



Supply and Price Behavior: Rice & Fish Markets of Sri Lanka

Outline

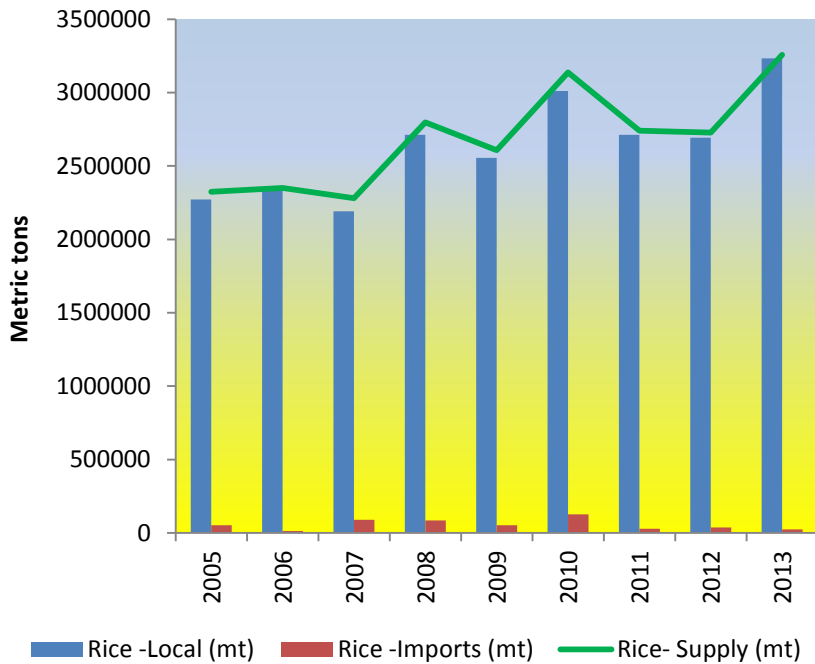
- Introduction
- Research Objectives
- Methodology
- Results
- Next Step



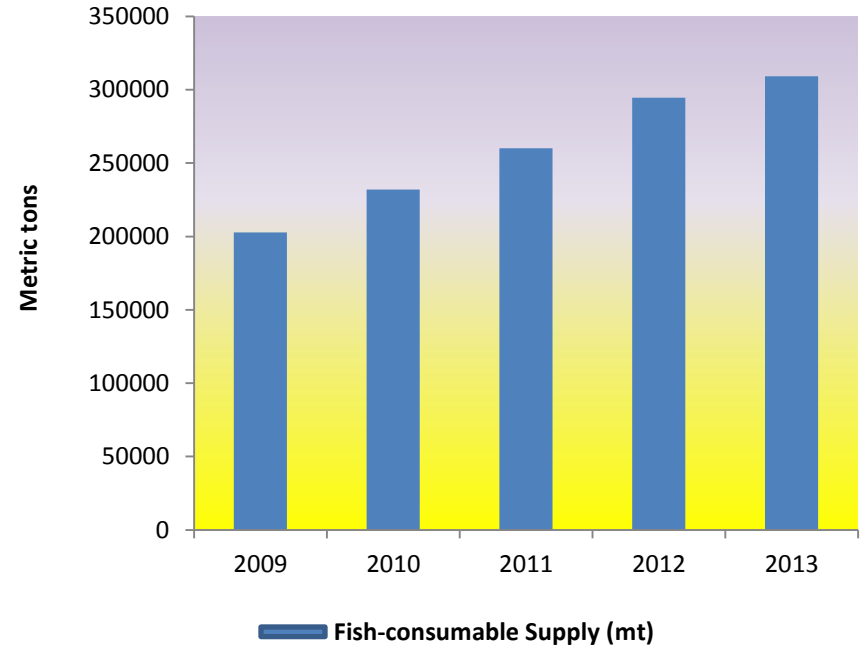
Introduction

Supply Side Changes in Sri Lanka

Rice Supply



Fish Supply



Responsible Factors

Technological Improvements

- **Capture Fisheries**
 - **Craft Improvements**
 - **Mobility**
 - **Navigation**
 - **Cold storage**
 - **Fish locating**
 - **Aquaculture**
 - **Breeding Techniques**
 - **Culture Techniques**

