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Recent Development of International Trade Theory and Some of its Consequences

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Comparative advantage now?

- "We have learned about it at school. What else is left? Kind of Euclidean geometry?"

- A new interpretation on Ricardo's four magic numbers.
  - Maneschi (2004), Faccarello (2015)
  - Shiozawa (2016d) Comments on Faccarello (2015)

- Comparative vs. competitive advantage
  - How are they differentiated?
  - Comparative advantage in more complicated cases?

How to define comparative ad.?

- **2-country, 2-commodity case** (textbook model)
  - Many-country, 2-commodity case
  - 2-country, many-commodity case
  - 2-country, a continuum of goods (DFS 1977)
- **M-country, M-commodity case**
  - Jones (1961), McKenzie (1954 & others)
- **Intermediate goods** (McKenzie 1954, p.179)

  A moment's consideration will convince that Lancashire would unlikely to produce cotton cloth if the cotton had to be grown in England.

A short history on input trade

- Chipman (1965) "McKenzie (1954, p. 177) stumbled across the interesting discovery that the introduction of trade in intermediate products necessitates a fundamental alteration in the classical analysis."
- Amano (1966) Intermediate Goods and the Theory of Comparative Advantage. Impossibility of arranging goods in order when input trade exists.
- Deardorff (1980) "It is well known that the law of comparative advantage breaks down when applied to individual commodities or pairs of commodities in a many-commodity world."
- Ethier (1999) "[Jones (1961) 's] contribution was so definitive that the Ricardian model has since been used almost entirely as a tool for other purposes and not as a subject of research in its self."
  - Untrue, Conveys the atmosphere of Rochester University.
  - Jones (1961) is partly guilty because he gave an impression that input trade was solved by his paper. He did only when material input coefficients are the same across countries.
- Eaton & Kortum (2002) Contends to incorporate intermediates goods, as bundles of imports. Results: Japan without trade suffers 1/4% of GDP down.
- Deardorff (2005) Tries 10 types of definitions. He could only give a weak results in average formula. No results on individual goods.

A provisional conclusion (up to 2007)

- Importance of input trade is evident:
  - Outsourcing, fragmentation, global supply chain, etc.
  - Fragmentation: one of major reason of DFI.
- Theory
  - Many ad hoc analyses: based on fixed patterns of trade. (after Jones 2000 in particular)
  - No general theory treating general case with intermediates goods.
  - Possible escape: Arrow-Debreu type GET?
- Great discrepancy between theory and facts.

New theory of international values:

- Started from Shiozawa (2007)
  - My research started before 1985. First paper on Ricardian trade theory (in Japanese).
  - Shiozawa (2014, in Japanese: Table of contents in ResearchGate)
  - A Study group. First book will be published in 2017. (Bicentenary of Ricardo's *Principles*)
- Shiozawa (2016d) a most "readable" introduction?

Two trade economies:

- R trade economy vs. RS trade economy
- Ricardian trade economy:
  - No input trade.
  - M-country, N-country, material inputs, choice of techniques
  - Linear production techniques
  - Simple production (No fixed capital goods)
  - Capital goods are but reproducible goods.
  - Only one primary input: labor (uniform in each country)
- Ricardo-Sraffa trade economy
  - Ricardian trade economy – (No input trade)
  - Permit trade of input goods

RS trade economy (mathematical formulation)

- *T*-technologies т $c=c(т)$, $g=g(т)$
- Input coefficients for unit production

   a_{c0}, a_{c1}, … , $a_{cN} \Rightarrow e_g$

- Matrices: $L=(a_{c(т)0})$: (T,M)-matrix, $A=(a_{c(т)g})$: (T,N)-matrix, $I = (\delta(c(т), g(т)))$: (T,N)-matrix

- Production **s**= $(s_т)$:

