

Stylized Facts about Growth

What is Economic Growth?

Based on how we have measured GDP, GNP, and NI, we can safely say that growth is the increase in the value of final goods, and services an economy produced or consumes.

Why is it important for us to study Economic Growth?

Growth → Increase Productive Capacity & Efficiency → Higher Income and Increase Time for Leisure → More Goods and Services Provided and Consumed → Increased Quality and Standard of Living

How do we study Economic Growth?

The study of economic growth focuses on how is economic growth attained?

Using the concepts from your Microeconomics segment of this class, you will recall that you can characterize the output choice of an economy can be naively characterized as being on the boundary of the production possibility frontier. When we are studying economic growth, we are implicitly assuming an economy is operating at its full potential, i.e. on the production possibility frontier. We can then consequently refer to the level of output produced at that level as potential output. When we have growth, the idea can be equivalently characterized as an outward shift in the production frontier.

However, in Macroeconomics, because we are not concerned with product/output choice but aggregate production/output level choices, we will not be depicting growth using production possibility frontier to depict growth.

Recall that Economic Growth is a long run concept. So we principally focus on the supply side. The idea is based on Say's Law which says that supply creates its own demand. The principal argument goes as follows, people work and supply goods to the market because they want other goods. The very fact that they supply goods means that they demand goods of equal value. Consider the following, if the good they produce is of no value in the market, they can always choose to produce something else that would give them value and hence allow them to obtain what they desire. Considered from another view, if there is nothing they desire that is produced by others, they wouldn't supply anything. By Say's Law, aggregate demand will always equate with aggregate supply. (It should be noted that there is something more subtle involved, there must be an efficient market place where people can meet and exchange those goods. If there is no efficient matching of needs and wants, what would happen?) Further, in the short run, potential output is fixed since capacity, or capability of an economy is fixed.

This leads us to Markets, which allows for Specialization and Economics Growth.

Just as individuals have comparative advantage in different aspects of production, in the sense that each of you have varied talents. The existence of a market noted above allows you to meet with someone better at producing a product than you do, and there by allowing you to exchange. Of course it requires the other individual to appreciate what you produce, or more precisely, someone in the market that demands what you produce,

and is willing to pay you for it, thereby allowing you to eventually get what you want. So you get to enjoy producing what you're really good at, i.e. specialization (Concentration of individuals in certain aspects of production). Of course as production gets more sophisticated, as a result of efficiency requirements to meet demand, we end up refining specialization even further into specific tasks, i.e. division of labor (the splitting up of a task to allow for specialization of production). According to Adam Smith, markets thus raise productivity. Recall from your Microeconomic Segment how trading raises the production possibility frontier.

Economic Growth, Distribution and Markets

Granted Economic Growth raises total products and services available for consumption to consumers and thereby the living standards of consumers at large. Put it simply, how do we know every one gets their "fair/equitable share" from their hard work. Although what is currently done in economics regarding how economists are defining and examining notions of equality and equitability, and its transmission through generations are outside of the scope of this course, it worth noting that these ideas are not forgotten.

One of the easiest and fastest way to get an idea of whether growth is meeting the needs of the general populace is Per Capita Output Growth. Recall that Per Capita Output is just Total Output/Population. Then Per Capita Output Growth tells us whether the rate of growth in total output is being outstripped by the growth in population. Can you think of ways to measure whether growth is benefiting some and not others?

Sources of Growth

1. Capital Accumulation/Investment in Productive Capacity:
 - a. Physical Capital including Infrastructures, Machines, Buildings that raise production capacity during its period of usefulness.
 - b. Human Capital includes education accumulated by the labor force that enhance the development of human and physical capital and growth of future production capacity.
 - c. Social Capital includes Government, Legal System, Culture, etc
2. Available Resources:
 - a. Natural Resources which in turn is dependent on whether technology finds it useful. Note that a lack of natural resource does not mean that growth is not possible.
 - b. Human Resources: Labor Force.
3. Growth-Compatible Institutions: Related to Social Capital that creates the compatible Institutions. Principally laws that define ownership and property rights to property and ideas will encourage development of ideas that may generate growth. That is these institutions must allow individuals whose hard work generated the gains, be permitted to retain the gains.
4. Technological Development:
 - a. Changes how products are made.
 - b. The types and quality of goods we consume. Think about the difference between 12 inch records of yester years, and compact discs, and from

compact discs to MP3 players that don't require a special disc. Or a more drastic example, the abacus to handheld calculators to PDAs.

