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Auctions for quota: A primer and perspectives for the future

Daniel Marszalec¹

Graduate School of Economics, University of Tokyo 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-0033, Japan

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ABSTRACT

Auctions are not a new concept in fisheries economics: wholesale fish markets have a long history of using such mechanisms. By contrast, fishing quota is usually allocated by grandfathering, and traded through a secondary market. Often the secondary market is not transparent and functions poorly. Furthermore, quota for various species may exhibit complementarities: there may be value-synergies for acquiring quota for particular species together. These characteristics combined make it unlikely that the current allocation of quota is efficient, and that complementarities are fully exploited. One approach to alleviate the problem is to improve the performance of secondary markets. Another alternative is to improve the efficiency of the initial allocation of quota. Using the example of bycatch, I illustrate why complementarities are likely to occur between quotas for different species, and how package auctions could be used to solve such an allocation problem more efficiently. A brief survey of the literature shows that recent developments in auction theory, experiments and practice, offer numerous solutions for allocation problems with complementarities, and could be used for the sale of quota. Which particular design is best-suited will depend on the regulator's objectives; auctioning of the quota is only one element of an overall fisheries management policy. Auction choice will not be a one-size-fits-all problem: trade-offs between revenue, efficiency, and other policy goals need to be considered explicitly. Given the currently limited amount of research on the application of auctions to quota allocation, this field poses many open questions of substantial academic and policy-making interest.

1. Introduction

While auctions are used daily for the sale of fish at wholesale markets, there has been little interest in using auctions for allocating rights to scarce fishing resources. Instead, grandfathering – the costless allocation of fishing rights based on historical participation in the fishery – has become the accepted wisdom. The few occasions on which auctions for fishing rights have been used have not resulted in successful and well-functioning markets. Furthermore [Anderson et al. \(2011\)](#) argue that even if auctions did function well, grandfathering would grant dynamic efficiency advantages. It is my contention, however, that the case against auctions is not quite this firmly decided: appropriately designed, auctions can be a precise tool to achieve a combination of efficiency and other policy objectives. My aim is modest: not to show that auctions are always necessarily superior, but to re-open the discussion on the relevance of auction methods for

rights-based management of fisheries.²

Three main thoughts will underpin my exposition in this paper: firstly, that auctions are not only tools for pricing, but also for allocation. In the context of fisheries management, “who gets what, and in what proportions”, is as important question as “at what price”; auctions can answer both questions simultaneously. Secondly, the auctioneer's objectives need not be restricted to financial considerations only: auctions can accommodate quality, diversity, and equity considerations in addition to revenue. By requiring the auctioneer to announce the rules in advance auctions also ensure transparency and equality in enforcement of the rules. Thirdly, given the previous two points, auctions offer an efficient means of information aggregation, subject to the regulator's policy objectives.

To develop a nuanced understanding of the capabilities of auctions, in Section 2 I discuss the paper of [Anderson et al. \(2011\)](#), which highlights a few common misconceptions about the limitations of

¹ E-mail address: dmarszalec@e.u-tokyo.ac.jp.

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² While this paper was undergoing final revisions for publication, a new fisheries reform bill was introduced to the parliament of the Faroe Islands in June 2017 (information from: <http://www.government.fo/news/news/new-fisheries-reform-introduced-to-parliament/>). The bill proposes the gradual introduction of auctions for allocating 25% of the country's fishing quota, from 2018 onward. This shows that auctions are actively being considered as viable means for allocating quota, and that now is a good time for both academics and policy-makers to revisit this discussion.

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auctions. Subsequently, Sections 3 and 4 provide a primer on single, and multi-unit auctions, respectively. Using bycatch as an example, in Section 5 I show why we need more complicated auction rules to deal with issues such as complementarities and exposure. Section 6 provides an introduction to static and dynamic package auctions, which have been successfully used in other industries, for example to allocate mobile spectrum or auction contracts for servicing bus routes. In Section 7, I briefly discuss how other non-revenue policy-objectives can be included in auction design. Section 7.3 considers a family of auctions which are budget-balanced, or self-financing; these rules may be particularly attractive if the regulator wants to commit to not collecting any revenue. To close, Section 8 draws together the main arguments of this paper, and points out some fruitful avenues for further discussion of auctions for quota.

2. A reassessment of the grandfathering vs. auctions argument

In their elegant paper [Anderson et al. \(2011\)](#) argue, using a dynamic model, that grandfathering is a better method for maximizing resource rents in rights-based fisheries than an auction. Though the model itself is sound, it only offers a bare-bones characterization of auctions, and provides a good context in which to discuss a few common misconceptions. The auction is modeled as a one-and-for-all sale of fishing rights to the highest bidder, with the auction price being a simple financial transfer from the winner to the auctioneer. By reducing the wealth of the winning bidder, the auction reduces investment and R & D expenditure, which in turn results in lower long-run rents.

While the model is dynamic, it is not stochastic: there are no demand, investment, or R & D shocks. After the auction, then, the optimal investment path is deterministic, and because grandfathering does not lead to an initial negative wealth-shock, it generates higher investment and resource-rents overall. Though this story holds true, it is only a part of the picture.

