

The Impacts of Disputed Exclusive Economic Zones on Fisheries in the South China Sea

Himaushu Hardikar
Satoshi Yamazaki
Yifan Lu

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Background: South China Sea Conflict

Geopolitical tools

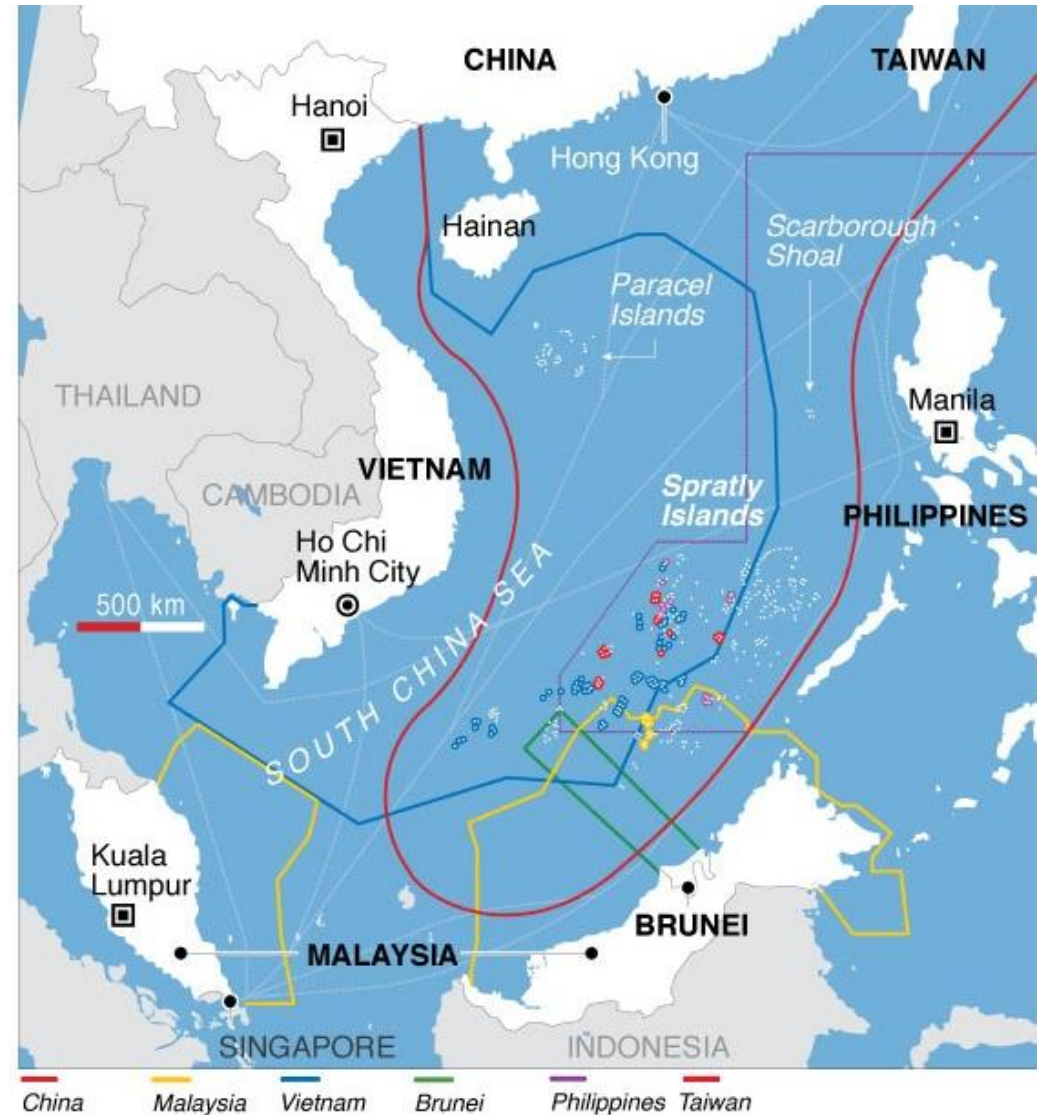
- Skirmishes
- Land reclamation & expansion
- Domestic policy initiatives

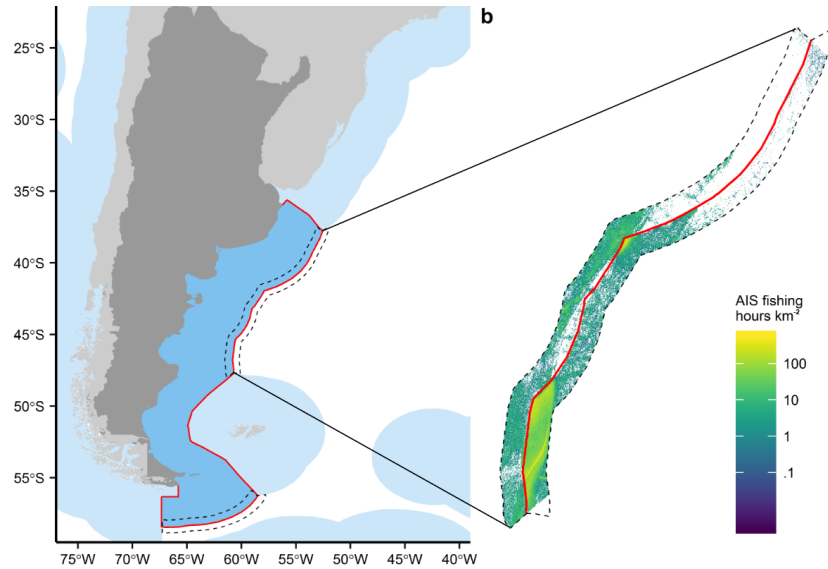
United Nations Convention on the Law of the Sea

