CHAPTER S I X

International Economics

6 Economies of Scale, Imperfect Competition, and International Trade

In this chapter:

- The Heckscher-Ohlin Model and **New Trade Theories**
- **Economies** of **Scale** and **International** Trade
- **Imperfect Competition** and International Trade
- Trade Based on **Dynamic Technological Differences**
- **Costs** of **Transportation**, **Environmental Standards**, and International Trade

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Introduction

- Heckscher-Ohlin theory based comparative advantage on **differences** in **factor endowments** among nations.
- **Leaves significant portion** of international trade **unexplained**.
- Need **complementary trade** theories to fill in the **gaps**.

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This chapter fills this gap with some new **complementary trade** theories, which base international trade on **the following factors**:

- ✓**Economies** of scale,
- ✓**Imperfect** competition,
- ✓**Differences** in the development and **spread** of **new technologies** over time among nations.

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- **Thus**, we need to relax the assumptions of the Heckscher–Ohlin theory discussed in the previous chapter.
  - ✓ Perfect Competition.
  - ✓ Constant Economies of Scale.
  - ✓ Same Technologies.
- We will see that **relaxing** the assumptions does not affect the validity of the basic **Heckscher–Ohlin model**.
- **However**, complementary trade theories are required to explain the significant portion of international trade that the Heckscher–Ohlin theory leaves unexplained.

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Economies of Scale and International Trade

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- One of the assumptions of the **H–O** model was that **both commodities** were produced under conditions of **constant returns** to scale in the two nations.
- In this section we drop this assumption and consider the more realistic case of **increasing returns to scale.**
- It will help us to explain the trade between the **nations** that are **identical** in terms of **factor endowments**.
- **Accordingly**, the new theory shows that with increasing returns to scale, mutually beneficial trade can take place even when the two nations are **identical** in every respect.

This is a type of trade that the H–O model does not explain.

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Note that:

In such situation: **Trade** between **countries need not** depend on country **differences** under the assumption of economies of scale.

For this reason, economies-of-scale models are often used to explain trade among countries like the United States, Japan, and the European Union.
For the most part, **these countries**, and other developed countries, have similar technologies, similar endowments, and to some extent similar preferences.

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Increasing returns to scale

Definition

- Production situation where output grows proportionately **more than** the increase in inputs (**doubling** inputs will result in more than **doubles output**).

Increasing returns to **scale** result in:

- Production **frontiers** that are **convex** from the origin, or **inward-bending**, i.e. **decreasing opportunity costs**.

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Increasing returns to scale may occur **because:**

1
- At a **larger scale** of operation a **greater division** of **labor** and **specialization** becomes possible.
- That is, each worker can specialize in **performing** a **simple repetitive** task with a resulting **increase** in **productivity**.

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- A **larger scale** of operation may permit the introduction of **more specialized** and **productive machinery** than would be **feasible** at a **smaller scale** of operation.
- High degree of **Automation**

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Economies of Scale and International Trade

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Assumptions

(1) There are **two nations** (N1, N2) two **commodities** (**X**, **Y**)

(2) The two nations are **identical** in every respect,

- √ Both nations use the same **technology** in **production**.
- √ Both nations have the same **amount** of **resources**.
- √ **Tastes** are **equal** in both nations.

Hence, we can use a **single production frontier** and a single **indifference map** to refer to **both nations**.

(3) Both commodities are **produced** under increasing returns to **scale** in both nations. Hence PPF are **convex** from the origin.

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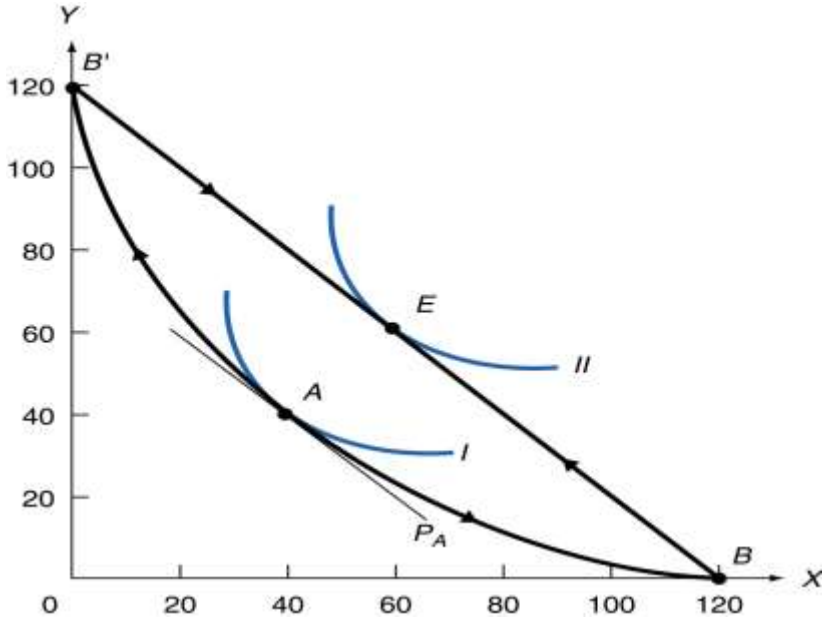

