Marine Resource Economics, Volume 22, pp. 79–82
Printed in the U.S.A.

0738-1360/00 $3.00 + .00

Thoughts on Capacity Analysis: Is Capacity Analysis Giving Policy Makers Information they Need?

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Key words *Capacity, capacity analysis, DEA.*

JEL Classification Codes Q2, Q22.

Introduction

A quick scan through the literature on the application of capacity analysis to fisheries cannot help but impress a reader. Most obvious is how much recent intellectual horsepower has been brought to the task. The work has attracted the best and the brightest of both the fisheries economics and production economics professions. It has received attention of economists who have been prominent for decades, as well as a group of sophisticated young professionals. There have been numerous high-level meetings and working groups convened by international agencies like the Food and Agriculture Organization (FAO); regional groups within the European Union (EU); and domestic governmental agencies, such as the U.S. National Marine Fisheries Service (NMFS) and Canada's Department of Fisheries and Oceans (DFO). There have also been numerous journal articles written applying methods to particular fisheries, volumes devoted to explaining concepts to policy makers and professionals, and both peer reviewed and gray literature available to interested parties. As someone who has not conducted any capacity analysis, I welcomed the opportunity to read some of this literature and reflect on the question: Is capacity analysis giving policy makers the information they need?

To address this question, we need to first revisit the policy context that originally generated recent interest in applying capacity analysis to fisheries. My read of the origins of this work is that it was initiated in response to needs expressed by the FAO and the EU to deal with the "overcapacity problem." As a prominent early FAO participant put it, "the existence of excessive fishing capacity is largely responsible for the degradation of fishery resources, for the dissipation of food production potential and for significant economic waste" (Greboval 2000). From this conceptual perspective, it is not surprising that fishing capacity has captured the attention of both the FAO and the EU. The FAO has placed new emphasis on measuring and reducing excess capacity as part of its Code of Conduct for Responsible Fishing. The EU similarly faces a number of Common Fisheries Policy (CFP) issues that require agreeing upon transparent and coordinated capacity measurement methods in order to phase out subsidies and reduce capacity.

Economists who have been involved in capacity analysis see its usefulness as applying at two levels. One is at a reasonably aggregated level, so that, for example, EU policy makers have a common measure to talk about the general level of overca-

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pacity. Does the EU have 50% too much capacity? 30%? Does Spain have more excess capacity than France? To answer these questions, it is obviously desirable to have a few commonly agreed-upon measures of capacity with which to have discussions regarding modifications to the CFP, and much of the recent methods development is directed at that need. A second level is at the more disaggregated micro level, specifically a need to have vessel-specific measures for use in directed capacity reduction programs and/or further regulations of capacity use. For example, Kirkley and Squires (1999) suggest that "(input-based Data Envelopment Analysis (DEA) measures) would allow determining the optimal vessel or fleet configuration and actual vessels that should be decommissioned."

My personal judgment about the above two potential uses of capacity analysis in fisheries is that the first is possible and desirable, while the second may be desirable, but less likely to be achieved. It is a good idea to have some commonly agreed-upon measures of excess capacity for the big picture part of the capacity policy problem discussion. For example, if the EU wants to develop and finance a decommissioning program, it would be useful to know which countries have the most excess capacity and at least an order-of-magnitude estimate of the extent of overcapacity. Policy makers need methods that can be used with different kinds of data bases and that produce similar conclusions in order to avoid gaming in the policy process. However, this application of capacity analysis seems best thought of as a back-of-the-envelope task (*e.g.*, to generate an ordinal ranking of countries with the most severe problems) and not a task for which policy decisions hinge upon precise measurement. On the other hand, using micro-level analysis to identify which specific vessels ought to be removed is a very precise objective, and one likely to be asking too much of the methods. This is particularly the case given both the state of our data and our understanding of production systems in fisheries.

