[Lecture 6] Alternative Theories of Trade

The alternative theories that have been developed since the publication of Leontief's findings fall into two main categories. Some have come about as one or more of the restrictive assumptions of the H-O model are relaxed. In the remaining cases, the H-O framework has been abandoned altogether. New theories that have emerged are much less general than H-O model, usually aiming to explain trade in only a narrow class of products.

1. Human Skills Theory (by Donald Keesing, 1965, 1966)

Of the alternative models, his ideas come closest to H-O model. But, he argues that the emphasis should be on differences in endowments and intensities of skilled and unskilled workers. Some industry requires more high-skilled labor inputs than others.

His model provides a straightforward explanation of Leontief paradox. Because U.S. has a highly trained and educated workforce relative to many other countries, U.S. exports tend to be *skilled-labor intensive*. One strong bit of empirical evidence to support this theory has been provided by Irving Kravis, who showed that high-wage industries in U.S. account for the bulk of U.S. exports, while U.S. imports tend to concentrate in products that are produced in lower-wage American industries.

2. Product Life-Cycle Theory (by Raymond Vernon, 1966) pp. 129 - 130

Comparative advantage may shift from one country to another.

Life-cycle Theory (Hypothesis)

1) Invention and test of the new products in the marketplace with considerable experimentation.
2) Firm establishment of product in the marketplace followed by a standardization process. Competing products from different manufacturers take on an increasingly common appearance. And production processes become more identical.
3) At this point, product has matured.

Now, how does the product life-cycle relate to comparative advantage?

Early in a product's life, the country that invents the product has CA. As the country exports the good to the rest of the world, and as the product becomes increasingly more standardized, it's possible for competing firms to begin to gain market share, if these firms have a cost advantage in large-scale manufacturing. In such instances, CA shifts from the inventing country to countries where manufacturing costs are lower.

How this model can be used to reconcile the Leontief Paradox?

Assume that U.S. is an innovating country producing many new products. This good is apt to be quite labor-intensive because it has yet to become standardized. Investment in fixed capital is likely to be postponed until it becomes certain what features are most popular with the public and how best to automate the production of good. Thus, U.S. exports will tend to be labor intensive. And because standardization involves the adoption of more capital-intensive production techniques, if later U.S. loses CA in a good and begins to import it, this good will tend to be capital-intensive.

This model has limited applicability. It represents an attempt to explain trade in manufactured products that require some degree of technical sophistication in their invention, design, and development. In some cases, the theory seems to fit the facts (e.g., color TV). For other sophisticated products (computer, aircraft), the model seems to do less well. The U.S., which took the lead in the development of these goods, still retains substantial CA despite the fact that each is now a relatively mature product. These examples point to the fundamental weakness of the

product life cycle model – its inability to generalize its predictions about the timing of changes in the location of CA.*

3. Similarity of Preferences Theory (Stefan Linder, 1961)

All the theories we have discussed so far have one theme in common: The source of CA is found on the ( ) side. That is, the country with the lowest autarky cost of production will export the product. The differences between the theories we have examined lie in what factors tend to explain why costs are lower in one country than in another. Linder argued that an explanation for the direction of trade in differentiated manufactured products lies on the demand side rather than the supply side.

Linder's hypothesis can be described as follows: In each country, industries produce goods designed to please the tastes of the consumers in that country. However, not every consumer is alike. Some prefer alternative products, with slightly different characteristics. International trade provides a means to obtain these goods. The advantage of international trade, then, is that consumers benefit from a wider variety of goods.

Going further, Linder's hypothesis explains which types of countries are most likely to trade with each other. Countries with similar standards of living (per capita GDP) will tend to consume similar types of goods. Standards of living are determined in part by the factor endowments of countries. Countries with large amounts of capital per worker tend to be richer than countries with lower amounts of capital per worker. Thus, there should be a considerable volume of trade between countries with similar characteristics. This implication of Linder's hypothesis provides a sharp contrast to the predictions of the H-O model, in which countries with dissimilar factor endowments would seem to have the greatest incentives to trade with each other, because they would exhibit the greatest disparity in pre-trade relative prices.

Several additional points bear noting. First, Linder's theory applies only to differentiated manufactured products. He tends to explain trade in raw materials or agricultural products by using an H-O model. Second, since he rejects the H-O explanation for trade in manufactured goods, he finds nothing paradoxical about the Leontief Paradox. Rather, Leontief's findings might simply reflect a desire on the part of American consumers for capital-intensive goods.

