TOPICS IN INTERNATIONAL TRADE (ECONOMICS 507A)
Final Exam

December 17, 2007

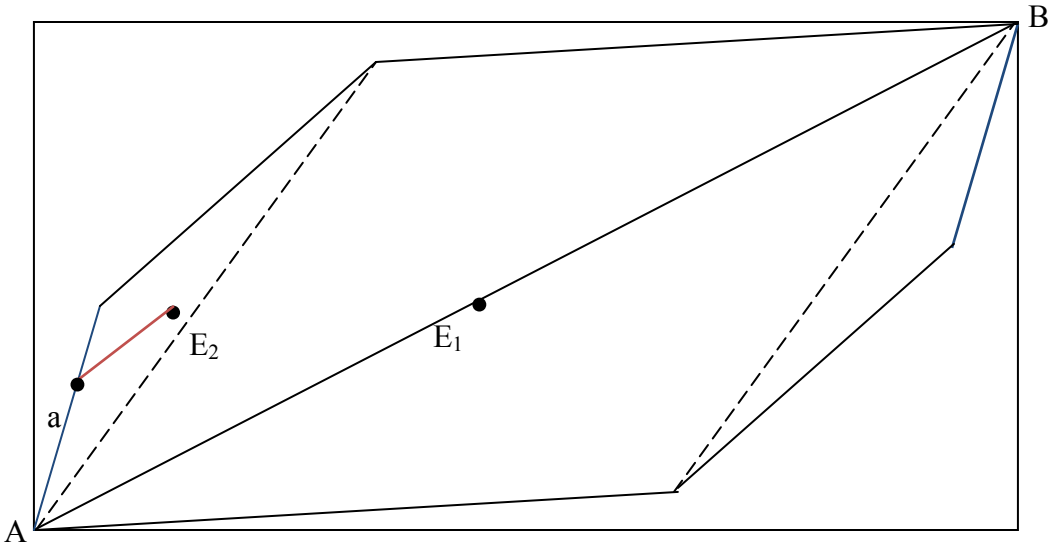
Professor Tybout

Suggested answers

Please write your student ID number at the top of each page you turn in and number all pages (For example, if you use 6 pages, label them 1 of 6, 2 of 6, and so on.) Do not write your name anywhere on the exam.

You must answer all questions on this exam—each will receive equal weight. Good luck, and have a great winter break!

1) Assume two identical countries—A and B—produce a homogeneous product and a product that requires headquarter services as well as production facilities. Describe the effects on the location of each type of activity when labor migrates from country A to country B for exogenous reasons. (Perhaps as global warming takes place, the beaches in country B become relatively attractive.) In your answer, first use the Helpman and Krugman (1995) representation of multinational investments, then use the Markusen and Venables (1998) representation. If your predictions differ for the two models, explain why.



Helpman/Krugman: Let the homogeneous product be the most labor-intensive, and let headquarter services be the most capital intensive. At the initial endowment point there is no need for trade *or* multinational investments; each country can produce and consume half of the global amount of all activities in the integrated equilibrium. Starting from this equilibrium, consider moving the endowment point from E_1 to E_2. If headquarter services must be located in the same country as the production activities they oversee, the FPE set is defined by the dotted lines above, and moving from E_1 to E_2 will result in a reduction in the relative price of (human?) capital. However, if headquarter services can be located in a different country from the production activities they oversee, the movement from E_1 to E_2 will simply result in a reallocation of activities between countries. The allocation of activities across countries is not unique (because there are more goods than factors), but a plausible scenario has A supplying Aa of the headquarters activity and aE_2 of factory production. Since Aa is more than enough headquarter services to support aE_2 of factory production, some of A's headquarter services will support foreign factory production—this is what Helpman and Krugman characterize as multinational headquarters overseeing a foreign subsidiary.

