

Ricardian model and Developing Countries



- Lessons

- 1) Wage differences according to Technology Difference or Productivity difference
- 2) Specialization – Concentrate on few goods and import the rest.
- 3) Technological Progress and its implications
Terms of Trade loss may lead to welfare loss.
Inelastic World Demand

Heckscher-Ohlin-Samuelson (Neo-classical Trade Model)



- Comparative Advantage determined by
Relative Factor Abundance

Not by Technology Difference.

Developing Country(d) L abundant

Developed Country (D) K abundant

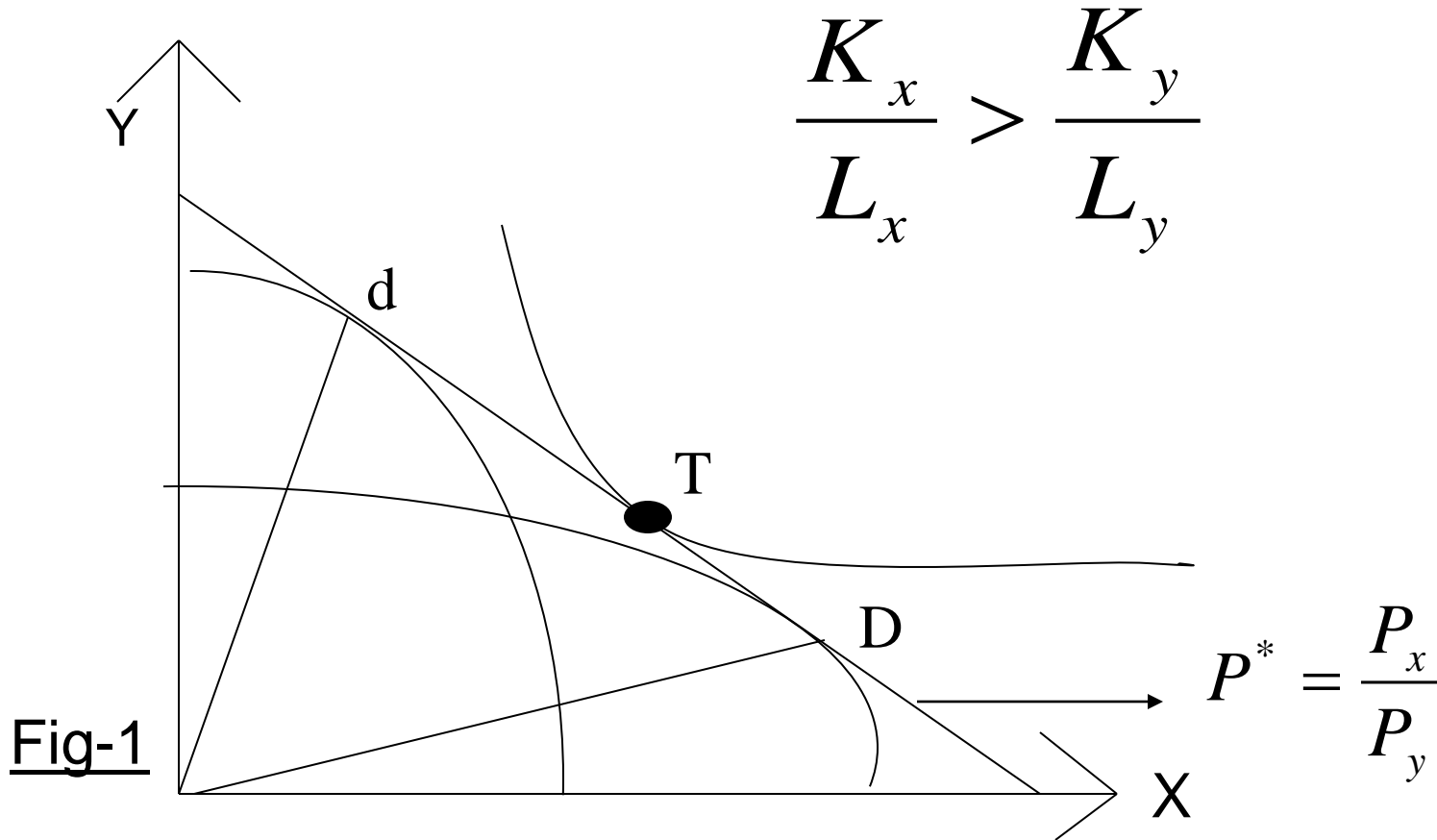
$$\left(\frac{L}{K} \right)_d > \left(\frac{L}{K} \right)_D$$



