STATISTICAL, ECONOMIC AND SOCIAL RESEARCH AND TRAINING CENTRE FOR ISLAMIC COUNTRIES

HEALTH POLICY AND HEALTH ECONOMICS

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Why do we need health economics?

Economics is the study of allocation of **scarce** resources among their alternative uses.

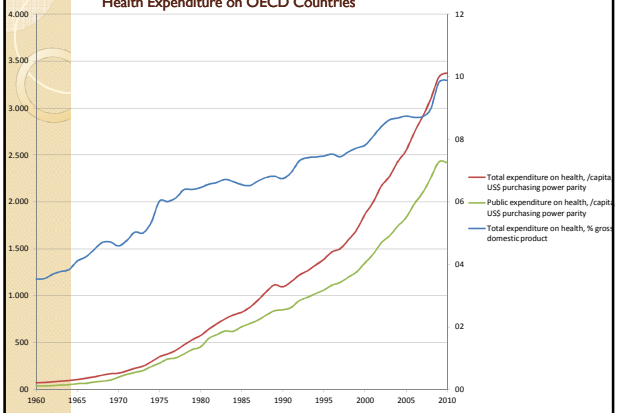
In health care, there are scarce resources

- Physicians
- Nurses
- Land
- Money

In societys, there are scarce resources.

2

Health Expenditure on OECD Countries



3

Selected Health Variables in OECD Countries

	Life Expectancy	Total exp. on health / capita	Total exp. on health % GDP	Public exp. on health % TEH	Physicians / 1 000 population	Nurses/ 1 000 population	Hospit. beds / 1 000 population	MRI units Per million population	ALOS	Doctors consultat. Per capita
Australia	81.5	2776	8.5	67.5				5.6		6.4
Austria	80.5	3970	10.5	76.9	4.6	6.35	7.7	18	7.9	6.9
Belgium	79.8	3677	10.2	72.6	2.97		6.7			
Canada	80.7	4079	10.4	70.2		7.05				
Chile	78.7	999	6.9	59.4						
Czech Republic	77.3	1781	7.1	82.5	3.6		7.3	5.1	10	11.4
Denmark	78.8	3074	9.7	84.5			3.6		5.1	8.9
Estonia	73.9	1263	6.1	77.8	3.35	6.4	5.7	8.2	7.8	6.5
Finland	79.9	3008	8.4	74.2	2.72		6.5	16.2	9.7	4.3
France	81	3696	11.2	77.8			6.9		12.9	6.9
Germany	80.2	3737	10.5	76.8	3.56	8.34	8.2		9.9	7.8
Greece	80	2316	9.7	60.3		1.84	4.8	19.6		
Hungary	73.8	1437	7.3	71	3.09	4.64	7	2.8	10.5	11.3
Iceland	81.3	3359	9.1	83.2	3.72	8.55		18.8		6.4
Ireland	79.9	3793	8.7	76.9				9.4		
Israel	81.1	2244	7.8	57	3.56	4.16	3.7	1.8	4.4	
Italy	81.5	2870	9.1	77.2			3.8			
Japan	82.7	2300	8.1	81.9	2.15	6.63	13.8	43.1	33.8	
Korea	79.9	1801	6.5	55.3	1.86	2.2	7.8	17.6	16.7	13
Luxembourg	80.6						5.8	12.7		
Mexico	75.1	852	5.9	46.9	2	1.43	1.7	1.5	3.9	2.8
Netherlands	80.2	4063	9.9				4.3	10.4		5.9
New Zealand	80.4	2683	9.8	80.4	2.46	8.97		9.6		
Norway	80.6	5003	8.5	84.2	4.01	14	3.5		7.3	
Poland	75.6	1213	7	72.2	2.16	5.19	6.6	2.9	6.7	6.8
Portugal	79.3						3.4			
Slovak Republic	74.8	1738	7.8	69			6.6	6.1	8.5	12.1
Slovenia	78.8	2329	8.3	72.3	2.41	1.94	4.8		6.9	6.7
Spain	81.2	2902	9	72.5	3.6	4.76	3.3		8.1	
Sweden	81.2	3470	9.4	81.9						
Switzerland	82.2	4627	10.7	59.1	3.82	10.15	5.2		10.7	
Turkey	73.6	673	6	67.8			2.3	6.9		6.3
United Kingdom	79.7	3129	8.7	82.6	2.61	7.44	3.4	5.6	8.1	5.9
United States	77.9	7538	16	46.5	2.43		3.1		6.3	
Yemen	62	122	5.2	24.2	0.3	0.7	0.7			
OECD Average	79.2	2887.5	8.8	71.6	3.0	6.1	5.5	11.1	9.8	7.6

