

IV. The Logic of Supply and Demand Decisions

A. Specialization. Last week we examined how the rational choice models developed in the first week could be used to analyze individual decisions to produce goods and services. The analysis demonstrated that incentives for specialization exist in cases where individuals may sell (or trade some) of their output or inputs for "money" and use the proceeds to purchase desired goods and services. Two different kinds of specialization were characterized in the last lecture.

- i. First, individuals may *specialize in what they produce*. If their output can be readily sold in markets for "money" that can be used to purchase other desired goods and services, they will produce the good that yields the greatest "money" income. Such ancient activities as farming, hunting, black smithing, and interior decorating are clearly instances of such behavior. In effect, individuals who produce output for sale become "owners" of Neoclassical Firms who produce as an indirect "means" to satisfy personal "ends." This contrasts with *subsistence* farming and hunting where the principle purpose of production is satisfying the producer's wants directly.
- ii. Second, we demonstrated that some individuals may *specialize in producing input services* if these can be sold for a "money" income. In effect, such individuals choose and invest in careers that generate the greatest personal income, e.g. command the highest market price (adjusted for risk and time).
- iii. Most firm owners do not produce their firm's entire output by themselves. Firm owner(s) may provide some entrepreneurial and managerial services to the firm, as well as some of the capital, but production within firms generally involves many more people and inputs than directly supplied by the owner. Owners purchase and/or hire inputs in order to produce outputs for sale in markets. This is, of course, the reason why many individuals *can* specialize as input providers (as in ii). Production in large firms takes place in more or less elaborate "teams" assembled for that purpose.

B. Markets and Production. The owner's interest in the production of goods to be brought to market (and sold) is not the output, *per se*, but rather the *net income or profit* that can be generated by selling the output. While a firm's profit maximizing behavior is sometimes contrasted with a consumer's utility maximizing behavior, it is more precisely the case that *profit maximizing behavior is a consequence of the utility maximizing behavior of firm owner(s)*.

- i. (A secondary benefit of the "objective" and single-minded aim of firm owners is that it consequently is much easier for owners to monitor employees directly and/or to hire others to do the monitoring for them. Profit can be measured in a manner that is independent of the person doing the measurement.)

C. The simple profit maximizing objective function of all "firms" has a number of direct consequences regarding the extent to which goods and services are produced, and for the manner in which those goods and services get produced.

- i. The goods brought to market are the ones that the owner expects "to net" the most money (adjusted for risk and time). This, of course, depends on what consumers are willing to pay for the various products that might be manufactured.
- ii. A firm's total output of manufactured goods maximize profits for firm owners during the time period of interest can be characterized for a variety of market settings. [See Math and Figures: lecture/Nicholson.]
- iii. All Final goods that are brought to market are produced in a manner which minimizes their cost of manufacture. That is to say manufactured goods are produced in a manner that is *economically efficient*, given available technologies
- iv. As a consequence, the production method adopted will maximize output from given inputs. Production of manufactured goods takes place via *technologically efficient* methods.
 - a. Firms may be able to use a wide variety of production methods, but will always choose a technologically efficient method because this is one of the methods by which profits are maximized.
 - b. Of course technological efficiency does not mean technologically sophisticated or complicated, just that outputs are maximized for given inputs.
- v. Inputs are employed by owners at levels which maximize profits. [See Math and Figures from class notes, also in Nicholson.] A firm's demand for inputs, thus, varies with each input's capacity to increase the firm's profits.
 - a. This varies with the input's ability to produce output and with the price at which the firm's output can be sold.
 - b. (As demonstrated below a firm's demand for an input is the same as its *marginal revenue product*. An input's marginal revenue produce is its marginal product times marginal revenue, $MRP = MR \times P$.)

D. It is clear that the *market prices* of outputs have a central role in determining *what* products get produced. Output prices partly determine the *net income /profit* that can be realized via production for sale, and thereby the output and input decisions of firm owners.

E. Clearly, *market prices reflect the interests that individuals have as purchasers of final goods and services*. Market prices reflect consumer willingness to pay for the products brought to market. If it is known that consumers are not willing to pay a given price for a particular product (say \$10 for a Big Mac) then those goods will not be brought to market at such prices.

F. Firm owners will bring a particular product "X" to market only if they expect to realize at least as much net income from sales of "X" as could have been realized with alternative uses of the resources consumed producing "X".

