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The bad, the good and the very good of the landing obligation implementation in the Bay of Biscay: A case study of Basque trawlers

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ABSTRACT

Landing obligation (LO) has become a core element on the Common Fisheries Policy (CFP). In this work a bioeconomic simulation tool is used to anticipate the effects of LO in a particular fleet that by its nature is likely to be highly affected by its implementation. These effects are measured in terms of biologic, economic and fleet indicators.

Results show how LO has a negative short term effect in the economic performance of the fleet (the bad). That the exemption and flexibilities foreseen in the CFP alleviate, in the short term, the effects of the choke species and the redistribution effects created (the good). Furthermore, results show that there are private incentives to improve the selectivity and to reduce the discard levels of the fleets. It is concluded how a breeding ground for a more sustainable and productive system is created (very good).

1. Introduction

Landing obligation (LO) has become a core element on the Common Fisheries Policy (CFP) (EU, 2013). The aim of this discard ban is to reduce the waste of the sea-protein that discards create or at least the waste created in terms of human consumption (direct or not) (Article 2 of the CFP).

Historically, European Union (EU) discards policies have had different regulations and, hence, implications (Borges, 2015; Condie et al., 2014). In the EU Atlantic fisheries discards have been used, inter alia, as a way to avoid the over quota problem. If the catch exceeded the quota, discarding was the way to comply with the regulation. Under this scheme, CFP granted permission and furthermore the obligation to discard. When relative stability principle (the principle from which quota share among EU Member States is fixed) was agreed, the focus of the negotiators was on the commercially valuable stocks of their national fishing fleets. The reason for that was that under a discard granting scheme there was not an implementation issue in a multispecies fishery. In this context, the over catch (catch beyond the quota) could be (and was) discarded. LO is altering this equilibrium; before this CFP quota was a landing quota, now, under LO, it is a catch quota.

Quota constraints are not the only reasons for discarding. Minimum Landing Size (MLS) as biological references for sustainability of the species (Rochet and Trenkel, 2005) and highgrading, that is, to retain the most valuable fish and discard the low or null valuable fish (Anderson, 1994), are also powerful reasons for discarding. Generally speaking, there are regulatory reasons (quotas), conservation reasons (MLS), market (highgrading) and other economic reasons (Pascoe (1997)) for discarding. Furthermore, these reasons are not fully separable by species, fleets and/or metiers (homogeneous sub-division of a fishery by fleet). The same stock caught during the same trip can be discarded due to the three reasons explained. Landing obligation bans, at least partially, this discard scheme (Article 15 of the CFP). Under a pre-defined calendar, stocks subject to total allowable catch (TAC) and quota regulations in the Atlantic area have to be landed, if caught.

Mixed fishery problems have been addressed in fisheries literature (Ulrich et al., 2011), and the conclusion is that there is always a choke species that can potentially limit the fishing effort. The term choke species was first introduced by Schrope (2010) and stands for the idea that the lowest quota in a mixed fishery constraints the opportunities of catching other stocks for which quota has not been exhausted, given a determined fishing effort level. Landing obligation implies that, effectively, this limit derived from the choke species enters into force. It creates limits to the effort from the "old" species. The current quota allocation of a particular stock cannot be enough to catch the target species of the fleet. It also creates effort limits to the "new" ones. For example, hake can become a choke species in the North Sea simply because its abundance has increased (Baudron and Fernandes, 2015).

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The arguments above imply that as pointed out in Hatcher (2014) discarding has an economic rationale and a likely reaction from the fishermen can be expected (Batsleer et al., 2016; Simons et al., 2015). This rationality implies that banning discards will create economic consequences. The CFP anticipates these consequences and in particular those in the form of implementation costs (of the LO). Therefore, and with the aim of partially reduce these consequences the CFP in its article 15 anticipates some flexibilities and exemptions to the LO. *De minimis*: allows up to a 5% of discards under certain circumstances; species transfer: Allows up to a quota deduction of the target species of up to 9%; Year to year transfer: allows the catch of the next year's quota in the current year with a limit of 10%; High survival rate: allows to discard those species that have high survival rates after discarding.

The main objective of this work is to understand the economic dynamic of a particular fleet under LO and to compare it with a no LO situation in order to assess on the biological and economic consequences of the exemptions anticipated by the CFP. In particular, the paper focuses on *de minimis* exemption and the year to year transfer flexibility. Species transfer has not been tested given that it is not clear which stocks can, in theory, be exchanged. High survival rates, neither, given the lack of specific studies of discard survival in the fleet studied.

For doing so a bioeconomic simulation analysis is performed for a selected case study: the Basque–north–east of Spain-trawlers fishery operating in the Bay of Biscay. This case study can be described as a multispecies and mixed fishery, that from its nature, is a likely candidate to be heavily affected by the LO.