In my opinion, there are several important reasons why it is unlikely that micro-level capacity analysis will be useful to help design specific decommissioning schemes, or to help with any task that requires vessel-specific precision. These reasons have more to do with the state of production analysis as applied to fisheries than to specific capacity methods, such as DEA methods. First, fishing production processes are not adequately captured by simple adaptations of conventional production analysis. Conventional production analysis, after all, was developed to study agricultural production systems. A typical agricultural production function estimates output per season as a function of inputs applied (water, fertilizer, management inputs, soil characteristics, degree days) and these kinds of systems tend to work because there are clear physical relationships and processes connecting outputs and inputs. But much of the fishing production process involves (often strategic) use of space and time in ways that seem too subtle to be captured by simple output/input relationships. Second, micro-level based capacity analysis relies on maintained behavioral hypotheses that do not hold in fisheries. While farmers may be atomistically competitive cost minimizers (or profit maximizers), fishermen are often engaged in strategic, coordinated behavior that depends upon their neighbors' actions. Information groups, group fishing, pooling, and other kinds of non-atomistic and strategic behavior are at odds with simplifying behavioral assumptions that are, in some cases, necessary foundations of empirical analysis. Third, and perhaps most important, an implicit assumption of analysis that estimates production relationships based on current technology is that optimum capacity and ideally configured fleets will be simply scaled-down versions of technology that is in use; *e.g.*, fewer boats and smaller vessels with similar designs. However, many rationalization programs have witnessed changes in incentives so different than under those regulated open/restricted access, that often the technology in place before rationalization is not evident afterwards. For example, much of New Zealand's nearshore

red snapper was prosecuted with mixed species trawl gear before ITQs; whereas after ITQs, longlines were used in order to produce high-quality live fish for the Japanese sashimi market. In other words, characterizing the optimal fleet (a precondition for determining which boats should be decommissioned) is generally a much more subtle exercise than estimating production relationships over existing activities and tweaking those to simulate rationalization. In some cases, the technology by which one estimates capacity relationships might not even exist under a regime that generates incentives to optimize rents.

The potentially critical role of the skipper is another important issue that reduces the likely ability of even sophisticated micro-level capacity analysis to say anything useful about which vessels ought to be removed. Many studies have shown that much of the heterogeneity we see in fishing production functions is attributable to the skipper rather than unobserved vessel characteristics (Hilborn and Ledbetter 1985; Squires and Kirkley 1999; Kirkley, Squires, and Strand 1998). If this is true, the link between typical capacity analysis and ranking candidates for removal requires more thinking. While there has been a considerable amount of high-quality empirical effort aimed at understanding this link, there has been less work on the policy implications of the findings. If the skippers' skills are responsible for variations in efficiency, what are the implications for capacity reduction? Should we remove the most productive skippers? Should (or is it even political or legally feasible) they be required to permanently exit? How do we target those we think should be removed (Vishwanathan *et al.* 2001)? Does the transferability of skills to tasks outside the fishery matter to decommissioning? What about opportunity costs of skippers?

Reflections

In summary, my opinion is that having simple aggregate measures of capacity at the country- or fishery-specific level is worth a modest amount of effort and thought, and it is likely to be of use to international, intra-governmental, and national regulatory agencies. Coming to some agreement over acceptable measures, and recognizing strengths and weaknesses of various options, is worth some transactions costs and research effort. Much of this conceptual work, comparison of methods, and assessment of strengths and weaknesses has been done and is admirably summarized in a series of reports and journal articles (Kirkley and Squires 1999; Felthoven, Hyatt, and Terry 2002; Kirkley, Morrison-Paul, and Squires 2002; Felthoven and Morrison-Paul 2004). Some of this work is finding its way into high-level policy discussions of capacity and capacity management, as it should be. However, I am more skeptical of economists' ability to generate robust, micro-level, vessel-specific capacity analysis that is useful for the task of identifying which vessels ought to be decommissioned. Instead, it seems much more sensible to leave that decision to the marketplace, with voluntary buyback auctions, *etc*. I am not convinced that the simple production-function based analysis that underpins DEA and other similar methods is rich enough to capture the subtle nuances of actual fisheries production processes. Moreover, the typical data available are not rich enough or even focused on the right variables to help lead the way to results that economists would find unanimity over. At the same time, a useful outcome that has emerged out of the surge of effort in capacity analysis is a push to develop better micro-level data and micro-level analysis in fisheries management agencies.

When all is said and done, however, perhaps the biggest problem with focusing so much effort on capacity analysis is that it distracts attention from the real problem, which is not excess capacity, but perverse incentives associated with insecure

property rights. It is misleading to suggest that the existence of excessive fishing capacity is responsible for the degradation of fishery resources, because excess capacity is a symptom and not a fundamental cause of the problem. Much of the dithering that we have witnessed as fisheries have declined is arguably due to this mistaken characterization, by fisheries scientists and policy makers, of the "fisheries problem" (Wilen 2006). My own normative judgment is that economists who operate in and have access to the policy process should be hammering home the real important message that we economists have to offer, and that is that all fisheries problems are caused by insecure access rights, and we will make no headway in solving global and regional problems until those problems are fixed. It does not advance the cause to buy into the false belief that we can fix the problem by removing excess capacity. Past debacles have shown repeatedly that buybacks do not work, direct capacity removal is ineffective and expensive, and it is impossible to engineer optimal fleet configurations by command and control.

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