GLOBALIZATION AND THE INEQUALITY OF NATIONS

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Globalization and core periphery

▶ There was a general unanimity that globalization will create a hierarchy between the core and periphery.

▶ Hence, globalization will affect core and periphery differentially.

▶ However, which nation gets affected adversely is an issue of debate.

▶ In the 1970s people thought that South will be adversely affected.

▶ The thought got reversed in 1990s with the rise of Asian Tigers.

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- ▶ What accounts for the reversal of wisdom?
- ▶ The empirical evidence (that continue to be the case from 1990s) reveals economic troubles for the developed nations while growth for the less developed countries.
- ▶ The authors present an economic model here that examines the channels through which globalization affects one set of countries (core) differently than the other (periphery).

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- The authors find the reason in transport cost.
- The model predicts that with the gradual fall in transport and communication there will be an early inequality.
- If transport falls below a critical value, a core periphery pattern spontaneously forms and countries in periphery suffer a decline in real income.
- With further decline in transportation cost a pattern of convergence emerges.

The Basic story

- ► Think of a set up with two regions – North and South, and two sectors – agricultural and manufacturing.
- ► Agriculture shows constant returns to scale while manufacturing shows increasing return to scale.
- ► The manufacturing sector produces both final goods for the consumers and intermediate goods.
- ► Stage I: Transportation cost is very high → regions are self sufficient.
- ► Stage II: Intermediate level of transportation → trade is possible now.
- ► With differentiated manufacturing products, two way manufacturing trade will occur.
- ► With high enough transportation cost no aggregate specialization will arise.

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- ▶ At some point a circular process arises that leads to regional differentiation.
- ▶ Suppose that one region for some reason has a larger manufacturing sector than the other.
- ▶ This place becomes a more attractive place to locate the plants for two reasons – backward (more intermediate goods are available) and forward (more buyers for intermediate inputs) are available.
- ▶ But wage is higher in the industrialzed zone.
- ▶ Stage III: Transportation cost low – industries will locate in periphery – where wage is very low.

- The intuitive story suggests that initially the long term decline in transportation costs leads to integration.
- This first leads to rich-periphery division of world market.
- With further decline in transportation cost we see convergence.

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Model

- ▶ Two economies – North and South which are identical in endowments, preferences, and technology.
- ▶ We describe the Northern economy, simply noting that analogous conditions hold in South.
- ▶ North is endowed with L units of labor, with wage rate w.
- ▶ It contains two sectors – agriculture and manufacturing.
- ▶ Representative consumer in each country receives only labor income, and has Cobb-Douglas preferences between agriculture and manufacturing.

► Expenditure function

$$Q_A^{(1-\gamma)} Q_M^\gamma V$$

► where V is utility, Q_A is the price of agriculture, Q_M is the price index of manufacture and γ is the share of manufactures in consumer expenditure.

► The budget constraint takes the form

$$wL = Q_A^{(1-\gamma)} Q_M^\gamma V \tag{1}$$

► The manufacturing sector produces a number of varieties of differentiated products, which are aggregated by a CES subutility function into a composite good.

► The price index of the manufacturing takes the form

$$Q_M = [np^{1-\sigma} + n^*(p^* t)^{1-\sigma}]^{\frac{1}{1-\sigma}} \tag{2}$$

- n is the number of varieties in North. In equilibrium these are all sold at the same price p.
- Similarly, n^* is the number produced in South and sold at price p^*.
- Southern products sold in North incur iceberg transport costs at a rate t – i.e. a proportion $\frac{1}{t}$ of the good arrives at a distant location.
- Hence, consumer price of Southern goods in North is $p^* t$
- $\sigma > 1$ is the elasticity of demand for a single variety.

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Supply Side: Agriculture

- ▶ Agriculture is perfectly competitive, and uses only labor with constant returns to scale.
- ▶ Assume agriculture is numeraire ($Q_A = 1$)
- ▶ Units are chosen such that one unit of labour produces one unit of output gives the equilibrium condition

$$w \geq 1 \tag{3}$$

- ▶ The wage rate equals one if the economy produces agriculture, and exceeds it only if agricultural production is zero.

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Supply Side:Manufacturing

- Firms uses labor and a composite manufacturing good which is same as the consumption good.
- Production function is also Cobb Doglas with intermediate share μ.
- Firms produce for domestic sale (y) and export (x).
- Firms use α units of input as a fixed cost and β per unit output as the marginal cost. Hence the firm's total cost function is

$$TC = w^{1-\mu} Q_M^{\mu}[\alpha + \beta(y + x)] \tag{4}$$

▶ The total value of expenditure on manufactured goods in the Northern economy is defined as E

$$E = \gamma wl + \mu(x + y)pn \tag{5}$$

▶ The first term on the right-hand side is consumers' expenditure on manufacture.

▶ the second intermediate demand, where we have used the fact that proportion p of costs (and since there are no profits, of revenue) is spent on intermediates.

