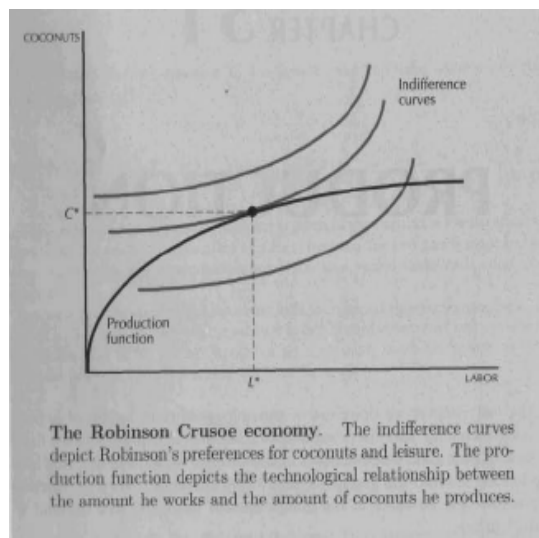# 7   PPF, Comparative Advantages

7.1   The Robinson Crusoe economy

During this analysis Robinson plays two roles: he is both a consumer and a producer. Robinson can either lie on the beach and do nothing, i.e. consume leisure or he can spend time working, gathering coconuts. The more coconuts he gathers the more he has to eat, but the less time he has to relax. Robinson's preferences for leisure and coconuts are depicted on the picture below.

The Robinson Crusoe economy.   The indifference curves depict Robinson's preferences for coconuts and leisure. The production function depicts the technological relationship between the amount he works and the amount of coconuts he produces.

We also illustrated typical Robinson's production function that describes the relationship between how much Robinson works and how many coconuts he gets. The more Robinson works the more coconuts he gets but due to diminishing returns to labor the marginal product of labor decreases as the hours of labor increase. How much will Robinson work and how much he will consume? The optimum combination of labor and consumption is a point where the highest indifference curve touches production function. The production function describes Production possibilities frontier (PPF) - maximum possible output for a given level of input(s). The set below this function is production set.

At this point, the slope of the indifference curve must equal the slope of the production function by the standard argument: if they crossed, there would be some other feasible point that was preferred. This means that the marginal product of an extra hour of labor must equal the marginal rate of substitution between leisure and coconuts. If the marginal product were greater than the marginal rate of substitution, it would pay for Robinson to give up a little leisure in order to get the extra coconuts. If the marginal product were less than the marginal rate of substitution, it would pay for Robinson to work a little less.
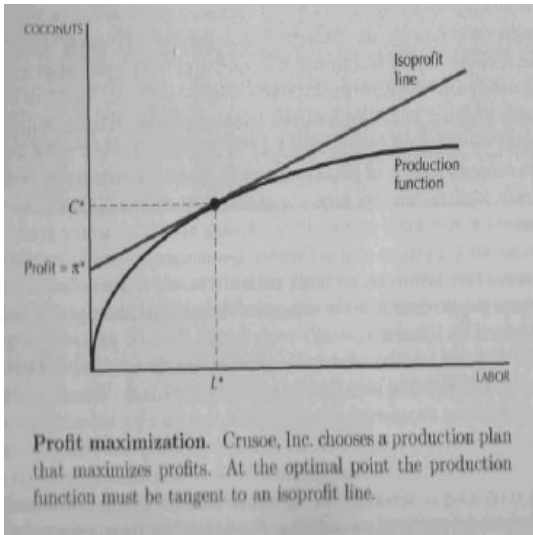
Market approach: Robinson the firm

Each evening, Crusoe decides how much labor it wants to hire the next day, and how many coconuts he wants to produce. Given a price of coconuts of 1 and a wage rate of labor of w, we can solve
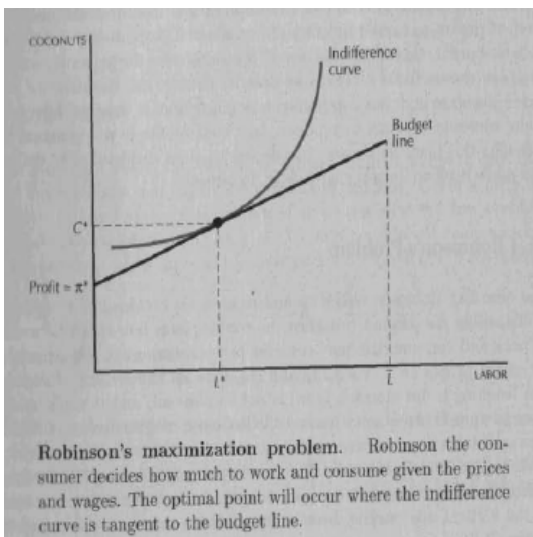
the firm's profit- maximization problem:

$$\max_{C} \pi = C - wL$$

For a given level of profit π, the formula $\pi = C - wL$ or $C = \pi + wL$ describes the isoprofit lines - all combinations of labor and coconuts that yield profits of π. Crusoe will choose a point where the profits are maximized. As usual, this implies a tangency condition: the slope of the production function - the marginal product of labor - must equal w, as illustrated in the picture below.

