Take-Home Final Exam
Due 5:00 PM, Monday, April 29

Instructions:

The exam is open book and open notes. That is, you are free to look at anything that was written by others before you got this -- books, articles, working papers, lecture notes, etc. Do not, however, talk to each other about these questions. If you are uncertain how to interpret any of the questions, ask me.

You should answer all questions, being guided by the points in parentheses to suggest how much effort you should put into each (there are 100 points total). You may give me your answers in blue books, if you wish, or on either handwritten or printed 8½ by 11 sheets. In either case, be sure that the pages are attached to each other. Put your name **only** on the cover or cover sheet, so that I can fold it back and read the exams anonymously.

1.   (20 points) Determine the effects of "learning by doing" in the Dornbusch-Fischer-Samuelson Ricardian model. That is, starting from a free trade equilibrium (with zero transport costs), suppose that unit labor requirements ($a(z,t)$ at home and $a^*(z,t)$ abroad) fall over time at a constant rate per unit time, λ at home and λ^* abroad, in one or both countries, but in only those goods, z, that a country is producing. That is,

$$\mathrm{d}a(z,t)/\mathrm{d}t = -\lambda a(z,t)$$ for all z that are being produced in the home country at time t

$$\mathrm{d}a^*(z,t)/\mathrm{d}t = -\lambda^* a^*(z,t)$$ for all z that are being produced in the foreign country at time t

Specifically,

a)   Suppose first that this learning takes place only the in the home country: $\lambda>0,\ \lambda^*=0$. Determine the effects over time on the range of goods produced in both countries and on their real wages.

b)   Repeat part (a) with both countries learning at the same rate: $\lambda=\lambda^*>0$.

c)   Repeat part (a) under the assumption, admittedly perverse, that foreigners "unlearn by doing," exactly as fast as domestic residents learn: $\lambda=-\lambda^*>0$. [Note: You do not need to determine whether it is possible for the foreign real wage to rise in this case, although you may attempt that for extra credit if you wish. I was not able to determine this.]

d)   [Also optional, for extra credit only.] What would you expect to happen if both countries were to unlearn by doing, that is, $\lambda=\lambda^*<0$?

2.   (20 points) Consider the two-sector, two-factor, two-country, Heckscher-Ohlin Model, with
        the two countries having identical technologies and the home country initially exporting the
        capital-intensive good. There is now an improvement in technology in both countries,
        making it possible to produce 25% more of the labor-intensive good with any given
        combination of factor inputs. Determine the effects of this change on i) quantities of
        production and trade, ii) prices of goods, and iii) real returns to factors in both countries.

        Assume the following:

                •   The countries start and remain in free trade.

                •   Preferences are identical and Cobb-Douglas. (This will make the problem
                        easier. If it doesn't, then you are not getting it right.)

        Consider each of the initial patterns of specialization listed below, examining in each case
        the possibilities that these patterns of specialization will and will not change due to this
        change in technology. Hint: Look first at the world production possibility frontier and the
        equilibria in the world market.

        a)   Both countries initially produce both goods.

        b)   The home country initially produces both goods but the foreign country initially
                specializes in only one.

        c)   The home country initially specializes in one good, but the foreign country initially
                produces both.

        d)   Both countries initially specialize.

3.   (10 points) In the Heckscher-Ohlin Model with arbitrary numbers of goods and factors,
        suppose that prices change by various amounts, $\hat{p}_i$, ranging from a low of ρ_{min} to a high of
        ρ_{max}, with $\rho_{min} < \rho_{max}$. Assuming that all factors are employed in positive quantities in all
        industries, does there necessarily exist a factor whose real return rises unambiguously due to
        this collection of price changes? Does there necessarily exist a factor whose real return falls
        unambiguously?

4.   (15 points) Explain the differences between Trefler (1993) "International Factor Price
        Differences: Leontief Was Right," *JPE*, and Trefler (1995) "The Case of the Missing Trade
        and Other Mysteries," *AER*. Also discuss whether it would have made sense to publish
        Trefler (1993) if Trefler (1995) had been published first.

5.   (20 points) Suppose that we are concerned about the low wage being paid to unskilled labor, especially in comparison to the wage going to skilled labor. Use the two-factor, two-good Heckscher-Ohlin Model of a small open economy, with the two factors being skilled and unskilled labor, to evaluate **and compare** the policies listed below in terms of

       i)   their ability to raise the unskilled wage to some given real level,

       ii)   the effect of doing so on the skilled wage, and

       iii)   the welfare cost to the economy as a whole of doing so.

Assume that the country in question is abundantly endowed with skilled labor, compared to the rest of the world. Also, assume for concreteness that the two goods are unskilled-labor-intensive textiles and skilled-labor-intensive computers.

a)   A tariff on imports of textiles

b)   A tariff on imports of computers

c)   A tax or subsidy on consumption of textiles

d)   A tax or subsidy on consumption of computers

e)   A tax or subsidy on production of textiles

f)   A tax or subsidy on production of computers

g)   A tax or subsidy on employment of unskilled labor

h)   A tax or subsidy on employment of skilled labor

i)   [Optional, for extra credit only.] How would a tax or subsidy on employment of unskilled labor in the textile industry only work here?

6.   (10 points) Does the Stolper-Samuelson Theorem hold in the Helpman-Krugman modification of the two-country Heckscher-Ohlin Model in which one sector, X, is monopolistically competitive? You may assume, as Stolper and Samuelson did, that there are positive outputs in both industries, both before and after the price change. You may also assume, as Helpman and Krugman did, that preferences for the differentiated product are of the Spence-Dixit-Stiglitz type, that there are many producers with free entry, and that the production function for each firm producing X is $X = F(K_x, L_x) - F_0$ where F( ) is a conventional neoclassical production function with constant returns to scale, and F_0 is a fixed cost. [Suggestion: What you are looking for here are relationships between prices of goods and prices of factors that either do or do not have the properties needed to derive the Stolper-Samuelson Theorem.]

7.   (5 points) This is a freebie, or should be: Go back and read the instructions at the start of the exam, and take a moment, before you hand it in, to make sure you are following them.