Everything else is the same

X → Capital intensive

Y → Labour intensive





Relatively K abundant D will export X , Relatively
L abundant 'd' will export Y

Implications

- ① Incomplete Specialization
- ② Factor Price Equilization
- ③ No further factor mobility

Empirically widely validated in various forms-Feenstra
(2004) Text Book

But not factor-price equilization proposition



Two Important Propositions

(a) Stolper-Samuelson Theorem

(b) Rybczynski Theorem

(a) is extremely relevant for understanding the impact of trade or “Wage- Distribution” within a trading nation.



Suppose X and Y are produced with skilled and unskilled labour-S,U. Suppress K for the time being

$$w_s a_{sx} + w_u a_{ux} = P_x$$

$$w_s a_{sy} + w_u a_{uy} = P_y$$

$$\left(\frac{u}{s} \right)_d > \left(\frac{u}{s} \right)_D$$

d \longrightarrow exports

D \longrightarrow exports

Y \longrightarrow U - intensive

X \longrightarrow S - intensive

Initially Trade is restricted

$$P_D = \left(\frac{P_x}{P_y} \right)_D < \left(\frac{P_x}{P_y} \right)_d = P_d$$

$$P_y \equiv 1 \text{ (Numeraire)}$$

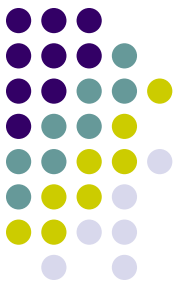
As trade opens up P in $\uparrow D$ and P in $\downarrow d$

SS Theorem

% \uparrow in $W_s > \uparrow$ % in P_x
 \downarrow in W_u in D

Opposite happens in d

$\left(\frac{W_s}{W_u} \right) \uparrow$ in D , $\left(\frac{W_s}{W_u} \right)$ in d .



$$\theta_{sx} \hat{w}_s + \theta_{ux} \hat{w}_u = \hat{P}_x \quad (1)$$

$$\theta_{sy} \hat{w}_s + \theta_{uy} \hat{w}_u = 0 \quad (2)$$



$$' \hat{ } ' \equiv \frac{\Delta P_x}{P_x} \equiv \frac{dP_x}{P_x} \equiv \frac{d(\log P_x)}{dP_x}$$

' $\hat{\quad}$ ' \rightarrow Hat \rightarrow % change

$$\theta_{sx} = \frac{w_s a_{sx}}{P_x}, \quad \theta_{ux} = 1 - \theta_{sx}$$

If $\hat{P}_x > 0$, one of $w_s w_u$ must rise and one must fall.

$$\hat{w}_s (\theta_{sx} - \theta_{sy}) + \hat{w}_u (\theta_{ux} - \theta_{uy}) = \hat{P}_x$$

$$\hat{w}_s (\theta_{sx} - \theta_{sy}) + \hat{w}_u (1 - \theta_{sx} - 1 + \theta_{sy}) = \hat{P}_x$$

$$(\theta_{sx} - \theta_{sy}) \left(\hat{w}_s - \hat{w}_u \right) = \hat{P}_x \quad (3)$$