- Exclusive Economic Zones
- International Tribunals

Motivators

- Natural resources
- Trade routes
- Territorial control





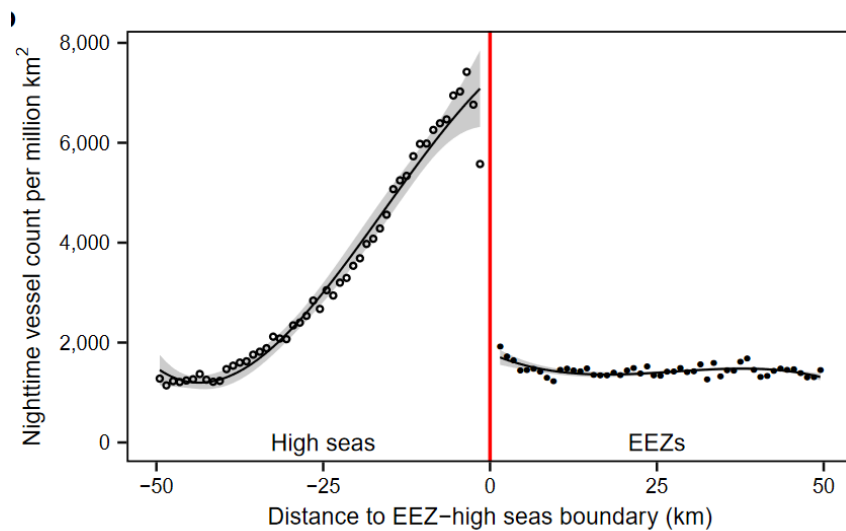
Hypothesis

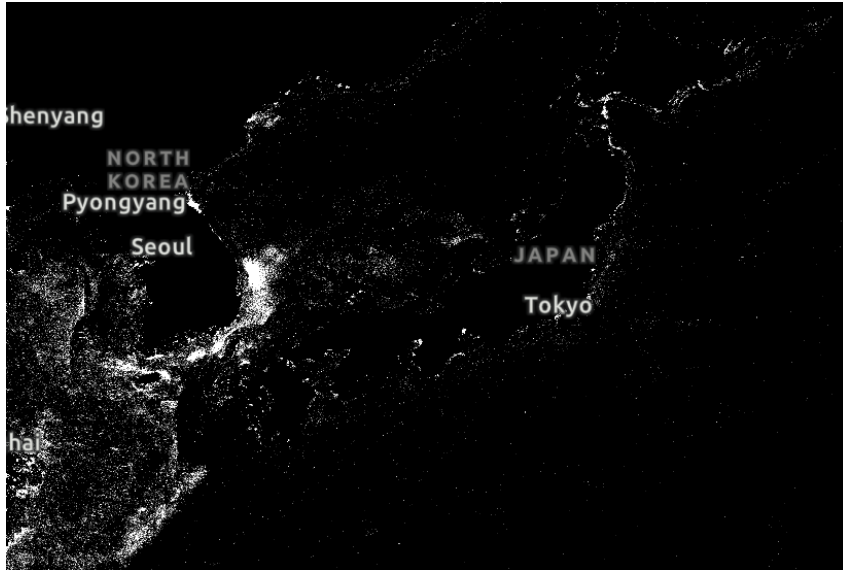
‘Property rights and the protection of global marine resources’ – Englander (2019)

- Deterrence effect observed around EEZ
- Agreed boundaries
- Lack of conflict

Hypothesis: Expectations for the current study depart from the literature

- No deterrence effect
- Continuous data at boundaries
- Contested boundaries
- Desire for control





Data

National Oceanic & Atmospheric Administration (U.S Dept. of Commerce) dataset

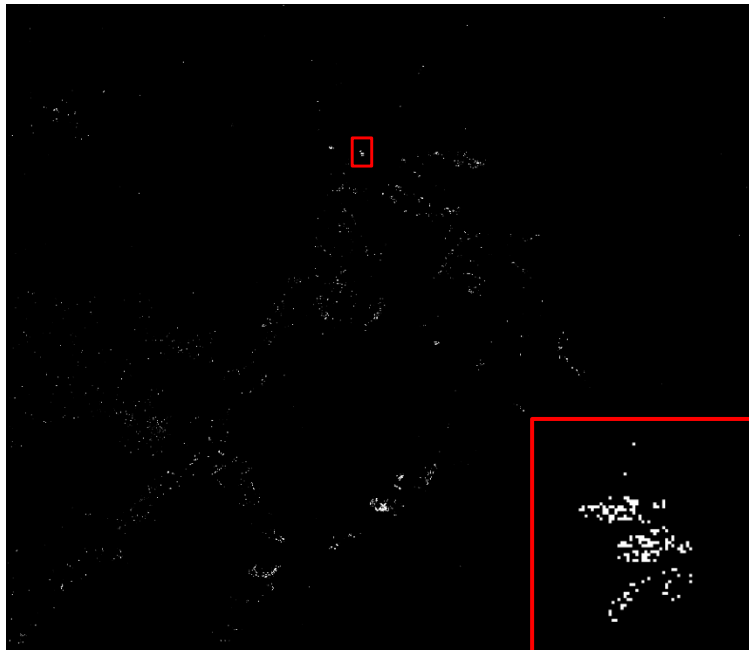
- Visible Infrared Imaging Radiometer Suite (VIIRS) – Night Light Detection System
- Daily/Monthly/Annual high-resolution observations