FIGURE 6-1 Trade Based on Economies of Scale.

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Illustration

With no-trade

- **Equilibrium** at **point A** where PPF tangent to highest **indifference curve**.
- **Equilibrium points** are the same in both **nations**.
- **Relative** commodity prices in the two nations are also identical. PX/PY = PA in both nations and is given by the **slope** of the **common tangent** to the production frontier and indifference curve I at point **A**.
- **Since** same relative price in both nation then according to the **H-O theory** we **cannot identify comparative advantage** and trade **cannot** be explained.

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With trade

- **Nation-1** could **specialize** completely in the production of **commodity X** and produce at point **B**.
- **Nation-2** would then **specialize** completely in the production of commodity Y and produce at point **B′**.
- **Exchange at P_B** which is parallel to P_A, i.e. the same **relative price**.

$$P_B = P_A = 40x/40y = 60x/60y = 1$$

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- By then exchanging 60X for 60Y with each other, each **nation** would end up **consuming** at point E on indifference curve II,
- **Thus** each nation end up **gaining 20X** and **20Y** each.
- These gains from trade arise from economies of scale in the production of only one commodity in each nation which **made large scale operation** possible.
- In the absence of trade, the two nations would not specialize in the production of only one commodity because each nation **wants** to consume both **commodities**. And hence cannot benefit from economies of scale.

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Illustration

Some aspects of the analysis:

- **First** of all, it is a matter of **complete indifference** which of the two nations **specializes** in the production of commodity X or commodity Y. In the real world, this may result from **historical accident**.
- **Second**, it should be clear that the **two nations** need not be **identical** in every respect for **mutually beneficial trade** to result from **increasing returns to scale**.
- **Third**, if economies of scale **persist** over a **sufficiently** long **range** of **outputs**, one or a few **firms** in the nation will **capture** the **entire market** for a given product, **leading to monopoly** (a single producer of a commodity for which there is no close substitute) or **oligopoly** (a few producers of a homogeneous or differentiated product).

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- **Forth**, Economies of scale or increasing returns to scale must also be clearly distinguished from **external economies**.

Economies of scale

- refer to the reduction in the average costs of production as the firm's output expands. Thus, economies of scale or increasing returns to scale are internal to the firm.

External economies

- on the other hand, refer to the reduction (i.e., downward shift) in each firm's average cost of production curve as the entire industry output expands (i.e., for reasons external to the firm).
- P.s. External economies and their importance for international trade are examined in the appendix to this chapter.

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Imperfect Competition and International Trade

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Trade Based on Production Differentiation

- Previous theories assumed **perfect competition** and **homogenous goods**.
- **However** in real life due to **presence** of **imperfect competition** markets (oligopoly) mainly in shape of **deferential goods** and economies of scale.
- This lead to a kind of trade that is **not** considered under the **classical** and **neo-classical** theory which is **intra-industry trade.**

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- A **large portion** of the output of modern economies today **involves differentiated** rather than **homogeneous** products.
- As a result, a **great** deal of **international** trade can and does involve the **exchange** of **differentiated products** of the **same industry** or **broad** product group.
- That is, a great deal of **international** trade is **intra-industry trade** in differentiated products.
- US import **Toyota** cars while Japan import **Chevrolet** car from US.

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- This type of trade is **different** than **inter-industry** trade that involve in completely **different products** (wheat and cloth) as explained by (**H-O model**) .
- We **drop** two assumptions:
  - **Perfect competition** and
  - **Constant economies** to **scale**.

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How theory explains the Intra-industry trade?

- **Intra-industry** trade arises in order to take **advantage** of **important economies** of **scale** in production and in the same time make available wider **varieties** of he good at **low prices**.
- In order to benefit from economies of scale and keep the average cost low, **each nation** would be forced to **produce** only **one** or at **most** a few, **varieties** and **styles** of the same product to produce at higher larger **scale rather than** many **different varieties** and styles that are produced at smaller scale of operation.
- The nation then **imports** other **varieties** and **styles** from other nations.

