

# Außenwirtschaft (International Economics)

## Problem Set 6: 17 January 2020

### Problem 1

Suppose that there are two countries, Home and Foreign. Let foreign variables be marked by an asterisk. Consider one period. All prices are perfectly flexible. Let the nominal exchange rate be constant and normalized to 1. All markets are perfectly competitive. In each of the countries, there is a representative set of firms. Firms in Home demand Home labor to produce good  $x$  according to production function

$$x = z_x h_x,$$

where  $z_x > 0$  is labor productivity in Home and  $h_x$  is labor demand by the firm. Firms in Foreign demand Foreign labor to produce good  $y$  according to

$$y = z_y h_y,$$

with  $z_y > 0$  being labor productivity in Foreign and  $h_y$  is labor demand by the firm in Foreign.

Each country is populated by a representative household. The household demand each of the two goods and supplies  $h = 1$  units of perfectly divisible labor. Goods can be traded without costs.  $p_x$  and  $p_y$  mark prices for the  $x$  and  $y$  good, respectively, in both countries.

The utility function of households in Home is given by

$$\ln(c),$$

where

$$c = \frac{c_x^\omega c_y^{1-\omega}}{(1-\omega)^{1-\omega} \omega^\omega},$$

Households in Foreign maximize

$$\ln(c^*),$$

where

$$c^* = \frac{(c_x^*)^{1-\omega} (c_y^*)^\omega}{(1-\omega)^{1-\omega} \omega^\omega}.$$

Let  $\omega \geq 0.5$ . Note that preferences differ across countries. If  $\omega > 0.5$ , there is home bias in consumption.

Social planner.

- Set up the social planner's problem. Assume that the social planner puts equal weight on welfare of both countries.
- Which allocations would the social planner choose?

Decentralized eqbm.

- Set up the firms' problem in each country and derive the first-order conditions.
- Set up the household's problem in Home and derive the first-order conditions.

- e. State all the market clearing conditions.

One can show that the consumer price indexes are given by, respectively.

$$\begin{aligned} P &= p_x^\omega p_y^{1-\omega}, \\ P^* &= p_x^{1-\omega} p_y^\omega. \end{aligned}$$

Demand in Home for the two goods is given by

$$\begin{aligned} c_x &= \left(\frac{p_x}{P}\right)^{-1} \omega c \\ c_y &= \left(\frac{p_y}{P}\right)^{-1} (1-\omega)c \end{aligned}$$

Demand in Foreign is given by

$$\begin{aligned} c_x^* &= \left(\frac{p_x}{P^*}\right)^{-1} (1-\omega)c^* \\ c_y^* &= \left(\frac{p_y}{P^*}\right)^{-1} (1-\omega)c^* \end{aligned}$$

- f. Define the terms of trade,  $\tau$  (from the perspective of Home).
- g. Define the real exchange rate  $q$  (Home goods/foreign good). Does an improvement of the terms of trade lead to an appreciation of the real exchange rate? Why/when?
- h. Suppose  $p_x \neq p_y$ . Does purchasing power parity hold?
- i. Solve for the equilibrium allocations.
- j. One can show that, in equilibrium, the terms of trade are given by  $\tau = z_y/z_x$ . Treat  $z_y$  and  $z_x$  as parameters and look at comparative statics. Is Home necessarily better off if the terms of trade improve ( $\tau$  rises?). Why/why not?
- k. Is the real exchange rate a good guide to welfare? Why/why not?

Next, assume that trade is costly. Namely, there are costs to shipping from Home to Foreign and *vice versa* such that a fraction  $t < 1$  of goods shipped abroad is lost in transit (“iceberg trading costs”). Let  $p_x$  be the price that Home households pay for good x. Let  $p_x^*$  be the price that foreign households pay for x. And similar for good y.

- l. Derive  $p_x^*$  as a function of  $p_x$ .
- m. Does the law of one price hold in this case?

n. Henceforth, assume that preferences are the same in both countries with

$$c^* = \frac{(c_x^*)^\omega (c_y^*)^{1-\omega}}{(1-\omega)^{1-\omega} \omega^\omega}.$$

In this case, the consumer price level can be shown to be

$$\begin{aligned} P &= p_x^\omega p_y^{1-\omega}, \\ P^* &= (p_x^*)^\omega (p_y^*)^{1-\omega}. \end{aligned}$$

- o. What happens to the real exchange rate when there is an increase in trade costs? Explain.
- p. Based on your previous answers, can you think of a case in which the law of one price fails, but purchasing power parity is maintained?

## Problem 2

- a. Other things equal, how would you expect the following shifts to affect a currency's real exchange rate against foreign currencies?
  - i. The overall level of spending doesn't change, but domestic residents decide to spend more of their income on nontraded products and less on tradables.
  - ii. Foreign residents shift their demand away from their own goods and toward the home country's exports.
- b. Explain why exporters might benefit at the same time as a *real appreciation* of the currency is observed.

## Problem 3

Suppose the government imposes a tariff on all imports. Use the DD-AA model to analyze the effects this measure would have on the economy. Analyze both temporary and permanent tariffs.