ArcGIS

- Spatial analysis – Conversion of NOAA datasets

Stata

- Forming datasets
- Modelling – RDD & Time series

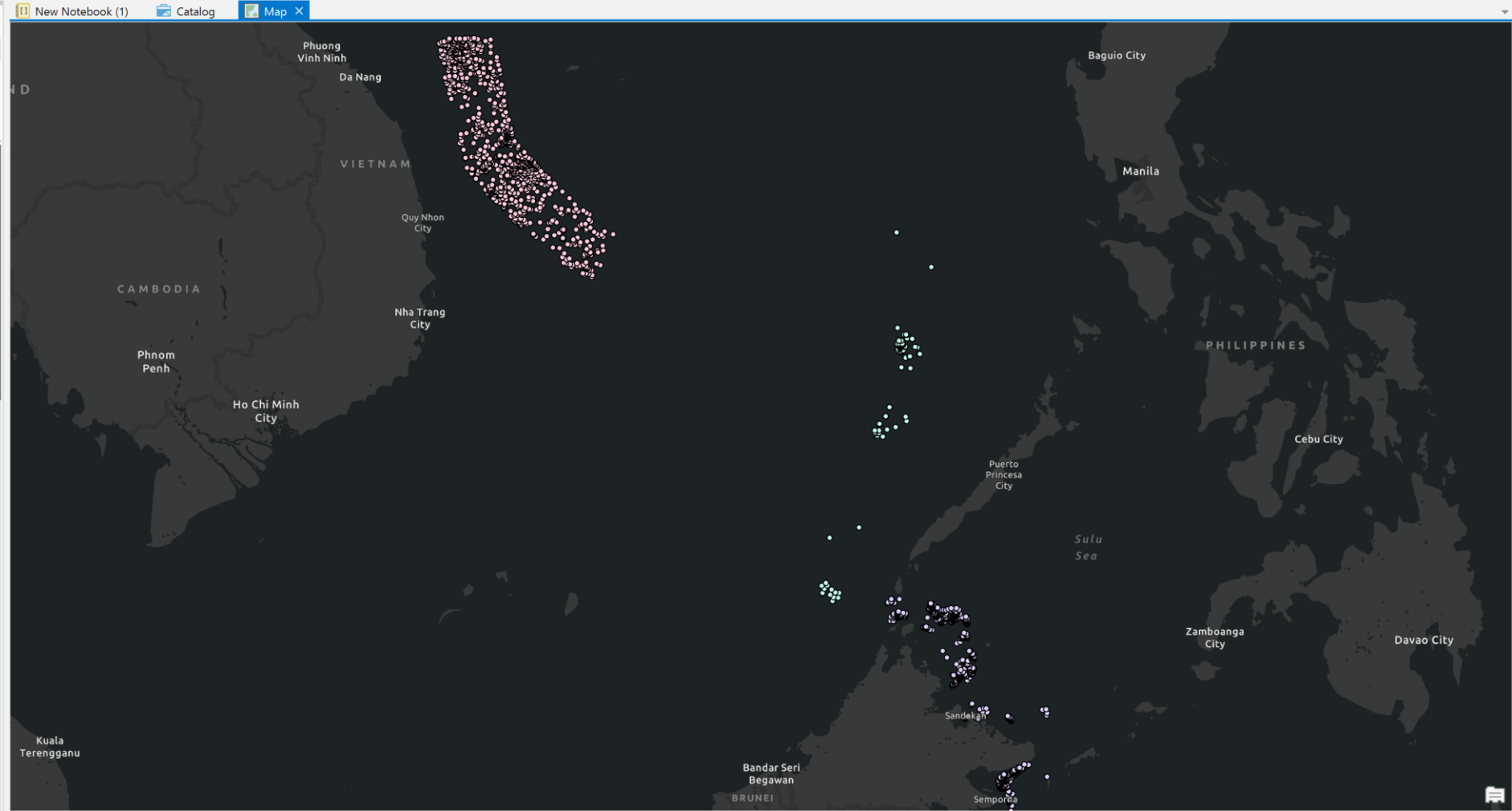


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- VNM 2018
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- VNM 2016
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- PHL 2013
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- EEZ_JPN
- EEZ_KOR
- EEZ_VNM
- EEZ_MYS



