

IMPERFECT COMPETITION AND TRADE

- **Neoclassical model assumes industries are perfectly competitive, exhibit constant returns to scale and sell differentiated goods**
- **In the case of food manufacturing, these may be less than plausible assumptions**
- **The global market for food involves several stages in a *vertical* production chain, including farm input suppliers, farming, food manufacturers, and food retailers**
- **In developed countries, input suppliers and farmers account for a relatively small share of value-added in the system, whereas food manufacturing, distribution and retailing account for nearly 60% of value-added in a country such as the U.S.**
- **To gain a sense of the key players in food manufacturing, the world's 10 largest firms are listed in Table 1**

Table 1. World's Largest Food Processing Firms, 1993

Company	Headquarters	Processed Food Sales \$ billion	Major Product
1. Nestlé	Swiss	36.3	Foodstuffs, restaurants
2. Philip Morris/ Kraft General Foods	USA	33.8	Foodstuffs, tobacco, beer
3. Unilever	UK/Netherlands	21.6	Foodstuffs, soaps
4. ConAgra	USA	18.7	Foodstuffs, meats poultry
5. Cargill	USA	16.7	Grain and oilseed products
6. Pepsico	USA	15.7	Soft drinks, snacks, restaurants
7. Coca Cola	USA	13.9	Soft drinks
8. Danone	France	12.3	Dairy products
9. Kirin Brewery	Japan	12.1	Beer, soft drinks
10. IBP	USA	11.2	Meats

Source: Economic Research Service, USDA

Table 2: 10 Largest US and EU Food Manufacturing Firms, 1997/98

Rank	United States		EU		
	Company	Sales (\$million)	Company	Turnover (\$ million)	Country
1.	Phillip Morris	31,527	Unilever	49,159	UK/Netherlands
2.	Conagra	28,840	Nestlé	45,859	Switzerland
3.	Cargill	21,400	Danone	15,503	France
4.	Pepsico	20,917	GrandMet	12,518	UK
5.	Coca-Cola	18,800	Beghin-Say	9,914	France/Italy
6.	ADM	16,109	Dalgety	7,655	UK
7.	Mars	14,000	Assoc. British Foods	7,634	UK
8.	IBP	13,259	Cadbury Schweppes	7,450	UK
9.	Anheuser-Busch	12,832	Tate and Lyle	7,034	UK
10.	Sara Lee	10,800	Saint Louis	6,681	France

Source: Cotterill (1999).

Table 3: Food Manufacturing/Retailing Firms in World's Top-100 Multinationals, 2000

Rank	Firm	Foreign Sales (\$ million)	Sector	Home Country
18	Nestlé	48,928	Food and beverages	Switzerland
27	Diageo	15,880	Food and beverages	UK
28	Wal-Mart	32,100	Retail	US
37	Unilever	26,067	Diversified	UK/Netherlands
45	Carrefour	28,664	Retail	France
46	Proctor and Gamble	19,913	Diversified	US
47	Coca-Cola	12,740	Food and beverages	US
53	Royal Ahold	33,653	Retail	Netherlands
67	McDonalds	8,420	Food service	US
75	Danone	9,910	Food and beverages	France
86	Interbrew	6,704	Food and beverages	Belgium
90	Cadbury-Schweppes	5,412	Food and beverages	UK
100	Philip Morris	32,051	Diversified	US

Source: UNCTAD (2002a).

Table 4: Product Concentration Ratios in US Food Manufacturing¹, 1997

Product	CR4 (%)
Dog and cat food mfg.	63.4
Malt mfg.	66.5
Wet corn milling	73.7
Soybean processing	73.4
Other oilseed processing	72.7
Breakfast cereal mfg.	86.7
Sugar cane mills	61.8
Cane sugar refining	96.4
Beet sugar mfg.	82.7
Chocolate and confectionary mfg.	86.6
Condensed/evaporated dairy mfg.	68.8
Cookie and cracker mfg.	64.6
Snack food mfg.	63.0
Brewing	90.7
Distilling	64.8
Cigarettes	98.0
Average	75.9

Source: US Census Bureau, 2001. ¹ Share of value added accounted for by the 4 largest firms.

