

PHYSICIAN SERVICES

7MHPH010 – Health Economics and Health Policy

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PHYSICIAN SERVICES

OUTLINE

- Physician Firm
- Market for Physician Services
- Supplier Induced Demand
- Small Area Variation

PHYSICIAN FIRM

PRODUCTION FUNCTIONS

- Production function, marginal product, average product
 - Physician firm production function (output $Q = \text{visits}$)
 - $Q = f(\text{MDTime, AidTime, Space, Equipment etc.})$
 - Recall that (see lecture notes on production) ...
 - Average product of labor = Q/L
 - Marginal product (MP) of labor = $\Delta Q/\Delta L$
 - Optimal Input combination when

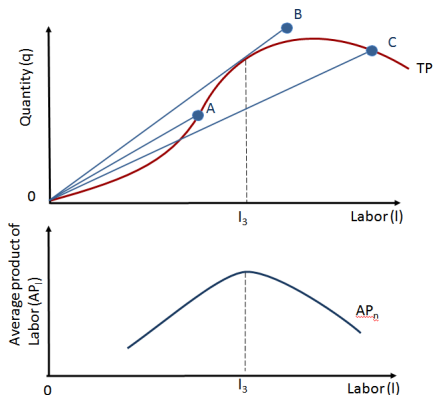
$$MP_1/P_1 = MP_2/P_2 = \dots = MP_n/P_n$$

- MP_i is the marginal product of input i and P_i is the price of that input (wage) and costs are minimum when the marginal productivity per dollar spent on each input is the same

PHYSICIAN FIRM

PRODUCTION FUNCTIONS

- **Average Product:** Total output divided by the number of units employed –
Average Product of Labor $AP_L = \frac{q}{l} = \frac{f(l,k)}{l}$



- If labor is measured in hours, the AP_L provides a measure of quantity produced per hour
- Extend a ray from origin to each point on TP curve – then AP_L is the slope of the ray
- Average productivity first increases with labor and then declines because of increasing and then diminishing marginal productivity

PHYSICIAN FIRM

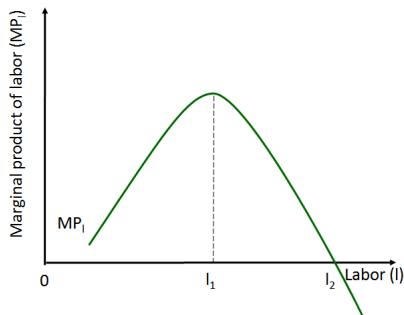
PRODUCTION FUNCTIONS

- **Marginal Product:** Change in total output associated with a one-unit change in one input holding all other inputs constant

$$MP_l = \frac{\Delta q}{\Delta l}$$

$$MP_k = \frac{\Delta q}{\Delta k}$$

- MP_l : Additional output produced by each additional unit of labor
- Slope of the total product curve

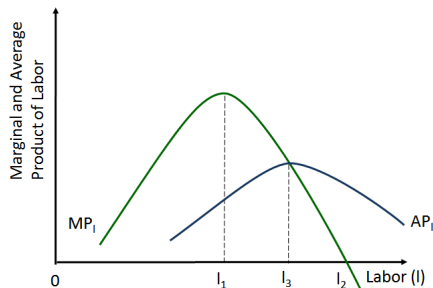


- Initially, increasing marginal productivity (MP_l is positive and increasing)
- Next, diminishing marginal productivity sets in (MP_l is positive but decreasing)
- Next, $MP_l = 0$ (when total product is maximum)
- Eventually, MP_l is negative

PHYSICIAN FIRM

PRODUCTION FUNCTIONS

- Average productivity rises when marginal productivity exceeds average productivity
- Average productivity falls when marginal productivity lies below average productivity
- Marginal productivity equals average productivity when average productivity is maximized

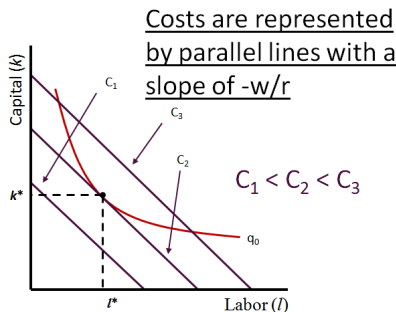


- MP curve cuts AP curve at its maximum point
- MP is above AP whenever AP is increasing
- MP is below AP whenever AP is declining

COST FUNCTIONS

COST MINIMIZATION

- Say the firm has already chosen the level of output (q_0) and wants to minimize its costs
- Given the input prices (w, r), how should the firm choose inputs so as to minimize costs at q_0



