

Innovation and trade

What does trade theory say about innovation?

A brief overview of some of the ways in which innovation can impact on trade patterns.

- ABSOLUTE ADVANTAGE: Adam Smith (1776)
- THEORY OF COMPARATIVE ADVANTAGE: Hecksher and Ohlin (1933)
- PRODUCT LIFE CYCLE THEORY OF TRADE: Hirsch (1965) and Vernon (1966)
- INTRA-INDUSTRY TRADE THEORY: Grubel and Lloyd (1975)
- TRADE AND LOCATION: Krugman (1991)

The theory of ABSOLUTE ADVANTAGE

Trade theory started with the classical theory of absolute advantage in Adam Smith's work.

According to this, a country would be an exporter in any industry in which it had an absolute advantage.

➤ any country with an absolute disadvantage in every industry would be unable to export at all.

According to the theory of absolute advantage, country A will be an exporter in those industries in which they have an absolute advantage over country B, and A will be an importer in those industries where it has an absolute disadvantage compared to B.

- *This means that if A has an absolute advantage in X but an absolute disadvantage in Y, then A will export X and import Y.*
- *And it also means that if A has an absolute advantage in X and Y then it will export both X and Y and country B will be unable to export either X or Y.*

➤ This theory of absolute advantage has a pessimistic implication for backward countries.

The theory of ABSOLUTE ADVANTAGE

- According to Smith, a country has an absolute advantage in the production of a good if it can produce that good more efficiently (using fewer resources) than another country.
- He argued that countries should specialize in producing the goods in which they have an absolute advantage and then trade with other countries for goods they cannot produce as efficiently.

A simple example


Smith illustrated the concept with a simple example of trade between England and Portugal.

- Portugal, he argued, had an absolute advantage in producing wine, while England had an absolute advantage in producing cloth.
- Therefore, it made sense for Portugal to focus on producing wine and England to focus on producing cloth.
- By specializing in their respective areas of advantage and trading with each other, both countries could increase their overall levels of consumption and wealth.

The theory of ABSOLUTE ADVANTAGE in a nutshell

- Smith's theory of absolute advantage highlights the benefits of specialization and trade, leading to increased efficiency, greater productivity, and ultimately higher standards of living for all participating countries.
- It laid the groundwork for later developments in trade theory, including comparative advantage, which was further developed by David Ricardo.

THEORY OF COMPARATIVE ADVANTAGE

The subsequent theory of comparative advantage, first articulated by Ricardo and developed by Heckscher and Ohlin (Ohlin, 1933), took a very different view 

It asserted that countries would be exporters in those industries in which they had a comparative advantage even if they had no absolute advantage in any industries.

This has altogether less pessimistic implications:

- let us consider the potential trade between countries A and B in products X and Y.

THEORY OF COMPARATIVE ADVANTAGE

Suppose that country A has a large advantage over B in producing X, but A has only a small advantage over B in producing Y. In that case we can say that A has a comparative advantage in X while B has a comparative advantage in Y – even though B is at an absolute disadvantage in Y.

According to the theory of comparative advantage, A will be an exporter of the product in which it has a comparative advantage (X) while B will be an exporter of the product in which it has a comparative advantage (Y).

This makes sense because this allocation of production maximises the total level of production and therefore combined national income.

A maximises its income by specialising in production X and buying that level of Y it wants by trading with B.

The theory of comparative advantage gives exchange rates the role of ensuring that markets for the two traded goods will clear.

THEORY OF COMPARATIVE ADVANTAGE

- The Heckscher-Ohlin model took this further by showing the relationship between comparative advantage and each country's endowments of factors of production (capital and labour).
- In particular, the Heckscher-Ohlin theorem stated that nations would specialise in producing commodities where the production process uses their relatively abundant factor intensively.
 - The implication of this would be that the USA (as a capital rich country) should export commodities whose production is relatively capital-intensive, and import commodities whose production is relatively labour-intensive.

