

# A DOUBLE HURDLE APPLICATION OF FISHERMEN'S CATCH SALES THROUGH FISH MOTHERS IN GHANA

---

KWAMENA QUAGRAINIE, *Purdue University, USA*

JINGJIE CHU, *The World Bank Group, DC*





# Introduction

- ❖ Marine capture fishery accounts for over 80% of total fish product supply.
- ❖ Subsectors: Small scale/artisanal; semi-industrial/inshore; industrial/deep sea; and tuna fleets
  - Small scale / artisanal fishery accounts for 70%-80% of total marine catch
- ❖ Main fishes landed by artisanal fishermen: sardinellas (*Sardinella aurita*), tuna (*Auxis thazard*), mackerels (*Scomber japonicas*), burrito (*Brachydeuterus auritus*), and Atlantic bumper (*Chloroscombrus chrysurus*).
- ❖ Minor fishes:red fish (*Sparus caeruleostictus* ; *Dentex angolensis*), white grouper (*Epinephelus aeneus*).



# Artisanal Fishery Challenges



- ❖ Seasonality, small margins, capital outlay, limited access to formal bank credit, low returns, etc
- ❖ Returns affected by:
  - limited value addition
  - weak backward-forward market linkages
  - poor infrastructure
  - low bargaining power
  - low catch

# Role of Fish Mothers

---

- ❖ Women participation rate in pre- and post-harvesting activities is about 48%
- ❖ Women play vital role in informal financing of fishing operations
- ❖ Marketing & remuneration from fish catch:
  - Greater % goes to “fish mothers” to cover any pre-financing arrangements
  - % to boat owner to cover fixed costs
  - % to hired laborers & as wages
  - Small % shared for meals
- ❖ Marketing channels: fish mothers, fish processors, fish retailers, food vendors, relatives, spouses, and direct to consumers.



# Selling Through Fish Mothers

## ❖ Advantages:

- Relatively low cost financing
- Less marketing costs; mostly cash market
- Higher volumes
- Sometimes, higher prices especially fish destined for national, and international markets

## ❖ Disadvantages:

- Lack of bargaining power
- Women may use financing leverage to control production chain



# Study Objectives & Data

---

- ❖ Assess fishermen's fish sale choices as a 2-step decision process
- ❖ Examine determinants of fish sales through fish mothers
  - Hypothesis: Self-financing negatively affects decision to sell through fish mothers
- ❖ Data collected in 2013 from artisanal fishermen at major coastal fishing communities in Ghana, i.e., Chorkor, Jamestown, Tema, Elmina, Cape Coast, and Moree

# Methodology

---

## ❖ The Double Hurdle (DH) model:

- 1<sup>st</sup> hurdle: Whether or not fisherman sold to fish mothers
- 2<sup>nd</sup> hurdle: fish catch % sold through them

## ❖ Test homoscedastic vs heteroskedastic

- variance in error:  $\sigma_i = \sigma \times \exp(\delta' \mathbf{h}_{2i})$ ;  $\delta = 0$  vs  $\delta \neq 0$



# Results

---

❖ Likelihood ratio test rejects homoscedasticity restriction

	Estimate
Homoskedastic Model	LLF = -52.521
Heteroskedastic Model	LLF = -33.808
$\chi^2$ test statistic	37.426
$\chi^2$ (1,0.01) critical value	6.63

# Results

## ❖ Estimated Parameters from Heteroskedastic Model

	<u>Hurdle 1</u>	<u>Hurdle 2</u>	<u>Hetero. Eq</u>
Weighted average price of all fishes (US\$)		0.015***	
Percentage of high value fish landed (%)		0.002*	
Self-financing for fishing activities (=1)	-0.676**	0.050	
Boat size (meters)	0.320***	1.211***	-2.913***
Experience (years)		0.105***	
Number of fishing trips in a year		0.107***	
At least a primary education (=1)		0.022	
Located in Greater Accra (=1)	0.351	0.012	

# Results

## ❖ Estimated Average Partial Effects (APE) from Heteroskedastic Model

	Prob[y > 0]	E[y]	<u>E[y y&gt;0]</u>
Variable	Coeff.	Coeff.	Coeff.
Weighted average price of all fishes (US\$)	0.004***	0.001***	0.001***
Percentage of high value fish landed (%)	0.000*	0.000*	0.000*
Self-financing for fishing activities (=1)	-0.190**	-0.102**	0.012**
Boat size (meters)	0.094***	1.461***	0.913***
Experience (years)	0.025***	0.008***	0.005***
Number of fishing trips in a year	0.026***	0.008***	0.005***
At least a primary education (=1)	0.005	0.002	0.001
Located in Greater Accra (=1)	0.100	0.056	0.005



# Highlights

## ❖ (+) effects:

- % of high value fish landed
- boat size
- number of fishing trips /yr
- experience

## ❖ (-) effects: Self-financing.



# Conclusions

---

- ❖ Relatively small effect of price
  - Minimal ability of fishermen to negotiate prices with the fish mothers.
- ❖ Relatively small effect of high value
  - Could result from low catch.
- ❖ Relatively small effect of experience & fishing trips
  - Could relate to quantity of catch.

# Conclusions

---

- ❖ Relatively stronger effects of boat size & self-financing.
  - Capital and investment considerations are important drivers for fishermen's choice of selling catches through fish mothers.
  - Address increasing capital costs associated with artisanal fisheries (larger canoes, high powered motors, fishing equipment, etc).
  - Incentives from formal banking services to minimize poor loan repayment & indebtedness.



# Thank you!

---

## Questions?

