



**AgEcon** SEARCH  
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

*No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.*

## **Impacts of Quality, Shipping, Storing Costs, and Policy on the Global Rice Trade**

**Hoa Hoang, Haitao Li, Wyatt Thompson, and Alvaro Durand-Morat**

*Selected presentation for the International Agricultural Trade Research Consortium's (IATRC's) 2022 Annual Meeting: Transforming Global Value Chains, December 11-13, 2022, Clearwater Beach, FL.*

*Copyright 2022 by Hoa Hoang, Haitao Li, Wyatt Thompson, and Alvaro Durand-Morat. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.*

# Impacts Of Quality, Shipping, Storing Costs, and Policy on The Global Rice Trade

**Hoa Hoang<sup>1</sup>, Haitao Li<sup>2</sup>, Wyatt Thompson<sup>1</sup>, and Alvaro Durand-Morat<sup>3</sup>**

1 – University of Missouri- Columbia

2 – University of Missouri-St Louis

3 – University of Arkansas

Presentation prepared for the IATRC Conference

December 11-14, 2022



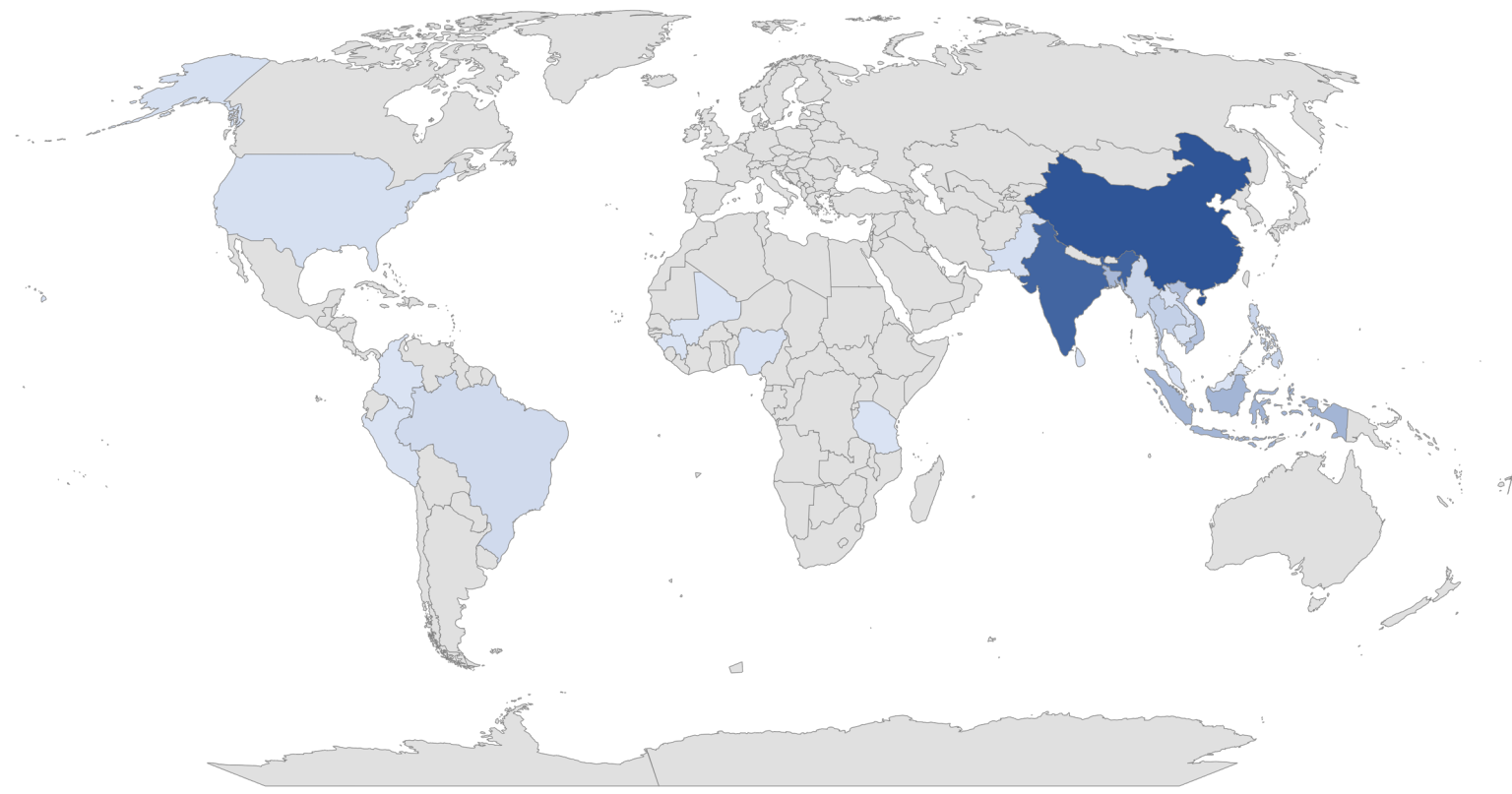
# Research question - Motivation

---

- Using policy as a tool, what does a country *optimize* when engaging in global rice trade?
  - **Cost minimization in a free market?**
  - **Domestic consumption stabilization?**
    - E.g.: Indonesia, China, Vietnam, Philippines
  - **Producer receipt maximization?**
    - E.g.: Vietnam, Thailand
  - **Quality preferences?**
    - E.g.: Vietnam vs. Thailand  Philippines
  - **Transportation costs?**
    - E.g.: India  China vs. Indonesia
  - **Stock capacity?**
  - *A combination of these?*

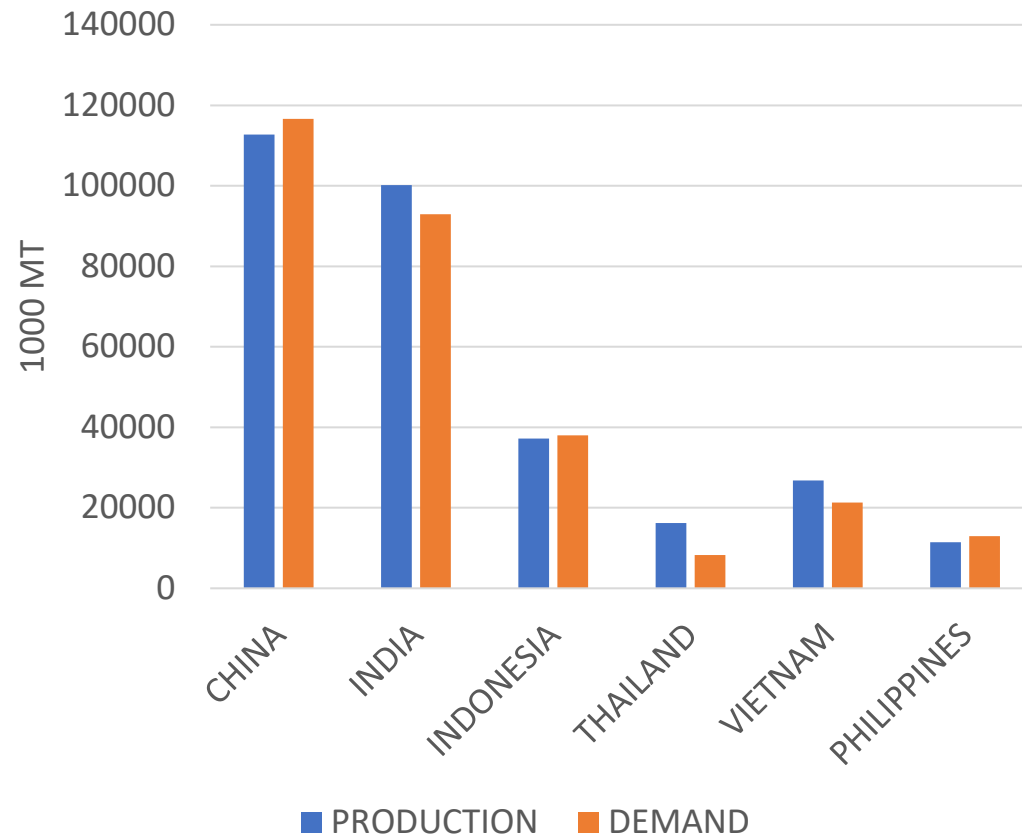
# The global rice market, 2013-2015 averages