THEORY OF COMPARATIVE ADVANTAGE

- The concept of comparative advantage is based on the idea of opportunity cost, which refers to the value of what must be given up to produce something else.
- Ricardo demonstrated that even if one country is less efficient in the production of all goods compared to another country, there are still potential gains from trade if each country specializes in the production of goods for which it has a lower opportunity cost.

A simple example

Ricardo illustrated this concept with a hypothetical example involving two countries, England and Portugal, and two goods, cloth and wine.

- Even if Portugal can produce both cloth and wine with fewer resources (has an absolute advantage in both), it can still benefit from specializing in the production of the good in which it has a comparative advantage, say wine.
- Meanwhile, England can specialize in cloth production.
- By trading with each other, both countries can obtain more of both goods than if they tried to produce both goods domestically.

THEORY OF COMPARATIVE ADVANTAGE

- The Heckscher-Ohlin model posits that countries will export goods that intensively use the factors of production that are relatively abundant and cheap in their own country, while importing goods that intensively use factors that are relatively scarce and expensive. In other words, countries will specialize in and export goods that they can produce most efficiently due to the abundance of the necessary factors of production.
- Key assumptions of the Heckscher-Ohlin model include:
 1. Countries differ in the relative abundance of factors of production, such as labor, capital, and land.
 2. Goods can be produced using different combinations of factors of production.
 3. Factors of production are mobile within countries but immobile between countries.
 4. Production technologies are the same across countries.

THEORY OF COMPARATIVE ADVANTAGE

- The Heckscher-Ohlin model predicts that countries will specialize in the production of goods that use their abundant factors of production intensively.
- For example, a country with abundant labor and relatively scarce capital will specialize in the production of labor-intensive goods, while a country with abundant capital and relatively scarce labor will specialize in the production of capital-intensive goods.
- The Heckscher-Ohlin model provides insights into patterns of international trade and the distribution of income between factors of production.
- It suggests that trade can lead to an **equalization** of factor prices between countries as they specialize in the production of goods that use their abundant factors of production intensively.
- However, the model has been criticized for its simplifying assumptions and its inability to explain all patterns of trade observed in the real world.

THEORY OF COMPARATIVE ADVANTAGE

Where does innovation fit into this theory?

1. a process innovation adopted in one country (A) which reduces the cost of producing X but which is not yet adopted in B, may shift A's balance of comparative advantage towards product X and away from product Y.
 - In short, process innovations can change the balance of comparative advantage, and hence change trade patterns, especially when diffusion across different countries proceeds at different rates.
2. an innovation which reduces the cost of transport and/or communications can have quite subtle effects on trade patterns.
 - First of all, if we start from a position where transport between A and B is so costly that trade is just not viable, then a transport innovation which reduces transport costs may be enough to start up trade between the two where there was none before the innovation.
 - Moreover, if one good is heavy and costly to transport while another is light and cheap to transport, such a transport innovation may also change the balance of comparative advantage and hence change trade patterns.

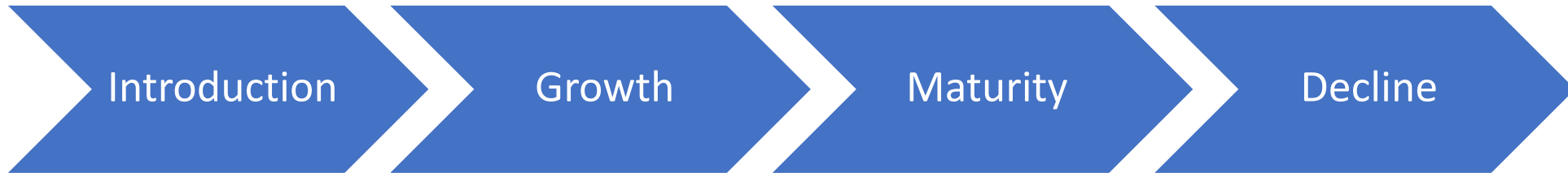
Product innovations, however, don't really fit into this theory because the theory is based on the assumption of fixed products.

