



AFRICAN ECONOMIC RESEARCH CONSORTIUM

Collaborative Masters Programme in Economics for Anglophone Africa
(Except Nigeria)

JOINT FACILITY FOR ELECTIVES (JFE) 2010

JUNE – OCTOBER

HEALTH ECONOMICS I

First Semester: Final Examination

Duration: 3 Hours

Date: Wednesday, August 11, 2010

INSTRUCTIONS:

1. This examination is divided into two sections: **Section A** and **Section B**.
 2. Answer **ANY THREE** questions in **Section A** and **ANY THREE** in **Section B**.
 3. You are required to answer **SIX** questions in total.
 4. Total exam marks = 105 (which will be converted to 60%, while continuous assessments will contribute 40% of final grade)
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SECTION A

Answer **THREE** questions from this Section

Question 1 (20 marks)

In the Grossman model discussed in class, assume a pure investment model and answer the questions below.

- (a) The wage elasticity of health (as capital) equation is $e_{HW} = (1 - K) \varepsilon = (1 - K) \left(\frac{-\partial \ln H_t}{\partial \ln \gamma_t} \right)$, where K = the share of time in the total cost of health investment, ε is the elasticity of the MEC, H_t is health stock, and γ_t is the opportunity cost of health. What is the sign of the equation? Explain (5 marks)
- (b) What is the sign of $\frac{\partial M_t}{\partial W_t}$, where M_t represents medical care? Explain (5 marks)
- (c) Now assume there is full insurance. What is the sign of $e_{MW} = (1 - K)(\varepsilon - \sigma_{MX})$, where e_{MW} = wage elasticity of medical care, σ_{MX} = partial elasticity of substitution in production between M_t and X_t . Assume M_t and X_t are substitutes in production so $\sigma_{MX} > 0$. Under what condition will $e_{MW} < 0$ possible? (5 marks)
- (d) Assuming no health insurance, what does the answer in (b) above imply to the policy maker? (5 marks)



Question 2 (20 marks)

In the Physician Agency Model discussed in class assume the physician chooses x and p to maximize profit, $px - cx$, subject to $NB^0 = B(x) - px$ where x is quantity of care, p is price and c is marginal cost and is constant. $B(x)$ is concave.

- (a) Find the first order conditions and illustrate on a graph. (5 marks)
- (b) Now assume θ is the share of price that is paid by the patient so that now $NB^0 = B(x) - \theta px$ and that the physician chooses only x . Find the new first order conditions and illustrate on a graph. (5 marks)
- (c) Show that the equilibrium x in (b) is more than that in (a). (5 marks)
- (d) Explain the result in (c). (5 marks)

Question 3 (20 marks)

Imagine a firm in the pharmaceutical industry and answer the questions below.

- (a) Explain the terminologies:
 - (i). Increasing returns consumption technology (2 marks)
 - (ii). Linear consumption technology (2 marks)
 - (iii). Decreasing returns consumption technology. (2 marks)
- (b) Assume two symptoms of malaria: fever and headache. Drug A is already in the market and one tablet can reduce headache for 3 hours without reducing fever. Drug B is an innovation and can reduce headache for 2 hours and fever for 3 hours. Does drug B have technical dominance? Why or why not? (4 marks)
- (c) Suppose the price of drug A is \$2.5 and that of B is \$4 and an average consumer has \$24 to spend on drugs. Assuming linear consumption technology for both drugs, how much of each drug will the consumer choose? Illustrate on a graph. (4 marks)
- (d) Now assume the P_B and P_A remain at \$4 and \$2.5 respectively, but drug B has increasing consumption technology such that hours of relief from headache provided by B are x^2 where x is the amount of dosage of B. Thus, for example, 3 doses of B give $3^2 = 9$ hours of relief from headache. The average consumer still has \$24 to spend. (6 marks)
 - (i). How much of each drug will the consumer buy? Explain carefully. (3 marks)
 - (ii). What is the highest price at which drug A will remain in the market. (3 marks)



Question 4 (20 marks)

Meseret is risk averse and has wealth \$2,500. With probability $\frac{1}{2}$ he will get sick. He estimates his loss from illness to be \$1,600. His utility function is $U(W) = x^{1/2}$ where x is the amount of wealth he has.

- What is Meseret's expected utility? (4 marks)
- Suppose he can buy an insurance policy that will cover the entire loss. Will he buy it if its price is \$1,000? \$900? \$800? (6 marks)
- What is Meseret's reservation price for such an insurance policy? (5 marks)
- Explain risk aversion. (5 marks)

Question 5 (20 marks)

In the moral hazard model discussed in class, the consumer's expected utility is $V_I = \int U(y - \pi - c(m(s)), H(s, m(s)))f(s)ds$ where $m(s)$ is the health care expenditure, s is the severity of illness, $c(s)$ is coinsurance, $H(s, m(s))$ is health status, $\pi = \int (m(s) - c(s))f(s)ds$ is the premium. The consumer chooses $m(s)$ to maximize expected utility.

- In the first best case in which the insurer can observe s , the resulting first order condition for each s is:

$$U_H H_m = EU_x \text{ where } EU_x = \int U_x (y - \pi - c(s), H(s, m)) f(s) ds.$$

Explain the first order condition. (5 marks)

- Assuming no substitution between x and H how justifiable will $c(s) > 0$ be? Explain (5 marks)

- In the second best situation in which π is fixed, the first order condition is:

$$H_m U_h = c'(m) U_{xx} \text{ for each } s. \text{ Explain} \quad (5 \text{ marks})$$

- Compare the levels of health care consumption in the first and second best cases. Explain why, if any, there is a difference in consumption between the two cases. (5 marks)



SECTION B

Answer **THREE** questions in this Section

Question 6 (15 marks)

Questions on Demand for Health Care

- (a) Explain two determinants of demand for health care. (8 marks)
- (b) Explain the relationship between health and health care. (7 marks)

Question 7 (15 marks)

Questions on Non-Profit Hospital

- (a) As far as quality is concerned, according to the Newhouse model, why is the non-profit hospital considered inefficient? (7 marks)
- (b) Give two reasons why the health care market is dominated by the non-profit hospitals. (8 marks)

Question 8 (15 marks)

Questions on Epidemiology

- (a) How does the elasticity of prevalence affect the ability of the private market to eradicate diseases? (8 marks)
- (b) Explain one method of public health intervention to eradicate an epidemic and how the success is affected by the elasticity of prevalence. (7 marks)

Question 9 (15 marks)

Questions on Government Intervention and Managed Care

- (a) Give two reasons for market failure and government intervention in the health care market. (8 marks)
- (b) Give two characteristics of managed care. (7 marks)