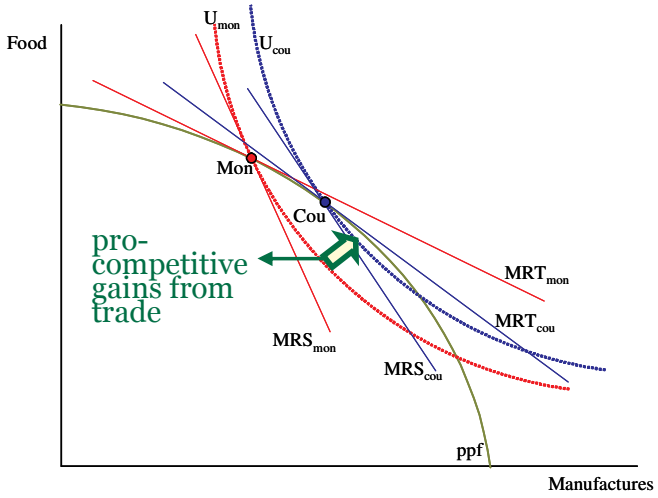

The point Cou is the cournot international trade equilibrium. Profit maximizing when MRT=MRS, this results in

MRT = $\frac{MC_m}{MC_f} = \frac{p_m(1-\frac{1}{2\varepsilon_m})}{p_f} < \frac{p_m}{p_f}$ = MRS

The wedge between the MRT and the MRS has reduced from 1 - (1/ε_m) to 1 - (1/$2\varepsilon_m$).

Dumping: The sale of export below normal value. The normal value is referred to as:

- The comparable price of a product in the exporting country.
- The comparable price for export to a third country.
- The cost of production in the country of origin plus a reasonable addition for selling costs and profit.

If a firm in a model sells products in another country for the same price as in home without restoring costs of transportation, this model is called the reciprocal dumping model.

Iceberg transport costs: If goods are shipped, only a fraction of these goods actually arrives at the destination. The fraction that does not arrive the destination represents the iceberg costs of transportation. We use these costs in the reciprocal dumping model.

The reciprocal dumping equilibrium, with

- Tc: marginal costs including transportation costs
- qAA: supply of firm A in country of A
- qBA: supply of firm B in country A

is given by:

$q_{AA} = \frac{a+Tc-2MC}{3b}$; $q_{BA} = \frac{a+MC-2Tc}{3b}$; $p_{rec} = \frac{a+MC+Tc}{3}$

Because of dumping, profits will be lower, but welfare can be increased due to pro-competitive effects of trade. Because this leads to lower prices, higher quantities and smaller differences between prices and MC. These things may increase the welfare for both trading countries. Actual outcome depends on transport costs. The net welfare is only negative if transportation costs are high. If transport costs keep increasing the trade becomes too small and costly with the result that trade disappears.

In the market of Aramid fibres there were three firms. In 2000 one firm was taken over by another firm so that there were only two firms left. This implies a decrease in international

competition and as a result of this the market price increased. All the suppliers benefit from this higher price and this led to higher operating profits.

Intra-industry trade: Trade within the same industry or sector. It is a general characteristic of international trade flows. This trade is becoming more important, especially for developed countries. It arises if a country simultaneously imports and exports similar types of goods or services
There are two types of intra industry trade:

- Horizontal intra-industry trade: at same stage of processing; product differentiation. By Krugman.
- Vertical intra-industry trade; at different stages of processing; "fragmentation". By Ethier.

A few characteristics of intra-industry trade stated by the OECD:

- It has risen significantly since the 1980s
- It is particularly high for sophisticated manufactured products
- It is particularly high for very open countries
- It is related to preferential trade agreements
- It is connected to FDI inflows
- It is to a large extent based on intra-firm trade

In the models discussed before we assumed that firms in the same industry produce identical products, such that consumers do not distinguish between the goods of the different firms. Producers either import or export a certain good or service but they do not do both. However, goods and services produced in the same industry are not identical. The goods and services are imperfect substitutes. This requires a change in the demand structure of the economy because consumers have a preference for different varieties of similar products. A firm often chooses a limited variety of products because investing in many varieties is very costly.

The Dixit-Stiglitz model enabled economists to explain and understand intra-industry trade. It is a model of product variety and implies two main reasons for intra-industry trade:

1. The final goods variety (Krugman)
2. The intermediate goods variety (Ethier)

The Grubel-Lloyd index is the most often used measure to measure the intra-industry trade.

