# EXAM ECON4330

## Spring 2024

# 1   Real exchange rates [50 Points]

To obtain the real exchange rate we need more than our one homogeneous good. There are two sectors producing traded and non-traded goods.

1. The production function in the two sectors is given by (subscripts $T$ and $N$ is for traded and non-traded):

$$Y_T = A_T K_T^\alpha L_T^{1-\alpha} \tag{1}$$

$$Y_N = A_N K_N^\alpha L_N^{1-\alpha} \tag{2}$$

where $0 < \alpha < 1$. Capital can be rented in an international market at price $r$. Labor is mobile between sectors at home, the wage rate is $w$. The price of the non-traded good is $p$. The price of the traded good is $p_T$.

(a) Set up the maximization problems and find the first order conditions of the firms optimization problem in the two sectors. Use capital intensities,
$$k_T = \frac{K_T}{L_T} \quad \text{and} \quad k_N = \frac{K_N}{L_N},$$
in the conditions.

(b) Solve for the wage rate in the traded sector. How does it depend on the world interest rate?

(c) Solve for the price of the non-traded good, $p$.

(d) Let the real exchange rate be defined as $Q = \frac{EP^*}{P}$ and the price index as $P = (p_T)^\lambda p^{1-\lambda}$, where $\lambda$ is the weight on traded good in the index. Assume $E = 1$ and $P^* = 1$. Assume $p_T$ increases. What happens to the real exchange rate $Q$ and to the real wage, $\frac{w}{P}$?

# Second Question [20 Points]

a) What is a difference between uncovered and covered interest parities?

b) How would you test the hypothesis of free capital mobility (financial integration)?

c) Show using the "fundamental equation of asset pricing" that UIP does not hold in theory.
The "fundamental equation of asset pricing" is:

$$E_1[m_2(r_2^P - i)] = 0$$

where
$m_2 = \beta \frac{u'(C_2)}{u'(C_1)}$ – discount factor
$r_2^P$ – return on a portfolio P
$i$ – safe return

# Third Question [30 Points]

There are 2 periods and 2 goods (traded and nontraded). Domestic price of tradable goods in period $t$, denoted as $P_t^T$, obeys the law of one price:

$$P_t^T = \varepsilon_t P_t^{T*}$$

where $P_t^T$ – domestic price of the tradable good

$P_t^{T*}$ – foreign price of the tradable good

$\varepsilon_t$ – nominal exchange rate defined as the domestic currency price of one unit of foreign currency — so an increase in $\varepsilon_t$ is a depreciation of the domestic currency.

Output of tradable goods of period $t$, denoted as $Y_t^T$, is considered as a countries endowment. Output of nontraded goods, denoted $Y_t^N$, is produced by perfectly competitive firms using labor, $h_t$, as only input using Cobb-Douglas production function with decreasing returns to scale. Price of non-tradable goods, denoted as $P_t^N$.

The representative household has no assets in period 0, gets wage and profit incomes in both periods, and can save in a foreign bond, $B_t$ yielding a return of $(1+r^*)$ (with the traded good as numeraire). Households utility function depends on consumption of both tradables $C_t^T$ and non-tradables $C_t^N$

$$logC_1 + \beta logC_2$$

where $C_t = (C_t^T)^\gamma (C_t^N)^{1-\gamma}$

a) Derive the representative household's intertemporal budget constraint

b) Set up maximization problem and derive supply and demand schedules in equilibrium

c) Assume a fixed exchange rate regime: The exchange rate is constant, $\varepsilon_t = \varepsilon$

How does the economy adjust to different shocks under a fixed exchange rate regime and downward nominal wage rigidity?

i) World interest rate $r^*$ increases

ii) The world cost of the tradable good, $P_1^{T*}$, increases