Intensity Ranking



$$\frac{S_x}{u_x} > \frac{S_y}{u_y}$$

$$\frac{a_{sx} \cdot X}{a_{ux} \cdot X} > \frac{a_{sy} \cdot Y}{a_{uy} \cdot Y}$$

$$\Rightarrow \frac{a_{sx}}{a_{ux}} > \frac{a_{sy}}{a_{uy}}$$

$$\frac{\frac{w_s a_{sx}}{P_x}}{\frac{w_u a_{ux}}{P_x}} > \frac{\frac{w_s a_{sy}}{P_y}}{\frac{w_u a_{uy}}{P_y}}$$

$$\frac{\theta_{sx}}{\theta_{ux}} > \frac{\theta_{sy}}{\theta_{uy}}$$

$$\frac{\theta_{sx}}{1 - \theta_{sx}} > \frac{\theta_{sy}}{1 - \theta_{sy}} \Rightarrow \frac{\theta_{sx}}{\wedge} > \frac{\theta_{sy}}{\wedge}$$

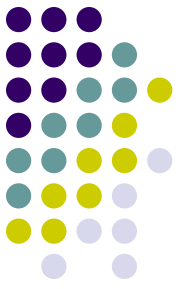
$\Rightarrow w_s > w_u$

From (1) - (3) , $\hat{w}_s > \hat{P}_x > 0 > \hat{w}_u$

Therefore, Inequality must go up in D and
should go down in d

But empirically inequality is on the rise globally as countries get more and more integrated through trade and investment.

[Ref.Feenstra(2004) , Marjit and Acharya (2007)
Princeton Encyclopedia of World Economy]