Table 5: Concentration Ratios¹ by Product in EU Countries

Product	Ireland	Finland	Sweden	Denmark	Italy	France	Spain	UK	Germany	Average
Baby food	98	100	100	99	96	93*	54	78	86	91
Canned soup	100	85	75	91	50	84	--	79	41*	87
Ice cream	--	84	85	90	73*	52	84	45	72	76
Coffee	91	72	71	70	60	100	--	74	67	75
Yoghurt	69	83*	90	99*	36	67	73	50	76	70
Chocolate confectionary	95	74	--	39	93	61	79	74	--	74
Pet food	98	80	84	40	64*	73	53	77	87	79
Breakfast cereals	92	--	52	70	88	70	82	65	67	73
Tea	96	90	63	64	80	82	62	52	55	72
Snack foods	72	70*	80	78	71	50	56	73	48	68
Carbonates	85	50	62	--	60	69	79	55	60*	71
Butter	--	--	--	100	--	32*	--	65	30	65
Pasta	83	97	82	61	51	57	65	37	49	65
Frozen meals	--	--	63	--	90	62	39	39	65	62
Wrapped bread	85	44	47	59	80	70	96	58*	9	59
Biscuits	83	73	51	44	55	61	53	42	50	58
Canned fish	--	70	72	49	68	43*	33	43*	--	55
Mineral water	--	100	74	70	37	--	31	14	22	50
Fruit juice	--	70	50	65*	62	26	38	35	46	48
Canned vegetables	--	68	47	50	36	29	--	--	--	47
Average	89	79	69	69	67	63	61	56	55	68

Source: Cotterill (1999). ¹ 3-firm concentration ratios, except * which are 2-firm.

Table 6: Seller Concentration in US and EU Food Retailing, 1990s

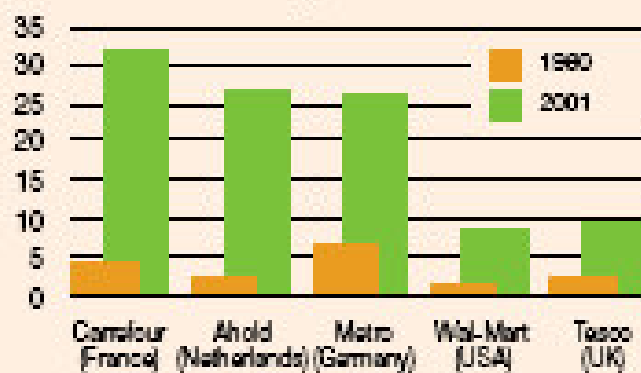
Country	CR5 (%)
Austria	79
Belgium-Luxembourg	57
Denmark	78
Finland	96
France	67
Germany	75
Greece	59
Ireland	50
Italy	30
Netherlands	79
Portugal	52
Spain	38
Sweden	87
UK	67
EU	26
United States	35

Source: Cotterill (1999), McCorrison (2002), and Hughes (2002).

Global expansion of the five largest transnational food retailers, 1980–2001

Between 1980 and 2001, each of the five largest global supermarket chains expanded the number of countries where it operates by at least 270 percent.

Number of countries operational



Source: UK Food Group

Concentration of market power in the global coffee chain

Four companies control almost 40 percent of global trade in coffee and only three roasters (Philip Morris, Nestlé and Sara Lee) control 45 percent of the global market.

