Does International Trade Cause Overfishing? (2018 JAERE)

Author:

Tobias Erhardt

Reviewed by:
Louis Hotte

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General question

- Does International Trade Cause Overfishing?

Introduction

Introduction

- World fisheries are severely overused.

- Since 1980s, increased fishing activities without increased landings.

- Global fisheries' trade has increased 4X from 1976 to 2009.

- Could trade openness be responsible for the increased overuse?

In a nutshell

- Empirical analysis per country-year

- Exclusive Economic Zones (EEZs)

- Consideration of resource stock-flow dynamics

- In theory, there are scenarios where trade could reduce excessive fishing. Empirical question.

- Results suggest that trade could help.

- Governance seems to play a role (property rights)

More specific questions

- How do "resource governance" and "trade" interact to cause resource overuse?

- Which of the following two hypothesis holds?
    1. Resource Haven Hypothesis
    2. Severe Overuse Hypothesis

NB Typical structure for an empirical paper

1. Issues in general terms
   - Sometimes a methodology issue (causality, etc) or new data
2. The more specific question(s)
3. Theoretical arguments
   - Anticipated effects; mechanisms
4. Context
   - Geography, period, individuals (firms, workers), socio-economic, …
5. The data
   1. Summary statistics
   2. Dependent and explanatory variables
6. Empirical strategy
7. Main results
   - Regression tables
8. Robustness checks; Sensitivity analysis
9. Conclusion

Theoretical arguments

Theory

- Based on Brander and Taylor (1997).

- Stock-flow dynamics play a big role.

- Backward-bending supply curve.

- Two opposite conclusions:

    - "Resource Haven Hypothesis"

    - "Severe Overuse Hypothesis"

Resource Haven Hypothesis (RHH)

- Corresponds to "common wisdom".

- Poorer countries generally have weaker resource governance compared to richer ones.

- Weak governance leads to more severe overuse, higher supply of fish, and thus lower domestic price.

- Lower price provides a (apparent) comparative advantage in the resource good.

- This in turn causes even more overuse with trade.

Severe Overuse Hypothesis (SOH)

- The RHH argument does not account for fish stock-flow dynamics.

- Severely overused fish stocks may eventually be small, almost depleted.

- This leads to drop in the supply of fish, and thus an increase in its domestic price.

- This increase in price reverses the comparative advantage.

- Countries with weak governance will import fish, thus lowering fish prices and reducing the overexploitation.

Some references for theory

- Chichilnisky, G. (1994), North-South Trade and the Global Environment, *The American Economic Review*

Fisheries

- Brander, J. A. & Taylor, M. S. (1997), "International Trade between Consumer and Conservationist Countries", Resource and Energy Economics

- Brander, J. A. & Taylor, M. S. (1997), "International Trade and Open Access Renewable Resources: The Small Open Economy Case", Canadian Journal of Economics

- Brander, J. A. & Taylor, M. S. (1998), "Open Access Renewable Resources: Trade and Trade Policy in a Two-Country Model, Journal of International Economics

Forests

- Jinji, N. (2006), "International trade and terrestrial open-access renewable resources in a small open economy", *Canadian Journal of Economics*

Context

The context

- The study considers the fish stocks in Exclusive Economic Zones (EEZs) of countries over time.

- From Wikipedia: "*An **exclusive economic zone (EEZ)**, as prescribed by the 1982 United Nations Convention on the Law of the Sea, is an area of the sea in which a sovereign state has special rights regarding the exploration and use of marine resources, including energy production from water and wind.*[1] *It stretches from the baseline out to 200 nautical miles (nmi) from the coast of the state in question.*"

The data

The Data

- Three variables of interest: FSS, governance, trade openness
- Some control variables
- **Fish Stocks Status** from the Sea Around Us project. (SAU)
- Collapsed stock: "the catch of a certain species is less than 10% of previous catch levels"
- Overused: "catches in a certain year are less than 50% of previous catch levels"
- Two measures: Share of collapsed and share of overused fish species
- Available from 1950-2016 and 200+ countries. Erhardt uses 1986-2006 and 80 countries (not sure why)
- NB: Data on "percentage of catches from stocks of a given status" is also available from SAU.

The Data

- Two measures of trade openness:
  - KOF index:
    - "reflects different dimensions of economic globalization, including trade restrictions, such as tariffs and barriers to investment, and actual flows, such as trade in goods or cross-border investments"
  - % imports and exports wrt GDP
    - NB There are issues with this measure of openness.
  - NB Fraser Institute also provides a similar index of trade openness.

