Resource and Energy Economics 33 (2011) 366–380

Contents lists available at ScienceDirect

Resource and Energy Economics

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

Restricted capacity and rent dissipation in a regulated open access fishery

Robert T. Deacon [a,*], David Finnoff [b], John Tschirhart [b]

[a] University of California, Santa Barbara, United States
[b] University of Wyoming, United States

ARTICLE INFO

Article history:
Received 1 June 2009
Accepted 1 February 2010
Available online 4 June 2010

JEL classification:
Q22
Q28
Q57

Keywords:
Fishery management
Regulated open access
Rents
Elasticity of substitution

ABSTRACT

A common strategy for limiting the total annual catch in a fishery is to restrict entry and season length. We examine the results of this strategy when entry limitation amounts to a limit on capital, but fishing firms can vary an unrestricted input, and thereby use the restricted input more intensively. Under these regulatory constraints, fishing firms will earn rents that depend on the elasticity of substitution between restricted and unrestricted inputs. Using simulations with data from the Alaskan pollock fishery, rents and season length are shown to depend on fish and variable input prices, sometimes in surprisingly non-monotonic ways.

1. Introduction

The economic literature on fishery regulation has moved away from treatments focused on understanding incentives and outcomes under open access to more recent explorations of the consequences of specific regulations and the problem of choosing the right policy instrument for a particular circumstance.[1] The question of instrument choice remains highly pertinent in the United States due to the contemporaneous presence of diverse regulations and recent moves toward ITQs,

* Corresponding author.
E-mail addresses: deacon@econ.ucsb.edu (R.T. Deacon), finnoff@uwyo.edu (D. Finnoff), jtsch@uwyo.edu (J. Tschirhart).

[1] A seminal early contribution is Gordon (1954). Boyce (2004) gives a comprehensive review of instrument choice in the fishery. Homans and Wilen (1997) comment on the transition in the economic literature from discussions of stylized open access and its inefficiencies to treatments that explicitly examine applicable technologies and regulatory constraints.

0928-7655/$ – see front matter © 2010 Elsevier B.V. All rights reserved.
doi:10.1016/j.reseneeco.2010.05.003

cooperatives and other forms of rationalization in the U.S. and abroad. However, moves to rationalization through incentive-based management are tentative in the U.S., and the likelihood is that many existing management schemes will not be replaced soon (Kirkley et al., 2007). One existing form of regulation is a limit on entry (fishing permits) with an annual total allowable catch (TAC) enforced by season closure. This is common in salmon fisheries, it was the regime in place in the Alaska halibut fishery before ITQs were introduced, and will remain the regulatory system in the U.S. west coast trawl fishery until the switch to ITQs in 2010. The following analysis examines the within-season behavior of a fishery managed by a still common form of regulation: limited entry, which is here regarded as a limit on capital or fishing capacity, and a TAC that is enforced by season closure.

Several authors have made the point that capacity limitation programs can allow some of the rent accruing to the resource to be captured by industry participants. Anderson (1985) demonstrated that a gear restriction can increase rent in a context where effort is supplied at increasing unit costs. Restricting gear choice raises the unit cost of all effort employed, but reduces the number of redundant units actually used; positive net rent can emerge as a result.[2] Campbell and Lindner (1990) extend Anderson's approach by investigating the welfare consequences of input regulation when fishing firms can substitute between restricted and unrestricted inputs. Through simulations they conclude that a license limitation program will approximate a first-best solution in situations where unrestricted and restricted inputs cannot be easily substituted for one another or where restricted inputs account for a major component of the industry's total cost. Campbell (1991) empirically estimated the elasticity of substitution between restricted and unrestricted inputs for the Tasmanian rock lobster fishery and concluded that, in this case, a license limitation program could result in significant rent capture. Similar conclusions were reached by Dupont (1991) who estimated the elasticity of substitution between restricted and unrestricted inputs for the British Columbia salmon fishery, and found that substitutability varied across vessel types.

Boyce (2004) provides a unified treatment of instrument choice in the fishery to explain why suboptimal controls such as input restrictions and entry limitation persist in fisheries management. As he demonstrates, these suboptimal controls benefit input suppliers by transferring rents from the fishery resource to the owners of inputs permitted to operate. This insight provides a compelling answer to the puzzle of why such inefficient regulations are so common and durable, particularly in the U.S. where fishery management councils are heavily influenced by resident input suppliers with organized, entrenched lobbying power.

These studies have all made valuable contributions. Nevertheless, the following questions remain: How is rent affected by the level at which capacity (entry) is limited and what capacity limit maximizes rent? How does the ease or difficulty of substituting between restricted inputs (capacity or capital) and unrestricted inputs (labor or other variable inputs) affect the answers to the preceding questions? Given that a larger TAC increases revenue, but will also increase competition and increase the use of costly variable inputs, will a larger TAC necessarily increase the rents of capital owners? What about higher prices or lower wages, and do the answers depend on how substitutable fishing inputs are? We address these questions in what follows.

Two papers are of particular interest because together they shed light on the observable consequences and welfare effects of restrictions on fishing inputs and/or total catch. The first of these is Homans and Wilen (1997), who point out that most near-shore fisheries have operated under a variety of specific regulations since coastal nations extended their jurisdictions in the late 1970s. They emphasize that the details of these regulations are crucial in determining the observed behavior of fisheries and develop a model of one such regime, which they term 'regulated open access' (ROA). Under regulated open access the regulator fixes the total allowable catch based purely on biological criteria and enforces this catch limit with a season closure. Firms enter and exit the industry, taking allowable catch and season length as given, until all long-run rents accruing to the unpaid resource (the stock) are dissipated. Homans and Wilen (HW) close the model by specifying an objective function for the fishery regulator, who sets the TAC to keep the stock close to a level that is considered 'safe'.

[2] Anderson (1985) also demonstrates that a license limitation, modeled as a limit on the number of firms allowed to operate, can also yield positive rent.