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- **Intra-industry** trade benefits consumers because of the **wider range of choices** (i.e., the greater variety of differentiated products) available at the lower prices made possible by **economies** of **scale** in production.
- Hence **Intra-industry** trade is explained on the basis of:
  - ✓ Economies of scale
  - ✓ Differential products

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Example:

- Even before the formation of the European Union, **plant size** in most industries was about the same in Europe and the United States.
- However, **unit costs** were much higher in Europe, primarily because **European plants** produced many more varieties and styles of a product than did their American counterparts.
- As **tariffs** were **reduced** and finally **eliminated** and trade expanded within the European Union, each plant could **specialize** in the production of **only a few varieties** and styles of a product, and unit costs fell sharply as a result.

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Contrasts to H-O Model

1. **Trade** in H-O model is **inter-industry** trade based on comparative advantage or **differences** in factor endowment,

but intra-industry trade is based on product **differentiation** and **economies** of **scale**, and will likely be larger for nations of **similar** size and **factor proportions**.

Thus, while **trade** based on comparative advantage is likely to be **larger** when the difference in factor **endowments** among nations is greater, **intra-industry** trade is likely to be **larger** among industrial economies of **similar size** and **factor** proportions.

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2. With **differentiated products** produced under economies of scale, **pretrade-relative** commodity prices may no longer accurately predict the **pattern** of **trade**.

- **Specifically**, a **large country** may produce a **commodity** at lower cost than a **smaller country** in the absence of trade because of larger national **economies** of **scale**.
- **With trade**, however, all countries can take advantage of **economies of scale** to the same extent, and the **smaller** country could **undersell** the larger nation in the same **commodity**.

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Tentative conclusion

- **Comparative advantage** seems to **determine** the **pattern** of **inter-industry** trade, while economies of scale in differentiated products give rise to **intra-industry** trade.
- **Both** types of **international trade** occur in **today's** world. The more **dissimilar** are **factor endowments** (as between developed and developing countries), the more **important** are comparative **advantage** and **inter-industry** trade.
- On the other hand, **intra-industry** trade is likely to be dominant the **more similar** are factor **endowments** broadly defined (as among developed countries).

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- **However**, even in the case of **intra-industry** trade, "**comparative** advantage is somewhere in the **background**."
- One could say that **inter-industry** trade reflects **natural comparative advantage** while **intra-industry** trade reflects **acquired comparative advantage**.

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Measuring intra-industry trade

❖**Intra-industry Trade Index (T):**

$$T = 1 - \frac{|X - M|}{X + M}$$

- X = exports
- M = imports
- Numerator is absolute value

***T* ranges from 0 to 1**

- ✓ T=0 when **nation** only **imports** or **exports** the good **perfect inter-industry** trade
- ✓ T=1 when exports = imports. perfect **intra-industry** trade.

- The higher the value of T the higher the **intra-industry** trade.

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Intra-industry Trade Index (T): Shortcoming

- The T index must be used with **caution**.
- We can get very different values for **T** , depending on how broadly we **define** the industry or **product group**.
  - ✓ The more **broadly** we define an industry, the greater will be the value of T.
  - ✓ The reason for this is that the more broadly an industry is defined, the **more likely** it is that a **country** will **export** some **varieties** of the **differentiated product** and import others.
- It can, nevertheless, be very useful in measuring **differences** in **intra-industry** trade in different **industries** and changes in intra-industry trade for the same industry over time

Formal Model of Intra-Industry Trade

❑ Assume **monopolistic competition**.

The form or market organization where (as in this case) there are **many firms** selling a **differentiated** product and entry into or exit from the industry is **easy**.

- ***D*** represents the **demand curve** faced by the firm for the **differentiated** products that it **sells**.

✓ Since many other firms sell similar products, the **demand curve** faced by the firm is **fairly elastic** (i.e., ***D*** has a small inclination).

✓ This means that a small price change leads to a large change in the **firm's sales**.

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- Through **trade** by producing only one of a few **varieties** of the product, the **firm** also faces **increasing returns** to scale in production, **so that** its average cost curve (AC) is also **downward sloping** (i.e., AC **declines** as output increases).

- **As a result**, the firm's **marginal** cost curve (MC) is **below** the **AC curve**.
- The reason for this is that for **AC** to **decline**, MC must be **smaller than AC**.

