"CRIME AND PUNISHMENT" – AN ECONOMIC ANALYSIS OF ILLEGAL FISHING

MANUEL PACHECO COELHO
E-mail: coelho@iseg.utl.pt
SOCIUS/ISEG
JOSÉ ANTÓNIO BONITO FILIPE
E-mail: jose.filipe@iscte.pt
MANUEL ALBERTO M. FERREIRA
E-mail: manuel.ferreira@iscte.pt
ISCTE

Resumo

O reforço da fiscalização sobre o cumprimento da Lei imposto pelas instituições públicas é uma temática, teórica e empírica, muito relevante na área das Ciências Sociais. Montesquieu, Beccaria and Bentham referiram inicialmente este assunto no Séc. XVIII. A Literatura Económica olvidou-o até BECKER (1968), "Crime and Punishment: An Economic Approach". Na Economia das Pescas, o problema pode ser visto como uma externalidade quando os direitos exclusivos de propriedade estão ausentes. Isto depende, entre outros factores, dos custos de definir e impor a exclusividade. Considerações de eficiência não impõem, *de per si*, a escolha do regime correcto de direitos de propriedade. Na "Propriedade Comum" o realinhar dos direitos pode ter custos proibitivos. O modelo proposto conjuga o Modelo Básico de Gordon/Schaefer com a Teoria do "Crime and Punishment" de Becker. As conclusões permitem discutir o desenho e a reforma do regime de monitorização e controlo da Política Comum das Pescas.

Palavras-chave: Pesca, Fiscalização, Política Comum das Pescas.
Área Temática: Economía de la Energía, del Ambiente, de los Transportes y de los Recursos Naturales.

Abstract

Public enforcement of law is an obvious important theoretical and empirical subject for Social Sciences. First literature dates from eighteen century: Montesquieu, Beccaria and Bentham. After the sophisticated analysis of Bentham, enforcement subject "lay essentially dormant in economic scholarship", until BECKER (1968) article, "Crime and Punishment: An Economic Approach". In Fisheries Economics, this can be seen as an externality arising when exclusive property rights are absent, and that absence depends, particularly, on the costs of defining and enforcing exclusivity. Efficiency considerations don't dictate, only by themselves, the choice of a certain property rights regime. In "common property" the re-alignment of the property rights can have a very high or even prohibitive cost. This model combines standard Economics of Fisheries analysis (Gordon/Schaefer model) with Becker's Theory of "Crime and Punishment". The conclusions are used to discuss the design and reform of the control and monitoring regime of the Common Fisheries Policy.

Key Words: Fisheries, Enforcement, Common Fisheries Policy.
Thematic Area: Energy, Environment, Transports and Natural Resources Economics.

INTRODUCTION

Public enforcement of law, that is, the use of public agents to detect and sanction violators of legal rules, is an obvious important theoretical and empirical subject for Social Sciences. First literature on the subject of law enforcement dates from eighteen century: Montesquieu, Beccaria and Bentham. Curiously, after the sophisticated analysis of Bentham, the subject of enforcement

"lay essentially dormant in economic scholarship" (Polinsky and Shavell (2000)), until the influential article of Becker, 1968, "Crime and Punishment: An Economic Approach".

In the context of Fisheries Economics, the problem can be seen as an externality arising when exclusive property rights are absent (Cheung (1970), and that absence, among other things, depends on the costs of defining and enforcing exclusivity.

Differences in the costs of information, negotiation and enforcement, associated to the privatisation of the property rights, implicate differences in the choice and evolution of the alternative contracts (Alchian and Demsetz (1973); Cheung (1968)).

Efficiency considerations, only by themselves, don't dictate the choice of a certain property rights regime. In some systems of property rights (as it is the case of "common property") the re-alignment of the property rights can have a very high or even prohibitive cost. The establishment and enforcement of a system of rights depends, of course, on efficiency considerations, but also on the individual preferences and the ethical, political and social realities in a community. These include the lack of means (or other insufficiencies) of the administration to control and enforce the execution of legal rules - Demsetz (1967).