- Ex_i: Exports of industry i
- Im_i: Imports of industry i
- GL_i: Grubel-Lloyd index for industry i

$$GL_i = 1 - \frac{|Ex_i - Im_i|}{Ex_i + Im_i}$$

If a country only imports or exports goods and services within the same industry, such that there is no intra-industry trade then the fraction is one and therefore the Grubel-Lloyd index is zero. When imports exactly equal exports, such that there is only intra-industry trade then the fraction is zero and therefore the Grubel-Lloyd index is one. The index always lies

between zero and one. The higher the Grubel-Lloyd index, the higher the level of intra-industry trade.

International trade data is grouped at digit level. You can look for instance at the two-digit level or at the four-digit level. In the two-digit level the estimated share of intra-industry trade is relatively high. The four-digit level is more detailed. When you look at a more detailed level the share of intra-industry trade in trade flows is lower. The degree of intra-industry trade is related to the level of development and being the neighborhood of a high income region. A higher income is related to a higher level of intra-industry trade.

Although each producer has monopoly power over its own variety of a product, there is still a high level of competition between these monopolists producing a similar product. The Dixit-Stiglitz approach uses a *Constant Elasticity of Substitution (CES)* function for the Utility:

$$U = \left[\sum_{i=1}^{N} c_i^{\alpha} \right]^{\frac{1}{\alpha}} ; \quad 0 < \alpha < 1$$

In this formula:

- N is the number of total varieties
- C_i is the consumption of variety i
- α is a parameter that represents the love-of-variety effect of consumers
- i is the variety index

Love-of-variety effect: If N increases, the number of varieties a consumer can choose has increased and therefor the utility will increase. When a new variety is introduced there are always people who want to buy this product.

With the price of variety i, p_i, the budget constraint is given by the equation:

$$\sum_{i=1}^{N} p_i c_i = I$$

Maximization of the utility function subject to the budget constraint above, with P is the price index, gives demand for firm i:

$c_i = p_i^{-\varepsilon} (P^{\varepsilon-1} I)$; U=I/P ; ε= 1(1-ρ)

So the demand of variety i is influenced by four variables:

1. The income level I. The higher the income, the more consumers spend on variety i. This relationship is equiproportional; a multiplication of the income with factor k will multiply the consumption of variety i with the same factor k.
2. The price of variety i. When the price of variety i increases the demand will fall.
3. The elasticity of demand, ε. When the elasticity of demand is high, a small price increase will make the demand fall faster. It also measures whether it is difficult to substitute a variety for another variety.
4. The price index, P. When the price index increases, the income increases and therefore the demand for variety i will also increase.

Increasing returns to scale or economies of scale: Total costs increase while the average costs per unit of output fall because the output expands. This translates in a downward sloping average cost curve. Numerous of sectors have economies of scale instead of constant returns to scale. This is due to the high investment costs that have to be made before production can start. We distinguish between two different forms of increasing return to scale:

- *Internal:* With internal economies of scale a decrease in the average costs per unit output is due to an increase in the production level of the firm itself. The higher the production level of the firm, the higher its cost advantage is compared to small firms.
- *External:* With external economies of scale the decrease in the average costs per unit output is due to an output increase of the entire industry. An increase in the industry output leads to an increase of knowledge for each firm resulting in an increase in the output at firm level.

The amount of labor, L_i, necessary to produce x_i:
$L_i = f + mx_i$
F stands for the fixed labor input and m stands for the marginal labor input.

Each manufacturing firm produces its own unique variety under internal economies of scale. This implies that this firm has monopoly power. All firms in this certain industry are price-setters. The profit of the firm, with the wage rate W, will be:
$\Pi = px - W(f+mx)$

Maximization of profits leads to the optimal pricing rule, also called the mark-up pricing:
$p(1- 1/\varepsilon) = mW$

The marginal cost of producing one unit is equal to mW. Profits are maximized when MR=MS. If the operating profits of a firm are higher than the fixed costs firms enter the market. Firms enter the market until operating profits = fixed costs. When the fixed costs exceed the operating profits firms will exit the market. If new firms enter the market, the demand of firm i will fall. This reduces the output of firm i but the price will remain the same. So the mark-up is constant. For monopolistic competition in the manufacturing sector there is a zero-profit condition in equilibrium. In this equilibrium the output per firm is fixed.

Consider two countries, Belgium and the Netherlands. Labor is the only production factor available. These two countries are identical on all aspects. They only differ in the size of their labor force. The labor force of the Netherlands (7 mln laborers) exceeds the labor force of Belgium (5 mln laborers).

In the autarky equilibrium all firms have the same MC and the same elasticity for demand. Therefor they all charge the same price. The number of varieties produced in each country is proportional to the size of the market. In autarky the Netherlands will produce and consume 14,000 varieties and Belgium will produce and consume 10,000 varieties. This implies that in autarky Dutch workers achieve a higher welfare than Belgium workers.