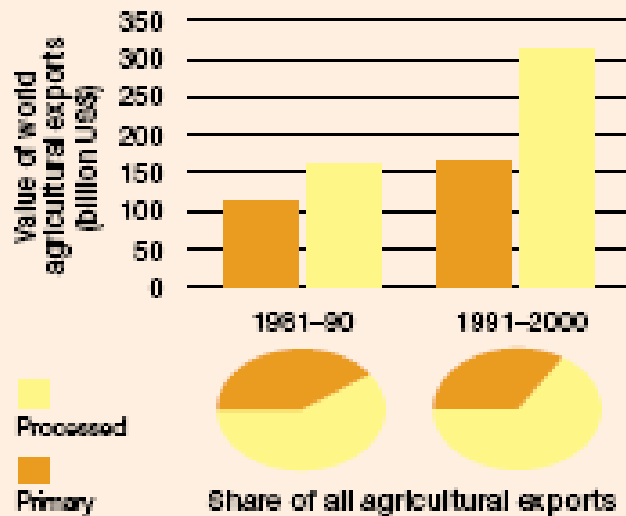


Source: UK Food Group

- **Trade in bulk commodities has been the dominant focus of research in agricultural economics, partly because of policy interventions, and partly because it sees like a good candidate for the Heckscher-Ohlin model**
- **Focus may have been a little misplaced; world trade in food and agricultural products has become increasingly dominated by manufactured foods, accounting for 85% of world trade**
- **Neoclassical theory predicts trade will be *inter-industry* in nature, however, there is empirical evidence that the structure of trade in food products is in part of an *intra-industry* nature, i.e. the simultaneous export and import of products that are very similar in terms of factor inputs and consumption**
- **Global trade in processed food has become increasingly concentrated among a few countries, notably Western Europe, North America, Australasia and Japan - 24 countries accounted for 80 % of world trade at the start of the 1990s**

Value and share of primary and processed agricultural products, 1981-90 to 1991-2000

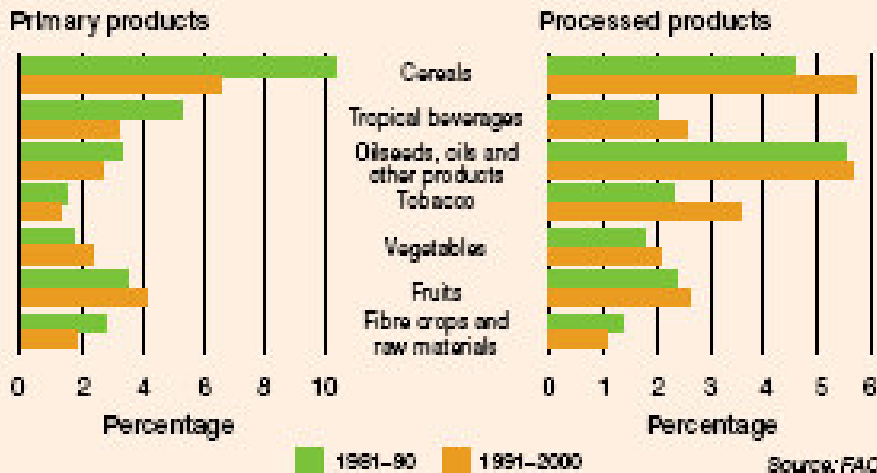
Global trade in processed agricultural products grew faster than trade in primary products over the past 20 years.



Source: FAO

Share of primary and processed products in world agricultural exports, 1981-90 to 1991-2000

The share of many primary products in total agricultural exports has declined, even as the share of processed goods made from the same products has increased.



Source: FAO

- **Global trade in food products is principally played out among developed countries, who have similar incomes and tastes; in addition, a relatively small number of multinational firms in these countries tend to dominate production of manufactured foods**

- **We might expect trade in this sector to have something to do with imperfectly competitive market structures, scale economies and differentiated goods**

- **Competition vs. Monopoly**

- Monopoly in one or more of the industries in the basic model results in another distortion

- Abstracting from the reason for monopoly, and given constant returns to scale, assume the home country has a monopoly producer of good X

- Under perfect competition:

$$p = MC \qquad (1)$$

Hence, with competition in X and Y:

$$p_x / p_y = MC_x / MC_y = MRT \quad (2)$$

- For a monopolist:

$$TR = p_x X \quad (3)$$

Hence, change in revenue is:

$$dTR = p_x dX + X dp_x \quad (4)$$

- Dividing by dX gives an expression for marginal revenue:

$$MR_x = dTR/dX = p_x + (dp_x / dX) \cdot X \quad (5)$$

(5) shows that for a monopolist, marginal revenue will be less than price, given that $dp_x / dX < 0$

- multiply second term of (5) by p_x / p_x , and factor out p_x :

$$MR_x = p_x [1 + (dp_x / p_x) / (dX/X)] \quad (6)$$

- the term $(dp_x / p_x) / (dX/X) = 1/e_x$, where e_x is the price elasticity of demand for X

