ELSEVIER

Journal of Development Economics 80 (2006) 106–135

JOURNAL OF Development ECONOMICS

www.elsevier.com/locate/econbase

Effects of rotation scheme on fishing behaviour with price discrimination and limited durability: Theory and evidence

Erika Seki *

Department of Economics, University of Aberdeen, Dunber Street, Edward Wright Building, Old Aberdeen, AB24 3QY, Scotland, UK

Received 1 November 2000; accepted 1 February 2005

Abstract

This paper examines how rotation arrangement between two groups of fishers with different institutional arrangements affects fishing behaviour and economic outcomes in a particular economic environment characterised by price discrimination and product durability. In one group, fishers cooperate and maximise the extraction of rents, while members in the second group behave non-cooperatively. Applying a model of alternating duopoly, we show that the cooperating group behaves like a price discriminating monopolist and tends to uphold prices. When the two groups rotate fishing days the cooperating group tends to produce more, which prevents the non-cooperating group from unprofitable demand preemption.

JEL classification: D23; Q22
Keywords: Price discrimination; Durable goods; Alternating duopoly; Rotation; Fisheries

1. Introduction

Local-level cooperative institutions play a substantial role in regulating and resolving conflicts over the usage of local natural resources (Baland and Platteau, 1996). These local

* Tel.: +44 1224 273134; fax: +44 1224 272181.
E-mail address: erika.seki@abdn.ac.uk.

0304-3878/$ - see front matter © 2005 Elsevier B.V. All rights reserved.
doi:10.1016/j.jdeveco.2005.02.007

informal institutions are of particular interest because a significant part of the livelihood of the poor in developing countries depends on local natural resources such as forestry, irrigation, grazing, and fisheries. There is also a growing recognition that local-level community organisations have the potential to manage natural resources and alleviate poverty more effectively than state and private control (Bowles and Gintins, 2002; Bardhan, 1993; Ostrom, 1990).

Rotation is one of the institutional arrangements commonly applied to allocate irrigation water, firewood and other forests products, and access to fishing spots.[1] While it is fairly obvious that these rotation arrangements promote equity and resolve conflicts among the people concerned, its effects on economic outcomes, particularly how it affects individual usage of resources and overall efficiency, are ambiguous. Most empirical studies on rotational arrangements in fishing communities seem to endorse the general view that the effectiveness of rotation arrangements is limited: it avoids conflicts and ensures equitable allocation of resources among the users but it does not address fundamental issue of internalisation of negative externalities, that is, control of individual fishing efforts.[2] Evidences often suggest that the advent of commercialisation and technological progress can threaten such schemes (Alexander, 1977; Baland and Platteau, 1996, pp. 199–210; Berkes, 1992; Schlager, 1994).

Such a pessimistic view about the effectiveness of rotation arrangements seems to be at odds with other empirical observations of long-lived and sustained practice of rotation among resource users. Ostrom (1990), for instance, reveals on the basis of in-depth field observations that rotation of irrigation water in Sri Lankan village has induced cooperative behaviour among resource users with differing interests. The documentation of self-management institutions among local fishers in Japan also suggest that rotational fishing arrangements can also be associated with the effective control of fish catches (Zengryoren, 1992). But why in some cases do rotation arrangements contribute to internalisation of negative externalities, while in other cases not? Particularly, why do some rotation arrangements manage to induce cooperative outcomes while inhibiting competitive pressure to behave non-cooperatively?

This paper aims to analyse how a rotation scheme influences individual behaviour and affects economic outcome in an actual field setting. More specifically, using unique data on a rotation arrangement between two groups of fishers in Japan, we examine formally how rotation arrangement induces strategic interactions between the groups, and how this then affects the individual fishing behaviour and economic outcomes in a particular market environment. These two groups harvest the same type of shrimp and sell them at the same market. Except for a few months in which only the first group (Group A) operates, the two groups adopt a

[1] See for instance Maass and Anderson (1986) for detailed historical studies of traditional irrigation communities in Spain, McKean (1986) for in-depth field investigation of management of precious communal forest product in Japan, and Alexander (1977) and Schlager (1990) for informal rules of regulating access to favourable fishing spots in various countries.

[2] On the basis of comprehensive international case studies of existing institutional arrangements for inshore fisheries management, Schlager (1994) concludes that self-management institutional arrangement of fisheries, of which rotation is one, does not directly address regulation of fishing effort.