- The minimum cost of producing q_0 is C_2
- This occurs at the tangency between the isoquant and the iso-cost curve – at (l^*, k^*)
- Mathematically, we seek to solve for values of (l, k) that minimize total cost subject to $q = f(k, l) = q_0$
- This gives the solution

$$\frac{w}{r} = \frac{MP_l}{MP_k} = MRTS_{lk}$$

(or equivalently $\frac{MP_k}{r} = \frac{MP_l}{w}$)

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REINHARDT (1972)

- Reinhardt (1972) undertook a classic study of physician productivity and found that
 - MP of docs increases up to about 25 hrs/week
 - MP of docs eventually decreases to zero at about 110 hrs/week
 - At 60 hrs/week, a 1% increase in physician input would result in a .8% increase in patient visits
 - Physicians in group practices were about 5% more productive in terms of patient visits than physicians in a solo practice
 - Also studied the substitution possibilities between physician and other labor inputs

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REINHARDT (1972)

- Physician aide MP was highest when approximately there was 1 aide present per physician
- Physicians could improve productivity and increase profits if they doubled the aids from 2 per doc (the sample average) to 4 per doc which would give them 25% more visits over the observed sample average of 183 visits

TABLE 4. — ESTIMATED OPTIMAL LEVELS OF AIDE INPUT AT VARIOUS ASSUMED WEEKLY SALARIES (W) AND “NET PROCEEDS PER VISIT” (P) (SOLO GENERAL PRACTITIONERS) ^a

Net Proceeds per Visit	Optimal Levels of Aide Input for Weekly Salaries of		
	\$70	\$110	\$150
	<i>Based on the Total-Visit Function</i>		
\$5.00	4.2	3.5	2.4
\$7.00	4.5	4.0	3.5
	<i>Based on the Office-Visit Function</i>		
\$6.00	3.9	3.4	2.8
\$8.00	4.1	3.7	3.2
	<i>Based on the Patient Billings Function</i> ^b		
	4.1	3.5	2.6

PHYSICIAN FIRM

BROWN (1988)

- By dividing MP by the wage rate (W) we can draw inferences about whether physicians are under or over utilizing various labor inputs
- Physicians underutilizing nurses
 - MP/w is .129 for practical nurses compared to .114 for physicians offices would become more profitable if they substituted practical nurses for physicians
- Also found that physicians in group practices were 22% more productive than solo practices
 - This maybe because group practices have an advantage in employing physician assistants (pa) MP/w is equal to -.003 for solo and +.192 for groups

Table 3
Marginal Products and Efficiency of Input Use

Input	All Physicians		Solo Physicians		Group Physicians	
	MP	MP/P	MP	MP/P	MP	MP/P
<i>H</i>	2.967	.114	2.686	.102	2.793	.110
<i>Sec</i>	.192	.043	.253	.058	.105	.023
<i>RN</i>	.585	.104	.628	.109	.625	.114
<i>PN</i>	.542	.129	.533	.132	.485	.109
<i>Tech</i>	.320	.067	.321	.069	.278	.057
<i>PA</i>	.231	.040	-.014	-.003	1.082	.192
\bar{L}_j	.295	.063	.327	.071	.308	.065

PHYSICIAN SERVICES

- Escarce and Pauly (1998)
 - Found that each hour of time for an office-based internist substitutes for \$60 in nonphysician costs or vice versa
- Jacobson et al (1998/1999)
 - Physician Assistants (PA) and Nurse Practitioners (NP) can substitute between 50-90% of tasks of primary care physicians without compromising quality

MARKET FOR PHYSICIAN SERVICES

OUTLINE

- How is the price/quantity set in the market for physician services?
 - Perfectly competitive?
 - Monopolistic?
 - Somewhere in-between (monopolistic competition)?
- Patient search costs
- Entry barriers

MARKET FOR PHYSICIAN SERVICES

PRICE/QUANTITY SETTING

- How is the price/quantity set in this market? Is it perfectly competitive?
 - The product exchanged/sold is information
 - In a perfectly competitive world, patients would be able to costlessly search for lowest priced physician, given the level of quality, for each level of quality → there would be only one price (for each quality of physician)
 - However, even after adjusting for quality, there tends to be significant price dispersion among physicians
 - In Dayton, Ohio 2 times the price difference for standard office visit between lowest priced GPs and highest priced GPs (Marquis, 1985)
 - Hard to believe that all this dispersion is due to differences in quality
 - Unlikely to be perfectly competitive
 - Physician face downward sloping demand curves

MARKET FOR PHYSICIAN SERVICES

MONOPOLISTIC COMPETITION

- Barriers to Entry
 - Substantial barriers to entry
 - Minimum educational requirement
 - Degree from an accredited medical school
 - Internship or a residency program at a recognized institution
 - Pass a medical exam
 - High opportunity cost of becoming a medical doctor
 - Substantial time and money costs