- Substituting in for the elasticity in (6):

$$MR_x = p_x [1 - 1/e_x] = MC_x \quad (7)$$

i.e. under monopoly, $1/e_x$ measures the mark-up of price over marginal cost, so in general equilibrium:

$$\{p_x [1 - 1/e_x]\} / p_y = MC_x / MC_y = MRT < p_x / p_y \quad (8)$$

As $p_x > MC_x$, equilibrium price ratio p_x / p_y is greater than the slope of the production frontier (see Figure 2)

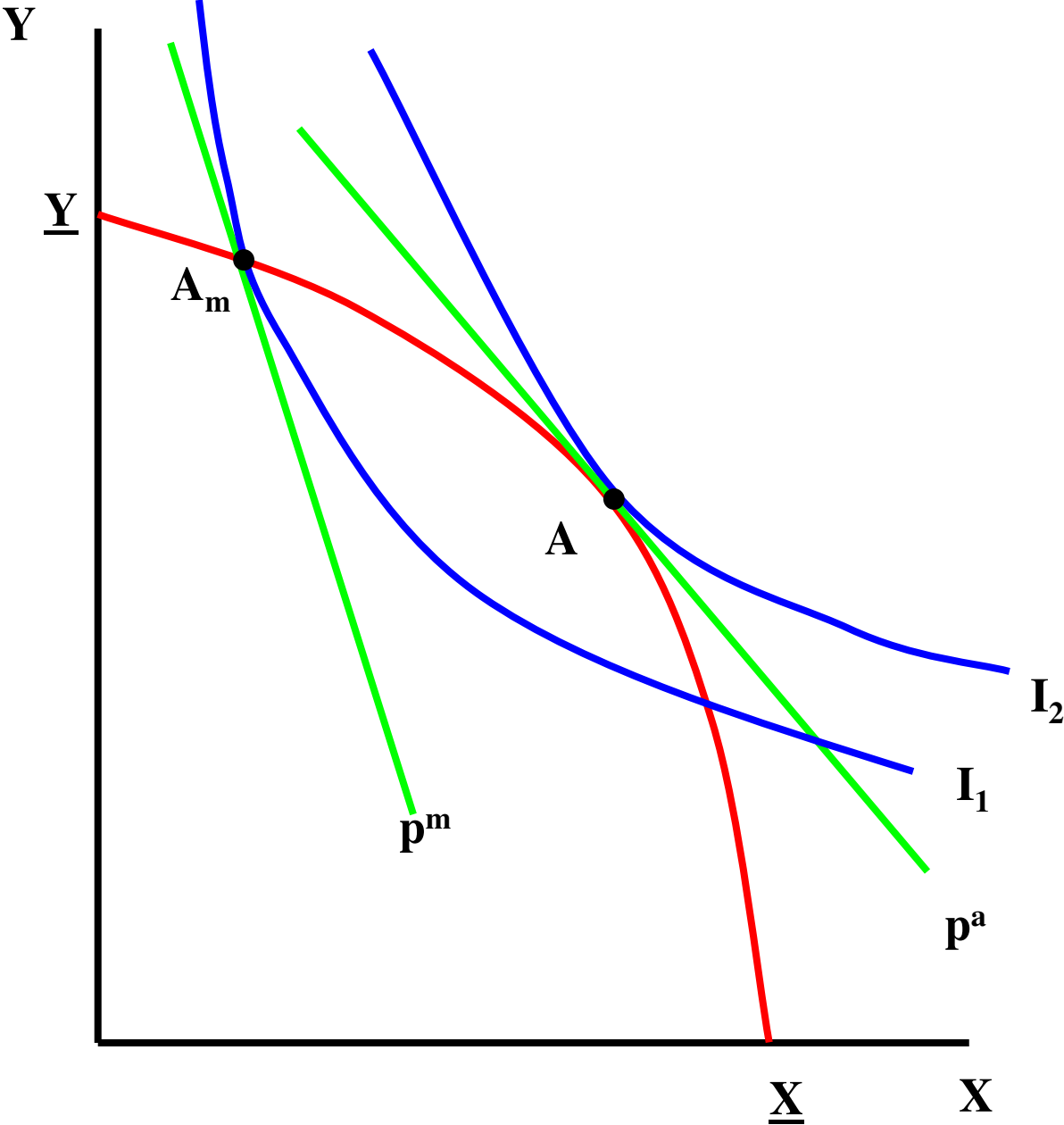
- A_m is the autarky equilibrium for the home country, given the autarky price ratio p^m :

