution or climatic risks. Historically, this sector has been affected by several crisis; the last ones were the unexpected mortality of spat in 2008 and 2009. Insurance is one important potential mechanism for managing this kind of risks (e.g. crop insurance in agriculture), but shellfish farming had limited insurance availability in France. The purpose of this article is first to determine specific risks of this segment of agriculture. We then present the existing hedging mechanisms, from self-protection / self-insurance measures to the possible intervention of the Fishery European Funds. We analyze the limits of such instruments and we try to explain why efficient protection is not available for this sector. Main reasons of such a lack are: High level of ambiguity in risks definition, individual correlation and the high degree of specialization of a small sector, what limits the possibility of risk pooling. Véronique Le Bihan & Sophie Pardo (co-authors, LEMNA-University of Nantes)

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Introduction

Shellfish farming is an important activity in France with oysters and mussels accounting respectively for 47% and around 30% of the whole production in 2008. Although the activity is highly exposed, very few insurance policies will cover risks linked to the production environment such as climatic events and epizootic diseases, to mention but a few. In the main, risk coverage takes the form of various preventive and self-insurance measures, as well as solidarity schemes.

Comparatively high mortality rates in the summers of 2008 and 2009, hurricane Xynthia striking the Atlantic Coast of France in 2010, numerous bans on commercialization have all recently undermined the industry, with the result that shellfish farmers are once again listing risk management as their top concern, demanding new coverage instruments.
After outlining the specificity of risks in shellfish farming, we will set out the existing risk coverage mechanisms in the industry, before analysing their limits and explaining why effective protection is not currently available. The last part will be devoted to concluding remarks.

1) Specificity of risks in shellfish farming

The first specificity of the shellfish farming industry relates to production risks. These are exacerbated because activities are carried on in an open environment:

- Open environments induce yield variability, which has an impact on productivity. Except for oysters, where the production of spat oysters in hatcheries may limit a deficit in natural spat collecting, shellfish production is dependent on natural spat recruitment which itself depends on environmental factors (hydrobiology, climatology, currentology).

- Shellfish growth is entirely reliant on trophic resources (shellfish farmers, unlike cattle and crop farmers, cannot take steps to make up for food deficits).

Strong interactions within and between basins result in more intense exposure of livestock to health hazards. Sea currents may thus facilitate transmission of epizootic diseases. Whereas agriculture can rely on a number of preventive or curative treatments for animals and plants, shellfish farmers are completely vulnerable to climatic, sanitary and other types of events. Health risks weigh heavily on the activity.

Collecting and preserving shellfish in unsinkable basins or protected areas in the event of disasters or as a preventive measure has become all but impossible today except for very small quantities and for a limited period of time.

Another specificity of shellfish farming relates to the impact of farmers’ behaviours among themselves and more particularly the existence of reciprocal negative externalities. Livestock farmed within a shared basin by a plurality of farmers tap a fluctuating trophic resource, the renewal of which depends on tides, environmental specificities and climatic changes. Intensive exploitation of beds may result in decreased productivity in the whole basin or contribute to the development of epizootic diseases.

The second specificity of the shellfish farming industry relates to institutional and financial risks. Shellfish (especially oysters) is commercialized and consumed as a live product. Marketing therefore implies a great number of checks carried out before and after production so as to guarantee consumer product safety. As food safety norms are tightened and reliance on safety principles becomes commonplace, shellfish farmers have been faced with an increasingly restrictive regulatory context.

The last specificity is the maritime public domain. Shellfish farmers also carry on an activity on the maritime public domain, which is administered by the State on behalf of the nation. This environment is therefore inalienable. Although the allocation or renewal of concessions is a relatively stable process, such authorizations are more and more easily revoked, owing among other things to increasing pressure from other forms of coastal exploitation (fishing, water sports, swimming, etc). Inalienability of the maritime public domain prevents mortgaging, which can raise difficulties when negotiating with lenders looking for guaranties. This is especially true of newcomers in the trade who cannot make a personal capital contribution.
2) **Coverage mechanisms**

Risk is determined by the likelihood of events and the scale of consequences. Risk management in fish farming depends on measures allowing professionals either to reduce the likelihood of certain events (self-protection measures) or lessen the financial consequences of the said events (self-insurance, risk transfer and solidarity).

