

## ECONOMIES OF SCALE AND IMPERFECT COMPETITION

**Bharati Basu**

*Department of Economics, Central Michigan University, Mt. Pleasant, Michigan, USA*

**Keywords:** Economies of scale, economic geography, external economies, income distribution effect, internal economies, intra-industry trade, inter-industry trade, monopolistic competition, national and international economies of scale, pattern of trade, symmetry in production and consumption, varieties in production and consumption, volume of trade

### Content

1. Introduction
  2. Economies of Scale and Imperfect Competition
  3. Intra-Industry Trade and Love of Variety
    - 3.1. Varieties and Scale
    - 3.2. Varieties Only
    - 3.3. Trade between Countries of Similar Size
    - 3.4. Trade between Countries of Different Sizes
  4. Coexistence of Inter- and Intra-Industry Trade
  5. Intra-Industry Trade and Income Distribution
  6. Economies of Scale and Economic Geography
  7. Preferred Variety and Intra-Industry Trade
  8. National versus International Economies of Scale
- Glossary  
Bibliography  
Biographical Sketch

### Summary

Economies of scale and imperfect competition, now considered a part of the new theory of international trade, provide a distinct departure from the traditional theory of international trade.

There is no doubt that consideration of economies of scale and imperfect competition has broadened the scope of theoretical approaches in explaining the post-World War II development in trade.

Consideration of economies of scale and imperfect competition in world trade helps us understand that very similar countries (i.e. those having similar endowment holdings or technologies) can engage in trade. It shows how a country can be both an exporter and an importer of the same commodity.

It provides an alternative to the theory of comparative advantage as an explanation for trade. The intra-industry trade that results from consideration of economies of scale and imperfect competition can explain both the economic convergence and the economic divergence in the post-war period.

## 1. Introduction

Economies of scale and imperfect competition have important influences on international trade. These effects include gains from trade, pattern and volume of trade, changes in income distribution, agglomeration, and factor mobility. The importance of economies of scale was realized as early as 1933 when Ohlin used economies of scale as an explanation of foreign trade patterns. The interaction between economies of scale and imperfect competition in trade was also noted. The literature on imperfect competition that centers on *Monopolistic Competition*, by E. Chamberlin (1933), and *Imperfect Competition*, by J. Robinson (1933), details its important implications for trade.

The relation between imperfect competition and international trade resurfaced in the late 1960s and early 1970s, when economists were searching for an explanation for post-World War II development in international trade. A large volume of trade was flowing between similar countries that could not be explained by the law of comparative advantage. The growing trade in similar products was also drawing increasing attention. In order to relate economies of scale, imperfect competition, and international trade, this article will focus on the development of the concept of intra-industry trade, how it can coexist with inter-industry trade, and its effects on the pattern, volume, and gains from trade. It will also explain the absence of income-distribution effects, the emergence of agglomeration economics, and the concept of economic geography.

## 2. Economies of Scale and Imperfect Competition

Economies of scale means gains from producing in large quantities. It is also referred to as increasing returns. Industries use economies of scale because they become more efficient the larger the scale at which they operate. More specifically, when there are economies of scale, doubling of inputs to an industry will more than double the industry's production.

Level of input	Level of output	Input per unit of output	Average output
2	5	0.40	2.50
3	9	0.33	3.00
4	15	0.27	3.75
8	32	0.25	4.00

Source: P.R. Krugman and M. Obstfeld, *International Economics: Theory and Policy* (New York: HarperCollins, 1991)

Table 1. Economies of scale

Table 1 shows that when inputs are increased from 4 to 8 units, output rises from 15 to 32 units and economies of scale are realized. These economies of scale can be of two types: a) external economies of scale and b) internal economies of scale. If the increase in the industry output is because each firm in the industry raises its output, this is internal economies of scale. However, if the industry output increases without each firm

raising its output, this is external economies of scale. The firm that does not increase its output level enjoys the benefit of a larger scale of production in the industry without producing on a larger scale.

It is important to understand the distinction between these two types of economies of scale. Under external economies of scale, a large number of firms can enter the industry to raise the industrial output originally produced by the existing group. Each firm behaves like a perfectly competitive firm and can thus be called a price taker. But when economies of scale are there because the firm itself increases its scale of production (i.e. it realizes internal economies of scale) the market structure becomes imperfectly competitive. Under an imperfectly competitive market structure, a very large firm can behave like a monopolist or a few big firms can form an oligopoly.