Goods and Factor Mobility -Development Issues



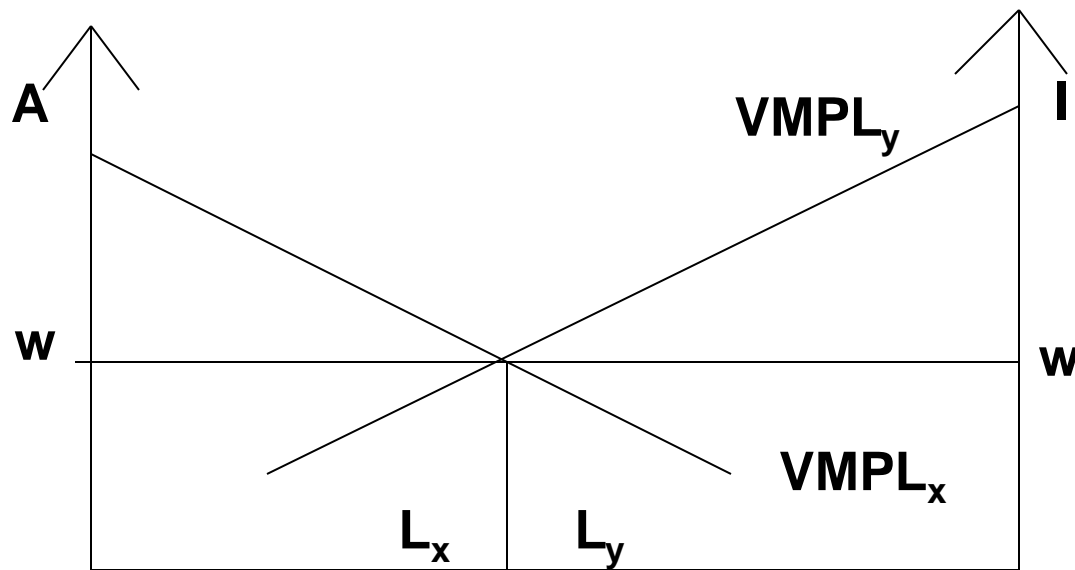
A very useful framework

Specific Factor Model

X \longrightarrow Agriculture \longrightarrow Land, Labour

Y \longrightarrow Industry \longrightarrow Capital, Labour

Land, Capital Sector Specific



HOS



$$c_x(w, r) = P_x = c_x^*(w^*, r^*)$$

$$c_y(w, r) = P_y = c_y^*(w^*, r^*)$$

- SF model

$$C_x(w, R) = P_x$$

$$C_y(w, r) = P_y$$

$$R \neq r$$

Land → Cap of Type 1

Capital → Cap of Type 2



Even if Com Prices are equalised,

$$\uparrow L \Rightarrow w \downarrow, r \uparrow, R \uparrow$$

$$\uparrow K \Rightarrow w \uparrow, r \downarrow, R \downarrow$$

$$\uparrow \text{Land}(T) \Rightarrow w \uparrow, r \downarrow, R \downarrow$$

If $K = K^*, T = T^*$ but

$$L > L^*, \quad w < w^*, r, R > r^*, R^*$$

Emigration or Capital Inflow will take place.

Other more recent Trade Models



Product Variety and Increasing Returns

Technology, Factor endowment, preference all may be the same across nations. But love for variety will lead to gains from trade.

$$U = \sum_{i=1}^n C_i^\theta \rightarrow n \rightarrow \text{no of varieties}$$

With trade n will increase.

Firm Heterogeneity and Trade


Which firms export or do FDI depend on productivity difference across firms.

Difference from the traditional approach

– After trade pattern is determined through Comparative Advantage – say X is the export good.

Then within that industry who exports and who serves the local market and who does FDI – these are the questions asked in the new theory.

Firm level data show that more efficient firms turn out to be exporters and foreign investors. But the theory is generally based on developed country data set. Also the source of heterogeneity may not be productivity but say access to credit – more applicable to the developing world.

However, generally, the efficiency criterion holds  more efficient firms turn out to be exporters.

Access to Credit, Structure of Production and Trade

Bulk production, vertical integration require credit

Imperfect credit market

$$R \text{ (Borrowing Rate)} > r \text{ (Lending Rate)}$$

If I produce with my own capital k and bank borrowing

I get,

$$Px - [\alpha x - k](1 + R) > k(1 + r)$$

$$Px - \alpha x(1 + R) + k(R - r) > 0 \dots\dots\dots (A)$$

Suppose all firms intend to export x amount and get a price p and cost is αx

If I have $k_1 > k_2$ your own capital

Then I have greater profitability from production and/or exports.

Suppose I produce $\frac{1}{2}$ of x . Then

$$\frac{1}{2} Px - [\alpha \frac{1}{2} x - k](1 + R) > k(1 + r)$$

$$= \frac{1}{2} Px - \frac{1}{2} \alpha x(1 + R) + k(R - r)$$

So, I will engage iff

$$\frac{1}{2} Px - \frac{1}{2} \alpha x(1 + R) + k(R - r) > 0$$

$$\text{Or, } Px - \alpha x(1 + R) + 2k(R - r) > 0 \dots\dots\dots(\text{B})$$

Compare (A) with (B), (A) < 0 , But (B) > 0 is possible.

It is more likely that

I will like to export only $\frac{1}{2}$ and not full.

Thus fragmentation and less Vertical Integration is likely along with production and trade. Fragmentation is likely to generate trade.

If $\alpha x < k$, so I do not need to borrow. Then,

$$(A) \leftarrow Px + [k - \alpha x](1 + r) > k(1 + r)$$

$$(B) \leftarrow \text{or } \frac{1}{2}Px + [k - \frac{1}{2}\alpha x](1 + r) > k(1 + r)$$