The Data

- Governance measures:

  - Not available for fisheries in particular

  - Use instead: "general indicator for the relative level of governance in a specific country"

  - Policy Risk Service (PRS) Group: "assessment of corruption in the political systems, the strength of the legal systems, adherence to law and order, as well as the quality of bureaucracy"

  - NB I don't have access to the PRS data. We can use similar measures from Fraser Institute and World Bank for the term paper.

Summary Statistics

Table 1. Summary Statistics

Statistic	Observations (N)	Mean	SD	Min	Max
Collapse share	361	.200	.140	0	.870
Overuse share	361	.483	.208	.030	.941
Openness	355	.654	.349	.010	2.034
KOF Index	345	.553	.188	.134	.964
Governance	361	.597	.221	.130	1
GDP per capita	348	11,841	14,457	239	66,739
Population density	358	105	143	1.781	1,285
Democracy	353	6.107	3.432	0	10

Empirical strategy

Empirical Strategy
Basic specification

$$Overuse_{it} = \beta_1 Overuse_{it-1} + \beta_2 Openness_{it} + \beta_3 Openness_{it} \times Governance_{it}$$

$$+ \beta_4 Governance_{it} + \mu_i + \delta_t + \varepsilon_{it},$$

Empirical Strategy Basic specification

- Two estimation methods:
  - Fixed effects
  - System-GMM estimation
- NB Distinction between "econometric model" and "estimation method" (Wooldridge 19-5c)
- FE uses 1-year lags for open. and gov.

$$Overuse_{it} = \beta_1 Overuse_{it-1} + \beta_2 Openness_{it} + \beta_3 Openness_{it} \times Governance_{it}$$

$$+ \beta_4 Governance_{it} + \mu_i + \delta_t + \varepsilon_{it},$$

Empirical Strategy
Estimation methods

- Two estimation methods:

  - Fixed effects

  - System-GMM estimation

- NB: There is something wrong with the time subscripts in the paper. (typo?)

Results

Table 2. Regression Results

| Dependent Variable:	Collapse Share			
Trade Openness Measure:	Openness		KOF Index	
Estimation:	FE	System GMM	FE	System GMM
	(1)	(2)	(3)	(4)
Collapse share $t-1$	.388*	.869*	.369*	.787*
	(4.61)	(11.68)	(5.07)	(9.32)
Openness	−.209*	−.280*		
	(−2.29)	(−3.19)		
Openness × Governance	.240	.313*		
	(1.64)	(2.12)		
KOF Ec. Glob.			−.506*	−.459
			(−2.84)	(−1.58)
KOF Ec. Glob.× Governance			.552*	.621
			(2.57)	(1.47)
Governance	−.230*	−.138	−.295*	−.291
	(−2.56)	(−1.51)	(−3.24)	(−1.08)
N	286	355	276	345
Adjusted R^2	.482		.462	
Pesaran p	.177		.181	
Instruments		30		30
Hansen J-test		.447		.110
Difference in Hansen test		.282		.0548
AR(1)		.000375		.000456
AR(2)		.666		.653

Note. Fixed effects (FE) estimations include country and time FE, cluster-robust t-statistics in parentheses. All explanatory variables are lagged by one period in the fixed effects estimations. System GMM: include time FE, Windmeijer (2005) finite sample corrected t-statistics in parentheses. All specifications estimated in two-step system-GMM estimation. *Openness* and its interaction with *Governance* are treated as endogenous. Hansen *J*-test denotes p-values testing the null hypothesis of instrument validity. Difference in Hansen reports the p-value for the validity of the additional moment restrictions required by system GMM. AR(1) and AR(2) report p-values for first- and second-order autocorrelated disturbances in the first differences equations. Data at 5-year intervals from 1986 to 2006. KOF Ec. Glob. = KOF Index of Economic Globalization.

[*] Denotes significance at the 5% level.

Results

- Column 3:
  - Beta_4<0: In closed economies (KOF=0), better governance lowers the share of collapsed species.

  - Beta_2<0: Under poor governance (GOV=0), increased openness lowers the share of collapse species. Consistent with SOH...

  - Beta_3>0:
    - Beneficial effect of trade openness is tempered by better governance.

    - Beneficial effect of better governance is tempered by openness.