A monopolist, unlike the perfectly competitive firm, is free to set its price and output at a level that will maximize its profit. However, unless there are barriers to entry, the monopoly profits and incentives will be wiped out by the new entrants. Oligopolistic behavior, on the other hand, does not provide any clear-cut rule of operations. The outcome depends on the strategies of a few big participants in the market. It is obvious that whether we are dealing with monopolists or oligopolies, the handling of market structure becomes much more difficult than the perfectly competitive market behavior where price is given.

This difficulty of dealing with the market structure may explain why internal economies of scale were not used as an explanation for trade until the 1970s, even though their importance in analyzing economic behavior was recognized earlier. To examine the implications of imperfectly competitive market structure with internal economies of scale for analyzing international trade, our focus will be on monopolistic competition. Monopolistic competition consists of a few very large firms, each of whose products are regarded as differentiated products by the consumers (*see Strategic Interaction, Trade Policy, and National Welfare*).

### **3. Intra-Industry Trade and Love of Variety**

In intra-industry trade, each country exports a set of varieties of a product and imports a different set of varieties of the same product. Gains from trade are derived from two sources. One is the gain from the consumption of increased variety of a product and the other is the gain in production at a larger scale. Since each country restricts the number of varieties it produces, each variety can be produced at a scale larger than the country could produce if it had to produce all possible varieties.

#### **3.1. Varieties and Scale**

In the model presented by Krugman, there is one industry in the economy that produces a differentiated good with a large number of potential varieties. The consumer consumes each one of these varieties and each one of them is given equal importance. Thus, the utility or satisfaction of an individual is the sum of utilities derived from each commodity. Each one of the varieties has positive marginal utility and the law of diminishing marginal utility applies to each variety.

On the production side, there is also symmetry. Labor is the only factor of production and the average cost of production in each firm decreases as output expands because of the increasing returns to scale. Since each firm producing a variety uses the same technology, both average and marginal costs are identical between firms, and goods are perfect substitutes in production. Thus, it does not matter which firm is producing which variety.

Since each individual is assumed to supply one unit of labor, the workforce equals the size of the population. To clear the market, total output of each variety equals the total consumption of each variety. Total consumption is obtained by multiplying the per head consumption by the total size of the population. Each firm producing one of the varieties uses a fixed amount of the labor force. Thus, the sum of the workers used by the existing firms must equal the size of the labor force. Given the symmetry in production and consumption, each firm would charge the same price and would produce the same amount of output. The question is how prices, output, and the number of varieties are determined.

Since each firm is producing a single variety, each firm can act like a monopolist and decide on a price that will maximize its profit. That price is set where marginal revenue is equal to marginal cost (rule of profit maximization). The relation between marginal revenue and price depends on how individuals change the quantity they demand in response to changes in price (price elasticity of demand). If consumers' response to a price increase becomes weaker as they consume a larger amount of the good then the equilibrium condition would establish a positive relation between the per head consumption and the price of the variety (i.e. as consumption rises the price increases). This shows the monopoly power of this firm. This positive relation between price and consumption per head is shown by the *PP* curve in Figure 1.

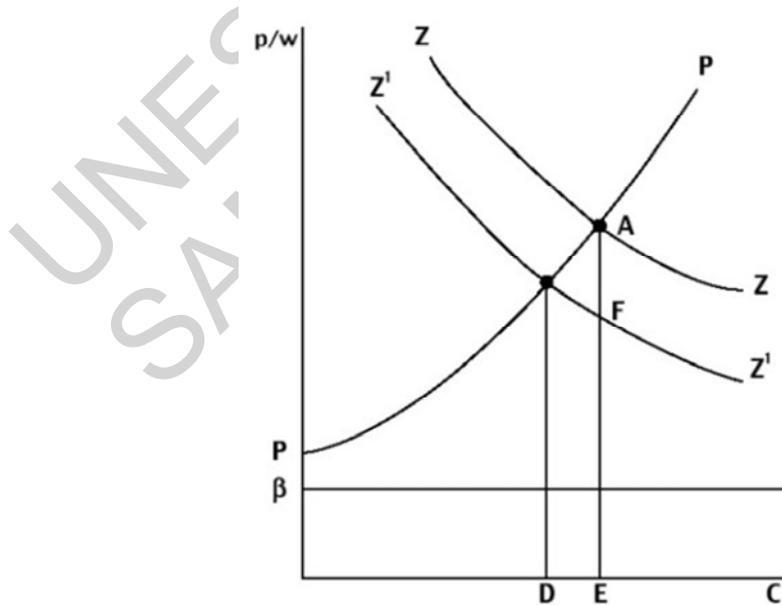


Figure 1. Effects of labor force growth  
 (Source: P. Krugman, Increasing returns, monopolistic competition, and international trade, *Journal of International Economics* 9 (1979), 469–479)

In addition to this profit maximizing condition, we have to consider the possibility of free entry. As a monopolist firm earns profit, free entry encourages other firms to join the market to share in that profit. This leads to the zero profit condition, which is given by average cost pricing where price is set equal to the average cost of production. We now get a negative relation between price and consumption per head. This negative relation between consumption and price is given by the *ZZ* curve in Figure 1. Thus, the marginal cost pricing gives the *PP* curve and average cost pricing gives the *ZZ* curve.

