
Neoclassical model of the firm:

Choose price and quantity to maximize profit subject to constraint imposed by market demand.

Doctors may not maximize profits.
Doctors may control demand by how they inform patients
Doctors may not choose prices (health plan does)
Doctors may not choose quantities (health plan may if in managed care)

Fuchs 1978: MD up => Prices up
Rice 1983: Fees up => quantity up

Simple-minded theory to explain this: Target income hypothesis, $P*Q = T = target income

Patient-doctor interaction is not “Here is my price, how much quantity do you want?” but rather “Here is what you should do.”

Gaynor and Gertler, 1995) find
Normal demand-side variables matter: demand-price, income, clinical need
Supply side factors also matter: supply price, physician attitudes, or partnership incentives

Evans (1974) hypothesis: physician-induced demand (PID)
Physicians induce demand, and can shift demand curve in and out. (What determines how much? How do they do this? Why to they care?)

Economists have recognized for a long time that a significant market is missing in the health sector: payments or insurance based on health outcomes. Arrow 1963.

Health status is non-contractible. But it is also unobservable. Certain inputs such as physician effort, is also unobservable.

Article sections
2: supply and demand, monopolistic competition
3: models with perfect information, (no uncertainty) add in insurance, price regulation, contracting, managed care
4: models with imperfect information, (uncertainty). Uncertainty allows for asymmetric information
5. PID
6 Provider objectives

Table 1.1 mechanisms used to set quantities

2. Demand and supply for Physician services
Average income $182k in 1994, (net income)
Gross income, about double net income
Work 55 hours /week 48 weeks/year, $65/hour wage, $130/hour of gross revenue.
Some evidence that the AMA slowed growth of MDs in US.
Significant evidence of competition among providers (Frank, 1985, 87)

3. Physician behavior with complete information
MD Eisenberg: doctors motivated by financial self interest.
Favored model: monopolistic competition: many sellers, each with downward sloping demand

Fuchs, 1974, surgeons market, surgeons only doing 1/3 of the surgery they would like at the going price.
Key insight: physicians are highly imperfect substitutes.
Patients demand one MD, not all MDs equally.

$B(x) = total benefit from one MD. B(x) = B'(x). Utility maximized at b(x)=0.$

$NB^0 = reservation net benefit from leaving his MD.$
If doctor can set price and quantity, will raise price above MC and hold quantity at place where just indifferent to going elsewhere.

Program 1 (equation 3.1)
Simple model, p = price, x = quantity, c = marginal cost B(X) = patient benefits

Max \( \Pi = (p-c)x \) s.t. \( B(x) - px \geq NB^0 \)

Set up as a lagrangian

Max \( L = (p-c)x + \lambda[B(x) - px - NB^0] \)

f.o.c.

\[ L_\lambda = B(x) - px - NB^0 = 0 \]

f.o.c.

\[ L_x = (p-c) + \lambda B'(x) - \lambda p = 0 \implies B'(x) = c \implies x = x^* \) (efficient x)

Doctors choose service which maximizes total surplus, but then choose price to extract the full net surplus.

Consumers are made better off if they have better alternative sources of care, or are better informed, so that NB^0 is as large as possible.

Price is too high

Now suppose that a regulator lowers price.

\[ \frac{dx}{dp} = \frac{-x}{p - B'(x)} < 0 \quad (3.5) \]

So raising price will lower quantity, and lowering price will raise quantity!

Quantity will exceed social optimum for \( p < p^* \).

3.2 Now assume regulated prices and add insurance

Program II

0 = share of costs paid by consumer.

Set up as a lagrangian

Max \( L = (p-c)x + \lambda[B(x) - \theta px - NB^0] \)

f.o.c.

\[ L_\lambda = B(x) - \theta px - NB^0 = 0 \]

\[ L_x = B(x) - \theta px - NB^0 = 0 \implies x' = \frac{[B(x') - NB^0]}{\theta p} = \text{average net benefit} \]

\[ x' > x^* \]

insurance has an effect similar to a regulator lowering the price.

Program II:

\[ L = px - cx + \theta(B(x) - \theta px - NB^0), \]

with the first-order conditions:

\[ L_x: \quad p - c + \theta(b(x) - \theta p) = 0 \]

\[ L_\theta: \quad B(x) - \theta px - NB^0 = 0 \]
\[ x_\approx = \frac{B(x_\approx) - NB^0}{\theta p} \]  

(3.7')

Mixed payment system

\[ R + p_s x, \text{ with } R > 0, \; c > p_s \geq 0. \]

Program III:

\[ \pi = n(NB)[R + (p_s - c(x))x] \]

\[ NB = B(x, c) - p_d x \]

The first-order conditions (3.9) and (3.10) describe the physician's maximization.

\[ \begin{align*}
     \pi_x & = n(B_c - p_d) [R + (p_s - c(x))x] + n(p_s - c) = 0 & \qquad (3.9) \\
     \pi_c & = nB_c [R + (p_s - c)x] + nc_c x = 0 & \qquad (3.10)
\end{align*} \]

These can be rewritten as

\[ \begin{align*}
     & \frac{B_c - p_d}{NB} \left[ \frac{R}{X} + p_s - c \right] = \frac{1}{\varepsilon_n, NB} & \qquad (3.9x) \\
     & \frac{R}{X} + p_s - c \frac{c}{c} = \frac{\varepsilon_n, c}{\varepsilon_n, e} & \qquad (3.10x)
\end{align*} \]

where \( \varepsilon_n, NB = n' \frac{NB}{n} \)

\[ \varepsilon_{c,e} = c' \frac{e}{c} \]

\[ \varepsilon_{n,e} = n \frac{\varepsilon NB}{\varepsilon c} \frac{c}{n} \]

\[ E[B(x,u)] = E[V(H(x) + u)] \]