Third, Linder's model provides an explanation for an important phenomenon in international trade, *intraindustry trade*. This type of trade occurs when countries both export and import the same kinds of products. Simple models of CA would seem to rule out this type of trade behavior. However, if, as Linder suggests, trade takes place to satisfy the need for variety in consumption, then it should not be surprising that a country such as the Netherlands exports Heineken beer and imports Löwenbrau. Finally, we note that despite the appeal of Linder's hypothesis, early studies of the theory revealed little empirical support. Several recent studies, however, report evidence in favor of Linder's theory.† In addition, the growing importance of intraindustry trade has spurred

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* A recent study by Joseph Gagnon and Andrew Rose casts further doubt on the importance of the product life-cycle in explaining trade flows. They looked at detailed data on U.S. and Japanese trade flows over the period from 1962 to 1988. They found that most goods that were net U.S. exports (imports) in 1962 were also net U.S. exports (imports) in 1988. Similar results held for Japan. This finding is inconsistent with the notion that the location of CA shifts over time. See "Dynamic Persistence of Industry Trade Balances: How Pervasive Is the Product Cycle?" *Oxford Economic Papers* (1995).

† See Jeffrey Bergstrand, "The Heckscher-Ohlin-Samuelson Model, the Linder Hypothesis, and the Determinants of Bilateral Intra-Industry Trade," *Economic Journal* (1990).

the development of alternative theories of the supply side of the economy capable of explaining this phenomenon. We now turn to a discussion of these issues.

4. Intra-Industry Trade

Table 1. Intra-Industry Trade in Manufactures by Country, 2000

U.K.	*85.4*	*Italy*	*68.2*	*New Zealand*	*37.7*
France	*83.5*	*Mexico*	*63.1*	*Australia*	*36.6*
Netherlands	*83.3*	*Switzerland*	*62.9*	*Turkey*	*33.5*
Belgium-Luxembourg	*81.2*	*Malaysia*	*60.4*	*Greece*	*33.2*
Singapore	*77.7*	*Korea*	*55.9*	*Hong Kong*	*28.4*
Czech Republic	*75.8*	*Taiwan*	*55.7*	*Indonesia*	*27.8*
Germany	*75.3*	*Portugal*	*54.4*	*Chile*	*25.7*
Austria	*74.1*	*Finland*	*54.2*	*Sri Lanka*	*18.9*
Spain	*72.5*	*Philippines*	*53.4*	*Brunei*	*17.9*
U.S.A.	*71.7*	*Thailand*	*52.0*	*Iceland*	*17.2*
Canada	*70.4*	*Poland*	*49.9*	*Bangladesh*	*10.0*
Ireland	*69.3*	*China*	*47.6*	*Pakistan*	*6.5*
Hungary	*68.9*	*Norway*	*46.7*	*Laos*	*6.3*
Denmark	*68.5*	*Japan*	*42.3*	*Papua New Guinea*	*5.1*
Sweden	*68.3*	*India*	*38.2*		

Source: National Asia Pacific Economic and Scientific Database Intraindustry Trade, 2000

$$IIT = 100 * \left(1 - \frac{\sum_{j=1}^{n} \left| X_j - M_j \right|}{\sum_{j=1}^{n} (X_j + M_j)} \right)$$

As the data in the table clearly show, there is a wide disparity in the amount of intraindustry trade in the world. In general, countries displaying the highest degree of IIT are industrialized countries, especially those in Western Europe. Developing countries and countries that produce agricultural and other food products exhibit a much smaller production of IIT.

The existence of IIT would seem to contradict the models of comparative advantage we have studied so far. After all, if a country has comparative advantage in a product, why would it ever import it? Several answers to this question are consistent with models such as the H-O model.

First, consider the role of *transportation costs*. On the east coast of North America, timber is exported from U.S. to Canada. On the west coast, trade in timber flows in the opposite direction. Such trade can be explained by the fact that it is cheaper to transport timber from British Columbia south to the United States than it is to transport it to Ontario.

Second explanation for IIT that is consistent with standard models of comparative advantage has to do with the *construction of the data used by the economists to measure IIT*. Obviously, there are hundreds of thousands of different types of products that can be traded. How do governments keep track of trade in all these different items?

(In macroeconomics, we usually use aggregate data! Don't we have any problem with these data?)

