

**Master EPP**  
**Eco 572 : International Economics**  
**Final Test, December 11th, 2013**

Note : the international trade and international macro parts have equal weights in the final grade.

**International Macro : Current account imbalances and RER adjustment with borrowing constraints**

Consider a small open economy with a representative agent living two periods with the following utility function :

$$U(c_1^T, c_1^N, c_2^T, c_2^N) = \ln((c_1^T)^\gamma (c_1^N)^{1-\gamma}) + \ln((c_2^T)^\gamma (c_2^N)^{1-\gamma})$$

where  $0 < \gamma < 1$ , and  $c_t^N$  and  $c_t^T$  represent consumption of a nontradable and a tradable good, respectively, at time  $t$ . Denote by  $p_t^N$  and  $p_t^T$  the price of nontradables and tradables at time  $t$ . Due to the small open economy assumption, we treat all foreign prices as constant. In particular we normalize the price of imports in home currency to one.

Denote by  $y_t^N$  and  $y_t^T$  production of nontradables and tradables, respectively, at time  $t$ . Let  $X_t$  be net exports to the rest of the world at time  $t$ . We assume that prices are flexible so that both tradable and nontradable markets clear at all times.

We assume that the agent may lend or borrow at the same interest rate  $r$ . For simplicity we assume  $r = 0$ .

1. Write down market-clearing conditions for both goods.
2. Define the price index as  $P_t = (p_t^N)^{1-\gamma} (p_t^T)^\gamma$ . Show that under the 'law of one price' (LoP) the Real Exchange Rate (RER) is a power function of the relative price of nontradables. From now on we will assume the LoP holds at all times.

3. Write down the consumer's intertemporal budget constraint. Solve for  $c_1^T, c_1^N, c_2^T, c_2^N$  as functions of exogenous variables  $\gamma, p_1^N, p_2^N, y_1^T, y_1^N, y_2^T, y_2^N$ . Show that  $p_1^N = \frac{1-\gamma}{\gamma} \frac{c_1^T}{y_1^N}$ . Write down  $X_1$  and  $X_2$  as functions of exogenous variables.

4. Consider a wealth-neutral, temporary negative shock to tradables' production : that is, the value of  $y_1^T$  decreases, but the value of  $y_2^T$  increases in such a way that  $Y \equiv p_1^N y_1^N + y_1^T + \frac{1}{1+r} (p_2^N y_2^N + y_2^T)$  is unchanged. How does consumption change relative to the values found in the previous question? How do net exports change? How does the RER change? Briefly explain.

5. We now consider a variant of the model where there is a constraint on how much the country can borrow at time 1, such that :

$$X_1 > -\kappa y_1^T, \kappa > 0$$

Briefly comment on this assumption.

Consider the same shock as in the previous question. If the shock is large enough to make the borrowing constraint binding, what will happen to net exports? to the RER?

6. In the 1990's several emerging economies experienced sudden and large decreases in foreign lending ('sudden stops'). In the light of the previous questions, discuss the predicted consequences of sudden stops and how they are affected by trade openness.

## International Trade : Comparative advantages and optimal trade policy

Consider a two-country world with a continuum of mass one of goods,  $z \in [0, 1]$ . In each country, goods are produced out of labor, paid at a wage rate  $w$  in the domestic country and  $w^*$ , normalized to unity, in the foreign country. Labor endowments in each country are denoted  $L$  and  $L^*$ . Labor is perfectly mobile across sectors and immobile across countries.

Production has constant returns to scale and  $a(z)$  (respectively  $a^*(z)$ ) denotes the unit labor cost necessary to produce good  $z$  in the domestic (resp. foreign) country. Producers operate in a perfectly competitive environment so that, in equilibrium, they price at their marginal cost, namely  $wa(z)$  in sector  $z$  of the domestic country and  $w^*a^*(z) = a^*(z)$  in the foreign economy.

To simplify, unit labor costs are assumed homogenous and equal to one in the foreign country,  $a^*(z) = 1 \quad \forall z \in [0, 1]$ . Unit labor costs are instead heterogeneous across goods in the domestic economy and, by convention, goods are ordered along the continuum in accordance with diminishing unit labor costs :  $a(z) < a(z') \quad \forall z > z'$ . In the rest of the exercise,  $a(z)$  is supposed to be invertible (i.e. if  $a(z) = 1$ ,  $z = a^{-1}(1)$ ) and  $a^{-1}(z)$  is increasing in  $z$  since  $a(z)$  is decreasing).

**1.** Explain why the position of a good on the  $[0, 1]$  interval can be interpreted as an indicator of the domestic country's comparative advantage in producing good  $z$ .

**2.** Show that, in the free trade equilibrium of this model, there is a threshold good  $\tilde{z}$  such that all goods  $z \in [0, \tilde{z}]$  are produced and exported by the foreign country while all goods  $z \in [\tilde{z}, 1]$  are produced and exported by the domestic country. Discuss How is  $\tilde{z}$  determined as a function of the equilibrium relative wage  $w/w^* = w$ . Comment.

Preferences over goods are the same in both countries. The representative consumer in each country shares its nominal income across sectors in fixed proportions :

$$\frac{p(z)c(z)}{Y} = \frac{p^*(z)c^*(z)}{Y^*} = b(z)$$

where  $\int_0^1 b(z)dz = 1$ . Here,  $p(z)$ ,  $c(z)$  and  $Y$  (respectively  $p^*(z)$ ,  $c^*(z)$  and  $Y^*$ ) respectively denote the consumption price of good  $z$ , the real consumption of good  $z$  and the aggregate income, in the domestic (resp. foreign) economy.

Let  $\beta(\tilde{z}) \equiv \int_0^{\tilde{z}} b(z)dz$  denote the (endogenous) share of domestic consumption devoted to domestically produced varieties. Under homogenous preferences and in the free trade equilibrium,  $\beta(\tilde{z})$  is also the share of imports in the foreign country's nominal consumption.

**3.** Write the trade balance equation under free trade (or equivalently the equilibrium in the domestic labor market) and show how this determines a second relationship between the equilibrium wage  $w$  and the threshold good  $\tilde{z}$ . Comment

**4.** Explain why, in a free trade equilibrium, an increase in the relative size of the domestic country (an increase in  $L$  holding  $L^*$  constant) reduces the equilibrium relative wage and increases the share of goods that the country specializes in. [Trick : Use the trade balance equation and discuss the impact of  $L$  raising on the equilibrium of labor markets]

**5.** Suppose now that the home country imposes an homogenous ad-valorem tariffs  $\tau$  on all imported goods. Show that there is now a range of products that are no longer traded in equilibrium. Discuss the consequences of such trade policy on the equilibrium wage and the range of goods that are exported by the domestic country. What is the likely impact of such policy on welfare?

**6.** Finally, suppose that the domestic country optimally chooses a vector of good-specific tariffs  $\{\tau(z)\}$  where  $\tau(z) > 0$  represents a tax and  $\tau(z) < 0$  a subsidy. Explain what could be the factors influencing the choice of  $\tau(z)$ , using insights of the different models studied during the course (arguments can go outside of the framework of trade under perfect competition).