- i. Revenues from alternative uses of the firm's resources are often called the true cost of production, or the *opportunity cost of production*.

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G. Equilibrium Production. If no firm has an incentive to change its production methods or outputs, the production (supply) side of a market may be said to be in equilibrium.

- i. Clearly this occurs when the net revenue that can be generated by alternative uses of the same resources are all equal in the eyes of firm owners. (That is, *equal* adjusted for risk and uncertainty, timing, and so forth.)
- ii. When rates of return are equalized across all alternative employments of available resources occurs, *economic profits are said to be zero*. E. G. *the resources used in production yield revenues that exactly equal their opportunity cost*, e. g. $TR - TC = 0$.
- iii. Of course, net revenues may remain substantial (>0) if the number of firms is limited. On the other hand, net revenues will tend to approach salaries from other "similar" employment opportunities if there are a large number of potential firm owners. (In equilibrium, no input suppliers would prefer to be firm owners, and no firm owners would prefer to be "mere" input suppliers--although there may be persons who sell services to others and own firms.)
- iv. The least that consumers could ever routinely pay for goods and/or services is clearly just a bit over the production cost of those goods and services. (Why?)

V. Intuitive Neoclassical Models and Analytics of Market Equilibrium.

A. A very lean and clean model of market equilibrium has been developed by neoclassical economists to capture much of the flavor of the more intuitive (and realistic) presentation developed above.

B. Consumers are modeled as maximizing particular utility functions, U_i , $i = 1..N$, given particular wealth constraints. (Wealth may be given in money terms or in terms of marketable endowments/holdings of goods and services such as labor.)

- i. In their role as consumers it is clear that individuals always prefer a lower to a higher price for a good, other things being equal. [Use a utility function to demonstrate this for a two person two good choice.]

C. Firms are similarly modeled as profit, Π , maximizing entities with a technologically efficient production function.

D. In the most deeply understood setting, **perfectly competition**, all firms and all individuals are modeled as passive "price takers" with perfect information about production and purchase opportunities, and all firms and consumers confront the same price. [What assumptions make price taking behavior plausible?]

E. Market Prices are used to coordinate consumer and firm behavior.

- i. At any *given output price*, firms produce the profit maximizing output combination of goods that can be generated via their production function. (The function that represents firm output as a function of market price is called its *supply function*.)
- ii. Consumers purchase the combination (bundle) of goods and services that maximizes their utility given their wealth. (The function that characterizes a

consumers purchases of a particular good as a function of market prices and his/her endowment is called a *demand function*.)

- iii. "Law" of One Price. (Given different prices for identical goods, consumers will all attempt to purchase the good at the lowest price, thus no firms are able to sell at the highest one, this puts pressures on prices to converge to a single price for each good if trades are to occur.)
- iv. Price varies until the total amount of every good brought to market "exactly" equals the total amount of those products that consumers are willing to purchase at the prevailing market price. In (full or general) EQUILIBRIUM, MARKET SUPPLY EQUALS MARKET DEMAND IN EVERY MARKET.

VI. Problems:

A. Suppose that Apex produces Z using a technologically efficient production function $Z = z(L, K)$. For the period of interest, suppose that K is fixed, $K = K^0$.

- i. Characterize Apex's demand for labor if it can sell as much Z as it wishes at price of P_z . (Use both mathematics and diagrams.) Explain your analysis.
- ii. Characterize Apex's profit maximizing output of Z if it can hire as much L as it wishes at price W. (Use both mathematics and diagrams.) Explain your analysis.
- iii. Characterize how Apex's profits change if there were an exogenous decline in K. (Hint, use the envelop theorem)

B. Suppose that Al has the utility function $U = u(Z, L)$ where L is leisure and Z is a good that can be purchased in some market. Suppose that Al can work for W dollars an hour and has T hours to allocate between labor and leisure. Determine Al's demand for Z.

C. In a setting where there are lots of firms like Apex and lots of consumers like Al, the "market for Z" can be said to clear when price is such that $Q_s(P) = Q_d(P)$.

- i. Explain how your answers to A and B might be used to analyze this market equilibrium.
- ii. In a small general equilibrium model, wage rate W would also adjust. Characterize in a diagram the P_z, W combination that would simultaneously "clear" both markets. Label all relevant details.