By definition, anything that is an infringement of the law is illegal. Illegal fishing therefore covers a wide range of behaviours, which can take place at three levels for members of the European Union: national, Community and international. Any violation of national laws or EU regulations, or failure to comply with the recommendations of international bodies, especially those of Regional Fisheries Organisations, constitutes an infringement.

Illegal fishing has always existed, but, in recent decades, there has been a sharp rise in violating activities, due to technical progress: motorization, freezing techniques, improved gear, new forms of stocks detection and information. This process was majored by the evolution of the Law of the Sea - a "creeping jurisdiction" process which seems to have given an end to the principle of open access.

Obviously it is impossible to quantify or qualify infringements. They are known to take place at all levels and take different forms at different times; some violations are detected but many remain unnoticed. Infringements take the traditional forms of fishing over the quota or using non-permitted mesh-size, but are also in situations of non-permitted by-catches or transhipment, even in the fake world of convenience flags. Illegal fishing occurs at all stages of fishing activity.

A large number of offenders are fishermen motivated by various interests, the fundamental being the lure of short term profit. But fishermen are not the only ones involved. Fraud can take place along the entire channel. National administrations sometimes bear part of the blame. Every state is responsible for enforcing the existing rules and monitoring activities (policing its territory, conducting controls and penalising offenders). Its inefficacy in controlling activities is the reason of a lot of enforcement problems.

Most of the literature on fisheries management implicitly assumes law can be perfectly and costless enforced. Even when such costs and imperfections are recognised, they are not incorporated in the analysis to show how management and regulatory policies are affected by their presence. This paper explores this issue with a formal model of fisheries law enforcement to show how fishing firms behave and fisheries policies are affected by costly, imperfect enforcement of fisheries law. This model combines standard Economics of Fisheries analysis (Gordon/Schaefer model) - Clark and Munro (1975), Clark (1985) - with the Theory of "Crime and Punishment" of Becker (see Sutinen and Andersen (1985) and, for an extensive review of the literature on fisheries regulation enforcement, see Nostbakken (2008) and Sumaila *et al* (2006)). The conclusions of the model are used to discuss the design and reform of the control and monitoring regime of the Common Fisheries Policy.

1. "CRIME AND PUNISHMENT" – THEORETICAL ANALYSIS

Despite the enormous volume of literature on Fisheries Economics, the issue of enforcement has always been "the neglected element in fishery management" (Sutinen and Hennessey (1986)).

We can explore this issue with a formal model of fisheries law enforcement showing how fishing firms behave and fisheries policies are affected by costly, imperfect enforcement of fisheries regulation. This model combines standard Gordon /Schaefer fisheries model with the theory of crime and punishment of Becker.

The fundamental problem in fisheries management is to obviate the tendency towards overexploitation of the resources under open access. Regulation methods used to curb this tendency of overfishing and overcapacity includes gear restrictions, area and seasonal closures, TACs, ITQs, limiting entry and other forms of reducing fishing effort.

Let's assume that, whatever means are applied to reduce catch rates, any catch level above the level of the permitted quota for a certain fishing, q*, is illegal. If we suppose a system of individual non-transferable quotas, the amount of the individual firm catch above its quota (q_i – q_i*) is illegal.

If detected and convicted, a penalty fee is imposed on the firm in an amount given by f,

$$f = f(q_i - q_i^*),$$

where $f > 0$, if $q_i > q_i^*$; and f =0, otherwise;

and $\frac{\partial f}{\partial q} \geq 0$; $\frac{\partial^2 f}{\partial q^2} \geq 0$; $\forall\ q_i > q_i^*$.

For hypothesis the function *f(.)* is continuous and differentiable for all $q_i^* > q_i$. This penalty fee has a finite upper bound and each firm is assumed to face the same penalty fee schedule.