In countries that use quota-based management of fisheries, even if the relative catch shares are fixed, the exact amount of quota available is adjusted annually. Furthermore, few industries suffer no major shocks over time: there may be technological developments, shifts in the location of stock, and even differences in the performance of various fishers. Both the underlying biomass as well as market structure may change over time. The allocation problem itself is nontrivial: there are multiple species, and a different catch mix may be optimal for different fishers at different times. The situation is not a one-off sale of a single item, but rather a repeated allocation of multiple items, with complex interrelationships between them. Much of the value of auctions comes from dealing with this complexity. The present model assumes that grandfathering and the auction implement the same distribution of quota, and the paper argues in favor of first possession. Whether such a pattern is indeed rent-maximizing is an empirical question; though [Anderson et al. \(2011\)](#) do offer some case-based evidence that first possession does generate rents, the argument does not show that these rents are higher than under alternative allocations.

If we allow for stochastic shocks, it is no longer clear that a historically-determined allocation pattern is efficient, or rent-maximizing overall. Implementing an optimal grandfathering regime in the presence of shocks poses steep information requirements on the regulator; some of this information may be hard to obtain, or it may not be in the fishers interest to reveal it. Yet for the argument in favor of grandfathering to be fully convincing we must believe that the regulator has superior foresight, and can implement a rent-maximizing allocation of rights over time.³

³ It is beyond the scope of this paper to formally model how auctions may result in a more efficient dynamic investment path in the presence of shocks. Two recent papers offer a good starting point for how such a model might be constructed: [Daley et al. \(2012\)](#) offer a model of efficient investment in a dynamic auction environment, and [Cui \(2014\)](#) shows that in a dynamic setting inefficiencies from delayed capital reallocation may

Even if, as [Anderson et al. \(2011\)](#) argue, entry into the fishing industry is limited, it does not follow that the same industry structure is optimal over time. If a particularly successful fisher wishes to grow his business, it may be easier for them to procure a larger quota via auction than by awaiting the regulator's decision. It is a rare industry where a regulator has been more successful at picking the winners, relative to the market.

The second driving assumption of [Anderson et al. \(2011\)](#) is that the auction is a purely extractive revenue-maximizing transfer. For simplicity, I will also make this assumption in Sections 3–6, but as Section 7 shows, more complex objectives can be feasibly incorporated in auction design. For example, many public procurement auctions in Japan and the United States use “scoring rules” that evaluate bidders’ performance on non-monetary criteria, such as punctuality, maintenance record, and quality. In the context of fisheries, measures for sustainable practices, employment conditions, and similar factors could be included in evaluating the bid within an auction.

If the regulator does not want to extract rents from the fishers, an auction can be designed to be budget-balanced from the outset. In such a design, fishers who win some quota, end up paying a subsidy to those that lost out, in effect compensating them for the lost access to the fishery. There is no net leakage of the wealth from the fishery to the government – only reallocation of fishing rights to those fishers who value them most. Such a design, however, comes at an efficiency cost: as the impossibility-result of [Green and Laffont \(1979\)](#) shows, there is no mechanism that simultaneously induces fully truthful reporting of all bidder valuations, is budget-balanced, and efficient.⁴ We should not be overly discouraged by this extreme theoretical result: as recent work by [Nath and Sandholm \(2016\)](#) shows, if the efficiency condition is relaxed even slightly, it is possible to design a truthful-reporting, budget-balanced mechanism. For policy decisions, this potential inefficiency should be weighted against possible inefficiencies from sub-optimal quota allocation.

Another argument against the use of auctions for fishing rights is that they are unnecessary: in the presence of a well-functioning secondary market, efficiencies can be realized by voluntary resale of quota. In a perfectly competitive industry, this may be the case, but in practice an excess quota holder may not wish to sell to a competitor. Perhaps the value from driving out a competitor who does not have adequate quota is worth more in the long-run than a one-off lease fee which would keep that competitor in business.

Grandfathering combined with resale of quota may also support an inefficient market structure for longer than necessary: if a fisher can no longer profitably run his operation, further profits may accrue to them from re-leasing the quota. In the extreme, this may result in certain fishers obtaining quota only for the purpose of resale. In this eventuality, re-sale of the quota to an operational fisher, via the secondary market, constitutes precisely an analogous wealth-reduction to that considered by [Anderson et al. \(2011\)](#).

The above arguments do not ensure that auctions automatically outperform grandfathering, but they do suggest that a more nuanced analysis of auctions is worthwhile. To that end, I invite the reader to persist with reading the remainder of this paper.

(footnote continued)

occur. If grandfathering leads to a slower-than-optimal reallocation of fishing rights, it would fall well within the analysis that [Cui \(2014\)](#) conducts in the context of capital.

⁴ The impossibility result applies under very general assumptions about preferences: in very broad terms, it shows that “it is not possible to design a mechanism that always satisfies the three properties, in all states of the world.” For practical implementation of budget-balanced mechanisms, such generality may not be necessary. If the domain of preferences is partially restricted, or the strict efficiency objective is slightly relaxed, many mechanisms that satisfy those properties can be found. For this reason, despite the theoretical impossibility-result, budget-balanced auctions have been successfully conducted in practice, as discussed in Section 7.3. I am grateful to an anonymous reviewer for highlighting this point.

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