Is Health Care Different?

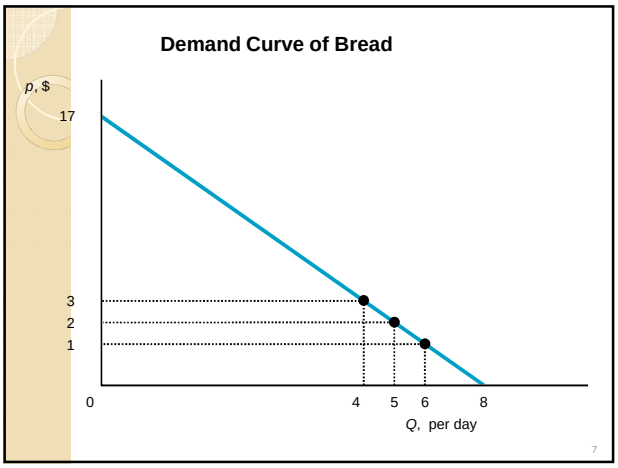
- Not a standart commodity
- Uncertainty and insurance
- Information
- Extensive government regulation and provision

5

Fundamental Instrument of Economic Analysis: Supply and Demand

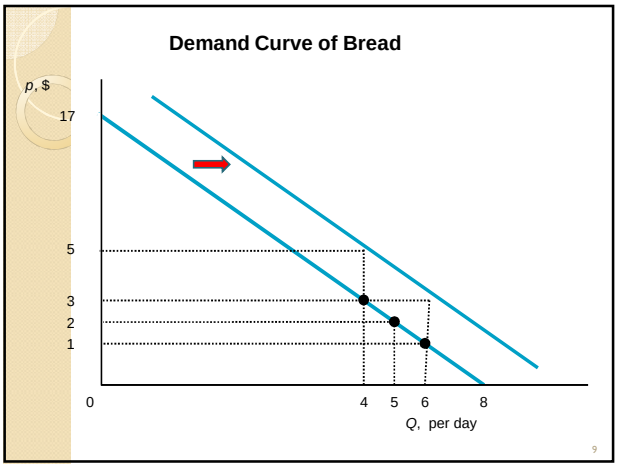
Demand Curve: shows quantity that consumers are willing to buy—at each price, holding constant other factors that affect purchases.

