University of California at Berkeley
Department of Economics

International Economics
Field Exam

August 2019

General Instructions:

This is a three-hour field exam. There are four questions in total but you need to answer questions from **three courses**, so that you have 1 hour average for each question:

- Question 1 corresponds to 280A
- Question 2 corresponds to 280C
- Question 3 corresponds to 280D
- Question 4 corresponds to 236B.

Question 1

In this question you will compare the predictions of two different models regarding the welfare effect of immigration. The two models are Eaton and Kortum (2002) and Krugman (1980) (in their simplest versions: only labor, one sector, no intermediates).

We consider a world with frictionless trade composed of two countries, the US and Mexico. Assume that initially there is a wall preventing migration and that the wage is higher in the US than in Mexico. We are interested in understanding the effect of the removal of the wall, which leads to a large number of people moving from Mexico to the US until the wage equalizes in the two countries. What is the effect of this shock on the real wage of people originally in the US and of people originally in Mexico? Do this for both models. Are the results different? Give an intuitive explanation of your findings.

Question 2

This question explores the link between economic size and equilibrium asset returns. The world economy consists of two countries: Home and Foreign. The world is populated by a continuum of households of mass 1. A share α of that population is located in the home country and a share $1-\alpha$ in the foreign country. By varying α, we can vary the relative size of the home country. Time is discrete. Each period, each country receives an endowment of a traded and a non-traded good. y_t^T and y_t^N denote the domestic *per capita* endowment of the traded and domestic non-traded good at time t while y_t^{*T} and y_t^{*N} denote the foreign per capita endowment of the traded and foreign non-traded goods. Preferences are additively separable, defined over consumption sequences:

$$U_t = E_t \sum_{s=t}^{\infty} \beta^{s-t} u\left(c_s\right)$$

where $u\left(c\right) = \left(c^{1-\sigma}-1\right)/\left(1-\sigma\right)$ exhibits constant relative risk aversion (CRRA). The consumption aggregate c is a constant elasticity aggregate of traded and non-traded good consumption:

$$c = \left[\gamma^{1/\theta}\left(c^T\right)^{\frac{\theta-1}{\theta}} + \left(1-\gamma\right)^{1/\theta}\left(c^N\right)^{\frac{\theta-1}{\theta}}\right]^{\frac{\theta}{\theta-1}}$$

where θ is the elasticity of substitution and $0<\gamma<1$ denotes the steady state share of traded consumption expenditures. A similar aggregator applies to the foreign country. The traded good is the numeraire.

1. Write down the resource constraints for this economy. Denote $\bar{y}^T = \alpha y^T + (1-\alpha)\, y^{*T}$ the aggregate per capita endowment of the traded good.

2. Assume that markets are complete. As usual, the complete market allocation solves a constant-weight standard planning problem:

$$\max_{\left\{c_t^T, c_t^N, c_t^{*T}, c_t^{*N}\right\}} \alpha E_0 \sum_t^{\infty} \beta^t u\left(c_t\right) + \left(1-\alpha\right) E_0 \sum_t^{\infty} \beta^t u\left(c_t^*\right)$$

   subject to the resource constraints. Show that the first order conditions of the planner's problem impose the following conditions:

$$\begin{aligned} c_t^{(1/\theta-\sigma)}\left(c_t^T\right)^{-1/\theta} &= c_t^{*(1/\theta-\sigma)}\left(c_t^{*T}\right)^{-1/\theta} \\ q_t &= \left(\frac{\gamma y_t^N}{\left(1-\gamma\right)c_t^T}\right)^{-1/\theta} \end{aligned}$$

   where q_t is the price of the domestic non-traded good. Interpret.

