

ECON3510 Formula Sheet

2019

Symbols

* refers to foreign

variable₁, variable₂ refers to goods 1 and 2

a_i refers to labor hours required to produce good i

variable ^{w} refers to world

s refers to specialized good

General Equations in Terms of Home

Gravity Model: $T_{i,j} = \frac{A \times Y_i \times Y_j}{D_{i,j}}$

Wage: $w_1 = \frac{P_1}{a_1}$

Relative Wage: $\frac{w}{w^*} = \frac{P_1}{a_1} \div \frac{P_2}{a_2^*} = \frac{P_1}{a_1} \cdot \frac{a_2^*}{P_2}$

Real Wages without Trade: $w_1^r = \frac{w_1}{p_1} = \frac{1}{a_1}$

- Note: this is equivalent to MPL

Real Wages with Trade: $w_1^{r1} = \frac{w_1}{P_1} = \frac{1}{a_1}$ wages for good 1 in terms of specialized good 1, $w_1^{r2} = \frac{w_1}{P_2} = \frac{1}{a_1} \times \frac{P_1^w}{P_2^w}$ wages for good 1 in terms of non-specialized good 2

- Note: make sure to use world relative price

Relative Productivity: $\frac{a_1}{a_1^*}$

Marginal Rate of Substitution: $MRS_{1,2} = \frac{MU_1}{MU_2} = \frac{P_1}{P_2}$

Production: $a_1 Q_1 + a_2 Q_2 = L$

Production Possibility Frontier: $Q_1 = \frac{L}{a_1} - \frac{a_2}{a_1} Q_2$

Marginal Productivity of Labor: $MPL_1 = \frac{1}{a_1}$

Opportunity Cost: $OC_1 = \frac{a_1}{a_2}$

Relative Price in Autarky: $\frac{P_1}{P_2} = \frac{a_1}{a_2}$

Relative Price in Free Trade: $\frac{P_1}{P_2} = \frac{\text{total } Q_1^*}{\text{total } Q_2^*}$ where the quantity is the total produced in the economy

Autarky Equilibrium Occurs When: $\frac{P_1}{P_2} = \frac{a_1}{a_2} = MRS_{1,2}$

Closed Trade Specialization of Good 1 Occurs When: $w_1 = \frac{P_1}{a_1} > \frac{P_2}{a_2} = w_2 \Rightarrow \frac{P_1}{P_2} > \frac{a_1}{a_2}$

Free Trade Specialization of Good 1 (World Price is Not Given) Occurs When:

$$\frac{a_1}{a_2} < \frac{a_1^*}{a_2^*} \equiv wa_1 < w^*a_1^* \equiv \frac{a_1^*}{a_1} > \frac{w}{w^*}$$

Free Trade Specialization with World Price Given (three cases):

- Case 1: $\frac{P_1}{P_2} = \frac{a_1}{a_2} < \frac{a_1^*}{a_2^*}$ then foreign specializes in good 2 and home does not specialize
- Case 2: $\frac{P_1}{P_2} < \frac{a_1}{a_2} < \frac{a_1^*}{a_2^*}$ then both home and foreign specialize in good 2
- Case 3: $\frac{a_1}{a_2} < \frac{P_1}{P_2} < \frac{a_1^*}{a_2^*}$ then home specializes in good 1 and foreign specializes in good 2