

## Total Factor Productivity Change in the New England Groundfish Fishery: 1964–1993<sup>1</sup>

Di Jin

*Marine Policy Center, Woods Hole Oceanographic Institution, Woods Hole, Massachusetts 02543*  
E-mail: djin@whoi.edu

Eric Thunberg

*Social Sciences Branch, Northeast Fisheries Science Center, National Marine Fisheries Service,  
Woods Hole, Massachusetts 02543*

Hauke Kite-Powell

*Marine Policy Center, Woods Hole Oceanographic Institution, Woods Hole, Massachusetts 02543*

and

Kevin Blake

*ICF Consulting, 9300 Lee Highway, Fairfax, Virginia 22031-1207*

Received June 4, 1997; revised July 2, 2001; published online January 31, 2002

We develop estimates of total factor productivity (TFP) change in the New England groundfish fishery from 1964 to 1993, using a procedure similar to Squires' (1992, *Rand J. Econom.* 23(2), 221–236) method, which extends standard TFP measurement by including the effect of fluctuations in stock abundance. The results indicate that TFP increased on average by 4.4% per year from 1964 to 1993. A higher average rate of increase occurred between 1964 and 1982, possibly due to new technologies (e.g., fishfinders). TFP declined at 0.33% annually from 1983 to 1993 due to stringent output and effort control measures. © 2002 Elsevier Science (USA)

*Key Words:* commercial fishing; total factor productivity; fisheries management.

<sup>1</sup> This work is a result of a research project on marine sector productivity supported by the Alfred P. Sloan Foundation under Grant 95-12-3. We thank our project advisors Robert Solow, Giulio Pontecorvo, Henry Marcus, and Robert Frosch for their guidance and suggestions; Andrew Solow, Jesse Ausubel, Dale Squires, Philip Logan, Fredric Serchuk, Porter Hoagland, Denise Jarvinen, John Tarasevich, and Christine Tarasevich for comments and beneficial discussions; and Mary Schumacher for collecting cost indices data. We are grateful to many researchers at the National Marine Fisheries Service, Woods Hole, for their suggestions and assistance. Joan Palmer and Johnny Blevins generated the landing and effort database for this study; Andrew Kitts provided cost data; Wendy Gabriel, Steven Murawski, Katherine Sosebee, Mark Terceiro, and Han Lin Lai provided biomass/abundance indices data. We are indebted to two referees for their helpful comments. This is WHOI Contribution 10486.

## 1. INTRODUCTION

Productivity change is an important indicator of an industry's performance. Understanding productivity change is very important to fisheries management [31] since productivity allows fisheries to become more competitive but also places additional harvest pressure on fish stocks. Because it is not a measurable input or output and is virtually impossible to control, productivity growth adds considerable complication to fisheries management. Productivity measurement can provide useful information about effective fishing effort, as opposed to nominal measures of effort such as catch per day at sea [31].

In this paper, we examine productivity in New England otter trawl fisheries. Otter trawl gear<sup>2</sup> is the dominant means for harvesting groundfish in this region. We selected the New England groundfish fishery for three reasons. First, there has been no long-term quantitative analysis of productivity change in the fishing industry because of data problems. For most fisheries, long-term historical stock data do not exist. New England fishing grounds have been among the most productive in the world, and historical landings, effort, and stock data have been well documented, which makes our study feasible.<sup>3</sup> Second, over the period of analysis (1964–1993) the fishery was open access. The industry's performance depends on the abundance of the stocks of commercially valuable species. By including the stock factor, we are able to examine the effect of changing resource conditions on the groundfish industry's productivity. Finally, the industry has experienced substantial changes in management institutions and regulatory instruments in the past 30 years.

Prior to the establishment of the Exclusive Economic Zone (EEZ) in 1977, the New England groundfish fishery was essentially unregulated. Productivity change during this period may be expected to have been largely influenced by market-driven factors. From 1977 to 1982 the fishery was managed under output quotas for the three most important species: cod, haddock, and yellowtail flounder. Under quota management, investment and fishing decisions were distorted by incentives to take quotas as quickly as possible. Dissatisfaction with quota management led to its abandonment in 1982 in favor of indirect effort controls such as minimum fish sizes and fishing gear restrictions. Although input controls are designed to reduce fishing mortality, they generally do so by inhibiting the efficiency of fishing technology. Thus, the study period covers three distinct periods representing watershed changes in management that may have important implications for productivity change in the New England groundfish fishery. By estimating the changes in total factor productivity during this period, we can draw inferences about regulatory impacts on the industry.

The remainder of this paper is organized as follows. Section 2 presents the methodology used to develop total factor productivity estimates. Section 3 describes the fishing industry as well as data sources and compilation processes.

<sup>2</sup> The otter trawl is an underwater net with one closed end (known as the cod end) and one open end acting as a giant mouth, capturing all fish in front of the net. At the sides of the net are flat "wings" or trawl doors, often metal pieces, designed to spread the net's opening or "mouth" to its maximum as it is pulled through the water column. To determine where in the water column the net fishes, weights or bars are added to, or removed from, the front of the net.

<sup>3</sup> We understand that our data do not capture undocumented landings which may be significant (John Tarasevich, personal communications).

متن کامل مقاله

دریافت فوری ←

**ISI**Articles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات