

Where could catch shares prevent stock collapse?

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Abstract

In a widely received study (Science 321: 1678–1681) Costello and his colleagues found that catch shares give better stock persistence and higher catch for fishermen. The conclusions made by Costello et al were further being supported by Grafton and McIlgrom (Marine Policy 33: 714–719) where they suggested a framework in order to determine the costs and benefits of separate ITQ management in seven Australian commonwealth fisheries, and what the alternatives should be if the net benefits do not justify ITQs. This raises the question why we do not see catch shares being used more often. We explore at a global scale which countries would have the potential for – and indeed do fulfil the conditions necessary to implement such a management strategy.

Key words: Individual transferable quotas (ITQs)

1. Introduction

Individual transferable quotas (ITQs) have been an increasingly hot topic and are today considered to be a superior management strategy for sustainable marine fisheries. A recent article by Grafton and McIlgrom [1] considered seven Australian fisheries to derive a framework to quantify the cost and benefits given by five prerequisites. Another recent study, by Costello and colleagues [2] covered over 11.000 fisheries, compiled compelling evidence that catch shares could prevent stock collapse. Their work has brought considerable media attention to a management instrument which has been discussed for nearly 40 years [3]. The ensuing scientific debate [4, 5, 6] highlighted known caveats and benefits of catch shares.

The fundamental idea of catch shares, defined by Costello et al. as variations on Individually Transferable Quota shares (ITQs), is to evict the “tragedy of the common” [7] by

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transferring stewardship incentives to those harvesting the resource. However, the annual value of the fish that are caught under such management schemes amounts to less than 2.7% of the total value of catch around the world.¹

Why are catch shares not employed more widely? We further investigate this question, which was raised in the comment by Heal and Schlenker [6]. We provide a first glance at where – at a global scale – catch shares could be used as a management instrument. We argue that, generally speaking, there are two sets of necessary conditions for a fishery to be manageable by ITQs: First, the respective authority in a given country must have the capability to design, regulate, and enforce such a management scheme internally. Second, the country in question must be able to exclude fishermen over which it can not exert any control from its fisheries. By comparing the value of catch obtained from the Exclusive Economic Zones (EEZ) of countries where both these conditions are met with those countries where this is not the case, we roughly indicate the scope where these management schemes are potentially applicable.² Figure 1 shows the distribution of harvested value over the different categories in terms of the share of total global harvested value. Figure 2 shows the geographic location of where ITQs are used and where they, according to our rough characterization, could be introduced.

2. Material and Methods

The analysis was coined in terms of value rather than the harvested biomass as this is the better indicator of socio-economic performance. It has to be born in mind, however, that this may systematically give rise to a more optimistic picture as fisheries that are efficiently managed presumably yield a higher value. Similarly, we have been optimistic with respect to the management abilities of the countries: In order to see which countries fulfil the necessary condition of internal management capability, we have categorized the countries according to the world banks’ “Worldwide Governance Indicators”[8] (WGI) and selected the three dimensions “Government Effectiveness”, “Regulatory Quality”, and “Rule of Law”. The WGI-index ranges from -2.5 to 2.5. We have divided the index for each dimension into three classes, assigning them a value of 1 (low) when the index was between -2.5 and -0.9, a value of 2 when the index was between -0.8 and 0.8, and a value of 3 (high) when the index was between 0.9 and 2.5. A country was said to fulfil the internal criterion when the sum of the ranks from the three dimensions was 6 or above. With respect to the criterion of external excludability we have used data from the “Sea Around Us” project[9] and classified countries as fulfilling this condition when they claim more than 75% of the value caught in their EEZ.

After omitting countries that lacked data on both accounts, and China whose data is reportedly uncertain[10], we have divided the worldwide value of catch in six categories: (1) The portion obtained in countries that use ITQ management schemes, (2) the portion

¹ Costello et al. have kindly provided us with the data of fisheries managed by catch shares on the species level. The value of catch obtained from these species was retrieved from the “Sea round Us database[9] and compared to the total value of global harvest. As many of these species are not among the eleven most valuable which were separately listed, the entry for “other taxa” was used, making this percentage an upper bound of the true fraction.

² Grafton and McIlgrom [1] discuss five prerequisites for the specific case of six Australian fisheries. The required data is not available at a global scale, but an initial understanding of where catch shares could be viable still is very useful.

obtained in countries that fulfill both the internal and external necessary condition, (3) in countries that have sufficiently good institutions but lack external control over their resources, (4) in countries that lack the necessary institutional quality, and (5) in countries that fulfil neither condition; finally, (6) the value of fish caught in the high seas (see Table 1).

3. Results and Discussion

The emerging picture is clear: 51% of the worldwide value of catch is taken in waters where both conditions for ITQ-management are fulfilled. In contrast, 49% of the worldwide value of catch is taken in waters where ITQ-management does not seem possible (see Figure 1).

Looking at the geographic distribution of countries that use ITQs (Figure 2), it is not surprising that these are mostly countries with a long shoreline and independent EEZ. Furthermore, it is remarkable that Chile and Namibia, both at coastal upwelling zones, are the only countries in South-America and Africa that employ ITQs while many countries of these continents fulfil the conditions for catch share management.