Added to the problem that goods with similar uses can be made in different ways is a second problem: Often there are so many goods that data storage and presentation restrictions require further consolidation of data to include trade in even more dissimilar goods. For example, cotton sweaters are added with other types of clothing, such as shirts, suits, and dresses, to form a category called apparel. The same sort of aggregation occurs in other industry data groupings. Thus, it is easy to imagine that some IIT is purely a statistical phenomenon, one that would go away if economists had access to highly detailed data on trade. Unfortunately, even the most highly disaggregated data that are available to economists include combinations of items whose potential two-way trade could be explained by factor requirements in production.

5. Increasing Returns and Imperfect Competition

Despite the examples just presented, there is good reason to think that a considerable proportion of intraindustry trade (IIT) is not explainable by problems of data aggregation and categorization. So, other explanations of IIT must be explored.

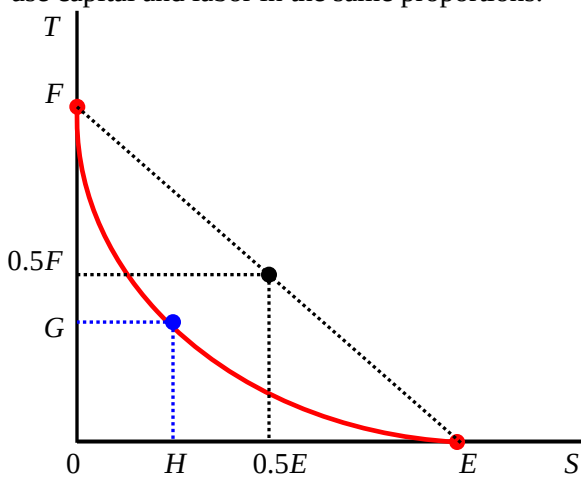
One idea that has been receiving increasing amounts of attention by economists has to do with the *role of increasing returns to scale in the production process*. In this section, we will define IRS and describe the implications for the presence of IRS on domestic industrial structure. Then, we turn to a discussion of the relationship between IRS and international trade.

1) Increasing Returns to Scale (IRS): when proportionate increase in the use of factors of production results in a greater than proportionate increase in output.

$$f(kL, kK) > kf(L, K) \quad (k \geq 1)$$

2) IRS may be external or internal to individual firms in an industry. In the first case, as more and more resources are devoted to the production of a good, the cost curves of all firms in the industry shift down. This seems to describe well what happened to American agriculture in 19th century. As the Midwest and Great Plains were settled and more and more farms were established, it became profitable to build railroad lines to ship grain to markets and for manufacturers of farm implements to begin production. The growth in the transportation infrastructure and the increased availability of factors of production helped to the lower costs of production for all farms.

3) If one or more industries in an economy exhibit IRS technology, this will affect the shape of a country's PPF. Suppose both S and T enjoy external economies and that these two industries use capital and labor in the same proportions.

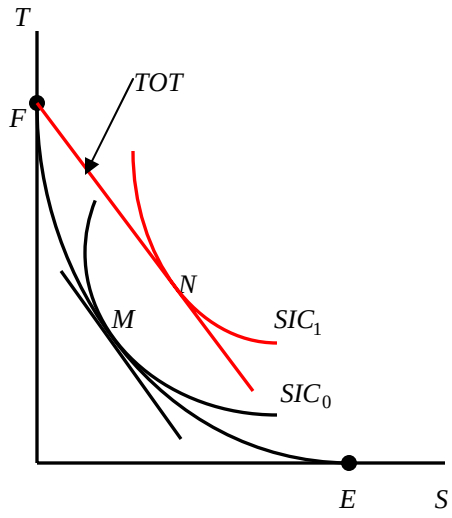


E and F are maximum S and T amounts from complete specialization.

Suppose that beginning from point E, resources are allocated away from S in such a way that each industry ends up with exactly half of all factors of production.

We know that output of S will fall by more than one-half its original level. That means that new level of S production will be a point such as H on the diagram.

Because T now has half the available resources, its output will rise. However, because it too enjoys IRS, T will produce an output level less than half of what it would produce if it had all available factors. That is, it would produce at a point such as point G. Thus, we have established that IRS typically result in PPFs that are ( ) to the origin.[‡]



Autarky equilibrium for this country is at point M, where PPF is tangent to the highest attainable SIC_0.

Note that autarky is not a very desirable equilibrium for this country. At existing prices, it would be better off by specializing in the production of one good, maximizing the gains from IRS, and trading its surplus production in world markets for the other good (point N).