Policy Reforms

- **Producer Support Policies**
- **Resource Conservation Policies**
- **Trade Policies**



- Knowledge on real impact of these factors is poor
- Exact nature & extent of the impact are unknown
- A major barrier for making informed policy decisions



Research Objectives

- Understand the nature of supply response relationships of rice and fisheries
- Recommend feasible policy interventions to sustain fish and rice production and overcome the identified barriers in the existing markets

Methodology



INSTITUTE OF POLICY STUDIES OF SRI LANKA

Estimation of Supply Elasticities

- Based on a generic model proposed by WFC which was used in nine Asian countries (Asian Fish Model)

Theoretical Model

- The Profit Function Approach
- Avoid complications involved in production function approach when used to study joint input production
- Specific form of function used is the normalized quadratic profit function
- It has frequently been applied to the joint agricultural production (Dey et. al. 2003; Ball, et. al. 1997; Shumway et. al. 1987)



Estimation of Supply Elasticities

Model Specification

- Profit = f(output price, input prices, supply shifters)

$$\begin{aligned}\pi^* &= \alpha_0 + \sum_i \alpha_i P_i^* + \sum_k \gamma_{0k} v_k + \frac{1}{2} \sum_i \sum_j \alpha_{ij} P_i^* P_j^* + \sum_i \sum_k \gamma_{ik} P_i^* v_k \\ &\quad + \frac{1}{2} \sum_k \sum_l \gamma_{kl} v_k v_l + \sum_i \varepsilon_i P_i^* + \varepsilon\end{aligned}$$

Where:

π^*	=	normalized profit
α, γ	=	parameters
P_i^*	=	normalized price of the i^{th} netput (P_i / P_{num})
v_i	=	conditioning variables (shifters)
ε	=	error terms

- Applying envelope theorem yields output supply function and input demand function

Demand-Supply Match

SOURCES	TYPE OF FISHERY	SUPPLY SPECIES (GROUPS)	DEMAND-SUPPLY MATCH	DEMAND SPECIES (GROUPS)
Marine	Capture	Skipjack Tuna Yellow Fin Tuna		Balaya, Kelawalla (1301)
		Seer Shark Other Blood Fish	LarPel	Seer (1306) Mora (1303) Thalapath (1304)
		Small Pelagics (shore seine varieties)	SmaPel	Sprats (1401) Hurulla, Salaya (1402) Karalla, Katuwalla (1403) Kumbalawa (1404) Paraw, Angilla (1405)
		Trevelly Mullet	Demars	Paraw (1305) Mullet (1302)
		Prawns Lobster Crabs Other	OthMar	Prawns (1501) Crabs (1502) Cuttle fish and other (1599)
		Dried Fish	Process	Dried fish (1601-1610) Canned fish (1702) Maldive fish (0610)
Inland	Capture	Tilapia Other Freshwater Fish	FWF	Tilapia (1409) Carps (1410) Lula (1407) Hunga (1408)
	Aquaculture	Fresh Water Fish Prawns	CulPra	

Structure of Estimated Supply Equation System -Fish

Production Category	Dependent Variable(s)	Independent Variables
Marine Capture Fisheries	Supply quantities of marine capture categories (LarPel, SmaPel, Demars, OthMar, process)	Endogenous Variables Output prices Input prices
	& Demand quantities of Inputs (labor)	Exogenous Variables Supply shifters
Inland Capture Fisheries	Supply quantities of inland capture categories (FWF)	Endogenous Variables Output prices Input prices
	& Demand quantities of Inputs (Labor)	Exogenous Variables Supply shifters

Structure of Estimated Supply Equation System- Paddy

Production Category	Dependent Variable(s)	Independent Variables
Paddy	Supply quantities of paddy &	Endogenous Variables Output prices Input prices
	Demand quantities of Inputs (labor, fertilizer)	Exogenous Variables Supply shifters