Markusen/Venables

In this model, multinationals arise when the advantages of avoiding transport costs outweigh the advantages of producing in the low wage country and the disadvantage of paying fixed costs for multiple production facilities. International wage differentials disappear when the two countries have identical factor endowments, so

multinationals are the dominant organizational form. As labor moves from A to B, relative wages fall in B, and eventually all production of the manufactured good shifts to B. (From there, manufacturers service consumers in A through exports.) Thus, contrary to the Helpman/Krugman model, differences in relative factor endowments cause multinationals to disappear rather than appear. The key distinctions between the two papers are (1) HK assume there are no trade costs while MV allow for positive costs, and (2) HK limit their analysis to the case of factor price equalization, while MV consider endowment points outside the FPE set.

2) Indicate whether you agree or disagree with the following assertion concerning Stephen Yeaple's (2005) model, and explain why.

> Increases in the elasticity of substitution among product varieties (σ) induce some entrepreneurs to shift toward the "high tech" (high fixed cost, low marginal cost) production technology. Therefore, increases in σ have the same effect on wage distributions as reductions in trade costs (τ).

Your score for this question will be based entirely on the explanation you provide.

Uncertain. An increase in σ makes goods better substitutes, and thus increases the change in revenues and profits associated with a given change in prices. Accordingly, ignoring trade for the moment, the elasticity of revenue with respect to marginal costs is larger when σ is high. This increases the incentive to adopt the high-tech technology. However, when σ is high, foreign demand for each product is relatively sensitive to trade costs, and foreign sales are therefore smaller relative to domestic sales. This shrinkage of total market size with σ tends to reduce the pay-off to adopting the high-tech technology.

In terms of model mechanics, the ratio of zero profit conditions for high-tech and low-tech firms is: $C_H/C_L = (F_H/F_L)^{-1/\sigma}$ **in the closed economy case, and** $C_H/C_L = \left((F_H + F_X)/F_L(1+\tau^{1-\sigma})\right)^{-1/\sigma}$ **in the open economy case. Once fixed costs and trade costs pin down the ratio of unit production costs, these in turn determine the cut-off between high-tech and low-tech workers:** $C_H/C_L = \varphi_L(Z_2)/\varphi_H(Z_2)$**. (Recall that the right-hand side of this expression is a negative function of Z.) Finally, market clearing in *Y* goods implies that whenever** Z_2 **increases,** Z_1 **must decrease, and this relationship does not depend upon σ. Thus, when σ increases** C_H/C_L **rises in the closed economy, driving down** Z_2 **and driving up** Z_1**. This is the same, qualitatively, as the reaction to a reduction in trade costs in the open economy. But in the open economy,** C_H/C_L **will not rise with σ if σ is sufficiently large relative to τ. To see these results formally, note that in the in the**

closed economy, $\frac{d\ln(C_H/C_L)}{d\sigma} = \sigma^{-2}\ln(F_H/F_L) > 0$ **and in the open economy case,**

$\frac{d\ln(C_H/C_L)}{d\sigma} = \sigma^{-1}\left[\ln(C_L/C_H) - \frac{\sigma-1}{\tau^{\sigma}+\tau}\right]$ **, which can be either sign.**

3) Short answer Indicate whether each of the following statements is true, false or uncertain and explain why. Your grade will be based mostly on your explanation. For maximum credit, be as precise and complete possible.

a) In the Davidson, Matusz and Shevchenko (2007) model, skilled wages simply reflect the marginal revenue product of skilled workers. Accordingly, they rise with trade liberalization for the same reason that they rise with liberalization in Yeaple's (2005) model.

Not quite true. The effect of openness on skilled wages is similar in these models. In Yeaple's model, openness increases the return to adopting the high-tech technology, which gives skilled labor a relatively high marginal revenue product and drives up skilled wages. In DMS, openness once again increases the return to adopting a the skill-intensive technology and thereby drives up demand for skilled labor. But in DMS a wage bargain is struck and agents are forward-looking, so there is more to the skilled wage than the marginal revenue product of skilled labor. Specifically, wages reflect the reservation wage of skilled workers, which in turn reflects labor market tightness.

b) In the model developed by Antras et al (2006), going from autarky to international team formation improves income for everyone in the world except southern managers, whose teams are competed out of existence.