**Risk:** likelihood of events and scale of consequences

**Self-protection**
- Diversification:
  - Species
  - Supply sources (spat)
  - Complementary activity
  - Distribution channel
  - Geographic area
- Good sanitary practice guidelines
- Preventive approach (HACCP)
- Temporary cessation of shellfish activities

**Self-insurance**
- Self-financing:
  - Financial reserves (Disaster Relief Scheme [DPA], equity capital, etc.)
  - Borrowing capacity
- Legal status of firm (company vs family-run business)
- Detoxification measures

**Risk transfer**
- Outsourcing part of the production via contract signing:
  - Cf: forward contracts
- Insurance:
  - Customer default; postponement of sales
  - Natural Disasters Compensation Scheme
  - National Guarantee Fund for Agricultural Disasters

**Solidarity principle**
- State Contribution:
  - Tax relief, tax exemptions, financial support for purchase of new livestock, low-interest loan, etc.
- European Fisheries Fund
- International Oil Pollution Compensation Funds (IOPC Funds)
- *Minimis Aid*
- National Guarantee Fund for Agricultural Disasters

**Self-insurance** will allow shellfish farmers to diversify their activities through:

- Production of various species
- Diversification of spat supply sources in order to equalize quantities produced in hatcheries. Relying on ploidy differences has allowed oyster-farmers to change not only duration of production but also sales seasonality.
- Complementary production and trade activities (fishing, sustainable 'blue' tourism...)
- Reliance on various distribution network to prevent loss of customers
- Holding concessions in various production areas along the coast in order to lessen the risks of sanitary closures or climatic events, enjoy better natural productivity, etc.
Preventive measures equally involve farmers, production tools (whether at sea and on land) and the marketed product. Some will be implemented via good sanitary practice guidelines or guidelines for application of HACCP (Hazard Analysis Critical Control Point) principles.

Faced with regular proliferation of toxic phytoplanktonic algae, some farmers had rather put their activity on hold during risky periods than suffer the economic consequences of a ban on the commercialization of shellfish.

Shellfish-farmers also rely on self-insurance by setting aside contingency funds and preserving their borrowing capacity in order to deal with possible damage. It is worth noting that the DPA (Déduction Pour Aléas or Disaster Relief Scheme) allows shellfish farmers to build up a nest-egg that may be used to face the damage resulting from climatic, sanitary, family or economic events.

Shellfish-farmers who can use storage and purification basins can limit the effects of a sanitary closure.

The third coverage principle concerns risk transfer. The recent development of new commercial relations between various producers has allowed the parties involved to transfer part or the whole of the risks linked to the production environment (following the example of forward contracts).

Although shellfish-farmers can take out standard personal or property damage insurance, only two types of contracts are tailored to meet their needs. The first one covers risks linked to commercialization, ie customer default. The other is a comprehensive farm insurance that includes an optional supplementary insurance policy called ‘postponement of sales’. It insures farmers against cash losses following a ban on commercialization of toxic shellfish. Very few currently take out such insurance owing to high premiums and the unavailability of compensation except in the event of major disasters.

The Natural Disasters Compensation Scheme (régime d’indemnisation des catastrophes naturelles) supplements the insurance system and provides compensation for uninsurable direct material damage resulting from a climatic event (farmed shellfish is excluded from the guarantee). Halfway between mutual aid and solidarity, the National Guarantee Fund for Agricultural Disasters (Fonds national de garantie des calamités agricoles) is a scheme jointly funded by farmers and the State. It covers part of the damage costs resulting from climatic events.

The last coverage principle in shellfish farming deals with solidarity. Solidarity exists at various territorial levels (department, region, state) and may take the form of reduced social security contributions, exemption from property tax payable for leased state-owned property, partial relief on bank loan interests repayments, support for the purchase of new stocks and equipment, refundable advances, tax breaks, low-interest loans.

At European level, the European Fisheries Fund is concerned only with the protection of livestock or human health. Compensations are available only in the event of major disasters.
So-called de minimis aid is meant to support the activity of small and medium-sized businesses where no other measures exist at national or European level. It is distributed in the form of subsidies or aid with an upper limit fixed at €30,000 over a period of three years.