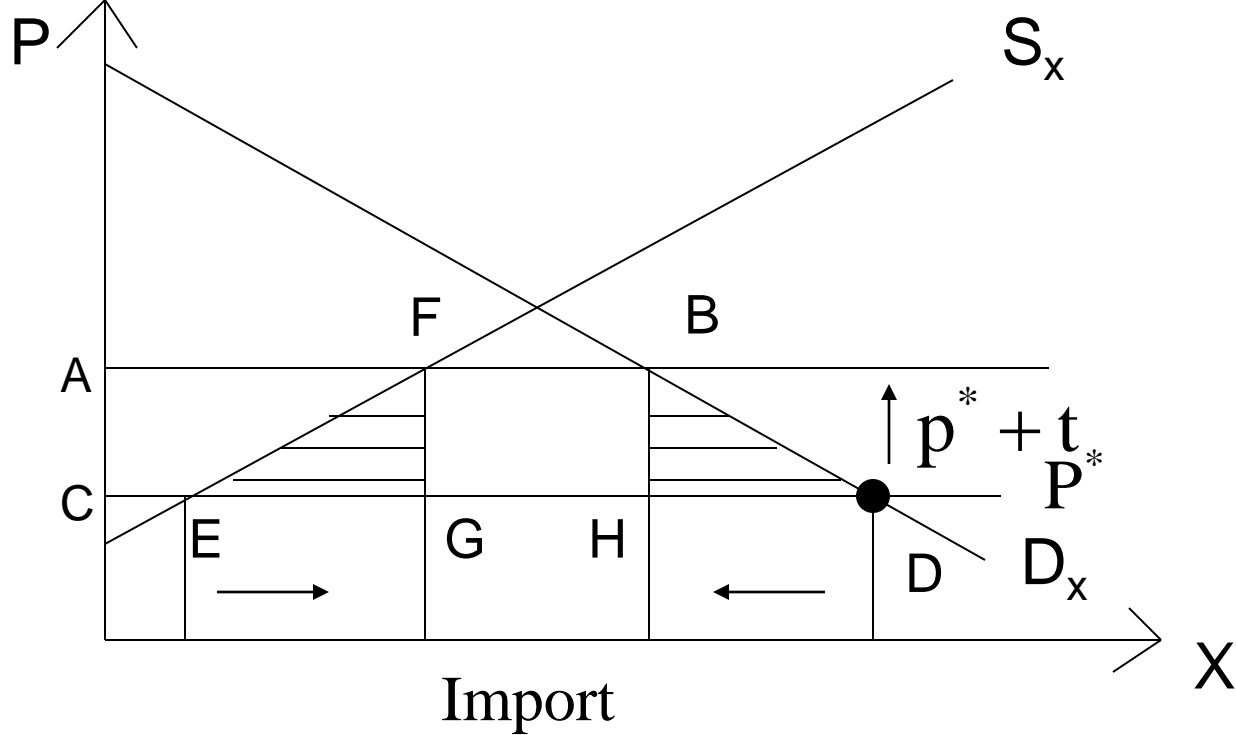
Then A > B, k does not appear in the decision making.

Pattern of trade is likely to occur in fragments in the developing world as access to borrowing is restricted.

Trade Policy



- Basic motivation to improve terms of trade.
- A small economy can't do that but volume of trade suffers.
- A tariff is an import tax → makes import more expensive → Consumer lose, producers gain.
- A Quota → Quantitative Restriction.



Loss in Consumer Surplus
 $=ABCD$

Gain in Producer Surplus
 $=AFCE$

Tariff Revenue $=FBGH$

Deadweight loss $=\triangle FEG + \triangle BHD$

Tariff leads to Welfare loss



Quota = GH amount of Import

$\Rightarrow P^* \uparrow$ upto level A

Tariff Rev = FBGH = Quota License

Fee \rightarrow Auction \rightarrow Tariff-Quota

Equivalent

a) But Quota- move

Restrictive \rightarrow Dynamic Sense

b) Quota \uparrow possibility of corruption

\rightarrow who gets the license.

Trade and Development



1. Does international trade promote growth ?
2. Does protecting domestic industries/ services lead to growth and welfare ?
3. Does trade promote employment ?
4. What about the role of foreign capital and technology ?

Trade and Growth



- Standard expression for economic growth.

$$g = \frac{s}{v}, s \rightarrow \text{Rate of saving or investment}$$

$v \rightarrow$ Incremental Cap - output

ratio, $\left(\frac{\Delta K}{\Delta Y}\right) \downarrow \Rightarrow \uparrow$ productivity

g can increase either through an increase in rate of investment or productivity.