Production, 1000 MT   
1257 112723

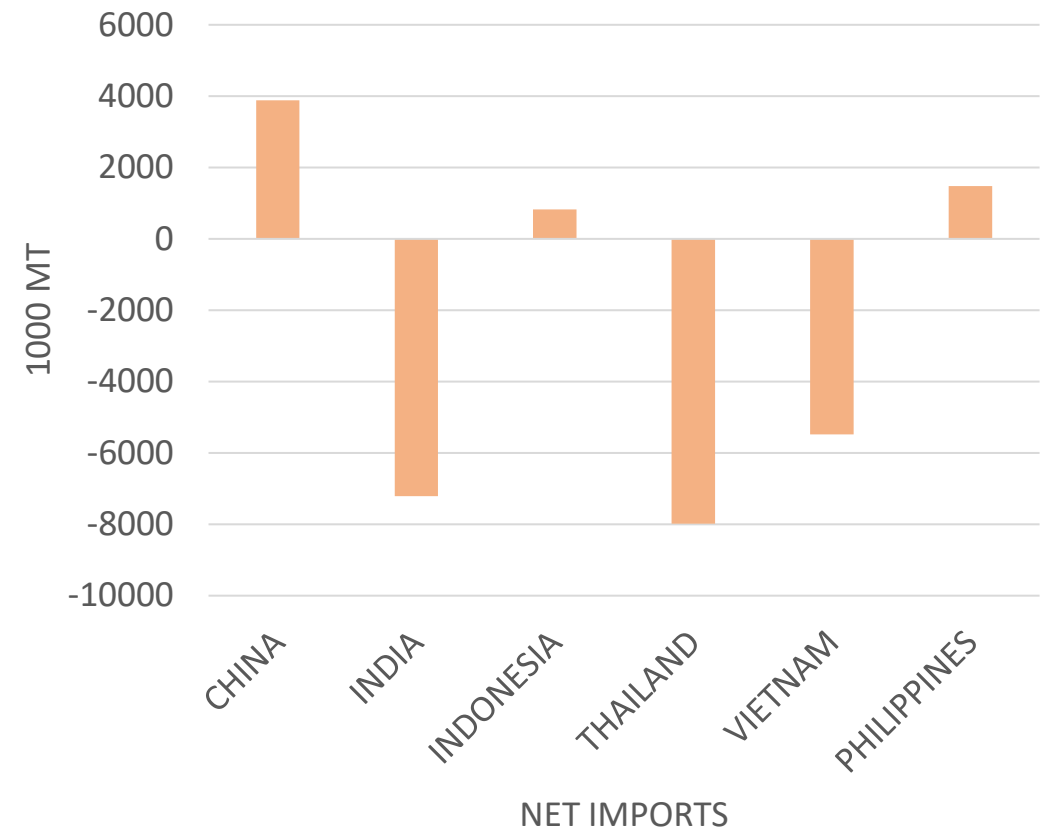


# A focus on Asia's milled long-grain rice markets

The region's rice production and demand account for >70% of world's total



Country is either overwhelmingly importing or exporting



# Overview of recent policies

Country	Domestic policy	Trade policy
<b>China</b>	Minimum support prices (MSP) for rice graded above 3.	2.6 MMT import tariff rate quota (TRQ) for both long grain and combined medium and short grain rice. TRQs will be split 50-50 to state-owned enterprises and private companies. A 1% tariff rate will be imposed for in-quota purchases while 65% tariff rate will be imposed for out-of-quota duties.
<b>India</b>	Minimum support price	70% import tariff
<b>Indonesia</b>	Indonesian National Logistics Agency (BULOG) procurements to maintain 1.5 to 2 MMT of rice supply each year.	The government will not import rice through BULOG from 2021 to 2022. All rice imports will be through the private sector.
<b>Thailand</b>	Price guarantee program	A memorandum with Indonesia that would allow Thailand to export up to 1 million tonnes of rice annually until 2025 on a government-to-government basis.
<b>Vietnam</b>	Prioritize rice quality vs. quantity; Maintain stable rice planting area; Minimum guideline price to ensure rice farmers' revenue; Government procurements to stabilize domestic prices.	Low to 0% import duty in countries with trade agreements (e.g., EU); government contracts with Philippines, Indonesia and other countries.
<b>Philippines</b>	National Food Authority (NFA) manages subsidies and trade.	On 21 May 2022, tariff rate for MFN countries is at 35% until 31 December 2022; allowed private companies to import higher quality rice.

Source: The International Rice Research Institute's Global Rice Policy Handbook Working Group, 2022.

# Data – Bilateral trade flows, 2013-2015 averages

1000 MT

EXPORTER	IMPORTER					
	CHINA	INDONESIA	PHILIPPINES	THAILAND	VIETNAM	INDIA
CHINA		0	2	0	0.4	0
INDONESIA	0		0	0	0	0
PHILIPPINES	0	0		0	0	0
THAILAND	531	241	412		5	0.4
VIETNAM	1823	395	1014	2		0
INDIA	2	88	36	0	1	



# Spatial equilibrium models

---

- Samuelson-Takayama-Judge (STJ) model: assuming **global** cost minimization
- RICEFLOW model: spatial **supply-chain** model of the global rice economy
- Our aim: Linear programming model using GAMS to solve for optimal solutions given a set of constraints **at each country**
  - Policy objectives as constraints

# Version 1.0: An equilibrium transportation model using GAMS

---

- Pre-defined exporters (Thailand, Vietnam, India) and importers (China, Indonesia, Philippines, ROW)
- Pre-defined excess supply
- Optimizing shipments to importing markets considering a price-responsive **demand** and variable transportation costs

