The Paretian Optimum

This releases 2 units of X_2 from the production of Q_1, 1 unit of which may be transferred to the production of Q_2 to keep its output at the initial level. If we do all this, the output of Q_1 and Q_2 would remain unchanged, and yet we are left with an extra unit of X_2. We can use this unit in the production of Q_1 (or Q_2) and get more of Q_1 (or of Q_2). Thus, one output is increased without reducing the other output.

The above example shows that if the $MRTS_{X1, X2}$ in the production of the two goods are not equal, if MRTS in the production of Q_2 is lower, say, than that in the production of Q_1; then we have to take away the marginal unit of input X_1 from the production of Q_2 and transfer it to the production of Q_1 where the $MRTS_{X1,X2}$ is higher, and take away from the field the input X_2, in exchange.

As we continue the process, the MRTS in the production of Q_2 would rise as the quantity of X_1 falls, and the MRTS in the production of Q_1 would fall as the quantity of X_1 increases, and, as we have seen, the allocation becomes better in the Pareto sense.

Therefore, if we are to reach the Pareto-efficient situation, we have to continue the process till the MRTS becomes equal in the production of the two goods. For when the MRTS in the production of both the goods becomes the same, no further reallocation will be able to increase the production of at least one of the goods without reducing the production of the other good.

To understand this, let us suppose that the MRTS between the two inputs are equal in the production of the two goods, and it is equal to 4. In that case, if we take away 1 unit of X, from the production of Q_2, and transfer it to the production of Q_1, the latter would release 4 units of X_2 in exchange, so that the output level of Q_1 might remain constant.

These 4 units of X_2 should be transferred to the production of Q_2 because there the MRTS is 4, and when 4 units of X_2 are given to be used in the production of Q_2 in exchange for 1 unit of X_1, the output of Q_2 would remain unchanged at the initial level.

Therefore, by means of a reallocation of the resources, we have not been able to increase the production of at least one of the goods. On the contrary, a reallocation of the inputs would keep the

outputs of the two goods unchanged at their initial quantities.