- output of X below competitive level at A

- monopolist raises relative price of X above its competitive level at p^a

- welfare is reduced below competitive level at A

FIGURE 2: AUTARKY AND MONOPOLY



- Distortion induced by monopoly is endogenous compared to say a production tax that raised X's price, i.e. if trade occurs, monopoly price can change, but tax distorted price does not

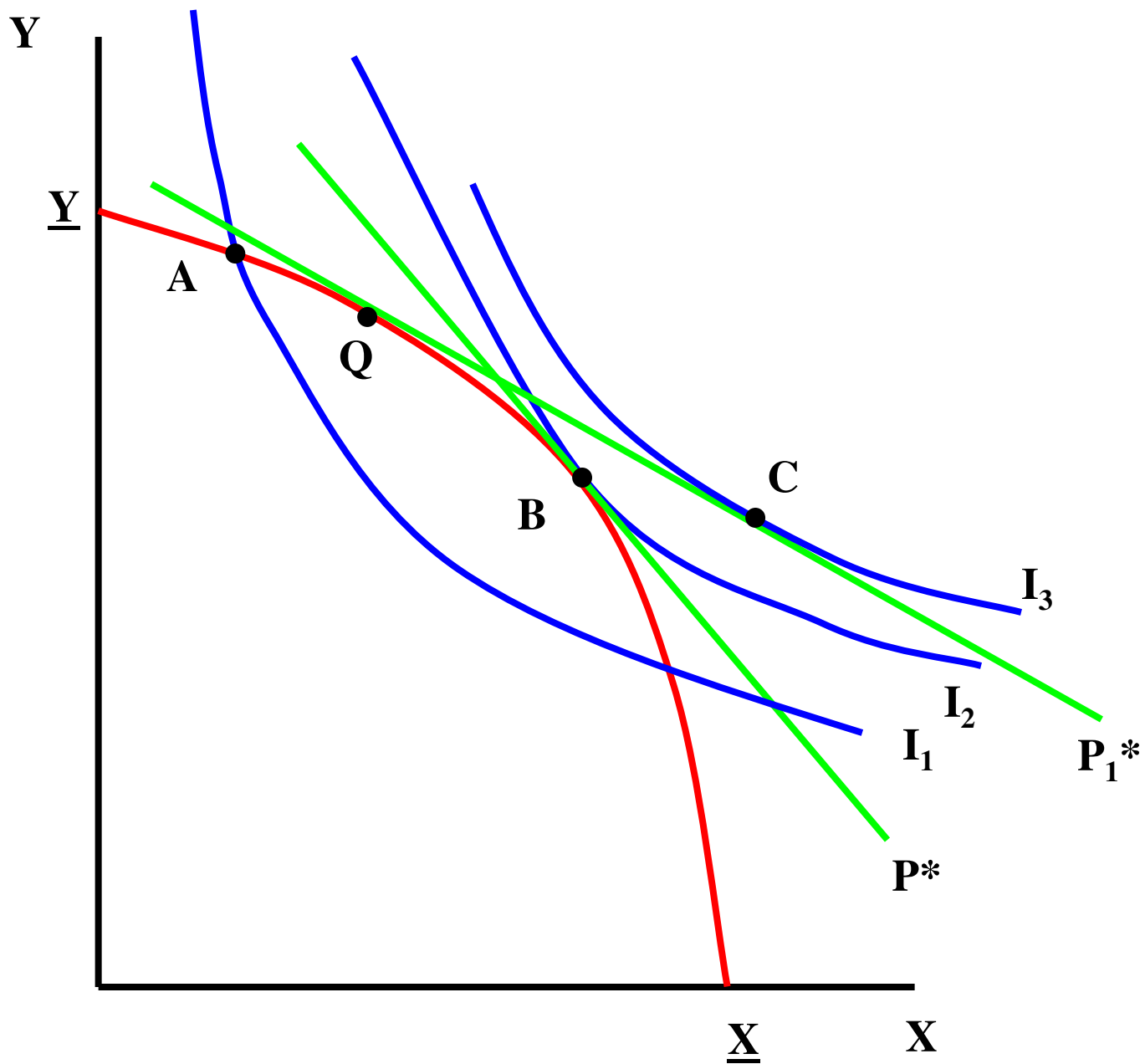
- As the monopoly distortion is endogenous, trade may have additional benefits when there is imperfect competition - "pro-competitive" gains from trade