  - Stata has a nice routine to estimate the effect of openness at various governance levels. (See next fig)
    - Effect of trade vanishes under good enough governance.
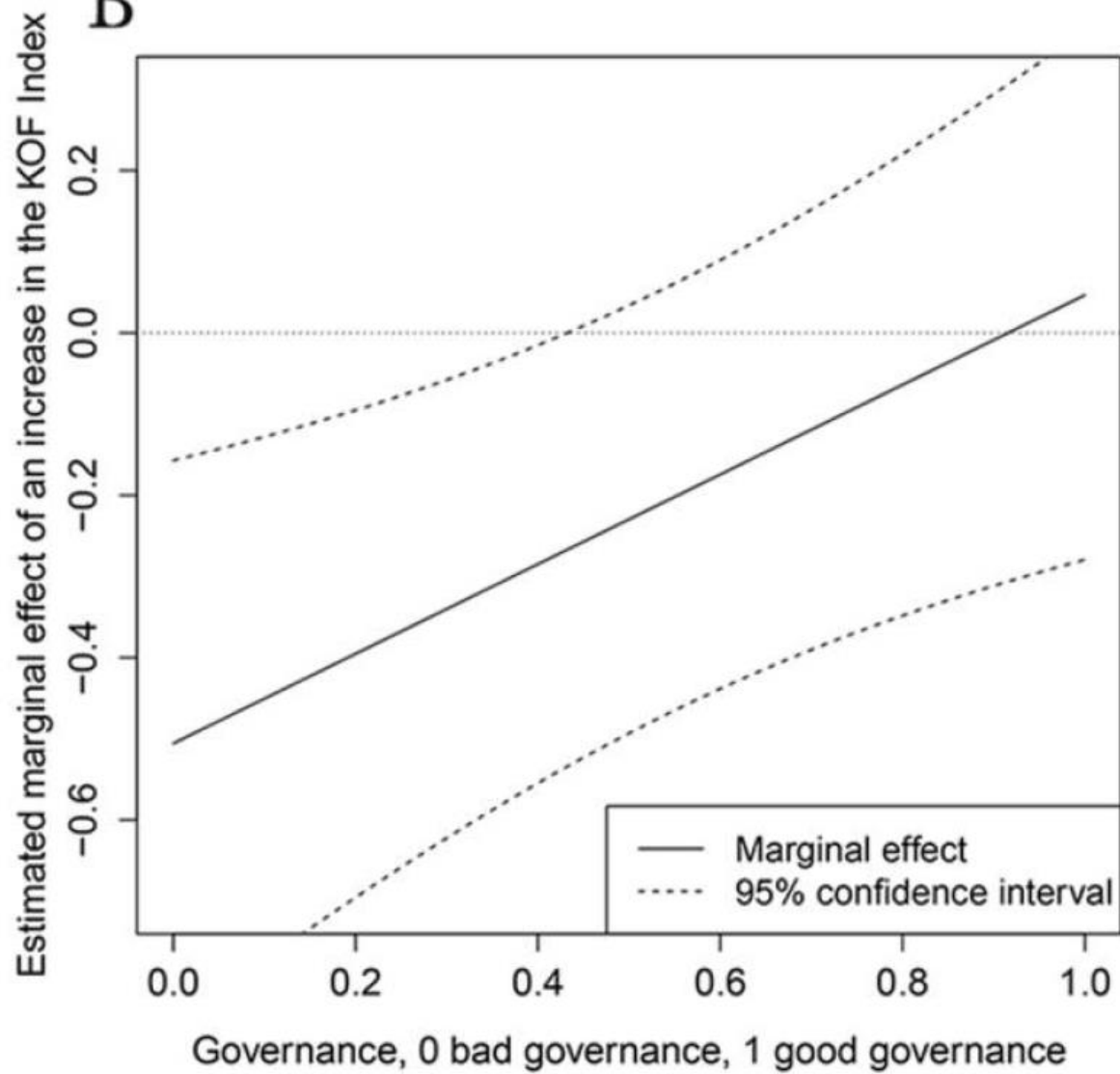
Sensitivity analysis

- See online appendix if interested.

Conclusion

Discussion

- Main take-away:
  - RHH v. SOH
  - Trade may actually be good for fisheries with poor governance.
- Not sure why the limited timeframe used.

Outlook

- What about deforestation?

- Based on Abman and Lundberg (2020), mechanisms are quite different.

- For intermediate report, use Erhardt econometric approach for the case of deforestation.
  - Does trade increased deforestation?
  - What is the role of governance?

- Dataset in Sugarsync folder: deforestation; governance; trade openness; some control variables.
  - You can be creative.
  - Use different econometric approach?