

AFRICAN ECONOMIC RESEARCH CONSORTIUM

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

JOINT FACILITY FOR ELECTIVES
JUNE – OCTOBER 2005

HEALTH ECONOMICS

First Semester: Final Examination

Time: 09.00 AM – 12.00 Noon

Tuesday August 9, 2005

INSTRUCTIONS:

There are two parts of this exam. In the first part, you are asked very short answer questions. In the second part, you are given a number of different problems that focus on specific health economic issues.

PART I: Short Answer

*Instructions: In this part of the exam, there are five short answer questions. **Answer FOUR of the five questions.** Within your answer, cite any relevant sources, while making sure that you provide a structured argument. You will be graded on the correctness of your response, the organization of your response, and the relevance of sources used. **You are limited to two pages for each answer**, so you might want to plan your answer before you begin. If you answer more than 4 questions, only the first four will be graded. You must therefore specify the four questions to be graded.*

Question 1

What is meant by health? How is it measured? Given our discussions in class, what are the major influences on that health and through what pathways do they influence it? (5 Marks)

Question 2

Many countries in Africa instituted fees for patients of the public health system. What has the effect of those fees been on the use of public health facilities? (5 Marks)

Question 3

True or False and Explain. Due to the spread of HIV and AIDS across Africa, subsidies should be made available to pharmaceutical firms to encourage them to further their research into developing country maladies. (5 Marks)

Question 4

In much of the developing world, especially Africa, rural households do not have access to insurance. Instead, they rely upon family and community for help in times of trouble. Briefly discuss situations in which these family/community insurance schemes are incapable of providing a buffer. Can you propose a policy that alleviates this difficulty? (5 Marks)

Question 5

True or False and Explain: Public health facilities in Africa inefficiently deliver health care, because they are inadequately resourced and are generally only located in larger urban areas. (5 Marks)

Part II: Focus-specific Questions

Instructions: Below, there are four questions covering, broadly, the five topics on the syllabus for this semester. Admittedly, there is overlap, but each question is designed to test your understanding of health economic theory, as it is applied within a particular topic. Each question is also designed to elicit a policy or empirical hypothesis. You will be asked to discuss these policy and empirical issues. Answer TWO of the four questions. Each question is worth 20 marks. The division of marks across sub-questions will be noted. **If you answer more than two of the questions, I will only grade the first two in the exam booklet. In other words, clarify which questions you intend to answer.**

Question 6

Consider an individual with preferences over health and consumption, such that $U = c^\alpha h^{1-\alpha}$, where $\alpha \in (0,1)$. However, health cannot be purchased on the market. Rather, it is produced with two inputs. There are low quality inputs, denoted by L , and high quality inputs denoted by K . Health production follows a modified Cobb-Douglas function: $h = (K + \theta)^\beta (L + \theta)^\gamma$, where θ is constant, while β and γ , with $\beta + \gamma = 1$, represent productivity parameters. Assuming that the consumer has exogenously given income (denoted by y), consumption goods are available for the

price of p , low quality inputs can be purchased for w , and high quality inputs can be purchased for a price of r , answer the following questions.

- a) Use the production function information to determine the health production cost function. **(5 marks)**
- b) Using the total cost function from part a. to represent expenditure on health within the budget constraint, determine the demand for the high quality input. *{Hint: find optimal health, which can be substituted into the derived demand for the high quality input from part a.}* **(5 marks)**
- c) What is the effect of $\theta > 0$ or $\theta < 0$ on the demand for the high quality input? What is the effect of a change in the price of the low quality input on this demand, does the value of θ affect that, how? Explain the intuition of these results. **(5 marks)**
- d) Which value of the parameter ($\theta > 0$, $\theta = 0$, or $\theta < 0$) is most reasonable? Discuss and provide a reference to at least one paper you have examined over the course of this semester, which relates to the parameter value. **(5 marks)**