- In Figure 3, autarky is at point A, X being monopolized; assuming this is a small country, it faces fixed world prices when it trades, which we assume are equal to undistorted autarky prices, $p^a = p^*$

- With trade, former monopolist faces a constant p_x^* , so $MR = p_x^*$, i.e. the perceived elasticity of demand is infinite, so monopoly distortion goes to zero

- Home country shifts to B, the move from A to B being the *pure, pro-competitive* gain from trade, i.e. the gain in a closed economy from eliminating monopoly

FIGURE 3: PRO-COMPETITIVE GAINS FROM TRADE



- Typically there will be gains due to comparative advantage, so world prices are p_1^* , and trade takes economy from A to C

- The gains are made up of the pro-competitive effect, A to B, and the normal gains from trade of B to C, i.e. the pro-competitive effect adds to the gains from trade

■ Cournot Competition

- Suppose there are two identical countries each with a single producer of good X, autarky equilibrium in Figure 4 being at A for both countries

- Now allow for free trade, and assume each firm in this duopoly chooses their optimal output given output of the other firm, i.e. Cournot-Nash behavior

- Let X_h and X_f be outputs of home and foreign firms. With trade, let the world price of X be $p_x = p(X)$, where $X = (X_h + X_f)$

- Perceived marginal revenue for the home firm is:

$$\mathbf{MR_{xh} = p_x + X_h \{(dp_x/d_x).(dX/dX_h)\}} \quad (9)$$

where for Cournot beliefs, $(dX/dX_h) = 1$

$$\therefore \mathbf{MR_{xh} = p_x + X_h (dp_x/dX)} \quad (10)$$

- Multiplying $X_h (dp_x/dX)$ by X/X :

$$\mathbf{MR_{xh} = p_x + X_h/X \{X.(dp_x/dX)\}} \quad (11)$$

and then by p_x/p_x :

$$\mathbf{MR_{xh} = p_x + p_x .(X_h/X) \{(dp_x/p_x)/(dX/X)\}} \quad (12)$$

- This is similar to the formula for a monopolist, except for the term (X_h/X) which is share of the home firm in total sales, i.e. $s_h = (X_h/X)$, so (12) is:

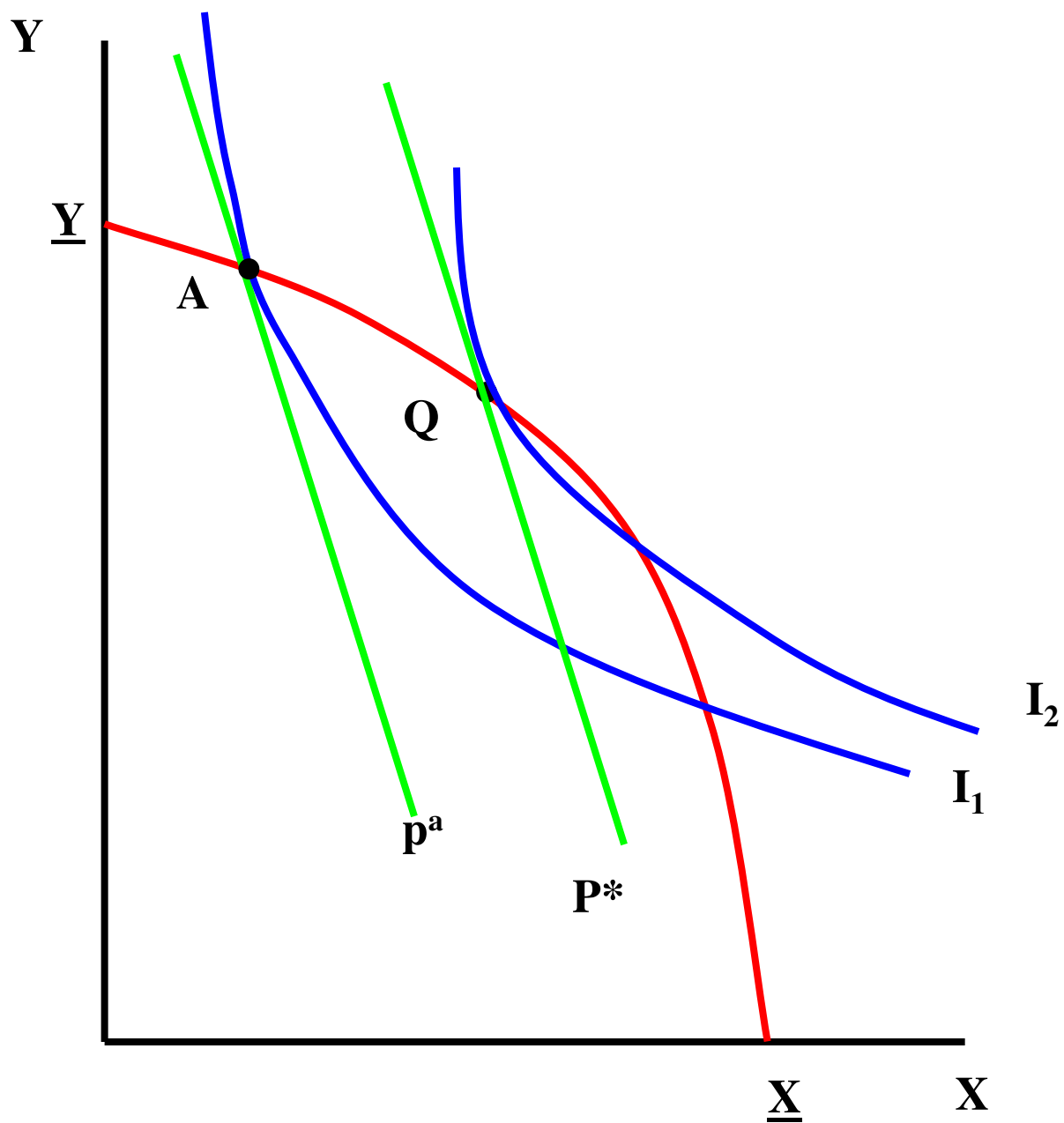
$$\mathbf{MR_{xh} = p_x [1- s_h/e_x] = MC_{xh}} \quad (13)$$

- Under Cournot, the firm's mark-up is given by s_h/e_x , which diminishes with market share

- When the home firm raises output, revenues lost through reduced price are shared between both firms - home firm takes no account of revenue loss to the foreign firm (and vice-versa)

- (13) proves formally that adding firms through trade makes demand facing any individual firm more elastic
- In Figure 4 open up trade between two identical economies where A is autarky for both; can A still be an equilibrium?
- Examining (13), market share for each firm falls from 1 to 1/2, so given e_x , the fall in s_h (s_f) means that marginal revenue MR_{xh} (MR_{xf}) rises
- If one firm raises output, believing the other will hold output constant, some of the loss in revenue from a lower price on the infra-marginal units is borne by the other firm
- With trade, each firm perceives MR to be in excess of MC, each firm raises output until $MR=MC$, i.e. move to Q with prices still at $p^a = p^*$
- There is no net trade, as each country consumes and produces the same amounts of X and Y (with no trade barriers, some consumers could be buying from the foreign producer, but such trade balances exactly - intra-industry trade in identical goods)

FIGURE 4: COURNOT COMPETITION AND TRADE



- There is a gain from removing trade barriers as competition between the producers of X generates an increase in output in each country - it is a pure pro-competitive gain from trade

- As the countries are identical, there is no pattern of comparative advantage, *yet* there is a gain from trade, i.e. comparative advantage is not a *necessary* condition for gains from trade