Empirical Strategy

Regression Discontinuity Design

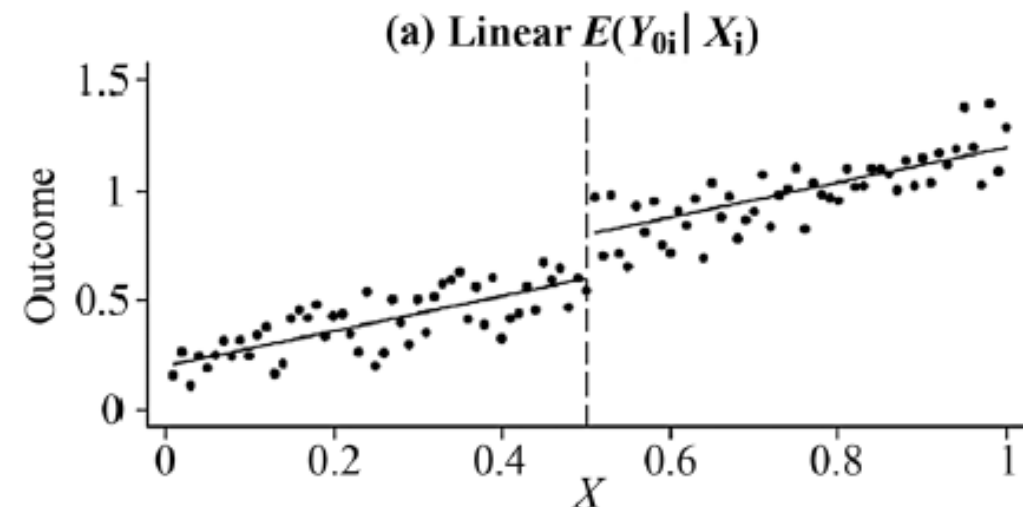
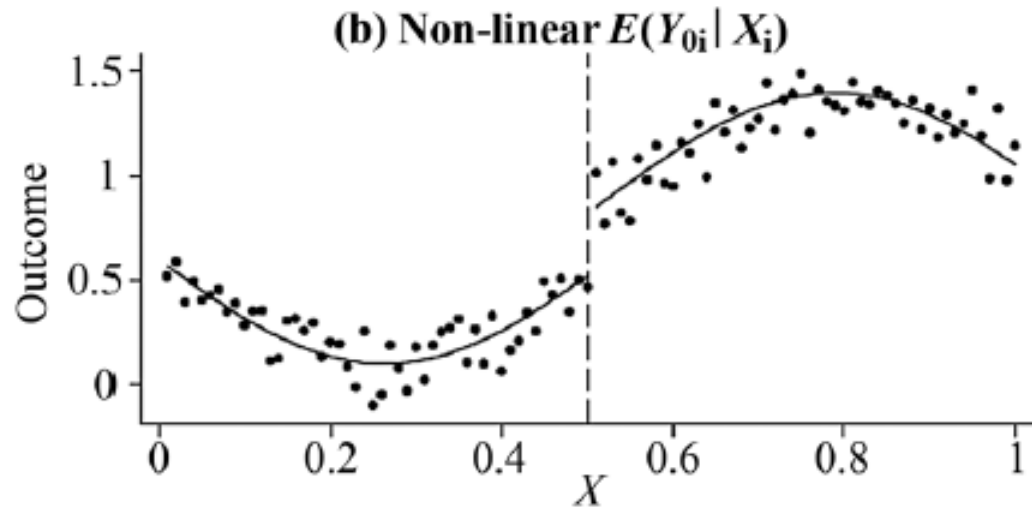
- Treatment is defined as effect of EEZ on fishing activity
- Set EEZ boundary as cutoff to observe 'treatment effect'

Identification Assumptions

- Cutoff value must be known
- But for change in treatment, outcome variable must be unaffected across cutoff value

Further Analysis

- Linear vs non-linear models
- Time Series
- 'Donut' Regression Discontinuity



Model Specification

$$Y_i = \alpha + \tau D_i + f(x_i) + \epsilon_i$$

Y_i : Number of fishing vessels for specified bin range

x_i : Distance from EEZ boundary/border (EEZ running/assignment variable)

α : Average number of fishing vessels in EEZ

D_i : Treatment variable (Whether or not in disputed territory)

- Treated observations: If $x_i > 0$, $D_i = 1$
- Untreated observations: If $x_i < 0$, $D_i = 0$

τ : Parameter of interest (treatment effect)

Smoothed function:
$$Y_i = \alpha + \tau D_i + \sum_{k=1}^K \beta x_i^k + D_i \sum_{k=1}^K \gamma x_i^k + \epsilon_i$$

Graphical Interpretation - RDD

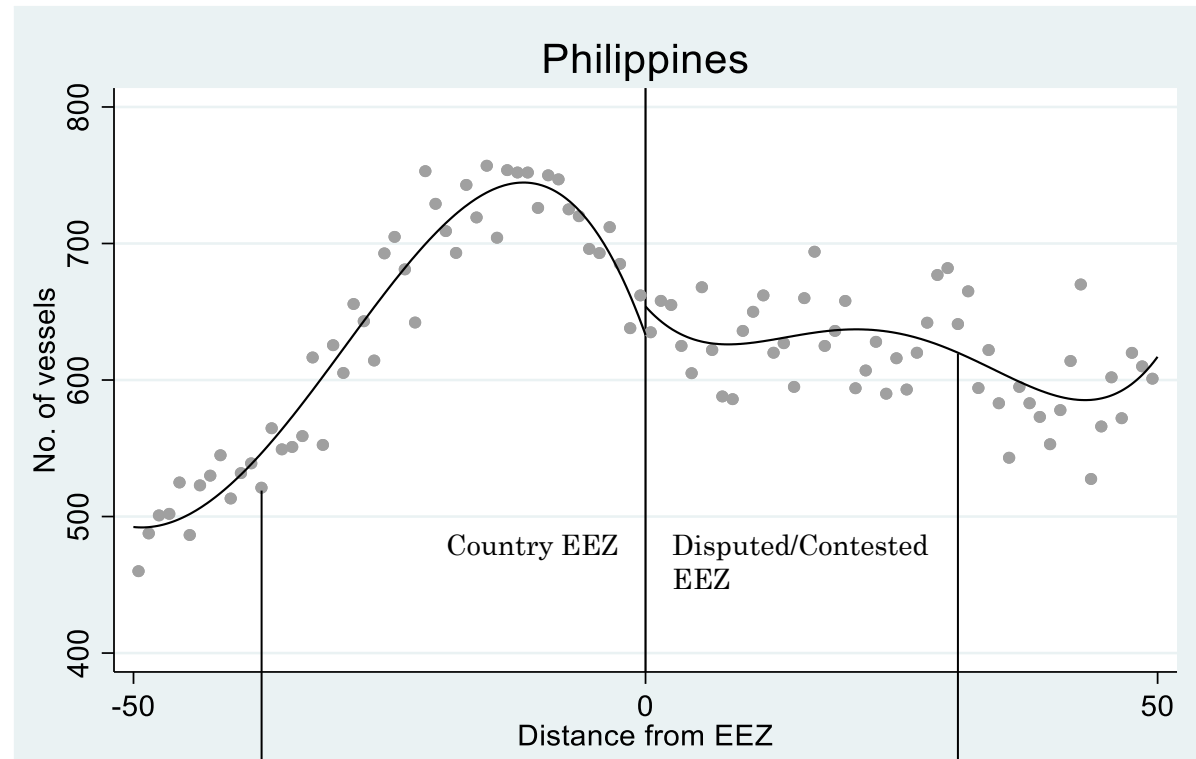
RD Plot with RD plot with manually set number of bins.