An individual firm's profit before penalty is given by

$$\Pi^i(q_i,x) = pq_i - c^i(q_i,x),$$

where *p* denotes the price of fish, *x* is the size of fish stock and *c(.)* is the cost function. Let's assume that firms are price takers.

In an imperfect law enforcement regime not every violator is detected and convicted. Let the probability of detection and conviction be given by θ, and, to simplify, let' s assume that all firms face the same probability.

If detected and convicted of a violation, a firm's profit will be $\Pi^i(q_i,x) - f(q_i - q_i^*)$; if not, $\Pi^i(q_i,x)$.

So, expected profits are

1) $\theta[\Pi^i(q_i,x) - f(q_i - q_i^*)] + (1-\theta)\,\Pi^i(q_i,x)$

Assuming that firms are risk neutral and maximising expected profits, each q_i is determined by the first order condition (subscripts other than i denote partial derivatives)

2) $\Pi_q^{\ i}(q_i,x) \geq \theta\ f_q(q_i - q_i^*)$.

The solution to 2) for one form of the marginal penalty schedule, f_q, has a clear economic meaning. The model sustains a rule of optimal behaviour for a rational ("homo economicus") operator:

For a given stock size (x), the firm sets its catch rate at a level in excess of its quota, where marginal profits equal the expected marginal penalty. If there were no penalty for fishing beyond legal quota, or if there were no probability of being detected and convicted ($f = 0$ or $\theta = 0$) the firm would set its catch at the open access catch rate. If the expected marginal penalty schedule lies above the marginal profit schedule for all q_i above the legal quota, the firm's "optimum" catch equals its quota. Firms with no quota have an expected net gain for entering, illegally, in the fishery, if their expected marginal penalty schedule begins below their marginal profit schedule.

This approach reveals the importance of empirical studies (see Sutinen and Gauvin (1989)) trying to estimate the factors that ensure compliance with the regulation. These studies give important basis for public authority decision about the actions to be implemented.

Stigler (1970) argues that public authorities have four basic means to improve compliance:

- minimise the chances that violations will go undetected,
- maximise the probability that sanctions will follow the detection of violations,
- speed up the process from time to detection to assignment of sanction,
- make the sanctions large.

There is dispute among experts about the best alternatives. Some scholars have argued that the probability of being detected is more important than the size or magnitude of the sanction, while others argue that making the charging time follow as closely as possible to the detection of illegal behaviour is the most important factor in enhancing compliance. Others, also, put in evidence the level of expenditure oriented to monitoring activities (Tietenberg (2003)).

2. THE MONITORING AND CONTROL REGIME OF THE COMMON FISHERIES POLICY

The main objective of the Common Fisheries Policy (CFP) is to provide sustainable exploitation of fish resources. In order to ensure the achievement of this objective, Community rules shall be applied, in an effective and uniform manner.

The effectiveness of the Common Fisheries Policy depends on the compliance of the various operators concerned with the CFP rules. Member states are responsible for ensuring the correct application of the CFP rules on their territory and in the waters under their jurisdiction. They must also ensure that all vessels flying their flags comply with these rules wherever they operate.

To ensure the equity and fairness of control and monitoring through the Community, Commission inspectors oversee the activities of the national enforcement services and report to the Commission. In addition, periodically, member states must transmit information to the Commission on various aspects of their enforcement activities.

It is up to the member states to ensure the effective implementation of regulation. Of course, inspection and surveillance of fisheries and related activities implicate establishing administrative and technical structures. So, it is of Community interest that the member states have structures (human and technical resources) that are adequate for the control purposes and allow them to meet the requirements of European Union regulation.

The Commission has implemented, since 1978, a series of provisions for financial support towards member states expenditure. This reflects the interest of the European Commission for the control improvement in the fishery activities. The first Council Decision was approved in 1978. A decade later, in 1987, a new Decision went on to grant financial contribution to all member states. The objective was to promote the development on the monitoring and control system capacity and capability within specific areas of control and surveillance.