3. Define $x = \left(c/c^*\right)^{\sigma\theta-1}$. x controls the allocation of the global endowment of traded good between domestic and foreign households. Using this definition and the equilibrium condition derived in part 2., show that

$$\begin{aligned} c^{*T} &= x c^T \\ c^T &= \frac{\bar{y}^T}{\alpha + \left(1-\alpha\right)x} \end{aligned}$$

and provide an implicit characterization of x. Describe how x responds to a decline in y^N depending on whether σ is smaller, larger or equal to $1/\theta$. [Note: in particular, you should show that $x = 1$ when $\sigma = 1/\theta$]

4. The –common– stochastic discount factor in terms of tradable goods can be written as [you are not asked to derive this]:

$$M_{t,t+1} = \beta \left(\frac{\gamma^{1/\theta} \left(\frac{\bar{y}^T_{t+1}}{\alpha+(1-\alpha)x_{t+1}} \right)^{\frac{\theta-1}{\theta}} + (1-\gamma)^{1/\theta} \left(y^N_{t+1} \right)^{\frac{\theta-1}{\theta}}}{\gamma^{1/\theta} \left(\frac{\bar{y}^T_{t}}{\alpha+(1-\alpha)x_{t}} \right)^{\frac{\theta-1}{\theta}} + (1-\gamma)^{1/\theta} \left(y^N_{t} \right)^{\frac{\theta-1}{\theta}}} \right)^{\frac{1-\sigma\theta}{\theta-1}} \cdot \left(\frac{\bar{y}^T_{t+1}}{\bar{y}^T_t} \frac{\alpha + (1-\alpha)\, x_t}{\alpha + (1-\alpha)\, x_{t+1}} \right)^{-1/\theta}$$

Show that economic size does NOT matter for asset returns when $\sigma = 1/\theta$. When $\sigma \neq 1/\theta$, explain why the stochastic discount factor increasingly reflects shocks to the larger economy [Hint: take the limit as α tends to 1]

5. Consider a domestic and foreign CPI-indexed bonds. Show that the return –in terms of tradables– on the domestic CPI-indexed bond is

$$R^f_{t+1} = P_{t+1} / E_t \left[M_{t,t+1} P_{t+1} \right]$$

where $P_{t+1} = \left[\gamma + (1-\gamma)\, q^{1-\theta} \right]^{1/(1-\theta)}$ is the price index for domestic aggregate consumption.

6. Assuming that shocks to endowment in both countries and both sectors are log-normally distributed with variance σ^2_ϵ, it is possible to show that the expected excess return on foreign vs. domestic real bonds satisfies [you are not asked to show this]:

$$\ln E_t R^{*f}_{t+1} - \ln E_t R^f_{t+1} = \frac{\sigma\,(\sigma - 1/\theta)\,(1-\gamma)^2}{1 + (\sigma\theta - 1)\,\gamma} (2\alpha - 1)\, \sigma^2_\epsilon$$

Based on your previous results, explain why there is a positive excess return ($\ln E_t R^{*f}_{t+1} - \ln E_t R^f_{t+1} > 0$) when $\sigma > 1/\theta$ and the domestic country is larger ($\alpha > 1/2$).

7. In your view, can this model provide a good explanation for the empirical evidence on the 'exorbitant privilege', i.e. the fact that the U.S. seems to earn higher returns on its external assets, relative to the return it pays on its external liabilities?

Question 3

In this question, we analyze an economic geography model of a city. The city is made up of N neighborhoods indexed by i or n. Agents choose where to live and where to work.

Workers consume a traded good c and housing h. The utility of an agent ω who lives and consumes at n and works at i is:

$$U_{ni}(\omega) = \frac{b_{ni}(\omega)}{e^{\kappa \tau_{ni}}} \left(\frac{C_n(\omega)}{\alpha} \right)^{\alpha} \left(\frac{H_n(\omega)}{1-\alpha} \right)^{1-\alpha},$$

where $b_{ni}(\omega)$ is an idiosyncratic preference shock drawn from a Frechet distribution with shape parameter ϵ:

$$G_{ni}(b) = e^{-B_{ni} b^{-\epsilon}} \qquad B_{ni} > 0, \epsilon > 1,$$

and where $e^{\kappa \tau_{ni}}$ measures the cost of commuting between n and i. It is assumed to depend on τ_{ni}, the travel time between the two locations, as mediated by the parameter κ. The consumption of the traded good is a CES consumption basket across varieties produced in all neighborhoods, with elasticity of substitution σ:

$$C_n(\omega) = \left(\sum_k c_{nk}(\omega)^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}.$$