Cutoff $c = 0$	Left of c	Right of c
Number of obs	31746	30866
Eff. Number of obs	31746	30866
Order poly. fit (p)	4	4
BW poly. fit (h)	50.010	49.998
Number of bins scale	1.000	1.000

Number of obs = 62612
Kernel = Uniform

Outcome: numbin. Running variable: km_distance.

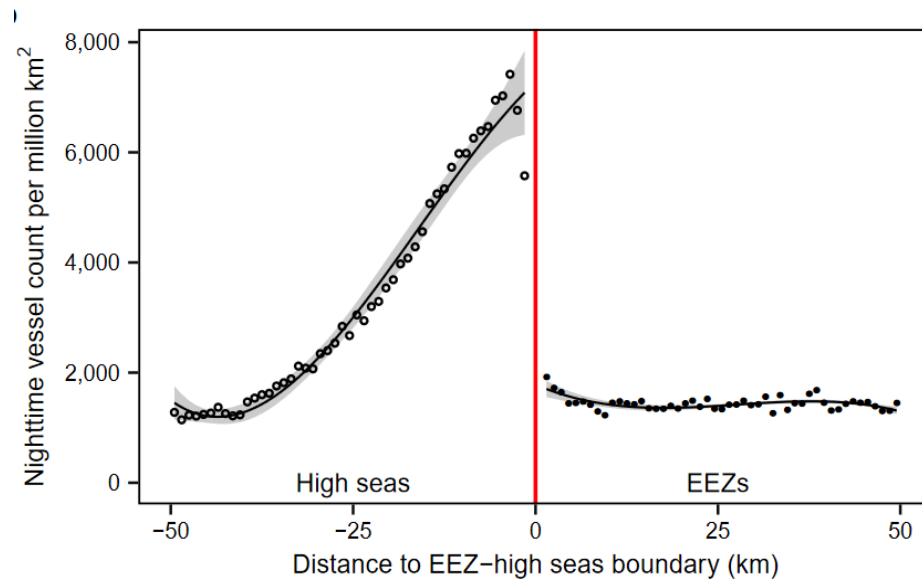
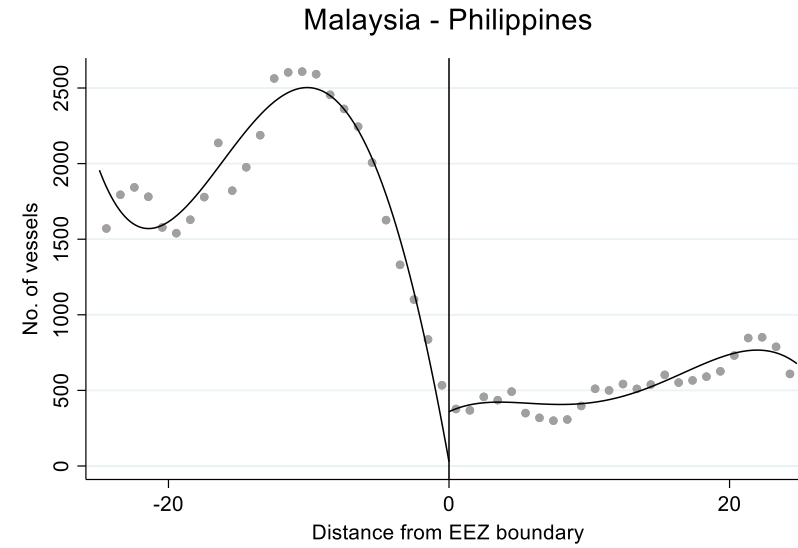
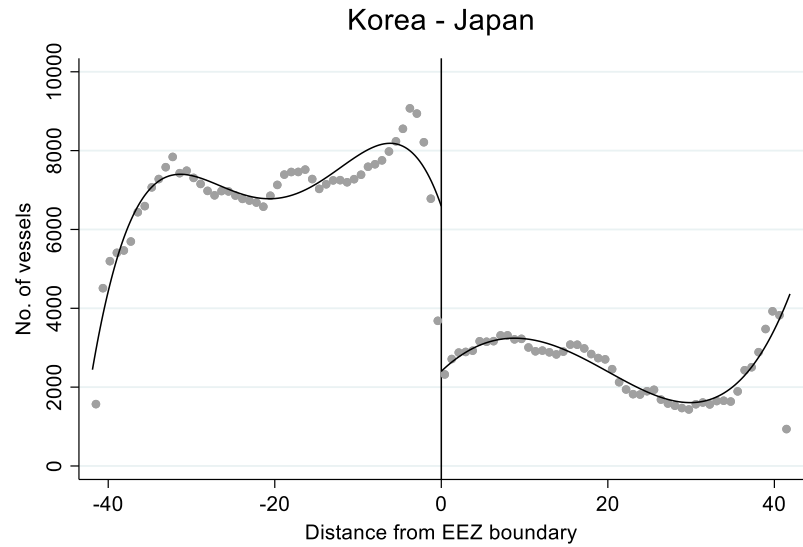
	Left of c	Right of c
Bins selected	50	50
Average bin length	1.000	1.000
Median bin length	1.000	1.000
IMSE-optimal bins	339	367
Mimicking Var. bins	168034	258492
Rel. to IMSE-optimal:		
Implied scale	0.147	0.136
WIMSE var. weight	0.997	0.997
WIMSE bias weight	0.003	0.003