In the 90s, the Community introduced a more complete aid scheme to provide financial support to the member states for the establishment of control structures, and, in particular, to promote certain forms of control which are particularly effective, such as systems to monitor fishing activities at a distance. Council Decision 89/631 established a framework for Community financial assistance. Assistance Programs were developed by the Commission since then to promote fairness among member states and an efficient control of fishing activities.

On the basis of the experience gained and in conformity with the conclusions drawn by the ex-post evaluation reports, it can be said that, in general, funding has been directed to the most deficient states in terms of EU average means for control purposes. This has addressed the imbalance in member states control capacity, but it has not completely solved it and there was a further scope for additional expenditure.

In this context, and considering the evaluation of the two first decades of CFP made in the "Green Paper"/2002, the 2003 Reform has brought an important evolution, particularly in the control regime of the European Fisheries.

The fundamental guidelines of this reform were the following:

A new framework and a more complete body of regulation were introduced. This new Regulation stressed the need to further improve control of fishing activities in order to fight, by any means, against illegal and undeclared fishing within and outside Community waters. It identified remote control technologies as a tool to better achieve the control objectives under CFP and extended the obligation for remote monitoring by means of vessel monitoring system - VMS (that became the real "jewel of the crown" of the control regime).

With ten new countries joining the Community, the monitoring structures of some of these countries needed upgrading rapidly. For these reasons, and for the sake of greater clarity, it was proposed to redefine the measures eligible for financial support. Those measures included, among others, purchase of computer equipment and installation of IT networks; purchase of equipment devices to locate fishing vessels and equipment for electronic transmission of information; programs of training and exchange of inspectors; purchase and modernisation of boats and aircraft for inspections at sea. Commission's contribution and procedural provisions on applying for aid and payment/ reimbursement have been amended to make them clearer and more precise. The fundamental objective of CFP reform was to enable the Commission and member states to tackle weaknesses in enforcement. Augmenting the expenditure in enforcement was the central element of the new regime. Other possible measures against Member States include the taking of preventive measures, suspension of financial assistance and deductions from future fishing opportunities.

At the same time, the Council decided to step up cooperation among the member states and coordination of their inspection activities by establishing a common inspection structure, using the structures, equipment and communications networks provided by the member states. The coordination of theses actions should rest on a European supra-national Agency with important powers in terms of enforcement. This European Control Agency was created in 2005 and has its official seat in Vigo, Spain. The reform also provided for increased powers for the Commission inspectors because it had been found, through the annual reports on infringement of the CFP rules, that the member states prosecuted infringements with varying degrees of diligence and severity**.** This meant that awareness of the importance of penalising non-responsible behaviour should be increased and that it required promotion of a culture of protection of natural resources and inspection, so that effective penalties could be applied. The role of the Commission inspectors, in this sense, was fundamental.

In the context of the reform, the Commission was committed to increase transparency in the information related to the compliance of member states with their enforcement obligations. This is why it has presented a Communication on compliance with the CFP rules which included, for the very first time, a scoreboard which should be updated on an annual basis.

The "scoreboard of compliance" is a pure example of this new environment of transparency and trust. This scoreboard represents a clear and easily accessible source of information about member states compliance. Among other things, it reports on catches taken by their fleets, the capacity and fishing effort of these fleets, and national monitoring and inspection activities. In addition, it sets out the infringement procedures initiated by the Commission, in respect of member states that have failed to comply with certain CFP rules. The scoreboard seeks also to serve as a tool for comparing data about regulation enforcement by member states. Using a number of key indicators, it shows in summary form, the general level of compliance with those rules. The scoreboard contains details, for each of the above subjects, on the legal basis of the member states obligations, their nature and the intervals at which they must be met along with information concerning compliance. It also contains information about actions taken by the European Commission, firstly, under its powers to check the monitoring activities by the competent national authorities and, secondly, in its role as guardian of compliance with Community law.