- c. Those changes also in turn change the social and political aspect of society. Consider the regulators dilemma in controlling music downloads.

5. Entrepreneurship

Production Function and Theories of Growth

The Production Function:

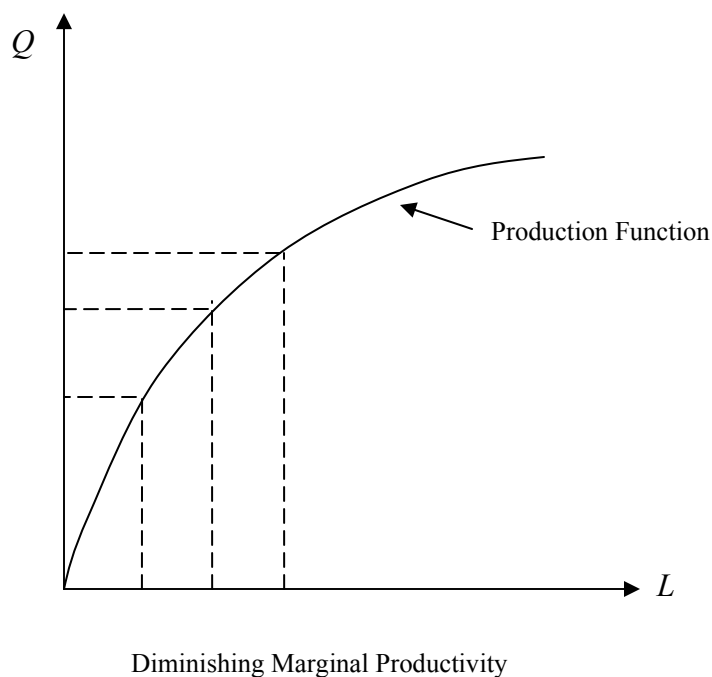
Recall we mentioned in the microeconomic segment that a firm makes use of factor inputs such as labor, factory building and land, technology and machines to make output that they sell. We can write this simply in a general mathematical formula as

$$\text{Output} = A \cdot f(\text{Labor}, \text{Capital})$$

This formula reads as follows, "Total Output is a function of the amount of Labor (L), Capital (K) (which includes factory building, land, and machines) and an adjustment factor (A) which is dependent on Technology (T) used in the production". f reads as "function of" and you may treat it as a black box which transforms L and K using T to make the output in the economy, this black box describes the relationship between the factor inputs with the output.

This simple formulation can easily be used to describe some notions we used in the earlier segment:

1. Returns to Scale:
 - a. Constant Returns to Scale: Output will rise by the same proportionate increase as all inputs.
 - b. Increasing Returns to Scale: Output will rise by a greater proportion than the increase in inputs.
 - c. Decreasing Returns to Scale
2. Law of Diminishing Marginal Productivity: Increasing one input, keeping all other inputs constant would lead to smaller gains in output.



The Classical Growth Model

What does Classical Growth Models say?

The Classical Growth Model argues that growth is a result capital accumulation, hence the name, Capitalism. The mechanism is as follows:

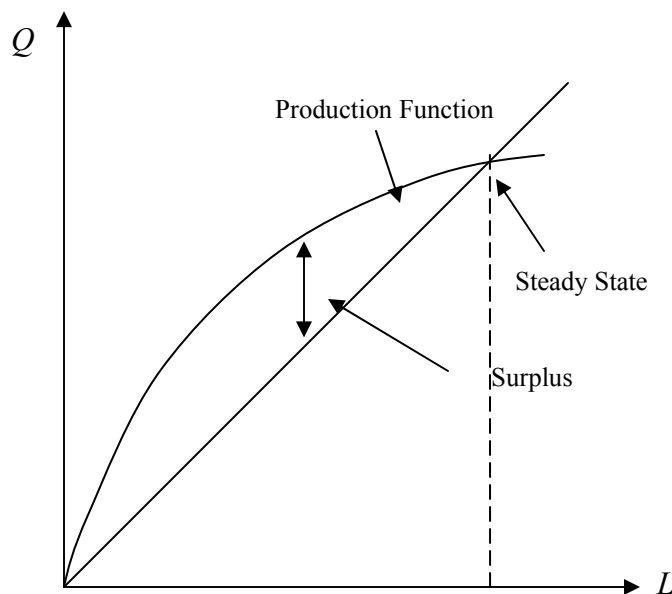
Savings \rightarrow Investment \rightarrow Capital Accumulation which Raises Capacity and Potential Output \rightarrow Growth

This line of thought thus supports savings as the primary engine for growth. Consequently government deficit as a result of excessive government spending is greater than income it generates from taxes are viewed as counter growth. Imagine the circumstance during the depression when the general populace not having sufficient income to even feed themselves, let alone save. **Do you think the advice against government spending is counter productive as far as getting the economy back on its feet seems counter intuitive, on account that the theory says there is no way there can be growth without savings?**

A Long Time Ago...the 1800s to be exact...