PRODUCT LIFE CYCLE THEORY OF TRADE

- The Heckscher-Ohlin theorem has been exceptionally influential in trade theory.
- However, Leontief (1953, 1956) found that US trade patterns were not actually consistent with the predictions of the Heckscher-Ohlin theorem.
- Leontief compared the capital and labour requirements of US exporting industries and also those US industries producing commodities in which the US is a net importer.
- He found that some US exporting industries were more labour-intensive than US import-replacing industries. This famous finding has ever since been known as the Leontief paradox.
- The product life cycle model of trade (Hirsch, 1965, and Vernon, 1966) and the related technology gap theory (Posner, 1961) were advanced as theories that could explain the Leontief paradox.

PRODUCT LIFE CYCLE THEORY OF TRADE

The essence of the product life cycle model is that during its evolution an industry passes through four main stages of development and that the nature of competition changes in important ways as the industry passes through these stages.



PRODUCT LIFE CYCLE THEORY OF TRADE

Introduction

During the introduction stage of the life cycle, growth is relatively slow.

This may be because:

1. of buyer inertia or ignorance;
2. there is not a large enough group of pioneering consumers to demonstrate the potential of the new product and start the bandwagon;
3. prices are high and the product is still at an experimental stage. Growth may also be slow if buyers wait to see what will become the industry standard.

PRODUCT LIFE CYCLE THEORY OF TRADE

Growth

In the growth stage, sales growth is very rapid because buyer inertia has been overcome and the bandwagon is rolling, and also because prices are falling and the product has become more reliable. In cases where industry standards are important, the rapid growth in consumer demand may also reflect the fact that consumers are clearer about what this industry standard will look like, and so find the product a less risky buy.

PRODUCT LIFE CYCLE THEORY OF TRADE

Maturity

In the maturity stage, diffusion throughout the target group of consumers is reaching saturation, so that growth starts to level out and then fade away.

The level of industry sales depends on rate of growth of the relevant buyer group, and the frequency of replacement purchase amongst consumers who bought at an earlier stage.

PRODUCT LIFE CYCLE THEORY OF TRADE

Decline

During decline, sales fall off partly because of the pattern that emerged in the maturity stage, but more so because of the fact that new products and technologies are starting to appear that offer a better price/performance trade-off than the present product.

PRODUCT LIFE CYCLE THEORY OF TRADE

Perhaps the three most important trends here are these.

1. Product manufacture often moves from being small scale, skill intensive and experimental at the introduction stage, to large scale, low skill, and standardised at the maturity and decline stages.
2. **Early consumers are pioneers**, often relatively unconcerned about prices, and willing to put up with a degree of unreliability in the product, while consumers at the end of the product life cycle are either sophisticated buyers who demand reliability at a reasonable price, or are very price conscious.
3. **Competition** from other firms is low during introduction, but grows considerably during the growth stage. The number of competitors starts to fall off during maturity, and even more so during decline, but the intensity of price competition is undiminished.

PRODUCT LIFE CYCLE THEORY OF TRADE

- On these foundations, Hirsch (1965) and Vernon (1966) built a very compelling account of trade flows.
- Their argument is that the USA would tend to:
 - specialise in exporting products which are in the early or growth phases of their life cycles: By exporting these products, US firms can sell in markets where technological advantage is paramount, and there they surely have an advantage.
 - but would tend to import products which are in the maturity or decline phases: by importing these products, they avoid trying to compete in markets where cost considerations are paramount – and where they cannot hope to compete against companies based in the newly industrialized country (NICs).
- This theory can explain the Leontief paradox:
 - For products in the early stage of the life cycle tend to be produced by relatively skilled-labour-intensive processes, while products in the maturity and decline stages of the life cycle tend to be produced by relatively capital-intensive processes.
 - This explains the apparently anomalous observation by Leontief: US producers in export-intensive industries will have relatively skilled- labour-intensive production processes while US producers in import-intensive industries will have relatively capital-intensive production processes.