Most interesting case

East Asian/South East Asian nation in the 80's ,90's compared with in the 70's

$\frac{\text{Trade}}{\text{GDP}} \uparrow$ $g \uparrow$ remarkably.

Rate of investment and productivity went up.

Question is whether $\uparrow \frac{\text{Trade}}{\text{GDP}}$ was the cause .Many things happened simultaneously.

Theory suggest \longrightarrow Trade leads to one improvement.

The cross country evidence is
Complex- Causality can not be
universally established. But they
happened at the same time –
Most striking examples –China
and India.





Recent evidence show that trade liberalisation led to more intermediate inputs, machine etc
——→ led to high growth rate in India.

The channel is productivity growth though rate of tariff has ↑substantially very recently.

Export Drives Manufacturing growth in china.

Virtual Trade and Normal Growth in Productivity across nations.



- Kikuchi and Marjit(2011)

- Trade across Time Zones.
Night in USA ,Day in India.
Converts 12 hr working period to
a 24 hr working period through
computerized network .



$$X = AK^\alpha (\delta M)^{1-\alpha}$$

M intermediate

1 unit of $X = 1$ unit of Intermediate

$$\frac{P_M}{P} = 1$$

Profit maximising M

$$\left[AK^\alpha (1-\alpha) M^{-\alpha} \cdot \delta^{1-\alpha} \right] = 1$$

$$(1-\alpha) AK^\alpha \cdot \delta^{1-\alpha} \cdot M^{1-\alpha} \cdot M^{-1} = 1$$

$$(1-\alpha) X M^{-1} = 1$$

$$M = (1-\alpha) X$$

$$X = AK^\alpha \delta^{1-\alpha} \cdot (1-\alpha)^{1-\alpha} \cdot X^{1-\alpha}$$

$$X^\alpha = AK^\alpha \cdot \delta^{1-\alpha} \cdot (1-\alpha)^{1-\alpha} = \left[A \delta^{1-\alpha} \cdot (1-\alpha)^{1-\alpha} \right]^{\frac{1}{\alpha}} \cdot K$$

$$X = A \cdot K = A(\delta) \cdot K$$

If saving rate is s .

$$\text{then } sA(\delta) \cdot K = \Delta K$$

$$X_t = A(\delta) \cdot K_t$$

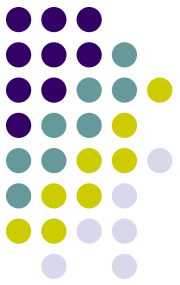
$$\begin{aligned} X_{t+1} &= A(\delta) [K_t + sA(\delta)K_t] \\ &= A(\delta)K_t [1 + sA(\delta)]. \end{aligned}$$

$$\frac{X_{t+1}}{X_t} = 1 + s\delta A(t)$$

$$(1 + g) = 1 + s\delta A(t)$$

$$g = s\delta A(t)$$

If $\delta \uparrow$, $g \uparrow$.



Trade allows δ to increase to 1 from $\delta < 1$

- $\frac{1}{2}$ of M is done during the day in USA,
then shipped to India $\frac{1}{2}$ done there
and shipped back \rightarrow next morning.
USA has full M , not $\frac{1}{2} M$.

$g \uparrow \rightarrow$ same for India.



Infant Industry Protection



Arguments in Favour/ Against.

a) Domestic Employment

(Exports also generate employment
net effect is uncertain)

But regional effect can be severe-
if resources can't move

b) Increasing Returns requires initial
Protection of the Infant

But Infant may not grow.

Capital Market Imperfection argument and The South Korean Case



- Protection has to be assessed in the particular Historical, Economic and Social context.
- WTO → has effectively contained trade restriction policies. Yet Anti-Dumping/ Non-Tariff Business of various kinds affect Developed-Developing Relationships.

Foreign Investment and Technology Collaborations



- Technology Transfer .
- Cross-Border Investment.