6

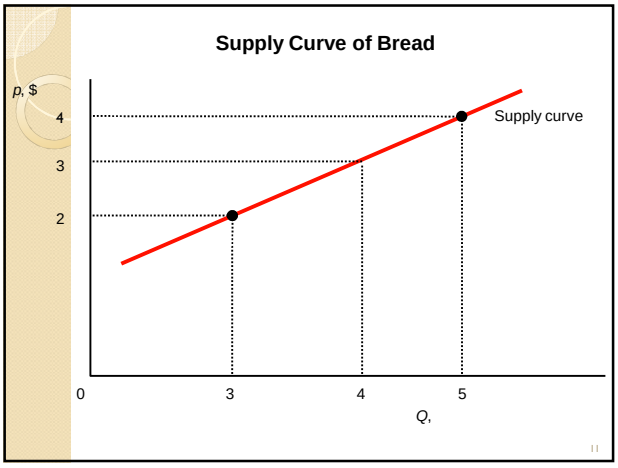


Other Factors Affecting Demand

- Income
- Prices of Other Goods
- Insurance
- Tastes

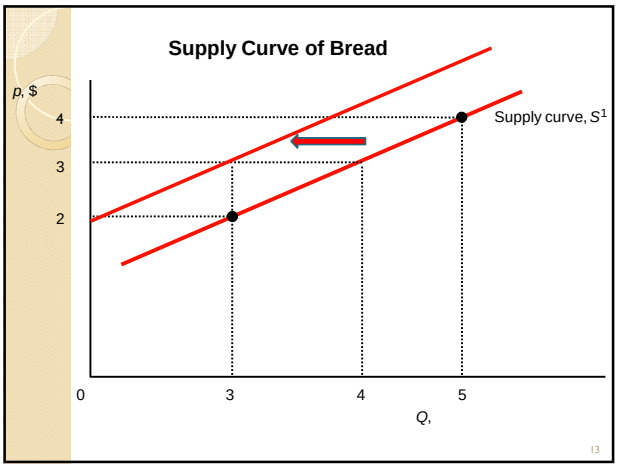


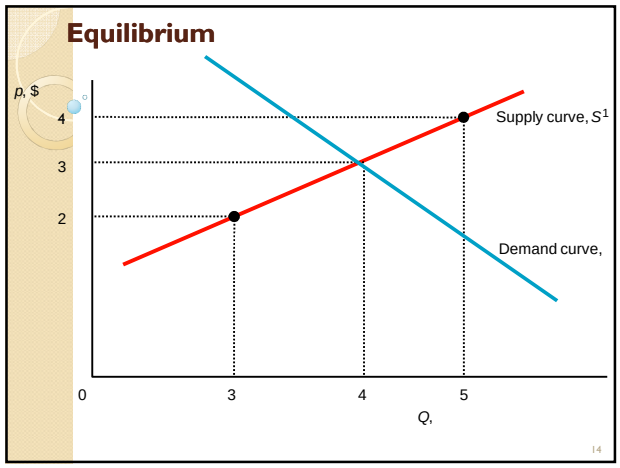
Supply Curve : shows the amount of a good or service that firms *want* to sell at a given price, holding constant other factors that affect supply.