Data Collection

	Fish	Paddy
Data Type	Secondary data	Secondary data
	Time series data -Provincial data (NWP, NOP, WEP, SOP, EAP)	Time series data -District data (Anuradhapura, Polonnaruwa, Trincomalee, Ampara, Kandy Hambanthota, Kurunegala , Mahaweli H, Kalutara , Gampaha)
Period	1980-2014	1980-2014
Data Sources	Ministry of Fisheries and Aquatic Resources Development NARA HARTI	Cost of cultivation, Department of Agriculture Dept. of Census & Statistics

Data: Fish

	Marine	Inland
Output Quantities	Production (LarPel, SmaPel, Demars, Other Marine, Processed)	Production (Tilapia, Other FWF)
Input Quantities	Active fishermen (Labor)	Active fishermen (Labor)
Output Prices	Annual average wholesale prices	Annual average wholesale prices
Input Prices	Wage rate of fishermen Fuel prices (Petrol, Diesel, Kerosene)	Wage rate of fishermen
Supply Shifters	Operating fishing boats by type (IMUL, IDAY, OFRP, MTRB, NTRB)	Inland fishing crafts
	Active ice plants & ice production capacity	Production of fish fingerlings and post-larvae
	Functioning major fishery harbours	

Data: Rice

Output Quantities: Paddy quantity

Input Quantities: Labor , Fertilizer

Output Prices: Farm gate price of paddy

Input Prices: Labor wage rate, Fertilizer prices

Supply Shifters : Aswaddumized extent, Sown extent, Harvested extent, Rain-fed extent, Irrigated extent, Extent sown by tractor, Area covered by new improved varieties, Area covered by chemical fertilizer, Guaranteed prices and Rainfall



Results



Supply Response: Fish

Preliminary elasticity estimates

	Marine Output Supply				Input Demand
	Large pelagic	Small pelagic	Demersals	Other marine	Labour
<u>Output Price</u>					
Large pelagic	0.13	-0.25	0.35	0.08	0.12
Small pelagic	-0.08	1.28	-0.10	-0.29	0.14
Demersal	0.06	-0.05	-0.53	0.11	0.002
Other marine	0.04	-0.46	0.29	-0.3	-0.18
<u>Input Price</u>					
Labour	-0.16	-0.51	-0.01	0.41	-0.09
Fuel Price	-0.30	0.22	0.06	-0.09	0.50

Preliminary elasticity estimates - Supply Shifters

	Marine Output Supply				Input Demand
	Large pelagic	Small pelagic	Demersals	Other marine	Labour
<u>Shifters</u>					
Total Crafts	0.76	0.74	1.06	1.16	-0.07
Ice plants	0.03	-0.23	-0.14	-0.42	-0.51
Ice plant capacity	0.39	-0.05	0.06	0.056	0.23
Harbours	0.67	0.01	0.31	0.16	-0.15

Supply Response: Paddy

Preliminary elasticity estimates

Variable	Elasticity
Own Price	0.023
Cross-price: Labor	0.0012
Cross-price: Fertilizer	-0.024
Supply shifter 1: Azwaddumized extent	-0.048
Supply shifter 3: Harvested extent	1.586
Supply shifter 4: Area covered by chemical fertilizers	0.114
Supply shifter 5: Area covered by new improved varieties	-0.02
Supply shifter 6: Extent prepared by tractors	0.14
Supply shifter 7: Irrigated extent	0.08
Supply shifter : Rainfall deviation	0.004

Next Step

- Estimation of supply elasticities
- Estimation of demand elasticities
- Trade core
- General equilibrium/market clearing
- Projection
- National action plan

Thank You



Institute of Policy Studies of Sri Lanka
100/2 Independence Avenue,
Colombo 7, Sri Lanka
T: +94 11 2143100

www.ips.lk

 www.ips.lk/talkingeconomics

 [/instituteofpolicystudies](https://www.facebook.com/instituteofpolicystudies)

 [@TalkEconomicsSL](https://twitter.com/TalkEconomicsSL)