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International Economics Field Exam
UCLA
June 2023

Please answer 3 questions corresponding to the courses you have enrolled.

Question 1 (Prof Pablo Fajelbaum).

A measure 1 of agents has preferences over an imported differentiated product and a numeraire outside good Z. Utility of each agent is

$$u(C) + Z,$$

where $u(C)$ is concave and twice differentiable. The economy exports the numeraire. Each agent produces 1 unit of the numeraire. Answer the following questions using known properties of models and, if possible, key equations:

1. (a) In the following scenarios, argue whether the home country gains from imposing a tariff:
    i. The import price for C equals the marginal cost of exporters, equal to C^{β}.
    ii. A monopolist produces C at constant marginal cost; $u(C) = C^{\theta}$; and the tariff is per-unit.
    iii. Same as ii., but the tariff is ad-valorem.
    iv. Same as iii., but the tariff is imposed if the import price is above some $\overline{p} > 0$.

   (b) Starting from an initial equilibrium, the price of the imported product increases by 10%.
    i. Using data on imports, exports, and GDP before the shock, how would you compute the change in welfare (to a first order approximation)?
    ii. Arkolakis et al. (2012)[1] show a welfare formula in response to foreign shocks. Compare your previous answer to their result. Is your formula nested in theirs?
    iii. Suppose that the country had import tariffs in the initial equilibrium. Is the measurement in (1)(a) an over- or under-estimate of the actual welfare change?

[1] Full reference: Arkolakis, Costinot, and Rodriguez Clare (2012), "New Trade Models, Same Old Gains," AER.

Question 2 (Prof Pablo Fajelbaum).

Answer the following questions:

1. (a) In the context of Zhelobodko et al. (2012)[2]: what does the impact of market size on firm size reveal about pro-competitive impacts of trade? Why?

   (b) What does the "home market effect" implies for wages, the number of firms, and firm sizes in Krugman (1980)[3] and in Venables (1987).[4] What key differences between these frameworks lead to differences in predictions?

   (c) Consider the framework in Allen and Arkolakis (2014):[5]

      i. Is the allocation efficient? If not, what policy would make it efficient?

      ii. Suppose that workers consumed a non-tradeable produced from land. Describe assumptions on land ownership compatible with efficiency.

[2] Full reference: Zhelobodko, Kokovin, Parenti, and Thisse (2012), "Monopolistic Competition: Beyond the CES," Econometrica.

[3] Full reference: Krugman (1980), "Scale Economies, Product Differentiation, and the Pattern of Trade," AER.

[4] Full reference: Venables (1987), "Trade and Trade Policy with Differentiated Products: A Chamberlinian-Ricardian Model," Economic Journal.

[5] Full reference: Allen and Arkolakis (2014), "Trade and the Topography of the Spatial Economy," QJE.

Question 3 (Prof Jonathan Vogel).

Aggregate output at each date $t \geq 0$, denoted Y_t, is produced according to the following production function

$$Y_t = \left[H^{\frac{\rho-1}{\rho}} + (L + M_t)^{\frac{\rho-1}{\rho}} \right]^{\frac{\rho}{\rho-1}}$$

where $\rho > 1$. The factors $H > 0$ and $L > 0$ are skilled and unskilled labor, which are inelastically supplied and fixed across time. The factor M is materials, which is produced each period linearly from $1/A_t$ units of final output (according to a roundabout production function). Neither materials nor output can be saved across time. Any final output not used to produce materials is consumed at date t. Hence, the resource constraint is

$$Y_t = C_t + A_t M_t \quad \text{for each } t \geq 0$$

where $0 \leq A_t < 1$ is an exogenous and time-varying productivity and where $C_t \geq 0$ is consumption at date t. Normalize the price of final output (and, therefore, consumption) to one at each date and denote by p_t the price of materials at date t. Suppose that all markets are perfectly competitive. Suppose that A_t satisfies the following properties: (i) A_t is continuously differentiable (in time), (ii) its derivative (with respect to time) is positive, (iii) $\lim_{t \to 0} A_t = 0$, and (iv) $\lim_{t \to \infty} A_t = 1$. Finally, denote by s_t the wage of skilled labor, w_t the wage of unskilled labor, and define the "skill premium" as the relative wage of skilled labor to unskilled labor s_t/w_t.

Characterize the skilled wage, the unskilled wage, and the skill premium as functions of time. To be sure you get points, start at $t = 0$ and solve for each, which will be easy. If you get stuck on the math and want to get partial credit, describe what you think happens over time.

Question 4 (Prof. Oleg Itskhoki)

Consider a small open economy with tradable and non-tradable trees producing a flow of endowment Y_{Tt} and Y_{Nt} respectively. The utility of the economy is given by:

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t [\gamma \log C_{Tt} + (1-\gamma) \log C_{Nt}].$$

The price of non-tradables is the home currency numeraire $P_{Nt} \equiv 1$. Trade balance is $NX_t = Y_{Tt} - C_{Tt}$. The large world tradable endowment is Y_{Tt}^W and it is a foreign currency numeraire, $P_{Tt}^* \equiv 1$. Denote with $\mathcal{E}_t = P_{Tt}$ the home currency price of the tradable good, which is the nominal exchange rate assuming the law of one price.

