

### PC3: Imperfect Competition

#### Exercise #1. Gains of trade under imperfect competition

In country 'A', there are  $N$  apple orchards indexed by  $i \in \{1..N\}$ , each producing a given variety of apple: Golden Delicious, Granny Smith, etc. Each farmer is a monopoly producer on its market segment, and it is small enough to take as given the average price of apples. The perceived demand  $Y_i$  and cost function  $C_i$  of farmer  $i$  are:

$$(1) \quad Y_i = \bar{Y} \left[ \frac{1}{N} - b(P_i - \bar{P}) \right] \quad b > 0$$

$$(2) \quad C_i = f + cY_i \quad f, c > 0$$

where  $\bar{Y}$  is the (exogenous) total demand for apples,  $P_i$  is the selling price set by farmer  $i$  and  $\bar{P}$  is the average price across market segments.

In the short run, the number of orchards is fixed.

1. Comment the model's assumptions. Plot the average cost curve of the representative orchard as a function of the number of farms,  $N$ .
2. Invert the demand function and compute the marginal revenue, then the first-order condition of profit maximization. Where does the equilibrium price lie on the preceding figure?

In the long run, the number of orchards is endogenous due to free entry on the market.

3. What is the number of farms and the long-term equilibrium price? What is the individual production of each farm? Explain its relation with  $\bar{Y}$  and  $f$ .

Country 'A' strikes a free-trade deal with country 'B' which is identical to country 'A' (same total demand for apples, same technology).

4. What is the total number  $N$  of farms in the short run? In the long run? What if before opening the market to foreign trade, governments in each country decide to compensate fully the revenue losses of farmers?



2. We suppose that proportional transport costs  $\tau_{ij}$  apply to the importing country:

$$p_{ij} = (1 + \tau_{ij})p_i$$

where  $p_i$  is the price at departure from exporting country  $i$  (the so-called ‘free-on-board’ or ‘FOB’ price) and  $p_{ij}$  is the price at arrival in country  $j$  (‘cost, insurance and freight’ or ‘CIF’ price). How do transport costs impact on exports from  $i$  to  $j$ ?

3. Infer from the last question the equation explaining aggregate trade between  $i$  and  $j$ .

4. Based on the following pooled regression, assess the effect, for trade of goods and services, of sharing a common currency.

	(1)	(2)	(3)	(4)	(5)	(6)
ln Pop, $i$	0.978 <sup>a</sup> (0.006)	0.893 <sup>a</sup> (0.009)	0.290 <sup>a</sup> (0.046)			
ln Pop, $j$	0.837 <sup>a</sup> (0.006)	0.835 <sup>a</sup> (0.008)	0.962 <sup>a</sup> (0.040)			
ln GDP/Pop, $i$	1.118 <sup>a</sup> (0.007)	0.921 <sup>a</sup> (0.010)	0.732 <sup>a</sup> (0.015)			
ln GDP/Pop, $j$	0.945 <sup>a</sup> (0.007)	0.702 <sup>a</sup> (0.010)	0.634 <sup>a</sup> (0.015)			
ln Dist (avg)	-1.035 <sup>a</sup> (0.014)	-1.197 <sup>a</sup> (0.015)				
Shared Language	0.506 <sup>a</sup> (0.034)	0.522 <sup>a</sup> (0.038)				
Shared Legal Origins	0.313 <sup>a</sup> (0.026)	0.160 <sup>a</sup> (0.029)				
Colonial History	1.560 <sup>a</sup> (0.380)	2.605 <sup>a</sup> (0.206)				
RTA	0.958 <sup>a</sup> (0.044)	0.593 <sup>a</sup> (0.026)	0.521 <sup>a</sup> (0.027)	0.400 <sup>a</sup> (0.029)	0.411 <sup>a</sup> (0.034)	0.317 <sup>a</sup> (0.033)
Both GATT	0.125 <sup>a</sup> (0.020)	0.155 <sup>a</sup> (0.016)	0.159 <sup>a</sup> (0.017)	0.244 <sup>a</sup> (0.038)	0.368 <sup>a</sup> (0.041)	0.206 <sup>a</sup> (0.042)
Currency union	0.688 <sup>a</sup> (0.091)	0.483 <sup>a</sup> (0.064)	0.486 <sup>a</sup> (0.068)	0.499 <sup>a</sup> (0.047)	0.469 <sup>a</sup> (0.056)	0.309 <sup>a</sup> (0.089)
Tetrads: Fixed Effects:	None	Dyads(RE)	Dyads	GBR,FRA Tetrads	USA,DEU Tetrads	CHE,CAN Tetrads
# Obs.	618233	618233	618233	635531	651603	633190
RMSE	2.165	1.480	1.473	1.677	1.722	1.832

Source : Head, Mayer and Ries (2008).

Notes:

- The first three columns portray results where exporter and importer population and per-capita GDP proxy for exporter-specific and importer-specific effects. In the ensuing three columns, these effects are eliminated by creating tetradic trade flows. This requires choosing reference countries. To investigate the robustness of the method, we employ three country pairs—Great Britain-France, the United States-Germany, and Switzerland-Canada—as the reference countries and report estimates for all three. All specifications include year dummies that are not reported in the table;
- ‘RTA’ signals the existence of a regional trade agreement;
- Standard errors in parentheses with <sup>a</sup>, <sup>b</sup> and <sup>c</sup> respectively denoting significance at the 1%, 5% and 10% levels. Standard errors are corrected to take into account correlation of errors within dyads in columns (1) to (3). Columns (4) to (6) use three-way clustering by dyad, i-year, and j-year using Cameron et al. (2006) method.