We assumed that international terms of trade are identical with the autarky relative price. This is not required and, indeed, is not likely to happen in the real world. But, the diagram clearly makes the point that, unlike the previous models we have studied, here the

benefits from trade occur not because of opportunity to trade in the world markets at prices that are more advantageous than autarky prices, but because international trade allows a country to specialize in industries where average costs falls (therefore productivity rises) as additional resources are utilized.

- Thus, we have to see an entirely new reason for international trade. The international trade allows countries the opportunity to expand production in order to achieve gains from IRS technology.
- Note that by assumption the country could have specialized S production and also experienced gains from trade.
- So, what determines in which direction specialization will occur? There is no simple answer to that question. One possibility is historical accident. For example, an order for merchandise from an overseas customer may occur and cause production in one industry to expand. Once an industry begins to grow, costs begin to fall, and this tends to induce further expansion.[§]

IRS may also be internal to individual firms in an industry. Under this situation, it is usually assumed that the capital investment required for production is lumpy in the sense that it cannot be easily altered in size to accommodate different levels of production. For instance, it is often the case that the cost of purchasing and installing larger machines is proportionately less than the cost of smaller machines. Consequently, small firms with low levels of production would have to

[‡] This is not always true. But, the conditions wherein concave PPFs occur even with IRS are beyond the scope of this lecture.

[§] The fact that the location of economic activity may be due to historical accident is one of the themes of a strand of research related to trade and geography. We emphasize the importance of increasing returns and decreasing costs due to geographic concentrations of production. Paul Krugman makes the case that industrial specialization is rampant, especially in U.S. where barriers to trade across states are low. He argues that in places such as the EU, where internal barriers are falling, specialization and trade will rise.

make capital investments that exceed the level they could profitably afford to make given their projected revenues. On the other hand, firms that produce relatively large amounts of outputs are able to justify larger capital investments that, in turn, lead to cost savings on a per unit basis. Moreover, because costs fall with scale of production, firms that expand first can undersell competing firms that have not expanded, potentially driving them from the market.

Because the practices of one firm can have effects on the health of another, it is no longer legitimate to assume that perfect competition prevails in this industry. Instead, some form of imperfect competition, such as monopolistic competition, oligopoly, or monopoly, must prevail. The precise market structure that will emerge depends in part on the size of the market, the extent to which firms can expand before the economies of scale run out, and whether the product being produced can be differentiated (by brand name) through slight variations in design and performance.

Now, what does the presence of IRS at the level of the firm imply for the pattern or the effects of international trade? Much research aimed at answering that question is currently under way. Several results seem especially important.

First of all, IRS and imperfect competition can easily explain intraindustry trade.
Let's consider the following situation.

Suppose there are two countries, originally in autarky. In each country there are two goods, food and automobiles. Assume that (1) food is produced under constant cost by perfect competition; (2) automobiles are subject to IRS; (3) each country makes slightly different cars; and (4) each country has diverse tastes. And let's allow two countries to trade. What will happen?

(1) Depending upon H-O arguments, one country will tend to export food in exchange for automobiles (*interindustry trade*). If food is labor intensive and automobiles are capital intensive, we would expect that the relatively labor-abundant country would export food.

(2) Nonetheless, we would also expect the labor-abundant country to export some cars in exchange for other cars. In other words, we would expect *intraindustry trade*. If there is no trade barrier, markets for differentiated cars are now much larger. Firms in both countries will move to expand their production.

(3) If the foreign firm producing red cars is able to expand first, it can drive its domestic competitor, the local red car market, out of business (assumption of IRS).

(4) Whichever firms expand first experience a reduction in their costs of production and can thereby lower their prices. Thus, production of one type of car will expand in one country at the expense of identical firms in the other. Perhaps, blue car production will tend to expand in the other country. But, the pattern and production of specialization are impossible to predict.

Another important result from IRS theory is about welfare effects of free trade.
Up to this time, we have argued that international trade improves the standards of living of both countries. When some goods are produced according to IRS, this need no longer be the case. In particular, if free trade leads to an overall contraction in the production of goods subject to IRS, then trade can be harmful. This situation is quite unlikely. Rather, it is more probable that the opposite occurs and that both countries gain from international trade.[**]

[**] Please read "*Imperfect Competition and International Trade*," Gene M. Grossman (Cambridge, Mass.: MIT Press, 1992).