Ocean & Coastal Management 106 (2015) 10–28

Contents lists available at ScienceDirect

Ocean & Coastal Management

journal homepage: www.elsevier.com/locate/ocecoaman

An experimental analysis of assignment problems and economic rent dissipation in quota managed fisheries

Timothy J. Emery [a, *], John Tisdell [b], Bridget S. Green [a], Klaas Hartmann [a], Caleb Gardner [a], Rafael León [a]

[a] Institute for Marine and Antarctic Studies, University of Tasmania, Private Bag 49, Hobart, Tasmania 7001, Australia
[b] School of Economics and Finance, University of Tasmania, Private Bag 85, Hobart, Tasmania 7001, Australia

ARTICLE INFO

Article history:
Received 9 September 2014
Received in revised form
5 January 2015
Accepted 8 January 2015
Available online 17 January 2015

Keywords:
Common-pool resources
Experimental economics
Behaviour
Fisheries management
ITQ
Quota
Leasing

ABSTRACT

Assignment problems may remain in quota managed fisheries due to variation in the productivity of the stock across space and time. Unless fishers can agree to coordinate their fishing effort, they will compete amongst themselves and over-exploit the stock where or when the quota unit value is highest, leading to economic rent dissipation. Coordination may be made more difficult in a dynamic marine environment when groups are heterogeneous and cannot communicate amongst themselves. To investigate this supposition, a series of economic experiments were conducted using university students. Participants took on the role of either a quota owner or lease quota fisher and in the presence or absence of communication were asked to make individual harvesting decisions, which allowed researchers to assess the relative influence of these factors on group coordination. This study found that participants were more likely to make socially optimal decisions to prevent rent dissipation when they could communicate and were in an experimental group containing solely quota owners. Participants who were lease quota fishers were less likely to make socially optimal decisions due to: (i) inequality in wealth; (ii) insecurity of tenure; and (iii) asymmetric information exchange. As participants were aware of these disparities, it negatively affected the ability of heterogeneous groups to establish trust and a sense of identity, despite being able to communicate. While requiring further exposition in the field, these results provide a theoretical insight into the difficulties heterogeneous fishers may have in solving assignment problems in a dynamic environment.

© 2015 Elsevier Ltd. All rights reserved.

1. Introduction

Fisheries have historically been a common-pool resource, in which appropriation of the resource by one fisher creates an external cost on others and it is difficult to exclude (limit) the access rights of potential (existing) fishers (Maldonado and Moreno-Sanchez, 2009; Schmitt et al., 2000). In such open-access environments fishers face a collective-action (prisoner's) dilemma, in which there is an economic incentive to appropriate more of the resource and ignore the external costs of appropriation imposed on others, provided that expected returns exceed costs (Grafton, 1996; Hackett et al., 1994). This behaviour is rational because a fisher receives all of the returns from appropriating more of the resource, but it is collectively disastrous, because the costs of their actions are shared amongst all fishers (Gordon, 1954; Hardin, 1968).

Understanding the decision-making of harvesters is critical in reducing unexpected and undesirable outcomes of policy implementation and improving overall management of resources such as fisheries (Cárdenas and Ostrom, 2004; Fulton et al., 2011). Economic experiments provide a means of examining human behaviour, alternate policy directives and/or institutional settings under controlled conditions by comparing direct observations with predicted outcomes (Knapp and Murphy, 2010; Reeson et al.,

* Corresponding author.
E-mail addresses: timothy.emery@utas.edu.au (T.J. Emery), john.tisdell@utas.edu.au (J. Tisdell), bridget.green@utas.edu.au (B.S. Green), klaas.hartmann@utas.edu.au (K. Hartmann), caleb.gardner@utas.edu.au (C. Gardner), rafael.leon@utas.edu.au (R. León).

http://dx.doi.org/10.1016/j.ocecoaman.2015.01.008
0964-5691/© 2015 Elsevier Ltd. All rights reserved.

2011; Tisdell et al., 2004). For example, economic experiments have been used to recreate the "tragedy of the [unmanaged] commons" (Hardin, 1968, 1998) in order to investigate the externalities that drive harvesters to over-appropriate the resource. This has been achieved through: (i) prohibiting communication and therefore agreements between participants; (ii) providing participants with complete, symmetric information about the payoffs associated with their appropriation decisions (Maldonado and Moreno-Sanchez, 2009) and (iii) relaxing regulations governing the resource. Under this scenario, non-cooperative game theory predicts that participants will over-appropriate the resource because they will only take into account their own net benefits and assume others will do likewise (Cárdenas and Ostrom, 2004). This private, efficient level of appropriation is called the Nash equilibrium strategy (Nash, 1950). Conversely, a superior payoff for all participants could be achieved through universal reductions in appropriation to the extent that no participant could achieve a higher payoff, without making another have a lower payoff (termed the Pareto-optimal solution) (Ostrom et al., 1994). Researchers predict however, that this will not occur while there remains a more individually rewarding alternative option (Reeson et al., 2011).