   $\sum_т s_т \cdot (a_{c1}, … , a_{cN}) \Rightarrow \sum_т s_т . e_{g(т)}$

   labor $\sum_{c(т)=c} s_т \cdot a_{c0} \leqq q_c$

- Production possibility set: defined as usual
  - A polytope in $\mathbf{R}^N$. Facet: a face of N-1 dimension

Main theorem (Shiozawa, 2012; 2014)

- At each facet of PP set there exists an international value $\mathbf{v} = (\mathbf{w}, \mathbf{p})$ that satisfies inequalities:
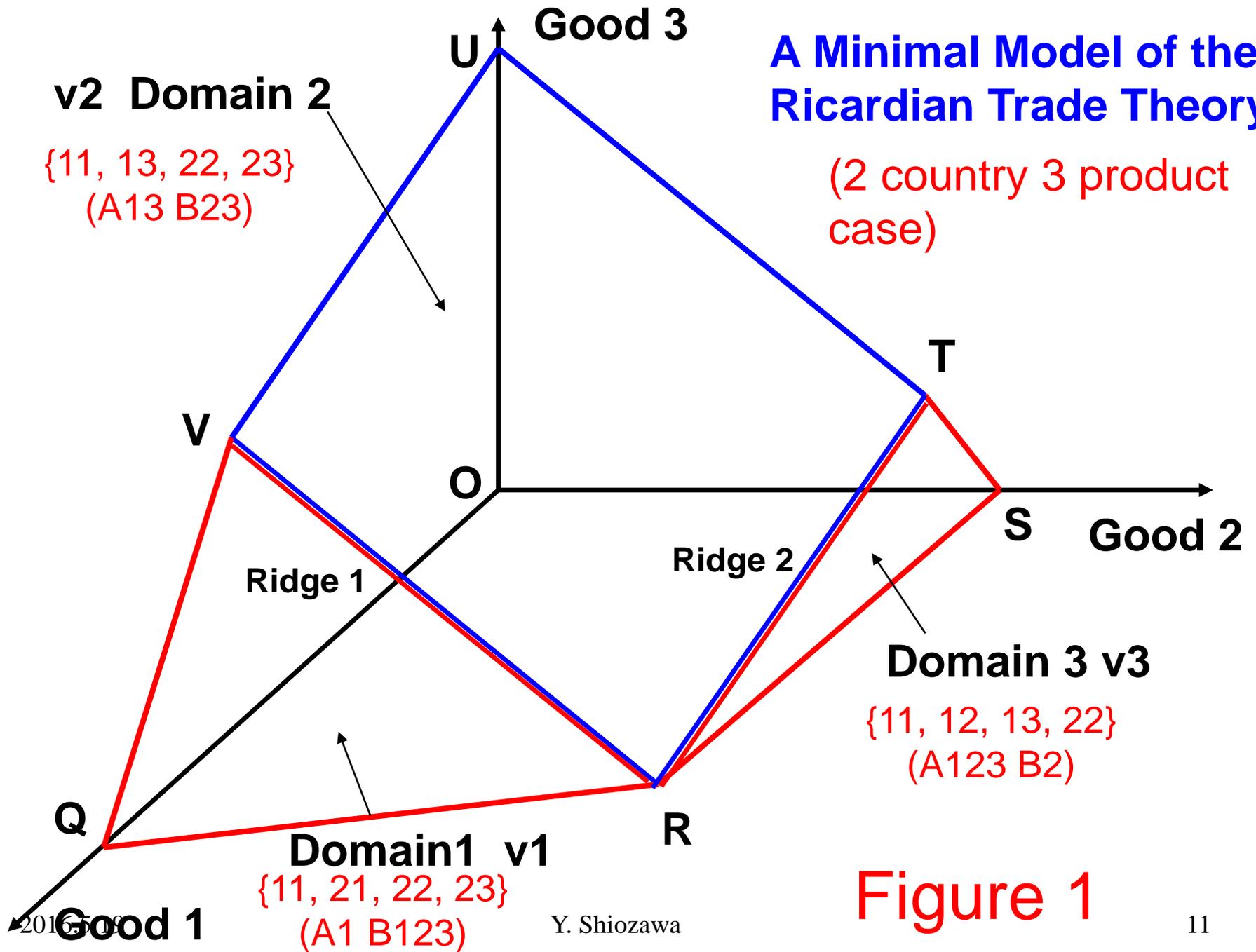
$$L\mathbf{w} + A\mathbf{p} \geqq I\,\mathbf{p}, \quad <\mathbf{w}, \mathbf{q}> = <\mathbf{p}, \mathbf{y}>$$