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❑ Equilibrium After Trade:

- The **best level** of output for the firm is **3** units and is **given** by point **E**, where the **MR** and **MC curves** intersect.
- At a smaller level of output, **MR** (i.e., the extra revenue) exceeds **MC** (i.e., the extra cost) and it pays for the firm to expand output.
- At an output greater than 3 units, ***MR < MC*** and it pays for the firm to reduce output.

- ***Thus, the best level of output (Q) is 3 units.***

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- Since we have **free entry** and **exit** at equilibrium in **L-R**
  - ✓ i.e. more firms are attracted to the industry in the **long run** whenever firms in the industry earn profits,

hence, the demand curve facing this firm (D) is **tangent** to its AC curve, so that P =AC =$4 at Q =3.

- This means that the firm **breaks even** (i.e., it earns only a **normal return** on investment in the long run).

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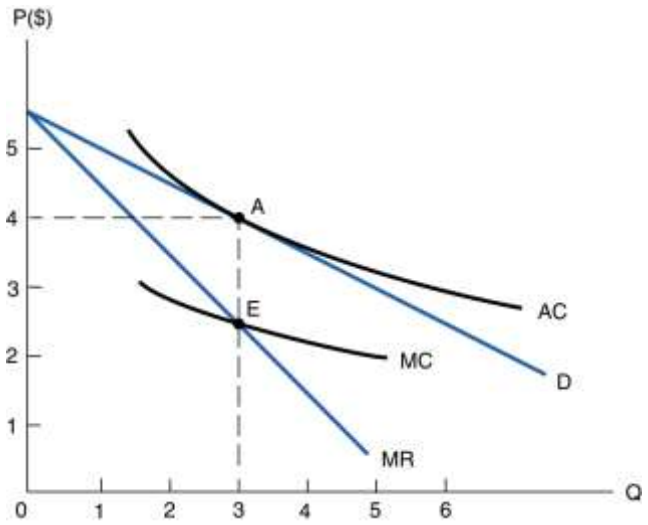

FIGURE 6-2 Production and Pricing Under Monopolistic Competition.

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Relationship between inter-industry and intra-industry trade:

If commodities are homogeneous, and

Nation 1 has a relative abundance of **labor** and commodity X is **labor intensive**,

while **Nation 2** has a **relative abundance** of capital and commodity Y is **capital intensive**.

Then:

Nation 1 will export commodity X and import commodity Y, while Nation 2 will export commodity Y and import commodity X, as **postulated** by the **Heckscher–Ohlin** theory.

This is inter-industry trade and reflects comparative advantage only.

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If there are different varieties of commodities (i.e., commodities X and Y are differentiated),

Nation 1 will still be:

- ✓ **a net exporter of commodity** X ***(this is inter-industry trade, which is based on comparative advantage),***

- ✓ **but** it will also **import** some **varieties** of **commodity** X and export **some varieties** of commodity Y.
  (***this is intra-industry trade, which is based on product differentiation and economies of scale).***

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If there are different varieties of commodities (i.e., commodities X and Y are differentiated),

while **Nation 2** will

- ✓ still be a net exporter of commodity Y, ***(this is inter-industry trade, which is based on comparative advantage),***
- ✓ it will also **import** some varieties of commodity Y and export some varieties of commodity X. .

(this is intra-industry trade, which is based on product differentiation and economies of scale).

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- The net exports of X and Y by Nations 1 and 2, respectively, reflect **inter-industry** trade, which is based on **comparative advantage**.

On the other hand, the fact that:

- ✓ **Nation 1** also imports some varieties of commodity **X** and **exports** some varieties of commodity **Y**,
- ✓ while Nation 2 also **imports** some varieties of commodity **Y** and **exports** some varieties of commodity **X** .

This shows that there is an **interpenetration** of each other's market in each product and reflects **intra-industry** trade, which is based on **product differentiation** and **economies** of **scale**.

Thus,

- ✓ When products are **homogeneous**, we have only **inter-industry trade**.
- ✓ When products are **differentiated**, we have both **inter-** and **intra-industry** trade.
- ✓ The more similar nations are in factor endowments and technology, the smaller is the importance of **inter-relative** to **intra-industry** trade, and vice versa.

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- ➢ **Since** industrial nations have become more **similar** in factor endowments and technology over time, the **importance** of **intra-** relative to inter-industry trade has **increased**.
- ➢ As pointed out earlier, however, a great deal of **intra-industry** trade is also based on **differences** in **international** factor endowments (when factors are defined less broadly and in a more **disaggregated** way).

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The End

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