Total number of observations within specified distance band (bin)

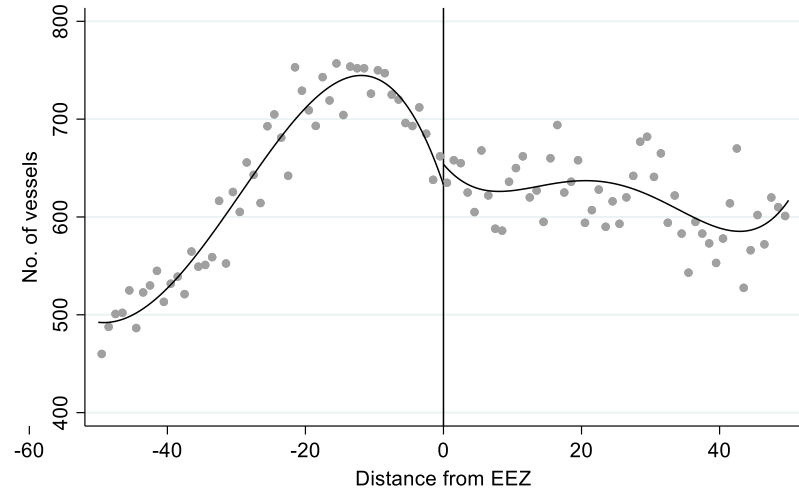
4th degree polynomial trendline

Agreed Boundary EEZs

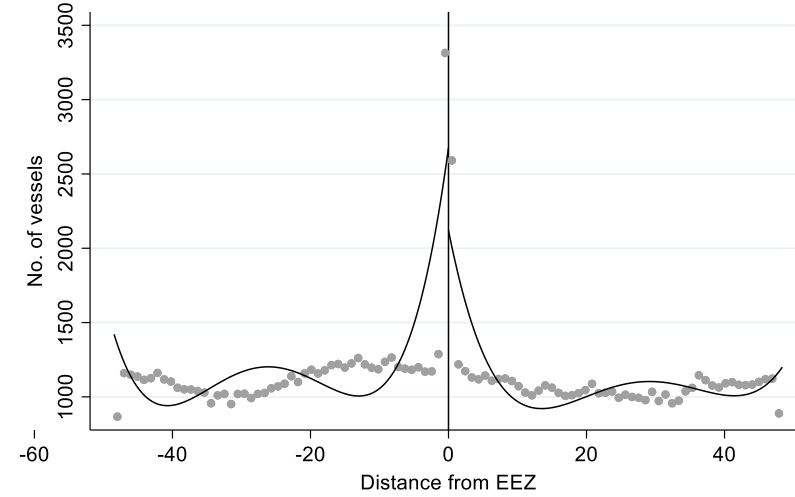


