Overview of Data Files and Programs for Ling Huang and Martin D. Smith, "The Dynamic Efficiency Costs of Common-Pool Resource Exploitation"

1. Introduction

This manuscript uses a combination of publically available data and confidential, proprietary fishing micro data from NC-DENR, Division of Marine Fisheries. We provide all publically available data in CSV files described below. For the fishing micro data, we are not allowed to disclose these data directly. We also provide sanitized summaries of the micro data and intermediate data products used in the econometric analysis and counterfactual policy simulations in CSV files. Other researchers can gain access to the micro data by entering into a confidentiality agreement with the North Carolina Department of Environment and Natural Resources, Division of Marine Fisheries. To our knowledge, all fisheries micro data in the United States are protected in this way. We are willing to answer any questions about the data and how to access confidential micro data to facilitate replication and stimulate further research on related topics.

Some of the econometric analysis was conducted with SAS, and some estimation was done in Matlab. The dynamic programming models for counterfactual policy experiments were all conducted in Matlab. We provide all programs with details on the order below.

2. Data

2.1 Publically Available Data

weather.csv: weather (WSPD: wind speed; WVHT: wave height; DPD: Dominant Wave Period; ATMP: Air Temperature)

These data are used in the summary statistics (Table 1), production function estimation (Table 2), structural model estimation (Table 3), as well as in time series analysis of exogenous state variable dynamics (Appendix Tables 1 and 2), the first-stage CCP estimation (Appendix Table 4), and re-estimation using the hold-out sample (Appendix Table 5).

diesel.csv: diesel price

These data are used in the summary statistics (Table 1), structural model estimation (Table 3), as well as in time series analysis of exogenous state variable dynamics (Appendix Tables 1 and 3), the first-stage CCP estimation (Appendix Table 4), and re-estimation using the hold-out sample (Appendix Table 5).

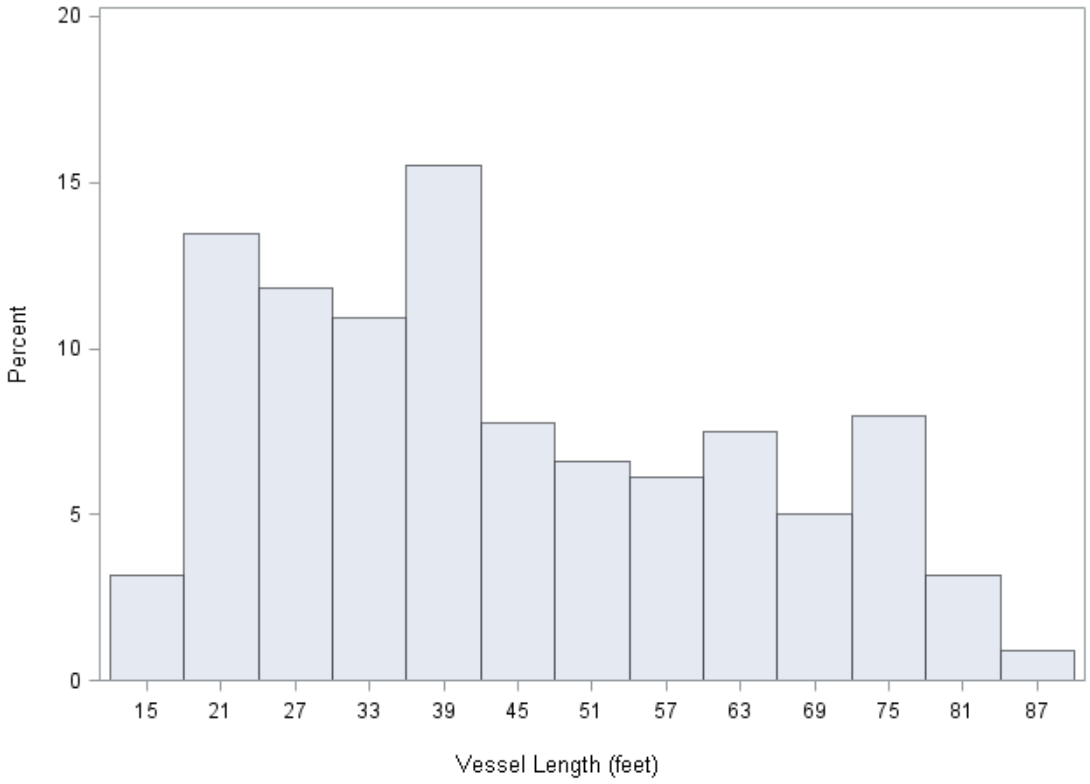
2.2 Sanitized Summaries of Fishery Micro Data

catch_trip_aggregate_scrubbed.csv: daily total catch and trips from year 2000 to 2005

This file documents the strong seasonal pattern and inter-annual variation in the aggregate fishing outcomes. We report true zeroes for days on which no fishing took place, but we indicate "<4" when fewer than four vessels fished on a given day and "<200" when less than 200 pounds was landed on a given day.