▶ The firm's mark up over marginal cost is $\frac{\sigma}{\sigma-1}$, so the prices are set according to the condition

$$p(1 - \frac{1}{\sigma}) = w^{1-\mu} Q_M^\mu \beta \tag{6}$$

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Equilibrium

► Now note that Northern and Southern demand for a single variety take the form,

$$y = p^{-\sigma} Q_M^{\sigma-1} E \tag{7}$$

$$x = p^{-\sigma} t^{1-\sigma} (Q_M^*)^{\sigma-1} E^* \tag{8}$$

► With free entry exit and the resulting zero profit condition we get

$$y + x = (\sigma - 1)\frac{\alpha}{\beta} \tag{9}$$

► The unit is chosen in such a way that the right hand side of equation (9) is taken to be one. Then we can use (8) and (7) to get the following condition

$$1 = p^{-\sigma}[Q_M^{\sigma-1} E + t^{1-\sigma}(Q_M^*)^{\sigma-1} E^*] \tag{10}$$

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- ▶ Equations 2,3,5,6 and 10 determine the equilibrium.
- ▶ Before discussing the solution of the model, it is important to understand the way in which n, the number of firms in manufacturing, affects firms' profitability.

    1. An increase in n reduces the price index Q_M, (equation (2)), thus shifting the demand curve for each firm down (equation (7) and (8)) and reducing firms' profitability (equation (10)).
    (The second and third channels operate only if μ is positive; i.e., manufacturing uses manufacturing as an input.)
    2. The reduction in Q_M associated with increase in n now reduces total and marginal costs ((4) and (6)) – forward linkage
    3. An increase in n also increases total expenditure on manufactured products, E (equation (5)), thus raising demand and profits of each firm (equations (7),(8) and (10)) – backward linkage

Output and Employment

► Next we look at the allocation of manufacturing between the two countries.

► We look at the numerical solution.

► The schedule NN and SS indicate loci along which firms in North and South earn zero profit.

► The dynamics are indicated in arrows.

Phase Diagram

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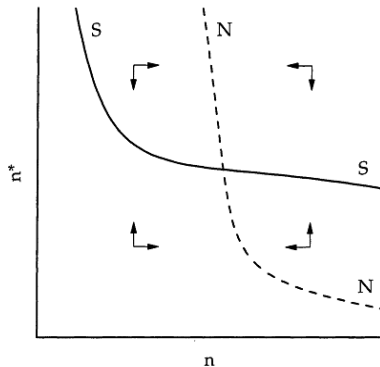
Labor force in manufacturing: High trade cost = 3

FIGURE II
Labor Demand: High Trade Costs

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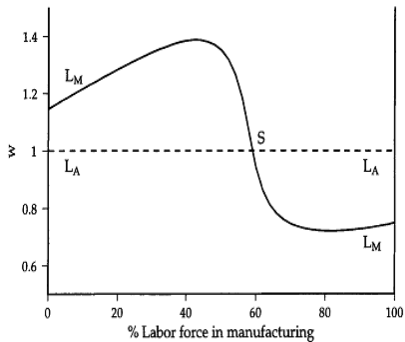
- The broken line $L_A L_A$ is the demand function for agricultural labor, it represents equation (3), and our simple structure ensures that it is horizontal at height unity.
- The solid line $L_M L_M$ is demand for labor in manufacturing.
- It gives the maximum wage that Northern firms can pay and break even as a function of Northern manufacturing employment, L_M, given that Southern manufacturing is in equilibrium with $w^* = 1$.
- The schedule is computed as follows

- Northern employment in manufacturing is related to the value of output by the equation,

$$wL_M = (1 - \mu)np(y + x) \tag{11}$$

- That is, a proportion $(1 - \mu)$ of firms' revenue is devoted to the wage bill.

- We assume that agriculture is active in the other country, so $w^* = 1$ and then use equations (2),(5), (6) and (10) (and their Southern analogs) to trace the manufacturing equilibrium as a function of w

- S is the equilibrium. In both countries wage will be w^* and both will produce both manufacturing and agriculture.

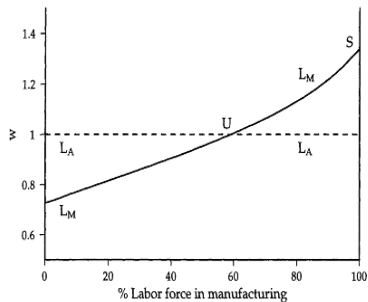Paul Krugman and Anthony J Venables

Low trade cost $= 1.5$

FIGURE III
Labor Demand: Low Trade Costs

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- If trade cost is low, North specializes in manufacturing and South in agriculture.
- However, we can get equilibria where North specializes in agriculture and South in manufacturing.
- The reason for the reversal of slope of the manufacturing labor demand schedule is the presence of linkages between manufacturing firms.
- Imagine relocating a firm from South to North.
- This raises demand for Northern firms' output, via the demand linkage, since at positive trade costs firms' demand for intermediates falls disproportionately on firms at the same location.
- It also reduces Northern firms' costs, via the cost linkage, as another variety of intermediate does not have to bear trade costs.
- These linkage effects will be weaker in presence of high trade cost.