Conflict Boundary EEZs

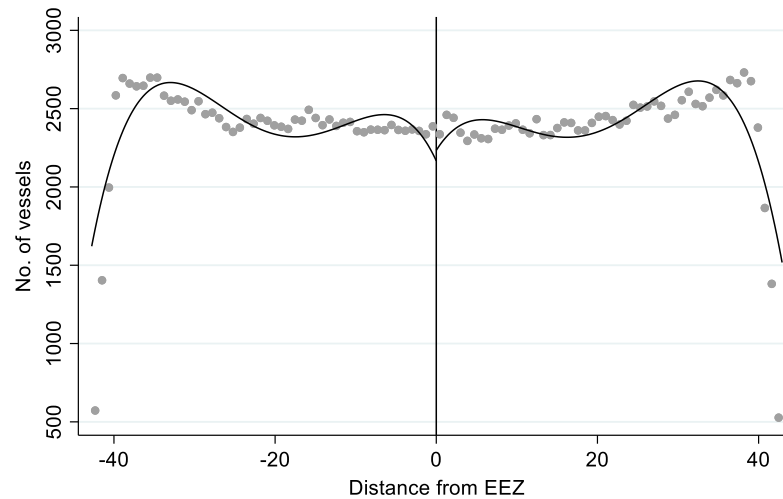
Philippines - International Waters



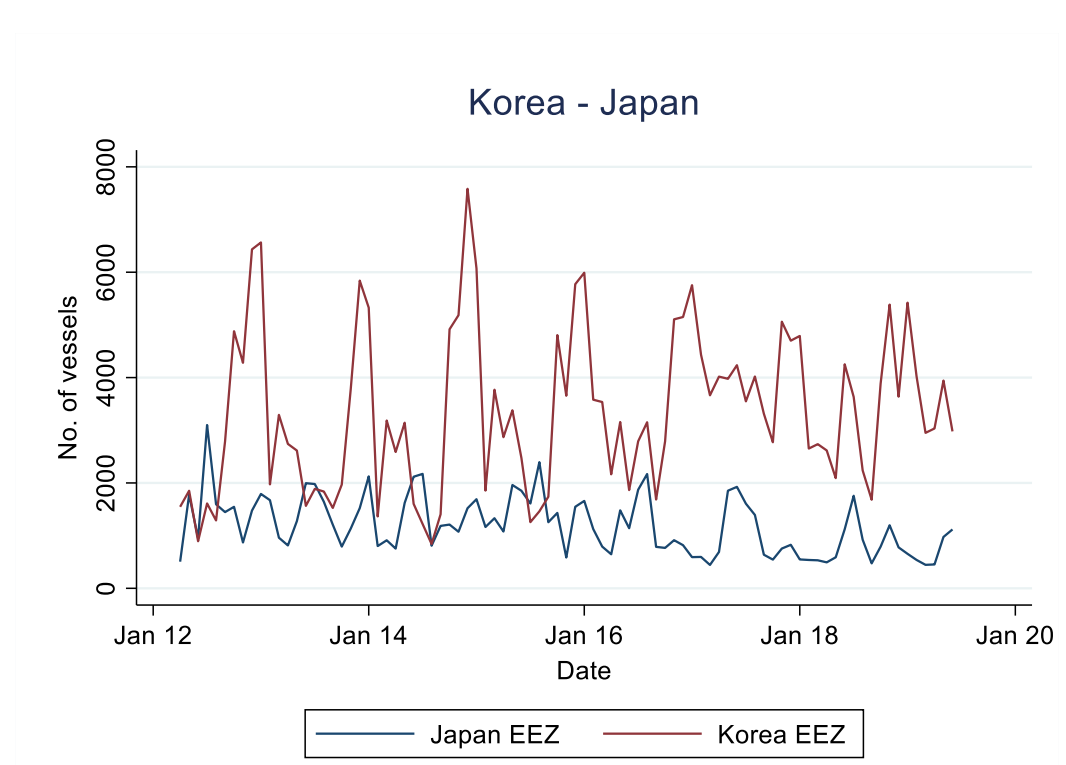
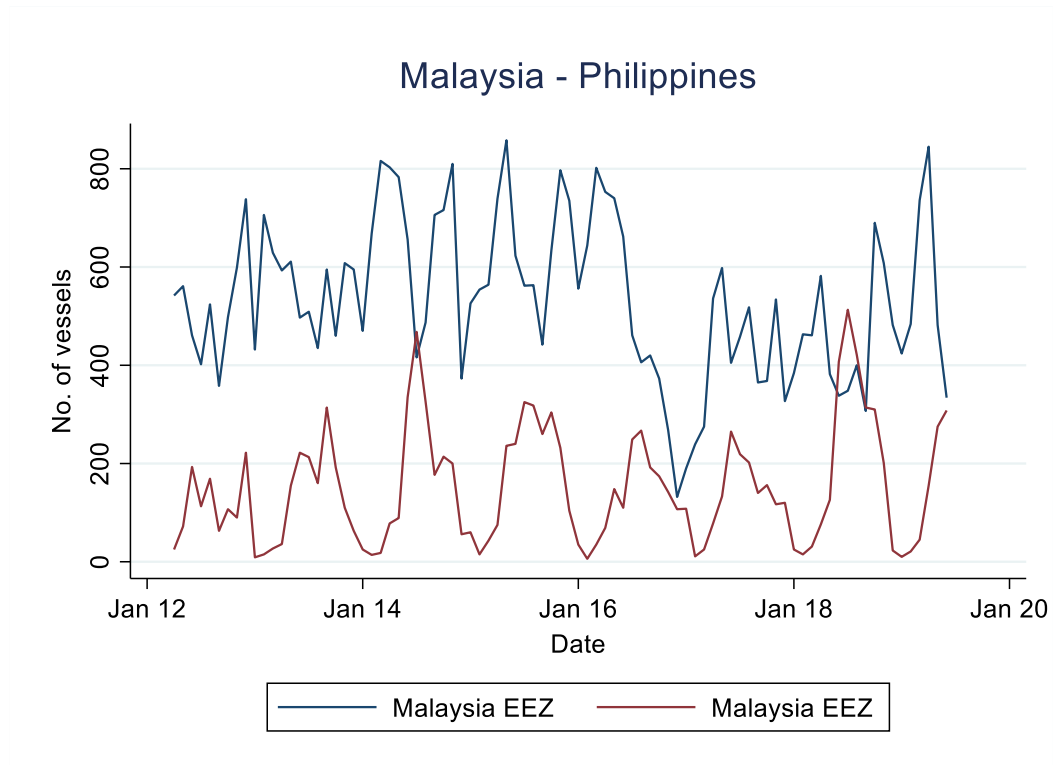
Vietnam - International Waters



