

PRODUCTIVITY

Productivity is essentially the efficiency in which a company or economy can transform resources into goods, potentially creating more from less. Increased productivity means greater output from the same amount of input. This is a value-added process that can effectively raise living standards through decreasing the required monetary investment in everyday necessities (and luxuries), making consumers wealthier (in a relative sense) and businesses more profitable.

From a broader perspective, increased productivity increases the power of an economy through driving economic growth and satisfying more human needs with the same resources. Increased gross domestic product (GDP) and overall economic outputs will drive economic growth, improving the economy and the participants within the economy. As a result, economies will benefit from a deeper pool of tax revenue to draw on in generating necessary social services such as health care, education, welfare, public transportation and funding for critical research. The benefits of increasing productivity are extremely far-reaching, benefiting participants within the system alongside the system itself.

Productivity Beneficiaries

To expand upon this, there are three useful perspectives in which to frame the value in improving productivity within a system from an economic standpoint:

- Consumers/Workers: At the most micro level we have improvements in the standard of living for everyday consumers and workers as a result of increased productivity. The more efficiency captured within a system, the lower the required inputs (labor, land and capital) will be required to generate goods. This can potentially reduce price points and minimize the necessary working hours for the participants within an economy while retaining high levels of consumption.
- Businesses: Businesses that can derive higher productivity from a system also benefit from creating more outputs with the same or fewer inputs. Simply put, higher efficiency equates to better margins through lower costs. This allows for better compensation for employees, more working capital and an improved competitive capacity.

- Governments: Higher economic growth will also generate larger tax payments for governments. This allows governments to invest more towards infrastructure and social services (as noted above).

Factors Affecting Productivity

The final important consideration in assessing productivity potential is the production-possibility frontier (PPF), which essentially outlines the maximum production quantity of two goods (in the scope of our current technological capacity and supply). This demonstrates the confinement of productivity, and thus is well captured in the Leontief production function. The critical takeaway here is that the production function will generally be affected by two things: overall supply and technological capabilities. Note that demand does not come into account in altering the production function or overall productivity potential. The illustration in the following figure demonstrates an increase in PPF, thus affecting the production function.

Productivity measures the way in which an economic system or business can leverage available functional inputs to generate meaningful outputs. This concept drives economies towards higher degrees of efficiency in production and thus higher economic growth and standards of living. As a result, improving productivity is a critical objective for societies to increase their relative wealth. Technological advances play a crucial role in improving productivity, and thus the standard of living in a system.

Production-Possibility Frontier

Productivity growth is bound by what is called the production-possibility frontier (PPF), which essentially stipulates a series of maximum amounts of two commodities that can be generated using a fixed amount of the relevant factors of production. In the context of a given PPF, only an increase in overall supply of inputs or a technological advancement will allow for the PPF to shift out and allow for an increase in potential outputs of both goods simultaneously (represented by point 'X' in the figure). The shift due to changes in technology represents increased productivity. This is a critical component in understanding the role of technology in productivity, as it is a primary influence on increasing the prospective production possibilities.

Production-Possibility Frontier (PPF)

This graph illustrates the varying theoretical takeaways from a PPF chart. On this, points B, C, and D all lie on a maximum output level, while A is representative of a realistic but inefficient amount. X is beyond the scope of the PPF graph, and thus requires a technological improvement or increase in supply.

Technological Advances: Past, Present, and Future

The variance in technological advances that have driven productivity upwards is remarkable, underlining the ongoing importance of focusing on technology as a primary change agent. Innovative advances in technologies can be either leaps or increments, although the larger technological advances tend to take the limelight. In general, there are a particularly notable categories:

- **Energy:** Historically, animals and humans were the primary energy input for the generation of products. This was extremely expensive and time-consuming relative to more modern ways to power things, and has been improved upon dramatically over time. Electricity, heat, steam, water, solar, and a wide variety of other energy capturing methodologies have dramatically increased efficiency while freeing up man hours.
- **Transportation and Industrial Machinery:** Trade has been a part of human history for nearly as long as civilizations knew of one another, bartering being the a central component of human interaction. The improvement of trade venues, such as boats, cars, planes, trains, etc. have enabled rapid increases in trade quantity and efficiency. Similarly, industrial machinery utilizing similar vehicles have enabled mass increases in scale and efficiency, particularly agriculture .
- **Communication:** Needless to say, the internet and mobile communications have rapidly expedited the transmission of knowledge, data, information, and networking. This has resulted in a massive increase in synergy across the world, alongside the development of economic learning and development.

- Logistics: Increases in technological systems is generally considered to be a tangible innovation, but is not limited to such. Improvements in the ways in which we do things is often just as useful. Henry Ford is a classic example of this, innovating the assembly line to maximize the efficiency the production process through strategic implementation of labor roles.

Implications on Productivity

Measuring the effects of technology on productivity is a difficult pursuit. It is generally approached through metrics such as Gross Domestic Product (GDP), GDP per capita, and Total Factor Productivity (TFP). The former two attempt to capture the overall output of a given economy from a macro-environmental perspective. The latter is slightly more interesting, attempting to measure technologically driven advancement through noting increases in overall output without increases in inputs. This is done through utilizing production function equations and identifying when the output is greater than the supposed input, implying an advance in the external technological environment. This system is more specifically tailored for technological change than GDP.

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