Economics 51
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Solution Set: Quiz 7

Consider a 2-person economy. Agents A and B both have identical preferencs which can be represented by $U(x_1, x_2) = x_1 x_2$. Person A is endowed with 2 units of x_1 and 8 units of x_2. Person B is endowed with 8 units of x_1 and 2 units of x_2. Therefore, there are ten units each of x_1 and x_2

Part a

Since agents have identical preferences, and the Edgeworth box is square, the indifference curves are mirror images. Given that the MRS for both agents A and B is $\frac{x_2}{x_1}$, we can tell that the MRS will be equal (with value one,) along the line $x_1 = x_2$. The Contract Curve, the locus of all points of tangency between indifference curves, is therefore the line $x_1 = x_2$.

The Core, the set of mutually preferred point, is the area enclosed by the indifference curves which pass through the endowment points.

This is all illustrated in the diagram at the end:

Part b

There are a couple ways to identify the equilibrium price ratio. The first is to observe, as we did earlier, that the two agents' indifference curves are tangent when their marginal rates of substitution equal 1.

The second is to use the demand function provided and calculate the market clearing condition for either x_1 or x_2. Remember, Walras' law says that establishing market clearing for one of the two will be sufficient.

For x_1 :

$$D_1 = \frac{(p_1 e_1 + p_2 e_2)}{2p_1}$$

The market clearing condition is $D_1^A + D_1^B = 10$

$$\frac{(p_1 e_1^A + p_2 e_2^A)}{2p_1} + \frac{(p_1 e_1^B + p_2 e_2^B)}{2p_1} = 10$$

$$\frac{2p_1 + 8p_2}{2p_1} + \frac{8p_1 + 2p_2}{2p_1} = 1 + 4\frac{p_2}{p_1} + 4 + \frac{p_2}{p_1} = 10$$

$$\frac{p_2}{p_1} = 1$$

This an exchange economy with endowments of goods, rather than money income, the price ratio is all that is relevant and is all that can be identified. There is no way to pin down an abolute price level.

Edgeworth Box: Endowment, Core and Contract Curve