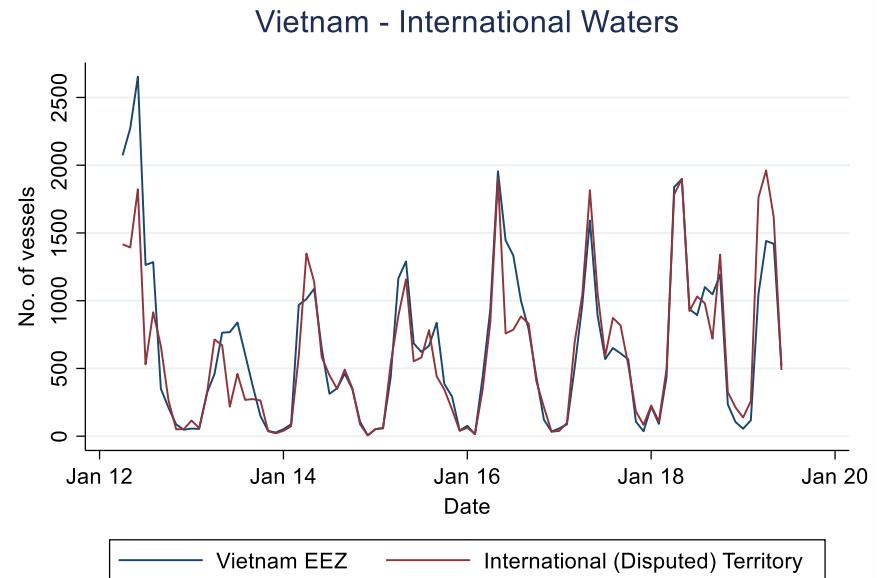
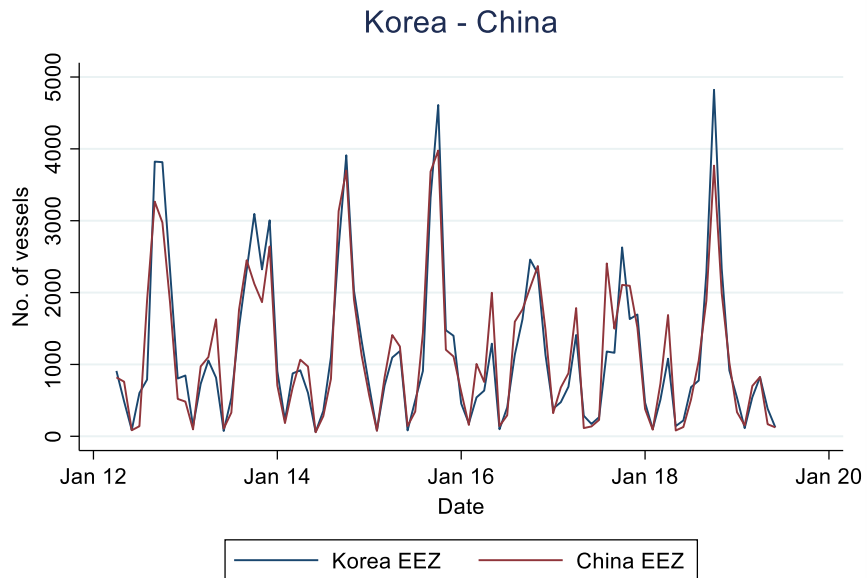
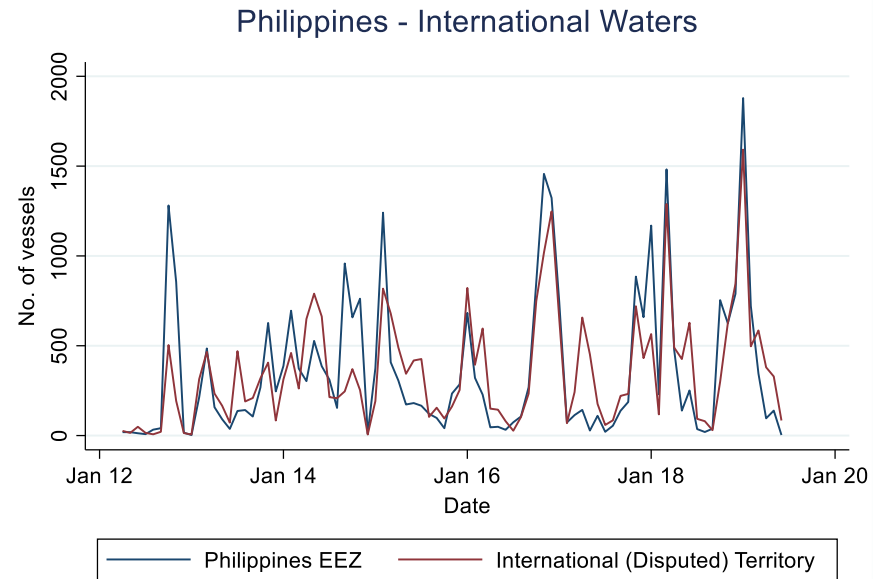
Korea - China



Agreed Boundary Patterns



Conflict Boundary Patterns



Conclusion and Further Research

Key Points

- Countries focus presence around disputed EEZs
- South China Sea appears to be fiercely contested
- Potential long-term environmental and economic sustainability concerns

Limitations of Research

- Identifying fishing vessels
- Country breakdown

Further Study

- Proportional fishing fleets by country
- Domestic policy analysis

Thank You