Clearly, a more accurate account of internal and external means would have been obtained if we had broken down the analysis to the level of the specific fisheries: on the one hand, not all fisheries in countries that do use ITQs are actually managed by ITQs and, on the other hand, some fish stocks might be under exclusive control of a country even though the majority is not. For a given fishery that is under the control of a nation which is capable of effectuating ITQs, the quality and quantity of data is demanding. Not only the total harvest must be kept within the appropriate limits, but also the specific biological dynamics must be taken into account. Complementary measures should protect undersized fish as well as the broader ecosystem relationships. Moreover, the distribution of potentially large resource rents is often a delicate political issue. And, most importantly, care must be given to not destroy existing informal community arrangements by introducing more formal market based instruments. Nevertheless, the gains from approaching bio-economic efficiency by altering the fundamental incentive structure could indeed be large, especially when compared to a command & control regulation that often merely induces the fishermen to substitute one input for another [11].

Simultaneously, it is evident that ITQs are no panacea. Roughly half of the global value from fisheries is obtained in areas where – at least in the near future – the internal or external capability of introducing ITQs is lacking. It will not be possible to alter fishermen incentives to catch the fish before others do by virtue of this management instrument in a broad range of countries, and, not the least, in the high seas. But at the same time, it is here that many of the worlds most valuable and vulnerable fish species such as bluefin tuna are found. Continued international effort is needed to establish the bio-economic profitability of these fisheries for today and to secure their existence for future generations. In particular, the involvement of all stakeholders will be crucial here [12]. It might be wise to focus on proximate and realistic measures that protect the natural growth potential of the fish stocks, provide refugia, and spares unwanted by-catch.

4. Conclusions

Altogether we have been, with our analysis, able to complement the debate on catch shares by pointing to the potential scope of this management instrument on a global scale. While there remains a large portion of the world's fisheries that seem out of reach for ITQ management, the large portion of national fisheries that – prima facie – are amendable to this instrument gives reason for optimism.

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| Category | External criteria | Internal criteria |
|-----------------|--|---|
| | 75% of the value caught in the countries' EEZ ? | Good rank from Worldwide Governance Indicators ? |
| 1 | | use ITQ |
| 2 | Yes | Yes |
| 3 | Yes | No |
| 4 | No | Yes |
| 5 | No | No |
| 6 | | high seas |

Table 1

The categorization of the worldwide fisheries obtained by both the Worldwide Governance Indicators (WGI) and the total value of catch. The WGI-index has a range from - 2.5 to 2.5, where positive and high values are better ranked countries. We divided WGI into 3 classes, ranging from low (-2.5 to -0.9), middle (-0.8 to 0.8) to high (0.9-2.5). Our composite WGI rank is then the sum of the values from the three dimensions: 3-5 is good, 6 is in the middle. 7-9 is bad. We used data from 2000-2004.

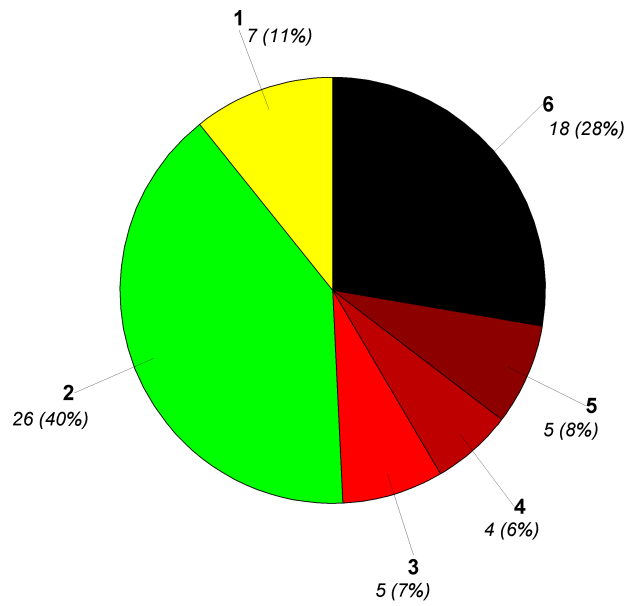


Fig. 1. The worldwide fisheries categorized by the countries internal and external rank (bold number), and the corresponding value of the catch given in billion US dollar (italic numbers with the percent in brackets). For more information, see Table 1. We use data from the “Sea Around Us” project, and the countries are beforehand ranked after their WGI-index for the years 2002-2004. Middle ranked WGI are included as fulfilling good internal condition, hence, we make an optimistic estimate of countries that have the propensity to infer ITQ).

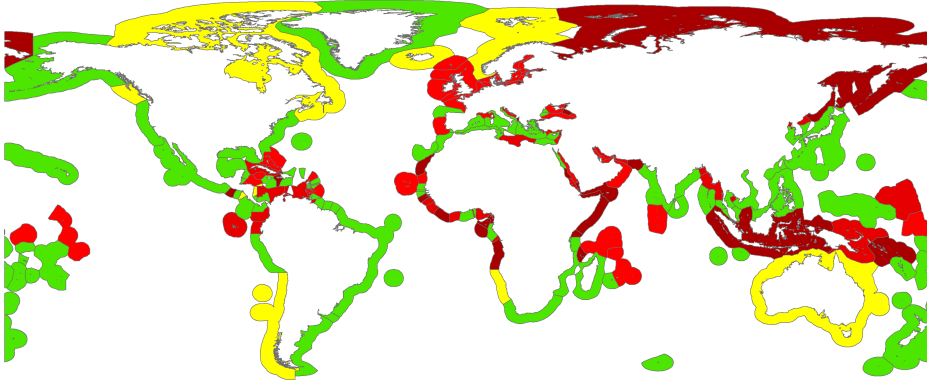


Fig. 2. Map of the geographic location of countries' EEZ where ITQs are used (yellow), where they could potentially be used (green), and where there are obstacles to their employment (light, middle, and dark red).