At an international level, one should note the existence of the International Oil Pollution Compensation (IOPC) Funds

3) Limits of coverage mechanisms

If only the limits of insurance schemes and solidarity measures is considered, today risk coverage in shellfish-farming appears as insufficient or incomplete in the light of recent events such as the high mortality rates in the summers of 2008 and 2009. Unguaranteed damage is often overlooked when assessing the actual losses incurred by shellfish farmers: loss of livestock, workforce, markets, tarnished reputations, increased investments, running costs, developed security procedures, rising insurance premiums, etc. There is no insurance contract to meet farmers’ main needs, namely sanitary closures, livestock mortality, climatic events and pollution. The absence of insurance coverage raises the question of the uninsurability of such risks.

Berliner (1982) has provided criteria for insurability. With the development of financial markets, these criteria are regularly modified while the limits of insurability have been pushed back. These developments remain insufficient for insurers to offer contracts tailored to meet the specific needs of shellfish farmers. Indeed, shellfish farming concentrates the main uninsurability factors, which may account for the small number of insurance contracts in the industry.

Gollier (1996) suggests that a risk is insurable as soon as no mutually profitable risk transfer can be exploited by either the policyholder or the insurer.

High transaction costs
Unusual hazards in a narrow branch of industry may lead to high insurance costs. Insurers try to include these into a package of comparable yet independent hazards which allows them to spread the risks and take advantage of the law of large numbers. Assuming that all shellfish farmers took out a specific contract, mutuality would not necessarily allow insurers to offer an optimal contract. The merging of farming businesses in the recent years has made an increase in the number of subscribers unlikely.

Strong correlation of individual risks
Geographic concentration partially undermines the independence of risks. There is a strong correlation of individual risks linked to the production environment. Systemic risk is important as illustrated by the mortality rate of juvenile oysters recorded in all French basins in 2008 and 2009. The risk of systemic mortality may lead to major disasters jeopardizing the financial equilibrium of insurers and makes it more difficult to mobilize reinsurers on these issues.
Ambiguity

A third uninsurability factor is linked to the existence of an ambiguity resulting from the lack of objective probabilities to determine risks. Within the context of insurance, aversion to ambiguity will tend to increase the cost of contracts (Brunette & al., 2009; Camerer & Weber, 1992; Hogarth & Kunreuther, 1985; 1989; 1992). Conversely, insurers’ loathing for ambiguity raises the cost of contracts (Kunreuther & al., 1995; Cabantous, 2007) and constitutes an uninsurability factor, particularly if only the insurer has an aversion to ambiguity or his aversion is stronger than the policyholder’s (Gollier, 1996). In shellfish farming, risks linked to the production environment are often characterised by strong ambiguity as natural events (whether climatic, sanitary or epidemiological) are numerous and poorly known. They are also difficult to determine. Indeed, the causes of shellfish mortality are often multifactorial and hard to pinpoint. Thus the oyster mortality rate in 2008 has been attributed to both environmental factors and infectious agents.

Ex post moral hazard

Ex post moral hazard in shellfish farming means that insurers are unable to check claims. The term refers not only to fraud risks but more generally the impossibility to verify losses. Farmers will not completely fulfil their obligation to declare commercial production, while the authorities will sometimes fail to implement checks and sanctions. There is a lack of data on shellfish volumes per age group. On-site assessment is both complex and costly and the lack of official area productivity tables as exist in agriculture makes it difficult to carry out a reliable inclusive evaluation.

Solidarity and insurance schemes

The State’s policy of unconditional financial relief in case of agricultural disaster today does not allow insurers to offer coverage in these areas. From a theoretical point of view, it is indeed assumed that the existence of public aids generates an ex ante moral hazard by encouraging agents not to take the necessary preventive measures (Brunette & al., 2008, Latruffe & Picard, 2005). The opposition between prevention and insurance on the one hand, and solidarity schemes on the other hand presupposes an evolution of solidarity funds that would allow the development of private insurance contracts.

Conclusion

The study of risks in shellfish farming shows that the industry is confronted with many risks that are often specific to the environment where the activity is carried on. Preventive and self-insurance measures are limited by their complete dependence on environmental, sanitary and epidemiological uncertainties. Non-appropriation of land, ignorance of the potential impact of practices and customs on the level of damage make risk management difficult. The small number of insurance products is explained by the existence of uninsurability factors. Ambiguity and ex post moral hazards remain the most difficult obstacles to clear and require partnership work between shellfish farmers, scientists and insurers beforehand. A keen knowledge of the livestock and potential losses appears as a preliminary condition to any forecast.
REFERENCES