2. Material and methods

2.1. Background on the Bay of Biscay Basque trawling fishery

Bay of Biscay (Fig. 1) is a highly productive system that creates the perfect conditions to multispecies fleets to make use of this productivity.

The Basque trawling fleet operating in the Bay of Biscay (Basque fleet, onwards) is composed of bottom trawlers and their activity can be divided in four métiers. The first métier is the pair bottom trawl (PTB_DEF_ ≥70) targeting hake. This métier uses a very high vertical opening bottom trawl to target, mainly, hake. A second métier is the bottom otter trawl targeting demersal species (OTB_DEF_≥70). Hake, megrims, and anglerfish are the main target species in this métier. However this is a very mixed métier including many other species (pout, dogfish...). A third métier, only operates in the winter season of the year and is the bottom otter trawl targeting mixed cephalopod and demersal species (OTB_MCF_≥70). Squids, cuttlefish, and mullets are the main target species in this métier although many other species (pout, seabass, hake...) are also harvested. Finally, there is a bottom otter trawl métier targeting a mix of demersal pelagic species (OTB_MPD_≥70), it also operates in the winter season. Apart from hake, this métier also targets mackerel and horse mackerel. The historical (average of the years 2011–2013) landings and revenues composition of this fleet are summarized in Fig. 2.

The fleet is managed through TAC and total allowable effort (TAE), apart from some other technical and physical measures (Iriondo et al., 2013). These two regulations (TAC and TAE) come from different origins.

The TAC was first implemented when Spain joined the EU in 1986. Setting TACs involves the fixing of maximum quantities of fish that can be caught from a specific stock over a given period of time. This operation requires cooperation among the various parties enabling those involved to come to an agreement regarding TACs and an allocation key for sharing them. The EU went on to share fishing opportunities in the form of quotas among Member States. A formula was devised to divide TACs according to a number of factors, including countries' past catch record (Hoefnagel et al., 2015). This formula is still used today, on the basis of what is known as the principle of 'relative stability' which ensures Member States a fixed percentage share of fishing opportunities for commercial species. Even if the share has been maintained stable over time, the growing scarcity of some key stocks has eroded significantly the fishing opportunities for these fleets.

The TAE is previous to the TAC regulation. In 1981 it was decided to list all the Spanish vessels operating in ICES Divisions VIIIa,b,d and Sub-areas VI and VII (see Fig. 1), in order to create the access rights to these fisheries (a single fishing right per vessel). The idea was to maintain these rights fixed even if the number of vessel decreased. When Spain joined the EU the number of vessels in that list was close to 300 and the so-called "300 list" was created. These fishing rights became transferable by area. A decrease in terms of number of vessels, around the 50% from where the "300 list" was created (according to Prellezo (2010)), has make that the current TAE system is not constraining the operational days of the fleet any more. Concerning technical measures, some mesh size limitations and minimum landing sizes for some stocks have been implemented. Further information on how this fishery is managed can be found in Iriondo et al. (2013), Prellezo et al. (2009) and in Prellezo (2010).

2.2. Description of the simulation model used

Simulations have been performed using FLBEIA (Garcia et al., 2013; García et al., 2016; Jardim et al., 2013). This is a simulation bioeconomic model coupled in all its dimensions (economic, biologic and social). It has been developed in R (R-Core, 2014) using FLR libraries (Kell et al., 2007). The model is divided into two components (Fig. 3): the operating model (OM) and the management procedure model (MPM). The first describes the real system and is composed of the stocks, fleets and covariates. These last can be used to account for the ecological interactions between the different stocks. However, in the simulations performed these interactions have not been considered.

MPM represents the management process and it is composed of the data collection, assessment procedure and management advice. In this case it is assumed perfect observation (no observation error is modelled). The management advice is different from stock to stock (see Section 2.4) and the implementation of this advice is based on the perfect implementation of the landing obligation, with or without flexibilities and exemptions (see Section 2.9).

The model follows the Management Strategy Evaluation approach (MSE), which is widely used in fisheries management to analyse the performance of management strategies against predefined management objectives, by means of simulation before they are put in place (Punt et al., 2014). The approach of the simulation consists on projecting the fleets that exploit the stocks under different management schemes.

2.3. Fleets included

The analysis is centered on the Basque fleet, however this is not the only fleet considered in the simulation. Fleets included are those used in ICES (2014a), that is, those included in the ICES working group assessing the northern stock of hake and megrim. It includes trawlers, gillnetters and longliners operating in the ICES sub-areas VIII and VII, from UK, Ireland, France and Spain. There is a group of "others" that accounts for the fishing mortality of hake and megrim that is not covered by the fleets explained above. It implies that all the fishing mortality of hake and megrim stocks has been included, although divided by fleets.