Historic Growth and Contemporary Development: Lesson & Controversies

The Economics of Growth: Capital, Labor, and Technology:

1) Capital accumulation, including all new investments in land, physical equipment, and human resources through improvements in health, education and job skills.

2) Growth in population and hence eventual growth in the labor force.

3) Technological process.

Capital Accumulation

Production function: relates inputs and outputs indicating the highest output Q that a firm can produce for every specified combination of inputs.

\[ Q = F(X_1, X_2 \ldots X_n) \]

where Q is output
X is input

In production, there are two scenarios.

1. All inputs are adjustable.
   . Making decisions subject to temporary constraints (plant managers)

2. Some inputs are not adjustable.
   . Mostly there are strategic management decisions, made by “the suits.”

Let’s simplify the Production function (2 inputs)

Q=F (L, K), where K= “things” or machinery and L= people. If both K and L are adjustable, we are in the long run.

The production theory will resemble in some principles of constraints and invisible hand because people are running production facility and most importantly all of the.

An isoquent is a curve that shows all the possible combinations of inputs that yield the same output.
The short run production refers to a period of time in which one or more factors of production cannot be changed.

The long run production is the amount of time needed to make all inputs variable. Q = F (K, L), where K = “things” or machinery and L = people if both K and L adjustable, we are in the long run.

~OR~

Q = F (L, Ko), where Ko is constant (Ko is fixed at K).

Let’s analyze short run production characteristics.

Q = F (L, K), where K is fixed.

Regular observations:

1) For output, we must have some L, therefore we can identify point A (no labor, no output)

2) As we add workers, we can observe our growth rate escalating.

Q1. What are diminishing marginal returns?

Q2. When we observe this happening, what is actually going on? What is changing, what is staying constant?
Short Run Production Functions

Where would the optimum be?

Average and Marginal Products

Average product of labor (APL) is the output per unit of labor input. \( \text{APL} = \frac{\text{total output}}{\text{total input per worker}} = \frac{Q}{L} \)

Marginal product of labor (MPL) is the additional output produced as the labor input is increased by 1 unit. \( \text{MPL} = \frac{\Delta Q}{\Delta L} \)

MPL is slope of TPL

The law of diminishing marginal returns states that as the use of an input increases in equal increments (holding other input fixed), a point will eventually be reached at which the resulting additions to output decrease. (when I am hungry I cannot work, however, there will be a piece of pizza that would make me sick and I will not work.)
The marginal rate of technical substitution of labor for capital is the amount by which the input of capital can be reduced when one extra unit of labor is used, so the output remains constant (like MRS).

\[
MRTS = \frac{-\Delta\text{incapital}}{\Delta\text{inlabinput}} = -\frac{\Delta K}{\Delta L} \quad \text{for fixed level of } Q.
\]

Production function with special cases.
MRTS = constant

Fixed proportions production function (DVD & TV)
If output more than doubles when inputs are doubled, there are increasing returns to scale. If output doubles when inputs double is constant returns to scale. If output less than double when all inputs double—decreasing returns to scale.

As we move from different output level we talk about different economy of scale. Economies of scale refers to homogeneous product:

\[ n \text{ is a constant, then } Qn' = F(nx_1, nx_2, \ldots, nx_k) \] multiply each input by constant what happens with output.
Population and Labor Force Growth

A larger labor force means more productive workers, but rapidly growing supplies of workers could have positive/negative effects.

Production possibility curve is the society’s potential total output of all goods. For a given technology and a given amount of physical and human resources, the production possibility curve portrays the maximum attainable output combinations of any two commodities when all resources are fully and efficiently employed.

Effect of Increases in Physical and Human Resources on the Production Possibility Frontier.

When there is corruption in a country and in the developing countries corruption is wide spread, then you are inside PPF.

PP to P₁P₁ means more things can be produced. A growth of productive resources can result in a higher total output combination at point X₁ even though there may still be widespread unemployment and underutilized or idle capital and land.

If only capital or only land in increased in quality and quantity, the shifts in society’s production possibility curve will be more pronounced for books when capital grows rapidly and for books when the growth is in land quantity or quality.
**Technological Progress**

There are three basic classifications of technological progress: neutral, labor-saving and capital-saving. Neutral technology progress occurs when higher output levels are achieved with the same quantity and combinations of factor inputs (economies of scale).

Capital-saving technological progress when quality or skills of the labor force are upgraded.

Invention, innovation, and technological progress have been and will continue to be primary factors in stimulating economic growth in any society.

Simon Kuznets, who received the Nobel Prize in economics in 1971, isolated six characteristic features manifested in the growth process of almost every developed nation:
1) High rates of growth of per capita output and population
2) High rates of increase in total factor productivity
3) High rates of structural transformation of the economy
4) High rates of social and ideological transformation
5) The propensity of economically developed countries to reach out to the rest of the world for markets and raw materials.
6) The limited spread of this economic growth to only a third of the world’s population.