

Title: **The Norwegian Winter Herring Fishery: A Story Technological Progress and Collapse**

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Abstract: The herring stocks in the Northeast Atlantic were nearly fished to extinction in the 1970s. This collapse is usually attributed to advances in fishing technology. The impact of productivity shocks depends critically on how sensitive the fish catch is to the size of the stock. If the catch per unit of fishing effort is proportional to stock size, catches will fall proportionally with stock size. However, for herring the opposite effect seems to dominate, a low sensitivity of the catch per unit of effort to stock size.

The purpose of this paper is to determine whether we can measure a statistical causal relationship between technological change and stock decline, and to determine if technological change was the cause of the low sensitivity of catch per unit of effort to stock size. To investigate the former, we define an ARMAX model by augmenting a ARIMA(1,1,2) using the price of herring and technology dummies. The price of herring is a proxy to capture changes in stock caused by fishing effort. We find that the stock was in fact resilient to all technological advances except the power block, which caused the collapse in the herring stock. To investigate the latter, we use an error-correction equation based on an expected revenue model to measure both the long- and short-run elasticity of harvest to stock size. Our results suggest that the low sensitivity of catch per unit of effort to the stock size was not long standing and can be statistically linked to technological change in the fishery.