Final Examination

ANSWER <u>ALL</u> QUESTIONS: <u>150 Points Total</u>

I. True, False, or Uncertain? (10 points each)

In each of the following, state whether the assertion is True, False, or Uncertain. EXPLAIN WHY! Answers that fail to explain why will receive no credit. Due consideration should be given to results that may point in different directions. Where appropriate, introduce equations or diagrams to bolster or illustrate your argument.

1. In the Stiglitz model of capital accumulation and trade, a country with a high rate of time discount (high ρ) will in the autarky steady state have a high marginal product of capital, hence value capital highly (at the margin), and accordingly have a greater steady state autarky capital stock than a country with a low rate of time discount.

2. In comparing the simple Heckscher-Ohlin model with the Stiglitz model of capital accumulation, we can point to a few key differences:

> (A) In the simple H-O model, trade always leads to factor price equalization (FPE), while in the Stiglitz model, trade is never consistent with FPE.

> (B) Trade is always preferable to autarky in the simple H-O model, while in Stiglitz trade is preferable to autarky only for the initially capital abundant country since per capita income falls in the new steady state for the initially capital scarce country.

> (C) In contrast to the simple H-O model with exogenous endowments, the Stiglitz model allows for capital accumulation, and so insures that in the trade steady state both countries will always produce both goods (otherwise at least one would have an incentive to accumulate more capital).

3. When opportunities for learning by doing are properly accounted for, trade inhibits growth.

4. In class, we used the Dornbusch-Fischer-Samuelson model to consider the consequences of neutral technical progress for a laggard country relative to a leader; the introduction of multinational enterprises (MNEs) that imperfectly carry their advanced technologies to another country; and international migration. We saw that the cases of migration and MNEs had clear implications for the welfare of the leading country and ambiguous effects on the laggard country, while the case of neutral technical progress had ambiguous effects for both countries.

5. In class, we developed a model of MNEs to address the issue of internalization. The fundamental internal tension in that model for the final good producer is that forming an MNE would provide direct access to the better technology of the intermediate producer, but would do so at the cost of not being able to maintain as high of a monopoly price for the final good.

II. Problem (50 points)

This problem considers the Krugman model of international trade (based on the underlying Dixit-Stiglitz model of monopolistic competition).

A. We will start with a simple two good model. Let utility be given as $U = \left(x_1^\rho + x_2^\rho \right)^{\frac{1}{\rho}}$. Write down explicitly the consumer's optimization problem and take the first order conditions.

B. Derive an explicit expression for the relative demand for the two goods. What does this depend on and why?

C. Use this expression to find an equation for total spending on good 2. Use the budget constraint to eliminate the term consisting of spending on good 2 and solve for the demand curve facing the producer of good 1. Explain the factors that affect demand.

D. Write down the analogous demand curve for a producer when there are n varieties.

C. In this problem, we assume that σ is constant at a value $\sigma = \dfrac{1}{1-\rho} > 1$. What problem might arise in this approach if σ were constant at a value $\sigma < 1$.

D. Is σ the elasticity of demand facing an individual producer or the elasticity of substitution between varieties? Explain the difference and which is correct.

E. Let marginal costs be c, fixed costs f and labor be the numeraire. Provide an explicit expression for the price of an individual producer.

F. Write down an explicit expression for the price index with n varieties.. Does this rise or fall with n? Show by rewriting this explicitly (and *simplified*) for a given n and a typical variety price p.

G. As n rises, what happens to the demand curve of an individual producer? Why?

H. A firm that produces output x has labor demand equal to $l = f + cx$. Assume that the firm faces an inverse demand curve that can be written as $p(x)$. Write down an explicit expression for firm profits $\pi(x)$.

I. Write down the firm's first order conditions for profit maximization and solve for the optimal price. Is this in agreement with your previous statement about firm pricing?

J. When firms are free to enter, they will do so until profits are bid down to zero. Does anything you have written above demonstrate that as more firms enter this reduces profits for the typical existing firm?

K. Use your expression for profits above and equate this to zero in order to determine the level of output of the typical firm when it earns zero profits. Solve explicitly for this in terms of fundamental parameters (e.g. substituting in for the firm price as needed).

L. What factors influence the equilibrium scale of the firm?

M. In this model, what role does country size play in determining the optimal scale of the firm?

N. How much labor does the typical firm employ in the full equilibrium?

O. How many varieties will an economy with labor force L produce? How is this affected by changes in marginal labor costs? Intuition?

P. Briefly explain the main insights in this model when countries trade costlessly.

Q. Briefly explain how the model changes when we allow for marginal and fixed costs of trading and when we introduce heterogeneity in firm productivity.

III. Essay (50 points)

Write an integrated essay appealing to results developed in the course, to address the following assertion:

> *When markets are open to the free movement of goods, firms, and people, we can expect that incomes across and within countries will both rise and become more equal.*

You are free to support or negate the assertion. Be specific and thorough regarding the analytic results you appeal to. You may also buttress your arguments with historical or empirical examples that you find relevant.