As shown in Figure 1, price will have to be above marginal cost ( $\beta$ ) so that the loss does not exceed fixed or overhead cost. At the point of intersection between the *ZZ* curve and the *PP* curve, per head consumption and price are determined; using the value of this consumption we find the output produced by an individual firm (which is equal to per head consumption times the size of the population). Given the size of the population, total output of a variety must equal its total consumption. Once the output level of the firm is decided, we will know the total amount of labor needed by the firm to produce it. It is thus easy to decide the number of varieties that is equal to total labor force divided by the amount of labor needed by a firm producing a variety.

With an increase in the labor supply, the *ZZ* curve in Figure 1 will move leftward and in Figure 1 we get a new point of intersection. Per head consumption will fall (given by *DE* in Figure 1), but this fall is less than the rise in the labor supply (given by *AF*) and as a result total consumption will increase. To maintain equilibrium (i.e. to supply the market with increased total output so that it can match the increased consumption), the price would have to be reduced. Consequently, output (scale effect) rises, as does the number of varieties (variety effect), but obviously by less than the rise in the labor supply.

-  
-  
-

TO ACCESS ALL THE 12 PAGES OF THIS CHAPTER,  
Visit: <http://www.eolss.net/Eolss-sampleAllChapter.aspx>

### Bibliography

Bhagwati J.N., ed. (1982). *Import Competition and Response* (Papers presented at the National Bureau of Economic Research Conference on Import Competition and Adjustment: Theory and Policy, Cambridge, Mass., May 1980), 410 pp. Chicago: University of Chicago Press. [This book develops concepts and ideas concerning import competition.]

Chamberlin E.H. (1933). *The Theory of Monopolistic Competition*, 213 pp. Cambridge, Mass.: Harvard University Press. [This book provides the basic theory of monopolistic competition.]

Dixit A.K. and Stiglitz J.E. (1977). Monopolistic competition and optimum product diversity. *American Economic Review* **67**, 297–308. [This is a pioneering work following Chamberlin and Robinson about how to tackle the equilibrium solution under monopolistic competition.]

Ethier W.J. (1982). National and international returns to scale in the modern theory of international trade. *American Economic Review* **72**, 389–405. [This paper is a first attempt to distinguish between national and international economies of scale.]

Krugman P. (1979). Increasing returns, monopolistic competition, and international trade. *Journal of International Economics* **9**, 469–479. [This paper is the first attempt to explain international trade with internal economies of scale.]

Krugman P. (1980). Scale economies, product differentiation, and the pattern of trade. *American Economic Review* **70**, 950–959. [This is another analysis of intra-industry trade, but under more restrictive assumptions than in his 1979 article.]

Krugman P. (1981). Intra-industry specialization and the gains from trade. *Journal of Political Economy* **89**, 959–973. [This article shows that intra-industry trade might not have unfavorable effects on income distribution under certain conditions.]

Krugman P. (1982). Trade in differentiated products and political economy of trade liberalization. *Import Competition and Response* (ed. J. Bhagwati), pp. 197–208. Chicago: University of Chicago Press. [This paper uses the existence of intra-industry trade to present a case for trade liberalization.]

Krugman P. and Venables A.J. (1995). Globalization and the inequality of nations. *Quarterly Journal of Economics* **110**, 857–880. [This explains intra-industry trade and economic convergence in the trading world.]

Lancaster K. (1980). Intra-industry trade under perfect monopolistic competition. *Journal of International Economics* **10**, 151–175. [This article presents a different approach from Paul Krugman's to internal economies of scale and international trade.]

Ohlin B. (1933). *Interregional and International Trade*, 617 pp. Cambridge, Mass.: Harvard University Press. [This is the pioneering explanation of trade using the differences in factor proportions.]

Robinson J. (1933). *The Economics of Imperfect Competition*, 352 pp. London: Macmillan. [This book provides the basic theory of imperfect competition.]

### **Biographical Sketch**

**Bharati Basu** received her Ph.D. from the University of Rochester in New York, USA. She specialized in the areas of international trade and economic development. She has published various works in these fields in reputable journals and books. She is on the editorial board and associate editor of the journal *Feminist Economics*.