Why and how did this rationale arise?

Consider the idea about Diminishing Marginal Productivity of Labor within an agrarian economy dominated by agriculture, and food production (Thomas Malthus). The economy has a limited resource in the form of arable land, which determines the production Function. At full potential, the production function of the economy would equate with the subsistence level of output (the line depicting the subsistence level of output is based on the assumption that every additional mouth to feed needs the same level of consumption.). The economy will reach this intersection by the rationale that as long as the economy can feed every mouth, there is incentive for households to raise the size of the family, thereby have more hands on the fields. But diminishing marginal productivity dictate that the potential output will be met by the growing number of mouths to feed, thereby reaching this level of full employment where there is no more growth and surplus. This is known as the steady state.



Diminishing Marginal Productivity

Of course on hind sight, we know they were incorrect since the proponents of this theory did not foresee technological advancement and capital accumulation that raised the production possibility frontier, and production function curve over time, thus causing per capita output to rise across time.

Economist such as Robert Solow next suggests that capital growth rates would out strip that of labor. This would then render capital less productive, thus slowing economic growth, and eventually stagnating, as argued before. They argue that the only way to sustain economic growth is through having labor force growing at the same rate as capital. Nonetheless, they argue that the final determinant of economic growth is still

vested with the labor force. Based on this argument, as economies developed, their growth would slow down, while developing economies would have faster rates of growth. However, again on hindsight we know this is not true since there has been divergence in growth between developed and developing economies, and developed economies are in fact growing at faster rates.

Why did the Classical view economics failed?

1. Ambiguities in the Definition of Factors of Production: Is human capital part of labor or capital or both or neither? Obviously human capital enhances both labor and capital efficiency in production, hence you would notice that today, we model human capital as a separate input into the production function. That is $Output = A.f(\text{Labor}, \text{Capital}, \text{Human Capital})$. In that case, classical economist failed to consider this facet of the labor force, their education that could prevent the onset of diminishing marginal productivity of capital and labor, thereby sustaining growth.
2. Technological Growth permitted continued growth.

Hence **New Growth Theory** focuses

1. On the role of technology rather than capital in the growth process. Although there are similarities in the ideas behind technology and capital since investment in either tend to raise the productive capacity of the economy. However there are distinct differences that consequently require us to model and think of them as separate.
 - a. Investments in technology require less in terms of monies, but more in terms of time spent pondering possibilities.
 - b. Although technological advancement has direct impact on production, it can have positive spill over impact on other processes, which in turn may have other positive impact, example the common knowledge aspect in inventions. These spillovers is known as **Positive Externalities**, and are not usually accounted for by the decision maker when she makes the discoveries. Nonetheless, inventions and ideas are often protected by **Patents**, and **Copyrights** respectively.
2. Another element that has been modeled is the idea of learning by doing. This refers to labor improving the methods of production through experience. Consider the change in efficiency with which you have adapted to attending university. Are you better at sifting through the pertinent elements in the classes, and text for what you need?
3. Nonetheless, technological advancement is not always implemented immediately upon conception. Consider the example in your text, or the available of more fuel efficient cars as early as 1 to 2 decades ago, but why hasn't it been roll out till recently? Consider Network Externalities: Externality in which the use of a technology/good by one individual makes that technology/good more valuable to other people.

How can Governments Encourage Economic Growth?

1. Policies to Encourage Savings and Investment
 - a. Registered Saving Plans that are not taxed till withdrawal.
 - b. Compulsory Savings through legislation
 - c. Formation of Banking Sector that is sensitive to cultural and regional needs and idiosyncrasies
2. Policies to Control Population Growth
 - a. Contraceptives Education
 - b. Family Planning Education
 - c. Family Size Policies
3. Policies to Create Institutions that Encourage Technological Innovation
 - a. Policies to Provide Funding for Basic Research
 - b. Copyrights, Patents, and Property Rights
 - c. Limiting Liability (Incorporation)
4. Policies to Increase the Economy's Openness to Trade
 - a. Free Trade Areas
 - b. Free Ports

Can you think of others?