Other Factors Affecting Supply Curve

- Technological Change
- Input Prices
- Size of Industry
- Weather


Supply Curve of Bread
p, $
4
3
2
Supply curve, S1
0
3
4
5
Q,
13


Equilibrium
p, $
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2
Supply curve, S1
Demand curve,
0
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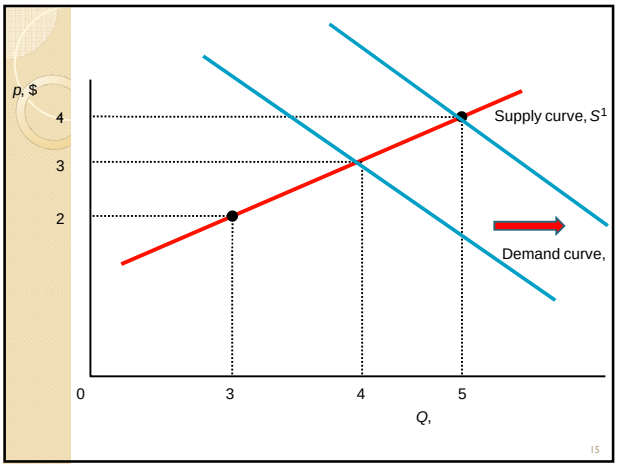
4
5
Q,
14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Supply curve, S1
Demand curve,
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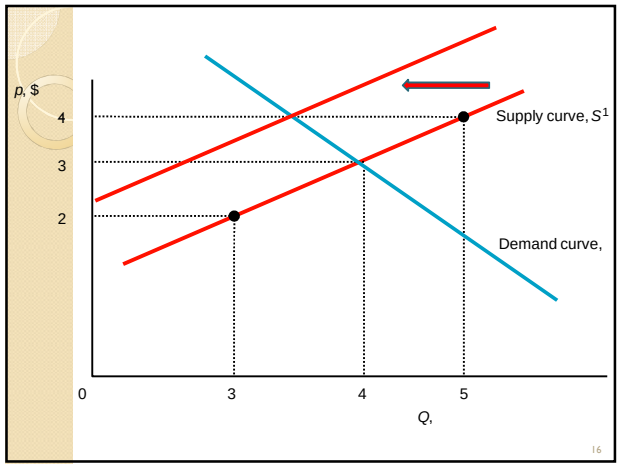
p, $
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Supply curve, S1
Demand curve,
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Q,
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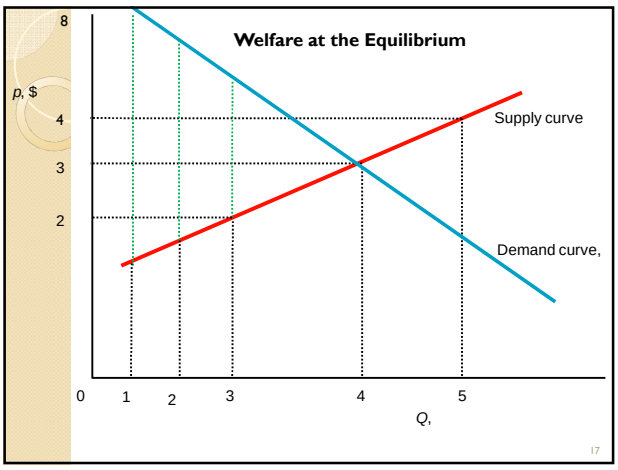
8
Welfare at the Equilibrium
p, $
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Supply curve
Demand curve,
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Q,
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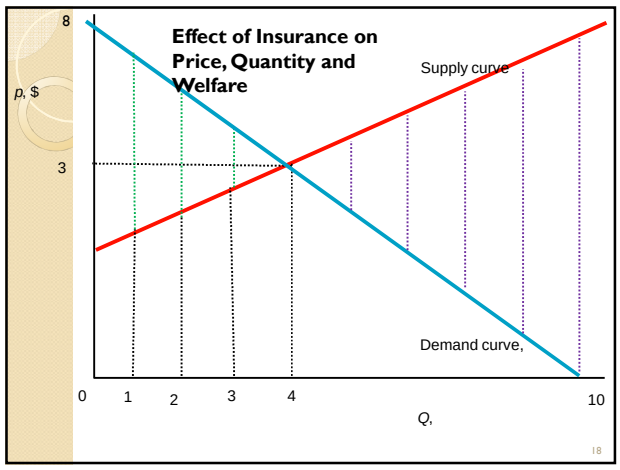
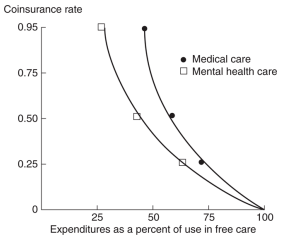

8
Effect of Insurance on Price, Quantity and Welfare
p, $
3
Supply curve
Demand curve,
0
1
2
3
4
10
Q,
18

Does Price Matter in Health Care?

- **The RAND Health Insurance Experiment (RHIE)**: A large randomly controlled economic experiment. The experimenters discovered that the greater the portion of the health care bill (higher coinsurance rate) that individuals are required to pay, the less health care they purchase.
- The results were robust in different groups.

Source: Keeler, Manning, and Wells (1980) for mental health care; Keeler and Rolph (1988) for medical care. (Cited from Folland 2012)

- Demand Response of Ambulatory Mental Health and Medical Care in the RAND Health Insurance Experiment



19

Elasticity

Responsiveness of the quantity demanded to changes in the factors affecting demand.

Price Elasticity: Shows how responsive the consumers to the price changes.

- E_p = % change in Q_d ÷ % change in P
- $E_p = (\Delta Q/Q) \div (\Delta P/P)$

Income Elasticity: Shows how much consumers increase their consumption when their incomes increase (decrease).