3. DISCUSSION

Applying theoretical analysis to the guidelines of CFP design and reform, it is suggested the following:

Implementing Community policies in Member States is never easy, especially when myopic individual interests do not match long term collective interests. This is the case of fisheries. Fishermen do not have a greater propensity to altruism than the rest of the society; so, they are little inclined to refrain catches (for the sake of a clear conscience) if they think their competitors are less scrupulous (European Comission/ DGF). That is, without a clear and effective policy of control and enforcement, the Commission is certain that the "Tragedy of the Commons" will result and that overfishing and overcapacity will occur (Hardin (1968), Filipe *et al* (2008), Filipe (2007), Filipe *et al* (2007). The reform of CFP insists in the philosophy of intervention of its early days, when the Commission put the problem of control in terms of ethical reasons: "It's the only way to assure that the sacrifices of some member states in the recovery of the stocks are not in vain because of the irresponsible action of others" (European Commission, 1976).

According to Becker, individuals rationally decide whether or not engage in criminal activities by comparing the expected returns to crime with the legitimate business. His main thesis is that crime is less attractive if the government increases the probability and severity of punishment (Garoupa (2000). The analysis of the Commission proposals seems to give a special attention to the increase of the probability of detection as a means to deter criminal behaviour and increase compliance with regulation. The introduction of severe penalties is not a priority (Coelho *et al* (2008)). Of course they are considered and an important effort is made to define and make clear the legal procedures to penalise the violators. However, the severity of penalties is not in the centre of the European Fisheries Policy. The Commission believes that the financial support will guarantee the indispensable means of surveillance and control to the member states and this will increase the deterrence capacity of control in member states, in a uniform way, and, also, the transparency and trust between partners. But the Commission also knows that legal administrations, in the member states, have significant differences and that judicial machinery has a great inertia. The capacity and efficiency of member states justice is not just a question of financial means devoted to his mission. It has also cultural and historical roots. It's virtually impossible to put all the member states in a uniform position in terms of speed and severity in the application of penalties.

The enforcement issue points out another advantage of private property rights based management - they are self-enforcing. This may be an important step to proceed to the discussion of regulatory instruments. First, if enforcement costs are significant, the more common forms of regulation (direct controls as TACs, mesh size or areas / seasons closures, for example) should require further re-evaluation. Usually they are detracted because they are not economically efficient. But is also commonly recognised that costs of enforcement are weaker in these cases. Second, the analysis of Individual Transferable Quotas (ITQs) reveals the equivalence between ITQs and taxes. But, with the consideration of enforcement costs, this may not hold. In any case, the reduced costs of enforcement support this tool. As the fishermen are given almost private property rights of resource use, this means that some kind of auto-regulation is guaranteed. In theory, this engages fishermen in compliance with the regulation and diminishes enforcement costs. However, in practice, the implementation of ITQs system is confronted with a lot of problems, including illegal behaviour (Copes (1986) and Coelho and Lopes (2000).

CONCLUSION

The European Common Fisheries Policy has proved that there are some important measures that have been implemented to create a more transparent control regime in the European Fisheries.

Besides the efforts made in the sequence of 2003 Reform, several problems, in the CFP control and monitoring regime, still remain. This implies a new reform that gives the member states a more trustable framework and allows to (re)discover the original philosophy of intervention of the Commission that saw the issue of the fisheries enforcement as an ethical question (equating the stocks recovery and the development of sustainable fisheries with a fair distribution of costs and benefits among member states).

In our opinion, this new Reform should be accomplished with a more intense debate on the issue of the regulation tools of the Common regime of conservation and management of fisheries resources. This implies a cost/benefit analysis that confronts the different instruments with their advantages/disadvantages. And this should include, of course, the issue of monitoring and enforcement costs. By now, it isn't, in fact, possible to predict the Commission position about the introduction of management instruments as ITQs, which could introduce economic efficiency in European fisheries and, at the same time, introduce forms of auto-regulation in the fisheries that could reduce, in theory, the enforcement costs.

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