

PRELIMINARY EXAMINATION FOR THE Ph.D. DEGREE

Instructions: Answer FOUR questions in total (with at least ONE from each section).

Section I

1. (a) Briefly derive the Heckscher-Ohlin-Vanek (HOV) equation linking the factor content of trade to the relative endowments of countries, assuming that technologies are identical across countries and that tastes are identical and homothetic across countries.

(b) Now let us drop the assumption that tastes are homothetic, and introduce non-homothetic tastes using a “linear expenditure” system. Denoting per-capita consumption of good i by d_i , $i=1, \dots, N$, we suppose that the utility function in any country is given by:

$$U = \prod_{i=1}^N (d_i - \bar{d}_i)^{\phi_i}, \quad \text{with} \quad \sum_{i=1}^N \phi_i = 1.$$

The parameters $\bar{d}_i \geq 0$ in the utility function are interpreted as the “minimum consumption” of each commodity $i=1, \dots, N$. They are assumed to be the same across countries, as are the parameters $\phi_i > 0$. Then maximize utility subject to the budget constraint $\sum_{i=1}^N p_i d_i \leq I$, and show that per-capita demand for each commodity is given by:

$$d_i = \bar{d}_i + \phi_i (I - \sum_{j=1}^N p_j \bar{d}_j) / p_i.$$

(c) Now introduce the superscript c to denote *countries*, which differ in terms of their per-capita income I^c . Assuming that prices are the same across countries due to free trade, we can normalize them at unity, and rewrite demand in the more compact form,

$$d_i^c = \delta_i + \phi_i I^c,$$

where $\delta_i \equiv (\bar{d}_i - \phi_i \sum_{j=1}^N \bar{d}_j)$ are the values of “minimum consumption” measured relative to their mean. Multiply the per-capita demand by county population L^c to obtain *total demand*, $D_i^c \equiv L^c d_i^c = \delta_i L^c + \phi_i E^c$, where $E^c \equiv L^c I^c$ denotes *total expenditure* in country j . We can write this in vector notation as, $D^c = \delta L^c + \phi E^c$. Using this demand function, re-derive the HOV equation linking the factor content of trade to the relative endowments of each country.

2. Suppose that there are two outputs – nontraded good 1 and traded good 2 – and three inputs – labor, capital, and an imported input. Assume that the cost share of labor is higher in nontraded good 1, and the cost share of capital is higher in traded good 2. The prices of both outputs are treated as fixed initially, but the price of the imported input increases.
- (a) Write down the zero-profit conditions and totally differentiate these.
 - (b) Determine the impact of the increase in the imported input price on the wage and rental, assuming that the *traded good 1 has a higher cost share of imports*. Can we definitely determine the effect on the *relative wage/rental*?
 - (c) If the price of the nontraded good changes endogenously due to the increase in the price of imported inputs, how will this affect your conclusions in part (b)?
3. (a) Consider a country importing from a single, monopolistic foreign firm. If a tariff is applied, then what is the impact on the domestic price? Derive an expression for the *optimal* tariff.
- (b) Now consider a duopoly situation, with one firm in each country. Is it possible for both firms to both find it profitable to dump in the other firm's market? Explain how this can occur, and under what condition(s).
 - (c) Now let us model the situation with dumping as a Cournot-Nash equilibrium with both firms selling in the *home* market. Suppose that this country applies an import tariff. What would be the effect on the home reaction curve, and on the equilibrium quantities and profits of each firm? Therefore, what is the effect on home welfare?

Section II

4. Suppose Egypt implements a trade package that reduces its tariff and non-tariff barriers dramatically. You've been asked to assess the implications of the trade reform for Egyptian productivity (TFP) and imports.

a) Describe how Harrison measures total factor productivity. In particular, show her equation for TFP and explain how it relates to factor inputs, markups and returns to scale.

b) Observed total factor productivity growth is generally measured by:

$$\phi = dy - \alpha_l dl - \alpha_m dm$$

Suppose Egyptian firms are characterized by constant returns to scale and no individual firm effects. Will estimates of trade reform based productivity changes measured by ϕ be upward or downward biased compared with true TFP changes. Your answer should include any assumptions you make in forming your prediction.

c) Suppose you have data on Egyptian firms. What regression specification would you use to test for the importance of markups and returns to scale, as well as for the effects of the trade reform?

d) In a related vein, you decide to use industry level data to see how the reduction in tariff and non-tariff trade barriers has influenced the level of Egyptian imports. Are you likely to get an accurate estimate if you regress changes in imports on changes in protection? (assume that changes in protection are measured by the the average tariff rate) If not, explain how could you could improve your estimating approach.

5. Consider the North American car market. Suppose that production for the North American market originates from 4 locations [U.S., Mexico, Canada and the rest or the world (ROW)], as in the framework described in Markusen, Rutherford and Hunter.

a) Provide the profit function (Π_u) that describes the profits of a North American multinational firm's sales in the U.S.

b) Take the derivative of your profit function with respect to sales of the multinational generated by U.S. production (X_{uu}), and derive the optimal mark-up for the multinational firm. Describe the characteristics that will elevate the markup it selects.

c) How does the optimal markup derived in b) change if it is computed instead for a national firm? Based on the new mark-up calculation, compare the pro-competitive effects of trade liberalization for the multinational and national firm cases.

d) Suppose a U.S.-headquartered firm serves its U.S. customers with production that originates both from the U.S. and Mexico ($X_{uu} > 0$ and $X_{mu} > 0$). Assume further that prior to trade liberalization, Mexico is characterized by low production costs, but high consumer prices. Finally, assume that consumer arbitrage is operative once trade liberalization is introduced to North American markets. What do these facts imply for the level of the multinational firm's markup in the U.S. market? In other words, compare the markup applied to the multinational's Mexican production sold in the U.S. with the markup applied to the multinational's sales of U.S. production in the U.S. market.

6. Export Behavior of Firms

- a) Describe the "stylized facts" that characterize exporting firms.
- b) What do the "stylized facts" imply for the wisdom of national policies, such as export subsidies, designed to promote exports? Evaluate from the selfish national welfare perspective.
- c) Suppose you want to identify the degree of exporter market power, as is done by Goldberg and Knetter, for the case of U.S. medical supply firms exporting to Britain, Germany and Greece. Describe the methods you would use to identify the degree of U.S. firm market power in these three export markets. In addition, explain how you would determine the relative level of substitutability between U.S. products and products from other countries.