Production of a differentiated variety of the traded good is made in each neighborhood by perfectly competitive firms with labor productivity A_i. Output in neighborhood i is $Y_i = A_i L_i$. It is traded between neighborhoods subject to an iceberg trade cost d_{ni}. Workers who work in neighborhood i face wage w_i.

Housing is provided inelastically. The stock of housing in neighborhood n is $\bar{H}_n$. Housing is owned by immobile landlords, who receive worker expenditure on housing as income, and consume only goods where they live.

We denote with P_n the price index of the traded good in neighborhood n, and with Q_n the price index of housing in neighborhood n. We denote with R_n the number of residents living in n and with L_i the number of workers working in i.

[Note: the questions below are largely (though not always) independent, so that you may skip some questions and proceed.]

1. What does the shock $b_{ni}(\omega)$ and the parameter B_{ni} capture in this model? What are the $b_{ni}(\omega)$ useful for, in this model?

2. Write down the indirect utility of a worker ω who lives in n and works in i. What is the probability λ_{ni} that a worker lives in n and commutes to i?

3. Write down the commuting market clearing equation that determines L_i as a function of the distribution of residents R_n across all neighborhoods and other variables of the model.

4. Derive the gravity equation for commuting and show that it takes the form:

$$\ln \lambda_{ni} = -\kappa\epsilon\tau_{ni} + \delta_n^o + \delta_i^d + \varepsilon_{ni}.$$

   What type of data and empirical strategy would you use to estimate $\kappa\epsilon$? What are the threats to identification? Why are the two parameters κ and ϵ not separately identified, intuitively?

5. What is the average wage $\bar{\nu}_n$ of a worker who lives in n? Write down the housing market clearing condition in neighborhood n.

6. What remaining set(s) of equations would you need to write to close the model, beyond those established in the questions above? You do not need to write them down mathematically.

7. Monte, Redding and Rossi-Hansberg (AER 2018) is based on a similar model. What are the main takeways from their analysis? How do they test for the model predictions on the elasticity of local employment to a labor demand shock?

Question 4

[Note: Each of the problems 1., 2., and 3. below will be worth 1/3 of the grade for this Question]

1. Exchange rates:

   (a) Describe the major types of exchange rate arrangements that exist in the world, and the primary approaches used to document/define these arrangements.

   (b) What is the state of the evidence on the impact of exchange rate regimes on real outcomes (such as GDP growth or volatility)?

2. In an influential paper, Meese and Rogoff (1983) show that a host of models including the leading structural models of the time as well as time series models (AR and VAR) produced inferior out-of-sample predictions about changes in exchange rate than the simple prediction that the exchange rate would not change (i.e., the random walk model).

   (a) Explain the significance of this paper in the context of the earlier literature, including Frankel (1979).

   (b) Explain the econometric reasons why Meese and Rogoff reached such different conclusions?

   (c) Are Meese and Rogoff's results puzzling from the perspective of the modern theory of exchange rates?

3. What is incomplete exchange rate pass-through? Describe the state of the literature on the magnitude of exchange rate pass-through into US prices.

   (a) What are the main sources of incomplete pass-through that have been emphasized in the existing literature?

   (b) Which of these sources of incomplete pass-through do you think is most important in explaining the overall volatility of the exchange rate? Why?

   (c) Describe the consequences of alternative specifications of household preferences (e.g., logit, CES or Dixit Stiglitz) for the interpretation of low exchange rate pass-through.