Vessel length is a variable in the profit structure (Table 3) but has the potential to identify an individual vessel. We show the distribution of vessel lengths in the figure below.

Distribution of Vessel Length



shrimp_price.csv: daily average shrimp price from year 2000 to 2005.

These data are used in the summary statistics (Table 1), structural model estimation (Table 3), as well as in time series analysis of exogenous state variable dynamics (Appendix Tables 1 and 2), the first-stage CCP estimation (Appendix Table 4), and re-estimation using the hold-out sample (Appendix Table 5).

2.3 Intermediate Data Products

Estimation of the production function in Equation 21 produces important intermediate data products that are used later in the structural estimation and in the counterfactual policy simulations. These include the vessel fixed effects (catchabilities) and daily stock shocks (zetas).

vess_fixed.csv: vessel fixed effect ($\ln(q_i)$) in Equation 21.

zeta.csv: (ζ_t) in Equation 21

3. Programs

The following provides the order in which programs were run.

3.1 Data Preparation, Exogenous State Variables, and First-stage Estimation

1activevessel.sas: selects the active vessels (ones that had more than 100 records of shrimp landings over the six-year sample period).

2stock.sas: estimate the production function to produce Table 2.

3fihsing.sas: data merge and preparation for the discrete choice modeling and state variable dynamics.

4firststage.sas: first stage logit model and dynamics of exogenous state variables.

3.2 Second-stage estimation

5simulation.sas: data preparation for simulation in Matlab.

Folder 6simulation_1:
Folder com2000: for year 2000
simulate.m: forward looking simulation.
predict_full.m: predict behavior using full data; produce Figure 3.

explainpower.sas: model validation; produce Table 4 (Model estimation using all data CCP only)

Folder com2001 to com2005 contain the same programs but for year 2001 to 2005.

Folder 7secondstage_1:
dataall1.m and dataall2.m: data preparation combining all year data from 6simulation_1 simulate.m.

8MLE_1.sas: second stage estimation to produce Table 3; update CCP.

Folder 6simulation_2:
Folder com2000: for year 2000 with updated CCP from 8MLE_1.sas
simulate.m: forward looking simulation.

Folder com2001 to com2005 contain the same programs but for year 2001 to 2005. (omitted)

Folder 7secondstage_2:
dataall1.m and dataall2.m: data preparation combining all year data from 6simulation_2 simulate.m.

8MLE_2.sas: second stage estimation; update CCP. (second iteration)
Then we continue to run Folder 6simulation_3 to Folder 7secondstage_3 to 8MLE_3.sas, so on so forth until 8MLE_6.sas (total six rounds). These programs are similar with updated parameters and therefore are omitted.

3.3 Counterfactual Policy Simulations and Out-of-sample Validation

Folder 9conter:
Folder op2000: optimization; produce Table 5.
test_stock_nofishing1.m: know the maximum stock
optn2.m: optimization: create mapping.csv mapping stock size to optimal number of vessels fishing
actual3_ex.m: The simulated vessel actions and actual profit
optimal4_ex.m: The optimal vessel actions and optimal profit
congestion5.m: If congestion is removed
opening6.m: If season closure is not implemented
strict7.m: If season closure is strictly implemented
explainpower.sas: model validation; produce Table 4 (Model estimation using all data—structural model)

Folder op2001 to op2005 contain the same programs but for year 2001 to 2005. (omitted)

Folder 9conter_6:

Folder op2000: optimization based on 8MLE_6.sas; produce online appendix Table 6.

Folder op2001 to op2005 contain the same programs but for year 2001 to 2005. (omitted)

Folder 10five_years: out of sample prediction. This set of folders and subfolders contains similar programs as above but that apply specifically to data from 2000 to 2004 for the out-of-sample validation.

4firststage.sas: first stage logit model with year 2000 to 2004.
6simulate_1/com2000/**simulate.m:** simulate using parameter from 10five_years/4firststage.sas.
6simulate_1/com2000/**predict_partial.m**: predict behavior using data from 2000 to 2004
6simulate_1/com2000/**explainpower.sas**: model validation; produce Table 4 (Model estimation using data 2000-2004 CCP only)
Folder com2001 to com2005 contain the same programs but for year 2001 to 2005. (omitted)

7secondstage_1**/dataall1.m and dataall2.m**: data preparation combining all year data from 10five_years/6simulation_1 simulate.m.

8MLE_1.sas: second stage estimation using data 2000-2004.

9conter/op2000/**actual3_ex.m**: The simulated vessel actions using data 2000-2004.
9conter/op2000/**explainpower.sas**: model validation; produce Table 4 (Model estimation using data 2000-2004—structural model)
Folder op2001 to op2005 contain the same programs but for year 2001 to 2005 (omitted).

The full program is run for three scenarios: annual discount rate=7%, 0% and 17%. The programs for 0% and 17% are the same with different discount rates, which are omitted.