- E_i = % change in Q_d ÷ % change in I
- $E_i = (\Delta Q/Q) \div (\Delta I/I)$

20

Elasticity Estimates

(Cited from Folland 2012)

Study	Dependent Variable	Price Elasticity
All Expenditures:		
Manning et al. (1987)	All expenditures	−0.17 to −0.22
Physician Services:		
Newhouse and Phelps (1976)	Physician office visits	−0.08
Cromwell and Mitchell (1986)	Surgical services	−0.14 to −0.18
Wedig (1988)		
Health perceived excellent/good	Physician visits	−0.35
Health perceived fair/poor	Physician visits	−0.16
Hospital Services:		
Newhouse and Phelps (1976)	Hospital length of stay	−0.06
Manning et al. (1987)	Hospital admissions	−0.14 to −0.17
Nursing Homes:		
Chiswick (1976)	Nursing home residents per elderly population	−0.69 to −2.40
Lamberton et al. (1986)	Nursing home patient days per capita elderly	−0.69 to −0.76

21

Firm Specific Elasticities

(Cited from Folland 2012)

Study	Dependent Variable	Price Elasticity
Physician Services:		
Lee and Hadley (1981)	Physician price	−2.8 to −5.1
McCarthy (1985)	Physician visits	−3.1 to −3.3
Hospital Services:		
Feldman and Dowd (1986)	Hospital patient days	−0.7 to −0.8
	Hospital admissions	−1.1
Gaynor and Vogt (2003)	Hospital discharges	−4.9
Nursing Homes:		
Mukamel and Spector (2002)	Case-mix adjusted days	−3.5 to −3.9

22

Income Elasticities

(Cited from Folland 2012)

Study	Dependent Variable	Income Elasticity
All Expenditures:		
Rosett and Huang (1973)	Expenditures	0.25 to 0.45
Hospital Services:		
Newhouse and Phelps (1976)	Admissions	0.02 to 0.04
Physician Services:		
Newhouse and Phelps (1976)	Visits	0.01 to 0.04
Nursing Homes:		
Chiswick (1976)	Residents per elderly population	0.60 to 0.90

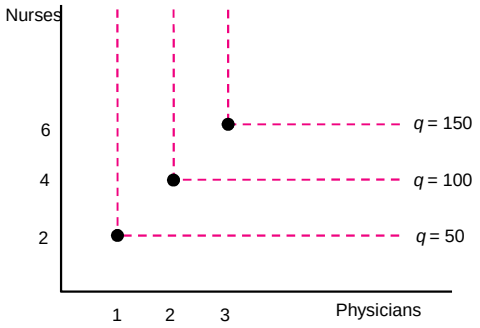
23

Substitution of Factors of Products

- Generally there are different ways of producing goods and services. In these different methods factors of production are used at different rates. (There is more than one way to skin a cat)

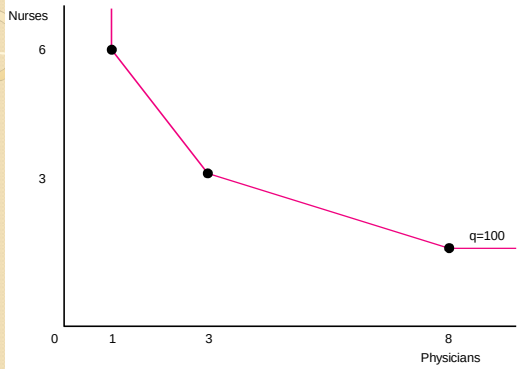
24

Isoquants



25

Some Flexibility in Production of Health Care Services



Substitution Between Factors

- Firms (profit maximizer or not fro profit), respond to changes in input prices. Usually respond occurs in a manner at which by shifting away from the now costlier input to the relatively cheaper input.
- If physician salaries increased relative to nurses salaries, hospitals substitute nurses for physicians.
- The elasticity of substitution (*ES):* measures the responsiveness of a firm to changes in relative input prices.

$$E_s = \frac{\text{Percentage change in factor input ratio}}{\text{Percentage change in factor price ratio}}$$

27

Evidence of Factor Substitution

(Cited form Folland 2012)