PRODUCT LIFE CYCLE THEORY OF TRADE

Where does innovation fit into this theory of trade?

- Innovation lies at the heart of this theory because the product life cycle theory is, in a way, a theory of innovation – in particular, a theory of how the balance of innovation alters over the life cycle.
 - A typical proposition of life cycle theory is that product innovations are most important in the early and growth stages while process innovations are most important later in the life cycle. Indeed, we could say that the incidence and frequency of product innovations versus process innovations is one measure of where the product is in its life cycle.
 - If product innovations predominate, then the product is at a comparatively early stage of the life cycle and a high-technology country will tend to be an exporter at that stage.
 - But if process innovations predominate, then the product is at a comparatively late stage of the life cycle and a high-technology country will tend to be an importer at that stage.
- Moreover, innovations in transportation and communication can impact on trade flows.
 - If transport costs are prohibitive, there will be no trade between A and B, regardless of life cycle considerations. But if transport innovations reduce transport costs somewhat, then trade will start to take place in products at either end of their life cycles (very early or very late). And if transport costs fall more or less to zero, then an even larger class of products will start to be traded.

INTRA-INDUSTRY TRADE THEORY

The theory of intra-industry trade (Grubel and Lloyd, 1975) attempts to explain why a particular country may be an importer and an exporter of a particular category of products.

The theory stresses the role of product variety and economies of scale. Because of economies of scale, countries specialise in particular parts of the product spectrum.

For example, the UK is both an importer and an exporter of refrigerators and washing machines.

- a) low-cost products tend to be imported from the countries of former Eastern Europe;
- b) mid-priced products are often produced in the UK and also exported;
- c) the high-price products are imported from Germany and Scandinavia.

Intra-industry trade becomes more common the wider are our product categories. --> if there is a lot of product variety within one statistical category, we may see a lot of intra-industry trade.

INTRA-INDUSTRY TRADE THEORY

Where does innovation fit into this theory?

- Process innovations that increase economies of scale will tend to increase intra-industry trade
- Product innovations also fit nearly into this theory.
- Innovations in transport which reduce the cost of trading will also increase intra-industry trade.

TRADE AND LOCATION

The theory of trade and location, often studied within the field of economic geography and international trade, seeks to understand why economic activities are distributed across space and how this spatial distribution affects trade patterns.

Strategic trade theory describes how a country may use tariffs and subsidies to alter the balance of international competition in its favour.

Proposed by Paul Krugman, this theory emphasizes economies of scale and product differentiation as drivers of trade. It suggests that firms may specialize in producing a narrow range of goods, leading to intra-industry trade, where countries both import and export similar goods.

- If transport costs are high then there is little trade between countries.
- But as transport costs decline, production becomes more concentrated in one cluster, and trade between countries increases.

TRADE AND LOCATION

This theory is highly relevant to trade in electronics.

- As transport and communication costs continued to fall, different industry clusters specialised in particular electronic components, and global production of these would become very concentrated in just a few clusters.
- A computer would consist of components made in many different countries and assembled somewhere close to the final market.
- Along with this increased specialisation and concentration of production in clusters, there is increased international trade in components and increased component miles within each computer.
- Any process innovation that increases economies of scale will reinforce this tendency towards global concentration of production in a few clusters.

TRADE AND LOCATION

Why we can assert that there will be 'less need for immigration and emigration'?

Because if falling costs of transport and communication lead to more concentration of business in clusters, then some of those located in the hinterland will find that they face declining employment prospects at home and will increasingly be drawn to emigrate to these large clusters.

Paradoxical as it may seem, declining costs of transport and communication may make location more important, may make size more important and may make emigration and immigration more important.