Evidence from resource economic experiments illustrate that some individuals make appropriation decisions that depart from the Nash equilibrium strategy reflecting motivations such as altruism, equality and/or reciprocity (Moreno-Sanchez and Maldonado, 2009) or an inherent concern for the environment (Cárdenas et al., 2013). The introduction of communication among participants further enhances the capacity for groups to cooperate and make decisions that are more socially efficient than predicted by the Nash equilibrium strategy (Cárdenas, 2000; Ostrom et al., 1994; Sally, 1995; Tisdell et al., 2004). The supposition is that communication can allow participants to: (a) detect what decisions others in the group are likely to make; (ii) devise a group strategy and make promises or commitments; (iii) develop a process of moralisation among the group and; (iv) create and reinforce a sense of group identity (Kollock, 1998; Messick and Brewer, 1983). These processes can establish and enhance reciprocity, individual reputations and trust to solve a variety of collective-action dilemma problems (Ostrom, 2006). Communication, however does not always improve efficiency. It depends on the rule structure of permitted communication, the form of communication used (i.e. face to face or computer-exchange), as well as the complexity of the social dilemma setting (Hackett et al., 1994; Rocco and Warglien, 1995). Similarly, the framing or context of the collective-action dilemma, scrutiny of participant's actions and associated absence of anonymity and/or selection of participants can also affect the level of efficiency (Levitt and List, 2007).

While economic experiments have shown that communication can reduce over-appropriation and improve social efficiency in static situations, for harvesters of fisheries resources the situation is more complex. Fishers must contend with the complex and changing population dynamics of the resource, making it difficult for them to determine whether declines in yield are due to over-appropriation or environmental factors (Schlager, 1994). Furthermore, it is challenging to determine the exact size of the stock, the amount that should be harvested and what effect an individual's catch has on others (Walters and Pearse, 1996). Consequently, many governments have preferred to introduce forms of quasi-private property allocations in an attempt to resolve appropriation problems. Historical evidence confirms that allocating shares of a total allowable catch (TAC) for a given fish stock to fishers as individual quota units (IQs or ITQs when transferable) has reduced over-appropriation of the resource and increased economic efficiency (Costello et al., 2010; Grafton et al., 2000). This is because fishers no longer have an incentive to maximise catch, but rather to minimise costs because their gross revenue is fixed by their quota-holdings in the absence of leasing (Grafton, 1996).

ITQs have been introduced in over 121 different fisheries across at least 22 countries (Chu, 2009; Deacon, 2012) and have been largely effective in reducing appropriation problems through regulations that set: (i) a suitable level of resource appropriation (i.e. TAC); (ii) the methods for appropriating the resource (i.e. permitted fishing gear); and (iii) how output is allocated (i.e. IQs or ITQs). However, many assignment problems remain largely unresolved. Assignment problems arise when the resource is heterogeneous in economic value through time and/or space (Ostrom et al., 1994). Many fisheries are characterised by economic heterogeneity arising from "patchy" stock distributions, spatial/temporal productivity differences or spatial variations in profitability based on the proximity of fishing grounds to ports and market facilities (Cancino et al., 2007). If the quota management system does not impose restrictive spatial and temporal conditions on harvests or there is no centralised authority coordinating effort, fishers will compete for the most valuable portions of the stock (Costello and Deacon, 2007; Deacon, 2012; Deacon and Costello, 2007). In engaging in a competition to appropriate the most valuable portions of the stock, fishers will dissipate part of the fishery's economic rent through production externalities, such as congestion on fishing grounds (Boyce, 1992; Fell, 2009). One example occurred in the New Zealand southern scallop fishery, where in racing to fish higher valued portions of the stock early in the season, fishers applied an excessive amount of effort that dissipated part of the fishery's economic rent (Bisack and Sutinen, 2006).

Heterogeneity among harvesters can compound assignment problems because it makes the task of agreeing to and sustaining efficient appropriation strategies for preventing rent dissipation more challenging. According to Hackett et al. (1994) and Ostrom (2006) any strategy for averting rent dissipation may produce variable earnings among harvesters, leading to some benefiting more than others. Furthermore, their incentives and/or discount rate (which harvesters apply to future income) may vary. Some harvesters may be motivated by short-term profits, while others may be more interested in long-term asset value and associated preservation of the resource it is dependent upon (Fulton et al., 2011).

Heterogeneity among harvesters has become particularly apparent in fisheries under quota management that allow temporary transferability of quota units within season (e.g. ITQs with leasing). This is because fishers who were bestowed quota units in the initial allocation (quota owners) have historically preferred to retain their quota units after they retire from the fishery and lease them out to gain income from their quota asset (Connor and Alden, 2001). This has given rise to a growing number of fishers who lease quota units (lease quota fishers) (Pinkerton and Edwards, 2009; van Putten and Gardner, 2010). The decision-making and incentives are likely to diverge between the two types of fishers because lease quota fishers are required to bid competitively to lease annual quota and have to recover their leasing costs in addition to other fixed and variable costs of fishing from the landed value of their catch (Parslow, 2010; Pinkerton and Edwards, 2009). Thus increased costs place lease quota fishers under greater financial stress than quota owners. Some economic experiments have illustrated how unequal distributions in wealth or heterogeneity among harvesters can reduce their capacity to coordinate (Cárdenas, 2003; Hackett et al., 1994). They postulate that this is may be due to heterogeneity hindering key triggers of cooperation and collective action, such as reciprocity and trust or building a greater sense of group identity (Cárdenas, 2003; Kramer and

Download English Version:

https://daneshyari.com/en/article/1723562

Download Persian Version:

https://daneshyari.com/article/1723562

Daneshyari.com