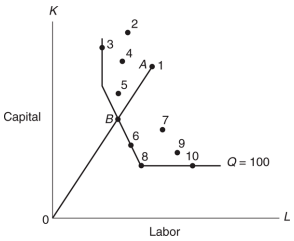
Input Pair	Nonteaching Case-Mix Adjusted Admissions	Teaching Case-Mix Adjusted Admissions
1. Medical Staff with Nurses	0.547	0.159
2. Medical Staff with Beds	0.175	0.155
3. Nurses with Beds	0.124	0.211
4. Nurses with Residents	—	2.127
5. Medical Staff with Residents	—	0.292

Source: Gail A. Jensen and Michael A. Morrisey, "The Role of Physicians in Hospital Production," *The Review of Economics and Statistics* 68:3 (August 1986), pp. 432-442. Copyright © 1986 by the President and Fellows of Harvard College and the Massachusetts Institute of Technology, with permission.

28

Technical Efficiency

- Data Envelopement Analysis
- Stochastic Fronties Analysis



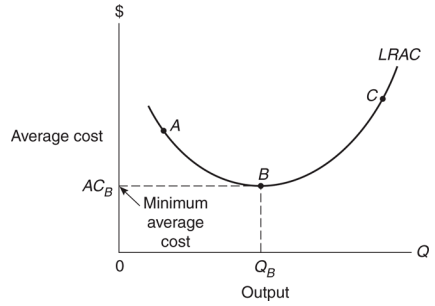
29

Relationship Between Cost and Production Quantity

- In a typical firm as output increases, firm's average cost of producing is likely to decline to a point; Because:
  1) On a larger scale, workers can better specialize
  2) Firm may be able to get inputs at lower cost if can get quantity discounts. Lower prices might lead to different input mix.
- However at some point, Average Cost will begin to increase
  1) Managing a larger firm may become more complex and inefficient as the number of tasks increase
  2) Bulk discounts can no longer be utilized. Limited availability of inputs may cause price to rise.

30

Average Cost of a Typical Firm



31

Economies of Scale

- When long-run average cost falls as the firm expands the firm is said to experience economies of scale and when long-run average cost increases the firm is said to experience diseconomies of scale.
- **Empirical Evidence for Hospitals:**
  - Conrad and Strauss (1983), Preya and Pink (2006), Dranove and Lindrooth (2003) found economies of scale.
  - Cowing and Holtmann, (1983) found constant returns to scale
  - Vita, 1990 found diseconomies of scale.

32

Economies of Scope

- Economies of scope is to produce two or more goods jointly more cheaply than they can be produced separately.
- Diseconomies of Scope is also possible. Emergency of specialty health care organizations suggests that there is possible diseconomies of scope.

33

Diffusion of New Health Care Technologies (Products)

- **Profits:** Health Care providers (Hospitals, physcians, public health policy-makers), tend to adopt a new health care technology or product if they expect to increase their revenues and or popularity. (This could happen through enhancing their prestige or by improving the well-being of their patients.)
- **Information:** You cannot adopt something you are not familiar with. (friends, colleagues, journals, and conferences in informing and encouraging the adoption)

34

Effects of New Health Care Technology

- **Treatment Expansion Effect:** Hitherto untretable patients are treated. (almost always improve the health outcomes but also increase costs)
- **Treatment Substitution Effect:** New technology replaces old treatment methods. (most of the time, health outcomes improve or stay constant, costs can go up or down.)

35

Effects on Health Expenditure

- Most health economists believe the innovations in health care are responsible for the biggest share of health expenditure increases.

→ Many cost containment programs try to slow the diffusion of new technologies (Sloan and colleagues (1986), Teplensky et al. (1995) Caudill et al. (1995) Baker (2001).)

- Some studies found pharmaceuticals as exceptions. (Civan and Koksal 2010, Lichtenberg 2005,2007,2010)

36

Prisoner's Dilemma (Medical Arms Race)

- Some new technology might be utilized even if it is not efficient (Marginal benefit less than marginal cost)

		Hospital B	
		Adopt	Do Not Adopt
Hospital A	Adopt	100, 100	200, −50
	Do Not Adopt	−50, 200	150, 150

37