

Supply of health care – Pharmaceuticals

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Competition

- ▶ There appears to be just a few big pharmaceutical companies – is price high because lack of competition?
- ▶ Concentration Indicators
 - ▶ four-(eight)-firm concentration ratio (C4/8) – share of industry output produced by 4 (8) largest firms
 - ▶ Herfindahl-Hirschman Index (HHI) = $\sum_{i=0}^n share_i^2$
 - ▶ 1 dominant firm, $HHI = 85^2 + 5^2 + 5^2 + 5^2 = 7300$
 - ▶ 100 small firms, $HHI = 1^2 * 100 = 100$

Note: lower number means more competition

Concentration Indicators

From 'Concentration Ratios in Manufacturing 2002'

Industry	C_4	C_8	HHI
Pharmaceutical preparations	36	53	530
Cereal breakfast foods	82	93	3000
Soaps and detergents	63	74	2308
Paints	34	52	423
Petroleum refining	41	64	640
Computer and peripheral equipment	50	65	1183
Motor vehicles	81	91	2324
Aircraft and parts	77	82	2528
Photographic equipment	37	54	523

What do these mean?

Substantial competition, but misleading, because within a drug class, top four firms control almost all of the market:

- ▶ patents
- ▶ advertising increases brand loyalty
- ▶ FDA approval

Drug Pricing and Profits

- ▶ Monopoly Pricing
 - ▶ Because of patent protection
 - ▶ Reason prices are high
- ▶ Price Discrimination
 - ▶ Can make more than that if can sell at different prices and don't have to worry about arbitrage
 - ▶ Examples:
 - ▶ across countries – borders
 - ▶ HMOs (or Canada) negotiate lower prices
 - ▶ vet meds cost less
 - ▶ If patent goes away and firm produces brand name and generic, it is also a form of price discrimination. Rich people will buy brand name, poor people will buy cheaper generic. Like a coupon.

Example of price discrimination

- ▶ US and Mexico have different demand curves
- ▶ Sell to Mexico at lower price – doesn't affect US market at all, but firm makes more profit off of Mexico
- ▶ If give drugs to Africa at MC, no extra profit, but not hurting US market – US is not subsidizing the charity

Mexico Example

Discounting

First, need to introduce discounting formula:

$$NPV = \sum_{t=1}^T \frac{(V_t)}{(1+r)^t}$$

- ▶ Discounting occurs because money today is worth more (could earn interest rate, inflation erodes, impatient)
- ▶ Risk matters a lot – if future stream is uncertain, need to discount more (expected value)

Research and Development

Costly up-front, discounted profits come later (after m):

$$\begin{array}{cccc}
 & & 0 & \text{high} & & & \text{high} & \text{low} \\
 & & & & & & & \\
 NPV & = & \sum_{t=1}^m & \frac{(R_t - C_t)}{(1+r)^t} & + & \sum_{t=m+1}^T & \frac{(R_t - C_t)}{(1+r)^t} \\
 & & & \text{low} & & & \text{high}
 \end{array}$$

Implications

- ▶ Because few drugs are profitable, need a lot of drugs being developed to spread risk → big firm is better (economies of scale)
- ▶ Firms doing lots of different kinds of research (economies of scope) will have spillovers to other projects → more productive

Effects of Insurance

Production Fcn: $HS = f(D, M)$

Are D (drugs) and M (medical care) perfect substitutes? perfect complements?

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Production Fcn: $HS = f(D, M)$

Are D (drugs) and M (medical care) perfect substitutes? perfect complements?

Neither – need a little of both.

Isoquant graph

Isoquant – everything along the line represents one value (of health, utility, etc.)

Note: indifference curve is type of isoquant

Optimal combination of M & D

Assuming no insurance:

- ▶ Budget line: $Cost = P_D D + P_M M$

Rearranges to: $M = \frac{C}{P_M} - \frac{P_D}{P_M} D$ (equation of the line
($y = mx + b$))

- ▶ Optimal point is tangent

Graph

How does change in price affect choice?

- ▶ Assume $P_D = \$100$ and $P_M = \$200$, slope = $-1/2$
- ▶ Assume $M_1 = 5$ and $D_1 = 5$,
cost = $\$100 * 5 + \$200 * 5 = \$1500$ (assume no insurance)
- ▶ If P_D rises to $\$150$, what happens?
 - ▶ slope = $-\$150/\$200 = -3/4$, steeper
 - ▶ will choose to substitute more M for less D to achieve same HS level
 - ▶ will have to spend more to achieve same HS level

Graph

How does change in insurance affect choice?

What happens if insurance covers 90% of either M or D?

- ▶ out-of-pocket costs for M = \$20, for D = \$10
- ▶ slope = $-1/2$, same
- ▶ optimal choice remains same as without insurance

How does change in insurance affect choice?

What happens if insurance covers 90% of M, but D costs \$5?

- ▶ out-of-pocket costs for M=\$20, for D=\$5
- ▶ slope = $-1/4$, flatter
- ▶ will choose to substitute more D for less M to achieve same HS level
- ▶ patient will spend less, but total costs (insurance+patient) is higher because optimal point represent lowest cost to achieve that HS level)

Graph