The Distributive Economic Impacts of Hawaii’s Fishery: A SAM Analysis

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PFRP Principal Investigators Workshop

Special Thanks goes to the Pacific Island Fisheries Science Center for Funding this Work
Objective:

- Construct a Social Accounting Matrix (SAM) model that can assess contribution, linkages, and socio-economic impacts of Hawaii’s Fishery sectors
- To explicitly measure the distributive income linkages of the Hawaii Fishery sector on households

Motivations:

- Quantitative assessment of Hawaii’s fishery sector’s social and economic contribution is crucial for policymakers to assess the sector’s importance (Magnuson-Stevens Act)
- Natural resource policy analysis is hampered by a lack of working tools to determine impacts on income distribution
Related Studies

• Hawaii Fishery Input Output
  – 1992 model (Sharma et al. 1999) 1997 Model (Peterson et al. 2005); (Leung and Pooley 2002); (Cai et al. 2005)

• SAM Fishery Models
  – Economic impacts of TAC (Fernandez-Macho et. al 2008)
  – Alaska Fisheries (Seung and Waters 2009)
Social Accounting Matrix (SAM) Model

Extension of input-output analysis
- detailed accounting of the purchases of goods and services that completely maps out the flow of accounts throughout the economy
- both a data system and a conceptual framework useful for policy analysis
- Comprehensive and disaggregated

Input Output Model

Production Activities

Value Added by Sectors and Components

Factor Incomes: Wages, Profits, Rents, Interest, etc.
SAM Income Distribution Flow

Data

- 2005 State Input Output Table
- Disaggregated Household institution accounts are from IMPLAN
- Hawaii State Industry Occupational Matrix
- Fishery Cost Earning Studies--NMFS
A square Matrix of direct coefficients \( S_{ij} = \frac{\text{Payment}_{ij}}{\text{TotalAccount}_{ij}} \) in demand can be represented by \( S = \begin{bmatrix} A & 0 & C \\ V & 0 & 0 \\ 0 & Y & H \end{bmatrix} \).

Supply and demand must balance: \( \begin{bmatrix} x \\ v \\ y \end{bmatrix} = S \begin{bmatrix} x \\ v \\ y \end{bmatrix} + \begin{bmatrix} ex \\ ey \end{bmatrix} \)

Demand-driven multipliers are obtained by the SAM inverse coefficients: \( \begin{bmatrix} x \\ v \\ y \end{bmatrix} = (I - S)^{-1} \begin{bmatrix} ex \\ ey \end{bmatrix} \)
SAM Total Industry and Household Income Multipliers

- Pelagic Small Boats
- Non-Pelagic Boats
- Tuna Longline
- Mixed Longline
- Education
- Charter
- Business Serv.
- Professional Serv.
- Agriculture
- Health Services
- Eating/Drinking
- Transportation
- Other services
- Accomodation
- Finance/Insurance
- Government
- Food Process.
- Arts/entertain.
- Mining/Construct.
- Utilities
- Retail Trade
- Real estate
- Wholesale
- Information
- Other manuf.

[Bar chart showing multipliers for various industries, with "Low Household Multipliers" and "Strong Industry Multipliers For fisheries" annotations.]
### Treatment of Foreign Crew Members in Longline Sector?

<table>
<thead>
<tr>
<th></th>
<th>Tuna Longline</th>
<th></th>
<th>Tuna Swordfish Longline</th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Foreign Crew</td>
<td>Treated same as</td>
<td>Without Foreign Crew</td>
<td>Foreign Crew</td>
</tr>
<tr>
<td>Income Leaked Out</td>
<td></td>
<td>domestic labor</td>
<td></td>
<td>Income Leaked Out</td>
</tr>
<tr>
<td>Number of Crew jobs</td>
<td>109</td>
<td>295</td>
<td>23</td>
<td>136</td>
</tr>
<tr>
<td>Total Crew Compensation (in $)</td>
<td>1,657,083</td>
<td>5,289,154</td>
<td>403,408</td>
<td>1,985,745</td>
</tr>
</tbody>
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### Household Income Multipliers

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<td></td>
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<td>domestic labor</td>
<td></td>
<td>Income Leaked</td>
</tr>
<tr>
<td>Household-Low multiplier</td>
<td>0.11</td>
<td>0.19</td>
<td>0.09</td>
<td>0.18</td>
</tr>
<tr>
<td>Household-Medium Multiplier</td>
<td>0.44</td>
<td>0.43</td>
<td>0.44</td>
<td>0.43</td>
</tr>
<tr>
<td>Household-High</td>
<td>0.17</td>
<td>0.17</td>
<td>0.18</td>
<td>0.19</td>
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### Household Income changes in response to changes in $10 million dollars

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<tr>
<td>Household-Low (&lt;$35k)</td>
<td>1.02</td>
<td>1.78</td>
<td>0.85</td>
<td>1.62</td>
</tr>
<tr>
<td>Household-Med ($35-100k)</td>
<td>4.12</td>
<td>4.05</td>
<td>3.99</td>
<td>3.95</td>
</tr>
<tr>
<td>Household-High (&gt;=$100k)</td>
<td>1.59</td>
<td>1.61</td>
<td>1.67</td>
<td>1.70</td>
</tr>
</tbody>
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Thank you