  where a net product $\mathbf{y}$ is a point in the interior of the facet. The value remains constant while $\mathbf{y}$ moves in the interior of the facet.

- Corollary: Competitive pattern of a facet is spanning.

Good 3

A Minimal Model of the Ricardian Trade Theory

U

v2 Domain 2

{11, 13, 22, 23}
(A13 B23)

(2 country 3 product case)

T

V

O

Ridge 1

Ridge 2

S **Good 2**

Domain 3 v3

{11, 12, 13, 22}
(A123 B2)

Q

R

Domain1 v1

{11, 21, 22, 23}
(A1 B123)

Good 1

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Figure 1

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Explanation of Figure 1

- Domains 1 and 3 the same value for one country: no gains from trade. (John S. Mill omitted these cases.)
- Domain 2 Country A produces 1, 3 goods, Country B 2, 3. Good 3 is linking goods. The condition:

$$w_A \cdot a_0(\text{A3}) = \underline{w}_B \cdot a_0(\text{B3})$$

- In Domain 2, two countries get gains from trade.
- In the interior of 3 domains the international values remain constant (up to scalar multiplication) when y moves within a domain.

Behavior of managers (or firms)

- Given the value, managers choose best production techniques for their product.
- Managers search global optimal procurement.
- Omitted problems: Each firm sets prices on full-cost principle. Markup rate is determined by the competitive state of the market. (L, A are in fact those of equivalent economy.) Shiozawa (2016a)

Generalizations

- Durable capital goods: possible to extend to the case where capital goods keep constant efficiency within the lifespan. (Sraffa 1960, Chap. X)

- Transport and transaction costs
  - Extend the commodity variety to $M \cdot N$ species distinguishing the country of existence.
  - Matrix A (T, $M \cdot N$)-matrix
  - Transportation and transaction: a kind of production, labor input is limited to that of one country

- Tariff: proportional tariff $\Rightarrow$ Equivalent to the change of markup rates

Some remarks on production techniques (*L* and *A*)

- **Production technique**
  - Mainly represents input-output relations in production process.
  - Efficiency may change considerably by improvement of work process and others.
  - May be influenced by transportation and transactions, consequently by infrastructure and institutions.

- **A negative implication**
  - Capital/labor ratio does not change international wage differentials.

Where did the main obstruction lie?

- Domestic values changes when cheaper product is imported for production input.
  - Invalidity of Harberler's opportunity cost theory.
- The international value (wage, prices) is determined at the same time as choice of competitive techniques.
- Requires theories of (1) linear inequality and (2) polytopes.

Related difficult problems

- **Exchange rates** (object of financial speculation)
  - The theory assumes a system of exchange rates. Wage w_i is expressed by one currency e.g. Euro.
  - Wage system **w** = (w_i) changes when exchange rates change.
  - Exchange rates 3 to 5 year half life.
  - Relative PPP holds in a mild way.
- **Similar, but different commodities**
  - monopolistic competition?
  - product differentiation

Implications and consequences

- Unique general theory in trade that comprises traded intermediate goods.
- A general theory in the tradition of classical theory of value
  - Classical theory: cost-of-production theory
  - Revival of classical theory of value, Shiozawa (2016a)
  - Power balance between classical and neoclassical theories of value changes.

