Exercise Sheet 1: Basics. Short Solutions

Exercise 1

a) The PPF shows what a country can produce (see the lecture slides).

b) The MRT is the (absolute) slope of the PPF. In our case it shows by how many units the production of food must be decreased if one additional unit of clothing is to be produced. The MRT in country A is one. In country B the MRT is increasing in the amount of C produced. In country C the MRT is not well defined.

c) Graphs are shown in the exercise session.

d) Country A produces only C and stops producing F. Country B produces more C and less F but still produces both goods. Country C still produces the same as before, i.e. it produces 2 units of F and C each.

e) Country A will only produce C for any $P_C > 1$. It will only produce F for any $P_C < 1$.

f) Yes, unless one of the prices is zero. If one good has a price of zero country A does not necessarily produce this good (it is indifferent about whether or not to produce a good with price zero).

g) Each country produces at this point of the PPF where the highest isovalue line is reached. However where the country consumes depends on the preferences. Without knowing something about the preferences of the country we do not know which amount of C and F the country consumes. Because a country can trade, production and consumption do not have to be equal!

a) Indifference curves show all consumption bundles (combinations of C and F) that give the same utility to the people in the country.

b) The MRS is the (absolute) slope of the indifference curve. In our case it shows how many units of food are needed to compensate consumers for the loss of one unit of clothing, if their utility level is to stay the same.

c) Graph shown in the exercise session.

d) At the optimal production point under autarky it must hold that MRS = MRT. Suppose $MRS < MRT$, for example MRS = $\frac{1}{2}$ and MRT = 1. Then, consumers are willing to give up one unit of clothing if they get one half unit of food in return. However, if production of clothing is reduced by one unit, one (*full*) additional unit of food can be produced. Utility of the consumers could be increased by producing less clothing and more food at such a production point. The argument is analogous for a production point where $MRS > MRT$. Under autarky, any production point where $MRT \neq MRS$ is thus never optimal, because utility of the consumers can be increased by decreasing production in one sector and increasing it in the other sector.

e) At the consumption point under autarky it must hold that $MRS = \frac{P_C}{P_F}$. Suppose $MRS > \frac{P_C}{P_F}$, for example MRS = 2 and $\frac{P_C}{P_F} = 1$. Then, if consumers trade two units of food against one unit of clothing, their utility would stay the same. However, at current prices, they get *two* units of clothing for two units of food. All consumers would then want to sell food and buy clothing at these prices, and their would be no market equilibrium. The opposite is true if MRS $< \frac{P_C}{P_F}$ (then, everybody would want to sell clothing and buy food). Only if MRS $= \frac{P_C}{P_F}$ are consumers indifferent between trading and keeping what they have, and the market is in equilibrium.

f) Graph shown in the exercise session.

g) The statement is true, as long as preferences are not "strange". In any case the country will never be worse off with trade. The main intuition behind this result is that a country *could* always produce and consume the same as under autarky,

even after it opened up to trade. So if a country changes production and/or consumption after opening up to trade it must be because the country can reach a higher indifference curve by doing this.

Exercise 3

a) Consumption and production under autarky is at point A, at 8 units of clothing and 16 units of food. Relative autarky prices are given by $\frac{P_C}{P_F} = \frac{1}{2} = $ MRT. Note that there is no MRS since consumers are not willing to trade clothing for food at any price when they have the desired relation of 2 units of food per unit of clothing.
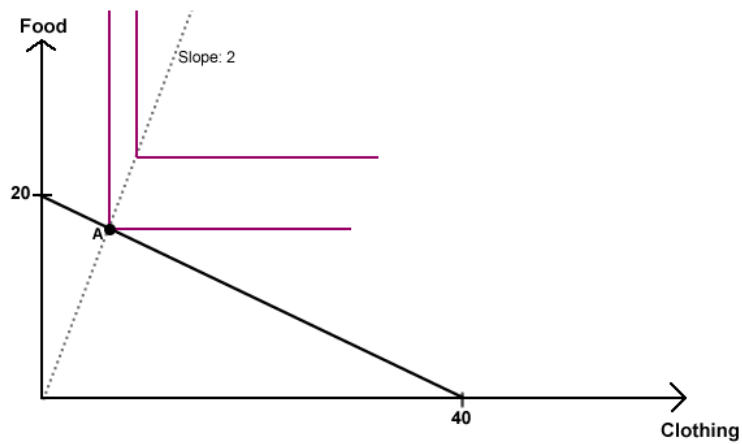
b) The country completely specializes in clothing, producing at point P and consuming at point C. The country is an exporter of clothing and an importer of food. Utility is increased under free trade. The country consumes $\frac{40}{3}$ units of C and $\frac{80}{3}$ units of F.
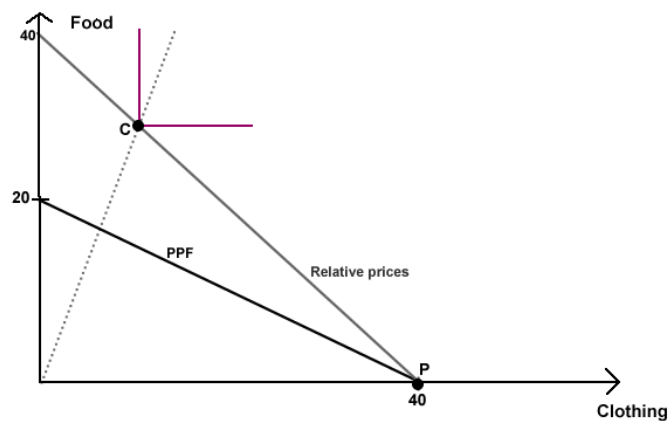
a) Country B "likes clothing more". We know that it must hold $\frac{P_C}{P_F} = \text{MRT} = \text{MRS}$. Since there is no MRT (it is not possible to shift production factors from one sector to another), we have to know the MRS at point P to identify relative autarky prices. Relative autarky prices thus depend only on domestic preferences in this case. Since the MRS of country B is higher at point P, country B has the higher relative price of clothing $\left(\frac{P_C}{P_F}\right)$ under autarky than country A.

b) The free trade relative prices will lie somewhere between the two relative autarky prices. The price at which trade occurs must be such that the quantity one country wants to export equals exactly the quantity the other country wants to import. We cannot derive the exact equilibrium price that prevails under trade without having more information about the preferences. With trade, country A exports C and imports F, and country B exports F and imports C. Each country imports the good which it likes more than the other country such that both countries are better off with trade, compared to living in autarky. (both countries can reach a higher indifference curve with trade).