Increasing Returns and International Trade

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Increasing Returns and International Trade

- Mid-1960s, trade theory dominated by Heckscher-Ohlin model

- Could not account for stylized facts (Dixit, 1993):
  - Trade between countries with similar factor endowments
  - Two-way trade in similar products – *intra-industry trade* (IIT)

- Grubel and Lloyd (1975), in documenting extent of IIT, argued it could be explained by *economies of scale*

- Ohlin (1933), and others (Graham, 1923; Knight, 1924), had already recognized role for increasing returns in trade models, but posed awkward problem for theorists – inconsistency with perfect competition
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- Attempts to incorporate *external economies* into general-equilibrium analysis, by Melvin (1969), and Chipman (1970), *inter alia* – generated a “…bewildering variety of equilibria…” (Krugman, 1995)

- In late-1970s, economies of scale and imperfect competition embedded in trade models – (a) Krugman (1979, 1980) and Lancaster (1979) in one-sector models of IIT, (b) Dixit and Norman (1980), Lancaster (1980), and Helpman (1981) integrating traditional trade theory with IIT

- Scale economies *internal* to firm, but moderate enough to ensure survival of large number of firms in free-entry equilibrium producing close but not perfect substitutes, i.e., *monopolistic competition*
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- Role of differentiated products recognized by Haberler (1937), but attempts to incorporate monopolistic competition into trade theory unsuccessful (Helpman, 1984)

- Limitation – absence of rigorous treatment of product differentiation – solved in 1970s through two approaches: (i) Dixit and Stiglitz (1977) love of variety, and (ii) Lancaster (1979), preferred variety – both generating aggregate demand for variety

- Krugman drew on (i), Lancaster, and Helpman (ii); how to model preferences essentially unimportant – either approach ends with an equilibrium, characterized by firms with monopoly power earning no monopoly profits (Krugman, 1987)
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- Krugman’s (1979) original model:
  - economy with single factor $l$, used to produce $i = 1,...n$ goods:
    
    $$ l_i = \alpha + \beta_i, \quad \alpha, \beta > 0 $$
  
  - all goods enter utility function symmetrically:
    
    $$ U = \sum_{i=1}^{n} v(c_i), \quad v' > 0, \quad v'' < 0 $$

  - workers also consumers, and there is full employment:
    
    $$ x_i = Lc_i, \text{ and, } L = \sum_{i=1}^{n} (\alpha + \beta x_i) $$

  - have to solve for: $p / w, x, \text{ and } n$ (dropping subscript $i$)

  - firm’s pricing condition implies: $p / w = \beta \epsilon / (\epsilon - 1), \quad \epsilon = -v' / v''c,$

  $$ d\epsilon / dc < 0, \text{ giving } PP \text{ in figure 1 }$$
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- zero profit condition implies:

\[ 0 = px - (\alpha + \beta x)w, \text{ or } p/w = \beta + \alpha / Lc \]

giving ZZ in figure 1

- solving for \( c \), and given \( x = Lc \), number of goods in equilibrium is:

\[ n = L / (\alpha + \beta x) \]
- number of goods constrained by \( \alpha \)
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- Allow for another identical economy – doubling $L$, shifts ZZ curve down to left, lowering $p/w$ and $c$; direction of trade indeterminate, but there is IIT, and gains from trade due to:

  (i) increase in output $x$ of each good:  
  \[ x = \frac{\alpha}{\frac{p}{w} - \beta} \]

  (ii) and increased variety of goods $n$:  
  \[ n = \frac{L}{\alpha + \beta L c} \]

  - result dependent on $PP$ sloping up, which depends on elasticity of demand $\varepsilon$ rising as $c$ falls, i.e., increased variety results in goods becoming closer substitutes

  - in Krugman (1980), elasticity held constant, gains from trade being increased variety, with no increase in scale of output
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- Subsequent analysis by Helpman and Krugman (1985), used approach popularized by Dixit and Norman (1980), setting monopolistic competition in context of traditional trade theory.

- Assume two countries, $j$ and $k$, two factors, $K$ and $L$, and two industries: one is competitive producing homogeneous good $Y$ under constant returns, the other monopolistically competitive producing range of goods $X = nx$ under increasing returns.

- Also assume $Y$ is labor-intensive, $X$ is capital-intensive, and that countries have common knowledge of technologies and identical, homothetic preferences.

- In figure 2, trade in goods reproduces integrated equilibrium, with both *inter* and *intra*-industry trade.
Figure 2: Trade Equilibrium

\[ O^k = \bar{V} \]
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- Krugman (1979) helped pioneer incorporation of increasing returns and product differentiation into trade models

  “...Remarkably, the paper achieves all of this in only ten pages, and in a very simple and transparent fashion...” (Prize Committee of the Royal Swedish Academy of Sciences, 2008)

- Synthesis allowed incorporation into general equilibrium trade model, and extended application to external economies, intermediate goods trade, vertical integration, and multinational firms (Helpman and Krugman, 1985)

- Also provided foundations for his subsequent work on increasing returns and geography (Krugman, 1991)