False. The relatively low-skill workers in the north lose from globalization because they were able to match with better quality managers in autarky. The highest skilled managers in the north also lose because their workers become managers, and they are forced to assemble lower quality teams. Finally, the effects on southern managers are more subtle than described. While some of these managers who switch to working lose income, others gain. Consider the worst pre-liberalization southern manager, who has skill level Z_S^*. This person was making the same as the best worker before liberalization, so she experienced an increase in income equal to the vertical distance from $m_s(Z_S^*)$ to $m_w(Z_S^*)$ as she switches over to working for a northern manager. At the end of the spectrum of switching southern managers, the worst Southern managers who *isn't* competed out of existence (i.e., the former manager at the at the Z_W^* cut-off) experiences a reduction in the quality of her workers equal to the horizontal distance between $m_s(z)$ and $m_w(z)$ at height Z_W^*. The fact that this manager prefers this to becoming a

worker suggests that the manager at Z_W^* - ε, who *did* switch must have experienced a loss in income almost exactly as large.

c) Most multinational investments flow from rich countries to poor countries, and reflect corporate attempts to reach consumers in the latter countries without incurring trade costs.

False. Although north-south investment flows have been rising, the majority of these flows remain north-north. Further, the north-south flows have largely been vertical investments rather than horizontal. That is, they have been shifting one stage of production offshore to exploit cheap labor, rather than creating integrated production facilities in developing countries to service local consumers.

4) Suppose that, because of wage differences, it is cheaper to manufacture the components for General Motors cars in Mexico than to manufacture them in the U.S. Also, because they have local contacts and are familiar with local business practices, Mexican-owned plants are better at producing these components than GM subsidiaries located in Mexico.

a) Adopt the hold-up model described in Barba-Navaretti and Venables. Is GM more likely to establish a subsidiary (instead of using a Mexican contractor) for components that are relatively standardized (i.e., can be used in any type of car, GM or otherwise)? Defend your answer as rigorously as possible, and be sure to mention all factors that might be relevant to GM's decision.

When components are standardized, local (Mexican) suppliers have good outside options if their negotiations with GM breaks down, so they will be able to capture a large portion of the revenues created by their collaboration with GM. This will encourage GM to want to avoid the hold-up problem by establishing its own production facilities in Mexico. Whether it does or not will, of course, depend upon other factors too, like the share of the rents created by the collaboration that GM can capture (called θ in the readings and lectures) and the value of GM's outside option.

b) Now adopt the agency model described in Barba-Navaretti and Venables. Characterize the locus of $\left(\alpha, \frac{N_L}{N_H}\right)$ combinations at which GM should be indifferent between establishing a subsidiary and contracting with a Mexican supplier. (Here $\alpha > 1$ is factor by which resource costs increase when GM does the component production itself, and N_j, $j = L, H$ is a binary, stochastic measure of local demand that only producers in Mexico can observe.) Explain the slope of this locus—i.e., why it is positive or negative—and provide an interpretation for any other factors it depends upon.

When there is a lot of variability in market demand conditions (i.e., when $\frac{N_L}{N_H}$ is very low), local managers are in a position to extract a lot of

information rent from the multinational. These are rents that the multinational could avoid giving up to local managers if they set up their own firms, run by trusted people from headquarters. On the other hand, when α is very high, the cost of using a subsidiary rather than a local manager is very high. There is therefore a negative relationship between $\frac{N_L}{N_H}$ and α, holding the probability of a good state (β) constant. (When an increase in $\frac{N_L}{N_H}$ encourages firms to outsource, an offsetting *decrease* in α makes the profits from a subsidiary larger too.) However, as β goes to 0 or 1, the amount of uncertainty about market states declines, and the associated amount of rent that the multinational must share with local managers decreases. Accordingly, movement of β toward 0 or 1 eliminates the need to sacrifice efficiency by creating subsidiaries rather than contracting with local agents.