**Objective function:** Minimize **global** costs

**Subject to:** Market demand

Supply constraints

# Base data and results

	Excess demand elasticity	Excess demand (1000 MT)
PHILIPPINES	-2.2	1479
INDONESIA	-6.5	824
CHINA	-4.8	3883
ROW	-4.8	14478

Transportation cost (\$/MT)	PHILIPPINES	INDONESIA	CHINA	ROW
THAILAND	27	29	30	30
VIETNAM	29	33	28	30
INDIA	80	46	79	30

# Base data and results

	Excess demand elasticity	Excess demand (1000 MT)
PHILIPPINES	-2.2	3883
INDONESIA	-6.5	824
CHINA	-4.8	1479
ROW	-4.8	14478

Transportation cost (\$/MT)	PHILIPPINES	INDONESIA	CHINA	ROW
THAILAND	27	29	30	30
VIETNAM	29	33	28	30
INDIA	80	46	79	30

# Results: Bilateral trade flows

Quantity	PHILIPPINES	INDONESIA	CHINA	ROW
THAILAND	1498	829		5649
VIETNAM			3935	1544
INDIA				7206

# Results: Bilateral trade flows

Quantity	PHILIPPINES	INDONESIA	CHINA	ROW
THAILAND	1498	829		5649
VIETNAM			3935	1544
INDIA				7206
<i>Excess demand</i>	1479	824	3883	14478

# Results: Bilateral trade flows

Quantity	PHILIPPINES	INDONESIA	CHINA	ROW	Excess supply
THAILAND	1498	829		5649	7977
VIETNAM			3935	1544	5480
INDIA				7206	7206
<i>Excess demand</i>	1479	824	3883	14478	

# Scenario 1: More elastic demand in the Philippines

	Excess demand elasticity	Excess demand (1000 MT)
PHILIPPINES	-100	1479
INDONESIA	-6.5	824
CHINA	-4.8	3883
ROW	-4.8	14478



# Scenario 1: More elastic demand in the Philippines

	Excess demand elasticity	Excess demand (1000 MT)
PHILIPPINES	-100	1479
INDONESIA	-6.5	824
CHINA	-4.8	3883
ROW	-4.8	14478

Quantity	PHILIPPINES	INDONESIA	CHINA	ROW
THAILAND	1879 ↑	810 ↓		5287 ↓
VIETNAM			3866 ↓	1613 ↑
INDIA				7206

More exports to the Philippines and less to others but slightly more exports from Vietnam to ROW.

## Scenario 2: Higher shipping costs in ROW

Transportation cost (\$/MT)	CHINA	INDONESIA	PHILIPPINES	ROW
THAILAND	30	29	27	80
VIETNAM	28	33	29	80
INDIA	79	46	80	80

## Scenario 2: Higher shipping costs in ROW

Transportation cost (\$/MT)	CHINA	INDONESIA	PHILIPPINES	ROW
THAILAND	30	29	27	80
VIETNAM	28	33	29	80
INDIA	79	46	80	80

Quantity	PHILIPPINES	INDONESIA	CHINA	ROW
THAILAND	1501 ↑	834 ↑		1068 ↓
VIETNAM			3953 ↑	↓
INDIA				3409 ↓

Less exports to ROW. More to other countries.

# Scenario 3: Imposing a quota that cuts down excess demand by half in China

	Demand elasticity	Excess demand (1000 MT)
CHINA	-47	1941
INDONESIA	-13	824
PHILIPPINES	-8	1479
ROW	-200	14478

# Scenario 3: Imposing a quota that cuts down excess demand by half in China

	Demand elasticity	Excess demand (1000 MT)
CHINA	-47	1941
INDONESIA	-13	824
PHILIPPINES	-8	1479
ROW	-200	14478

Quantity	PHILIPPINES	INDONESIA	CHINA	ROW
THAILAND	1501	834		5414 ↓
VIETNAM			1941	3539 ↑
INDIA				5525 ↓

More exports to ROW from Vietnam, less from India.

# Future work

---

- A linear programming model solving for optimal solutions given a set of constraints **at each country**
  - Reflecting a reality that each country might have different objectives when imposing certain policies
- Better reflect possible trade policy regimes
  - Minimize trade costs – a competitive market result
  - Consider producer receipt target
  - Maintain buffer stock to stabilize consumption
  - A combination of conflicting targets?
- **A work in progress**

# **Impacts Of Quality, Shipping, Storing Costs, and Policy on The Global Rice Trade**

Hoa Hoang, Haitao Li, Wyatt Thompson, and Alvaro Durand-Morat

**Thank you for your attention!**

**Questions and feedback?**

---

