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An analysis of fishing vessel accidents in fishing areas off the northeastern United States

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Abstract

Commercial fishing is one of the least safe occupations. Fishing vessel accident probability and vessel trip probability for fishing areas off the northeastern United States were modeled using logit regression and daily data from 1981 to 2000. Fishing vessel accident probability declined over the study period. Higher wind speeds are associated with greater accident probability. Medium size vessels had the highest accident probability before 1994. Within the study region, accident probability was lower in southern New England and Mid-Atlantic waters than on Georges Bank and in the Gulf of Maine. Accidents are more likely to occur closer to shore than offshore. Accident probability is lower in spring and fall. Changes in fishery management in 1994 have not lead to a general increase in either accident or vessel trip probability. Although higher economic payoff (i.e., revenue of landings) induces more vessels to go fishing, this is not associated with an increase in accidents. The probability models are important building blocks in development and quantitative assessment of management mechanisms related to safety in the commercial fishing industry.

Keywords: Commercial fishing; Fishing vessel; Vessel accident probability; Statistical analysis; Logit regression model

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1. Introduction

Commercial fishing is one of the least safe occupations. In 1996, the US commercial fishing fatality rate was 16 deaths per 10,000 workers, a rate 16 times higher than that for fire and police protective service occupations (US Coast Guard, 1999). Between 1984 and 1998, 2074 US commercial fishing vessel accidents resulted in total loss of the vessel (US Coast Guard, 1999). The annual property, injury, and other costs of US commercial fishing vessel accidents are estimated to be over $240 million, more than three times the comparable cost of tanker accidents (ICF Kaiser Consulting Group et al., 1997).

In response to the loss of fishermen's lives and fishing vessels, Congress passed the Commercial Fishing Industry Vessel Safety Act (CFIVSA) on September 9, 1988. The CFIVSA mandated the Secretary of Transportation to institute safety measures, including vessel safety equipment and operating stability standards. On August 14, 1991, the Coast Guard published Commercial Fishing Industry Vessel Regulations (46 CFR 28), and the CFIVSA became effective on September 15, 1991. Promoting the safety of human life at sea is also a policy objective set out in National Standard 10 (16 USC 1851) of the Magnuson-Stevens Fishery Conservation and Management Act (P.L. 94–265).

Research on commercial fishing vessel safety is sparse. The most comprehensive study to date was conducted by the National Research Council (1991) which recommended a fishing vessel inspection program. Fishermen's perceptions of safety and safety regulations have been investigated by Poggie et al. (1995), Poggie et al. (1996), and Kaplan and Kite-Powell (2000). Van Noy (1995) concluded that safety would improve if fishermen were involved in establishing and evaluating safety standards. Decker (1995) suggested that fishery management practices have contributed to highly competitive commercial fishing practices (i.e., race to fish) which risk the safety of both vessel and crew. A study by the US Coast Guard (1999) found that US commercial fishing vessel standards were lower than those for other domestic commercial vessels and lower than international standards for fishing vessels. Common factors in recent commercial fishing vessel accidents include: poor condition of vessel or equipment, inadequate emergency response training, inadequate training in the use of survival gear, and lack of attention to vessel stability issues.

Although the effects of fisheries management regimes on fishing vessel safety have been discussed in general terms (Dyer, 2000), these effects have not been analyzed quantitatively. Time series statistics of the number of fishing vessel accidents present a useful measure of safety performance. However, accident records alone cannot determine whether the accident rate has increased or decreased as the number of accidents is also affected by the number of fishing vessels and the number of trips per vessel. Thus, accident probability needs to be examined.

The probability of a vessel-accident related injury or total vessel loss depends on (a) the likelihood of the occurrence of a vessel accident (event probability) and (b) the severity of the event given that it has occurred (severity conditional probability). Jin et al. (2001) investigated accident severity by examining determinants of vessel total losses and number of fatal and non-fatal crew injuries resulting from commercial fishing vessel accidents. They found that the probability of a total loss is highest for a capsizing, followed by a sinking accident. Fire/explosions and capsizings are expected to incur the greatest number of crew fatalities (i.e., 3.5 and 3.8 for every 100 such accidents). For every 100 collisions, 2.1 non-fatal crew injuries are expected.