Faccarello's 3 remaining problems

Faccarello (2015)

- R: The exchange ratio is assumed and not explained. Q. arises how this ratio is determined.

- R: Gains from trade explained from country's point of view. How do individual agents know the benefit and directions of trade?

- Major part of Ch.7 of *Principles* devoted to money prices and money flows. How is this related to comparative advantage part?

Simple answers to 3 problems:

- 2 and half resolved by the new theory.
- Q1. International value is uniquely determined (with some demand conditions).
- Q2. Production technique with the least cost can produce. ($L\mathbf{w} + A\mathbf{p} \geqq I\,\mathbf{p}$)
- Q3. 3.1 Money prices: determined.

  3.2 Money flows: not answered.
- ♦ Trade balance is not assumed.

Some consequences and Implications (1)

- Wage differentials
  - Relative wage of each country is determined by set of production techniques (*L*, *A*, *I*) and **q** and **d**=**y**.
  - Occurs not because labor and capital do not move across countries (different from Ricardo's presumptions).
  - Capital and labor migration do not directly change wage differentials.
  - Wages may change through technological change that FDI and migration induces.

- Contrast with Heckscher-Ohlin theory.

Some consequences and Implications (2)

- **Possibility of unemployment**
  - Rapid liberalization of trade may induce unemployment. Lack of effective demand.
  - Not because of price distortions or slowness of labor migration (Cf. Oslington 2006, Davidson & Matusz 2010. Oslington focuses on prices, D&M on job search.).
  - Theoretically analyzable because price and quantity determinations are separated.

- **Trade conflicts and trade policy**
  - are real phenomena. Not an illusion (Cf. P. Krugman).
  - Ricardian trade theory ≠ Free trade policy

Some consequences and Implications (3)

- **Production process can be divided among several countries.**
    - Fragmentations. Outsourcing. Shiozawa (2016c)
- **Global competition**
    - Low wage rate can be a weapon for development. E.g. East Asian Miracle.
    - National target: Realize higher wage rate.
- **Policy implication: promotion of production technique efficiency is primal.**
    - Education, basic research, intellectual property, etc.

A possible application: world input-output table

- WIOD (World Input-Output Database)
  - 27 EU countries and 13 other major countries
  - 1995-2011 One year contains 30MB.
  - M=40, N=35 T=unknown, non competitive techniques do not appear. A: 1400×1400
- Decomposition to value added in each country:
  - If markup rate μ is the same for all countries and commodities, we can decompose the price into added values of each country.
  - $\mathbf{p} = \{E-(1+μ)A\}^{-1} L\mathbf{w} = L\mathbf{w} + (1+μ)AL\mathbf{w} + (1+μ)^2 A^2 L\mathbf{w}$
  $+ (1+μ)^3 A^3 L\mathbf{w} + (1+μ)^4 A^4 L\mathbf{w} + \cdots$

Choice of techniques: meaning for dynamics of comparative advantage

- **The theory itself is static.**
  - Assumes a fixed set of techniques and products.
- **Gives the framework for dynamic change**
  - The set is always increasing (new technology, learning etc.).
  - Gives logic how a new technique becomes competitive.
  - Mid and long term dynamics is governed by cumulative causation. At each period, new techniques and products are chosen.
- **Landesmann & Stehrer (2001)**

  "There is only little work on convergence and/or divergence processes of productivity and wage levels at the more disaggregated industrial level. … in the context of international trade …, these determine the dynamics of comparative advantages and the resulting trade structures between developing and developed countries."

How the new theory changes the theoretical landscape of economics.

- **Development economics:**
  - Why dependency and unequal exchange theories were theoretically wrong.
  - Terms of trade is not determined by the power balance of trading nations.

- **IPE**(international political economy):
  - Lacks theoretical basis of economic conflicts.
  - New theory provides reason for unemployment and industrial decline.

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Thank you.

- Questions and comments welcome.

- Please pose questions in ResearchGate.