Profit maximization. Crusoe, Inc. chooses a production plan that maximizes profits. At the optimal point the production function must be tangent to an isoprofit line.
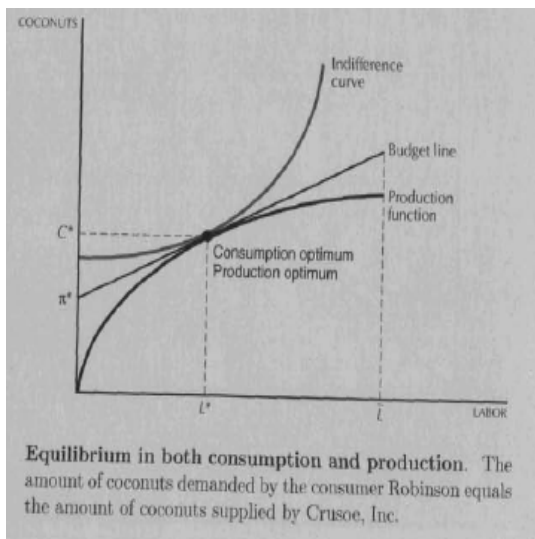
Market approach: Robinson the consumer

The next day Robinson wakes up and receives his dividend of π dollars. While eating his coconut breakfast, he decides how much he wants to work and consume. He may consider just consuming his endowments - spend his profits on π coconuts (the price of coconuts is normalized to 1) and consume his endowment of leisure. But he also might decide to work for a few hours. We can describe Robinson's labor-consumption choice using standard indifference curve analysis. Plotting labor on the horizontal axis and coconuts on the vertical axis, we can draw in an indifference curve as illustrated in the following picture:

Robinson's maximization problem. Robinson the consumer decides how much to work and consume given the prices and wages. The optimal point will occur where the indifference curve is tangent to the budget line.

Note that the indifference curves have a positive slope. This is because coconuts are a good and labor is a "bad". If we indicate the maximum amount of labor by $\overline{L}$, then the distance from $\overline{L}$ to the chosen supply of labor gives Robinson's demand for leisure. Robinson's budget line is also illustrated in the picture above. It has a slope of w and passes through his endowment point $(\pi^*, 0)$ (Robinson has a zero endowment of labor and a π^* endowment of coconuts). At his optimal consumption, the marginal rate of substitution between consumption and leisure must equal the wage rate.

Robinson the consumer meets Robinson the producer

Using the market system (solving separately consumer's and producer's problem) gives exactly the same result as choosing between leisure and consumption directly.

Equilibrium in both consumption and production. The amount of coconuts demanded by the consumer Robinson equals the amount of coconuts supplied by Crusoe, Inc.

Since the marginal rate of substitution between leisure and consumption equals the wage, and the marginal product of labor equals the wage as well, it follows that marginal rate of substitution between leisure and consumption equals the marginal product and hence the slope of indifference curve and production function is the same.

In case on one-person economy using the markets, i.e. dividing the decision onto two parts is unnecessary. However, in economy with many consumers it makes sense - firms and consumers make decisions based on the prices.

Robinson Crusoe Economy helps to illustrate:

- closed economy - no trade

- labor choices under changing environments, consumption-leisure choice

- trade offs, opportunity cost

7.2 Preview to absolute/comparative advantages:

Opportunity cost or economic opportunity loss is the value of the next best alternative foregone as the result of making a decision. Opportunity costs are not restricted to monetary or financial costs: the real cost of output forgone, lost time, pleasure or any other benefit that provides utility should also be considered. There is always an opportunity cost in a decision that is made either in economics or everyday life.

Example: You won a free ticket to see an Eric Clapton concert (which has no resale value). Bob Dylan is performing on the same night and is your next-best alternative activity. Tickets to see Dylan cost $40. On any given day, you would be willing to pay up to $50 to see Dylan. Assume there are no other costs of seeing either performer. Based on this information, what is the opportunity cost of seeing Eric Clapton? (a) $0, (b) $10, (c) $40, or (d) $50.

In other words - what is the minimum amount (in dollars) you would have to value seeing Eric Clapton for you to choose his concert? The correct answer is $10.