1. Explain why the nominal exchange rate consistent with the law of one price must be $\mathcal{E}_t = P_{Tt}$. What is the overall price level P_t in the home economy and how does it respond to the exchange rate?

2. Define autarky. Show from the goods market equilibrium that the exchange rate must in general satisfy $\mathcal{E}_t = \frac{\gamma}{1-\gamma} \frac{C_{Nt}}{C_{Tt}}$. What the value of the exchange rate under autarky? Show that the home currency interest rate R_t satisfies $\beta R_t \mathbb{E}_t[Y_{Nt}/Y_{N,t+1}] = 1$. Explain.

3. Assume that under complete markets, a small open economy will have $C_{Tt} = Y_{Tt}^W$ and thus the exchange rate $\mathcal{E}_t = \frac{\gamma}{1-\gamma} \frac{Y_{Nt}}{Y_{Tt}^W}$. Explain why this assumption makes sense or provide a formalization (hint: recall Lucas trees and the optimal risk sharing). Contrast the exchange rate under autarky and complete markets. Argue why the foreign currency interest rate is given by $\beta R_t^* \mathbb{E}_t[Y_{Tt}^W / Y_{T,t+1}^W] = 1$.

4. Consider a single foreign-currency bond risk sharing with a country budget constraint $B_t^*/R_t^* - B_{t-1}^* = NX_t$. Show that $\beta R_t^* \mathbb{E}_t[C_{Tt}/C_{T,t+1}] = 1$. Log-linearize the equilibrium system around $B = NX = 0$ and solve for the equilibrium exchange rate given AR(1) processes with persistence ρ for $y_{Nt} = \log Y_{Nt}$, $y_{Tt} = \log Y_{Tt}$ and $y_{Tt}^W = \log Y_{Tt}^W$. Hint: solve for the dynamics of (c_{Tt}, b_t^*) from the two-equation linearized system, then use the goods market equilibrium condition to solve for e_t which should have the form: $e_t = -(1-\beta) b_{t-1}^* + \frac{1-\beta}{1-\beta\rho}(y_{Nt} - y_{Tt}) + \frac{\beta(1-\rho)}{1-\beta\rho}(y_{Nt} - y_{Tt}^W)$, where $b_t^* = B_t^*/\bar{Y}_T$ and $\beta = 1/\bar{R}^*$. Explain when the equilibrium in this single-bond economy is close to autarky and to complete markets and why.

5. Consider an extension with risk sharing shocks ψ_t such that $\beta e^{\psi_t} R_t^* \mathbb{E}_t[C_{Tt}/C_{T,t+1}] = 1$. What is a possible source of such shocks? Using the home Euler equations for R_t and R_t^*, show that in this case the linearized UIP condition is $i_t - i_t^* - \mathbb{E}_t \Delta e_{t+1} = \psi_t$, where $i_t - i_t^* = \log R_t - \log R_t^*$. Why is ψ_t a UIP shock? Assuming ψ_t also follows an AR(1), show that the solution for the exchange rate in this case becomes $e_t = -(1-\beta) b_{t-1}^* + \frac{1-\beta}{1-\beta\rho}(y_{Nt} - y_{Tt}) + \frac{\beta(1-\rho)}{1-\beta\rho}(y_{Nt} - y_{Tt}^W) + \frac{\beta}{1-\beta\rho}\psi_t$. When does the ψ_t shock result in "excess" volatility of the exchange rate relative to macro fundamentals? Can the resulting allocation be worse than autarky? Provide an example.

Question 5. Prof. Aaron Tornell

Consider a small open economy with moral hazard in credit markets and government bailout guarantees. Concretely, consider a borrower with internal funds w that borrows an ammount b at time t and promises to repay $b * [1 + r]$ at time $t + 1$. With probability α the borrower will have enough income at time $t + 1$ to repay debt in full, while with probability $1 - \alpha$ the borrower will have zero income and will default on the debt. Furthermore, if at time t the borrower incurs a non-pecuniary cost $h[w + b]$, then at time $t + 1$ she will be able to divert all repayment funds and pay nothing to the lender. Lenders are competitive, risk-neutral agents, and have an opportunity cost r.

(a) Assuming that the borrower will not divert funds and repay debt whenever she has positive income, at what interest rate would competitive lenders be willing to lend to this borrower?

(b) Using the interest rate derived in (a) above, derive the borrowing constraint that a lender would impose at time t to ensure the borrower does not divert funds and repays debt at time $t + 1$ in the state in which she has positive income.

(c) Suppose there is a bailout guarantee that is triggered only if a critical mass of borrowers defaults, in which case the government repays lenders all their promised repayments. What would be the borrowing constraint in this case?

(d) What would be the answers to (c) if we assume instead that a bailout is granted anytime a single borrower defaults?

(e) Use the setup in (a)-(d) to describe an economy that exhibits currency mismatch and lending booms.

(f) Mian and Sufi "The Consequences of Mortgage Credit Expansion: Evidence from the U.S. Mortgage Default Crisis," QJE 2009, find that prior to the 2008 crisis, the expansion in mortgage credit to subprime ZIP codes occurs despite sharply declining relative income growth in these neighborhoods. Use the setup in (a)-(d) to provide an explanation of their findings.