

A Brief Introduction to Ricardo's Theory of Comparative Advantage: Old Idea, New Evidence

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Outline

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Motivation

Paul Samuelson¹:

Ricardo's theory of comparative advantage is both true and non-trivial.

Question

Is Ricardo's Theory of comparative advantage is mathematically correct as well as Empirically valid?

Key Challenge

Identification problem: relative productivity cannot be observed.

¹**Paul Samuelson**: the first American Economist to win the Nobel Memorial

- The differences in labor requirements cannot be observed.

Deardorff(1984)

- The Ricardo's theory of comparative advantage has no empirical content with general distributions of worker skills allowed.

James Heckman and Bo Honore(1990)

- The predictions can be tested by assuming that productivity levels are independently across countries and industries.

Jonathan E. and Samuel K.(2002), Arnaud C., Dave D. and Ivana K.(2011)

Model Construction

Focus on agriculture and take land as the only input factor.

Reasons:

- To solve identification problem.
- Inelastic supply of land.
- Agricultural product market is close to competitive market.

Model Construction

(1)

$$Q_c^g = \sum_{f \in \mathcal{F}_c^g} A_{cf}^g L_{cf}$$

Q_c^g : predicted output of good g in country c .

\mathcal{F}_c^g : the set of factors allocated to good g in country c .

A_{cf}^g : the productivity per unit production factor f for good g in country c .

L_{cf} : the supply production factor f in country c .

(2)

$$\mathcal{F}_c^g = \left\{ f = 1, \dots, F \mid \frac{A_{cf}^g}{A_{cf}^{g'}} > \frac{p_c^{g'}}{p_c^g} \quad \text{if } g' \neq g \right\}$$

Data Description

Productivity : Version 3.0 of the Global Agro-Ecological Zones(GAEZ) project².

Output and Price : The food and Agriculture Organization(FAO).

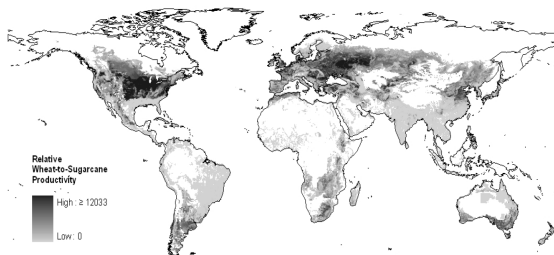


Figure: An Example of Relative Productivity Differences.

²The project aims to make agronomic predictions about the yield that would obtain for a given crop at a given location for major crops.

Empirical Result

$$\log(\hat{Q}_c^g) = \beta_0 + \beta_1 \log(Q_c^g) + \epsilon$$

\hat{Q}_c^g : Output levels observed in the data of crop g in country c .

Q_c^g : Predicted output amount that country c should produce in crop g .

Studying

- 1 Whether the slope coefficient is close to unity
- 2 Whether the coefficient is precisely estimated

Empirical Result

Table: Comparison of Predicted Output to Actual Output

Dependent Variable:	$\log(\hat{Q}_c^g)$				
	(1)	(2)	(3)	(4)	(5)
$\log(Q_c^g)$	0.212*** (0.0577)	0.244*** (0.074)	0.096** (0.062)	0.143*** (0.062)	0.273*** (0.074)
sample	all	all	all	major countries	major crops
fixed effects	none	crop	country	none	none
Observations	349	349	349	226	209
R-squared	0.06	0.26	0.54	0.04	0.07

Notes: All regressions include a constant. Standard errors clustered by country are in parentheses. ** indicates statistically significant at 5% level and *** at the 1% level.

Conclusion

- Ricardo's theory of comparative advantage is mathematically correct and non-trivial.
- It has significant explanatory power in the data.