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Intermediate trade cost $= 2$

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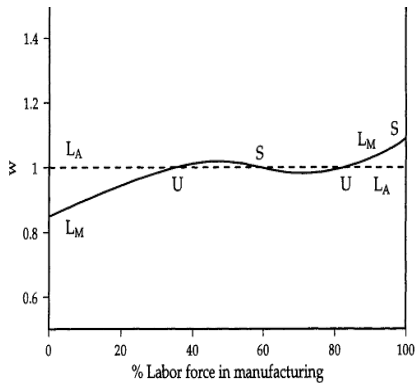
- In the case of intermediate cost ($t = 2$), four equilibria are illustrated.
- At thi intermediate level of trade barriers, linkages are not powerful enough to destabilize the symmetric equilibrium.
- But if North has all its labor employed in manufacturing, then linkages are sufficient to ensure that this is an equilibrium.
- So at high trade cost – symmetric equilibria
- At an intermediate level, asymmetric equilibria emerge.
- Finally, at a low trade cost, asymmetric equilibrium becomes unstable.

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- Hence, we have different equilibria depending on whether t is high enough.
- What does critical depend on?
- asymmetry only arises if there is a significant role of manufactured goods as intermediates i.e. μ

$$t^{\sigma-1} = \left(\frac{1+\mu}{1-\mu}\right)\left(\frac{\sigma(1+\mu)-1}{\sigma(1-\mu)-1}\right) \tag{12}$$

- If $\mu = 0$, critical $t = 1$. Any $t > 1$ would imply symmetry between economies.
- On the other hand $\sigma(1-\mu) < 1$ the expression becomes negative implying that the core periphery pattern will emerge no matter how big the trade cost is.
- This will occur either if economies of scale are very large – small σ
- Or, if the share of intermediates in costs μ, and thus the importance of backward and forward linkages, is very high.

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- For values of μ in the interval $[0, \sigma - 1/\sigma)$, there is a critical value of t at some number greater than unity.
- Higher the critical value, the greater is the region of multiple equilibria.
- But when is the critical value is likely to be higher?
- Lower σ, higher μ – higher critical value
- Greater the price cost mark ups (lower σ) and greater the share of intermediaries – more powerful are the forces of agglomeration. At $\mu = 0.7$ and $\sigma = 3$, $\sigma(1 - \mu) < 1$, so the symmetric equilibrium is unstable at all levels of trade costs.

Welfare effect

- ▶ How does the trade structure affect real wage and welfare in equilibria?
- ▶ V gives real wage in North and V^* is that in South.
- ▶ At high level of trade costs, North and South are symmetric.
- ▶ After some level of trade cost reduction real wage rises in the North and falls in South.
- ▶ If trade cost falls further, wages in North and South converge.

Trade cost and real wage
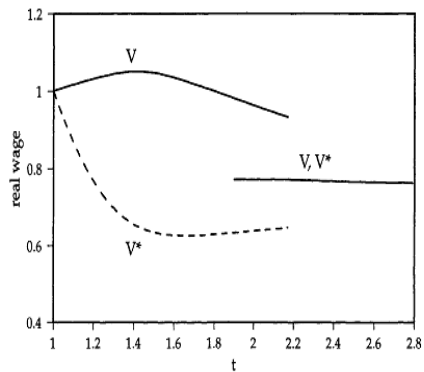
- ▶ Why does this divergence occur?
- ▶ In South the wage in terms of agriculture stays at unity, but real wages fall because a high proportion of manufactures now have to be imported, thus incurring transport costs.
- ▶ In North real wage rises because nominal wage rises (following a rise in industrial demand) and consumer price falls (smaller proportion of manufacturing is imported now from South)
- ▶ The third stage is one of factor price equalization. As trade costs become small enough, the wage differential that holds firms indifferent between locating in core and periphery narrows.
- ▶ More incentive to relocate in South – convergence in wage.

- Now change two parameters: increase in share of manufacturing in demand and share of intermediaries.
- In the first case we find less divergence and in the second more divergence.
- Increase in manufacturing demand increases manufacturing activity in South and reduces divergence.

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Increase in manufacturing demand

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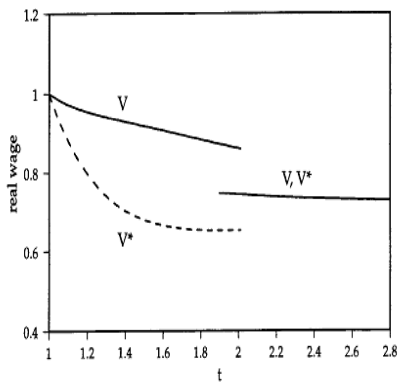
- If the share of intermediates in manufacturing increases, agglomeration orces become stronger, creating a wider real wage differential.ted
- Now there is a range of transport cost $t \in [1.28, 1.85]$ for which all manufacturing is concentrated in North.
- Northern wages are determined by the condition that the value of manufacturing output equals the value of expenditure.
- This leads to a big North South wage gap

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Increase in share of manufacturing in intermediates

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