Question 7

Consider an individual, who lives for two periods, which we will denote as youth and elderly. When she is a youth, she earns income, y , which she either consumes, c_1 , invests in her health, h , or saves. Assume that the price of first period consumption is given by p_1 , which is normalized to one for convenience, while the cost of her health investment is q per unit. In her elderly years, she also enjoys consumption, but no longer saves, since she will not live beyond the end of the period (and has no family to bequeath her wealth to). If she saved in the first period, she is able to consume, denoted by c_2 , her income y_2 as well as the total value of her savings, which was assumed to grow at the rate of interest, r . Assume that the price of consumption in the second period is given by p_2 and that her lifetime utility, suitably discounted, so that $\beta = \frac{1}{(1+r)} < 1$, is $U = \ln c_1 + \beta \ln c_2$. In order to make investment worthwhile, assume that her future income is affected by her health, such that $y_2 = y + \sqrt{h}$.

- a) Assume that the individual can borrow and save at the same interest rate. Determine the optimal choice of health to be purchased. Placing marginal benefits and marginal costs on the vertical axis, illustrate that optimal choice. **(3 marks)**
- b) Determine her optimal choice of consumption in each period. What is the effect of an increase in q ? **(3 marks)**

- c) Determine if she is a saver or borrower. What is the intuition behind the result? Substituting $(1+r)$ out of the solution, if you have not already done so, determine the effect of an increase in β and an increase in q on savings. Discuss the intuition of this result. **(5 marks)**
- d) Assume that she cannot borrow, although saving is still possible. Determine her optimal health purchases under this scenario. How does this result compare to the result in part a.? How does her consumption differ in this scenario, compared to her optimal consumption in part b.? Explain the intuition. **(5 marks)**
- e) Without access to capital markets, what do families in Africa do? Provide empirical examples of effects of the actions undertaken by these families. Discuss policy options that might help alleviate the lack of access to capital, how will your policy help the health of others. Which policy options are better and why? **(4 marks)**

Question 8

Consider an individual, who has become ill; either a good doctor or a bad doctor can treat the ill individual. Presume that all doctors, regardless of type, have preferences over their income and their effort. Presume those preferences are given by: $u^i = \sqrt{y} - \theta^i e^2$, where y denotes income, e is the effort expended by the doctor, and θ represents the disutility associated with effort. The superscript i is used to denote doctor type, where b is for bad and g is for good; assume that $\theta^b > \theta^g$. Assume that actual effort is not the only determinant of how well a doctor cures an individual; rather, assume that a better doctor helps the sick individual more than a bad doctor, but that things outside of the doctor's control also matter. For that reason, individuals are willing to pay more for a good doctor than a sick doctor, i.e., $w^g > w^b$.

- a) Calculate the Marginal Rate of Substitution between effort and income for each type of doctor and illustrate those preferences on the same effort-income axes. What difference(s) are apparent in the illustration? What is the intuition behind the (those) difference(s). **(5 marks)**
- b) Assuming a market with complete and perfect information, so that types of doctors are easily identified, illustrate the market equilibrium effort of each doctor. Assume that wages are given by the willingness to pay w^i , where i is defined as it is in the problem statement. Discuss any differences between doctors and wages in equilibrium. Is this outcome efficient? What type of patient is most likely to visit a bad doctor, why? **(5 marks)**
- c) Assuming, instead, that information concerning doctor quality is not verifiable (i.e., even patients that visit good doctors remain sick), but wages are still determined by the willingness to pay, what would bad doctors want to do? Illustrate the possibility and explain why they want to do what you suggest.

What effect does this have on market efficiency? What type of patient is most likely to be affected by this change? Why? How have traditional healers in Africa, been able to get around this problem? **(5 marks)**

- d) If we assume that effort is observable and verifiable, but that doctor quality is not easily verifiable, can you propose a solution to the information asymmetry in part c based on a minimum effort level provided by each doctor? Is this outcome efficient? Is it better or worse than the outcome in part c.? Why do you say that? Provide any relevant sources that you can. **(5 marks)**

Question 9

Consider a doctor, who receives utility over net income and from improvements in the health, h , of the patients she treats, so that if π is the payment received, then $U = U(\pi - wL - r\phi, h)$. Improvement in patient health is a function of the patient's initial health, and health care delivery: $h = h_0 + q(L, \phi)$. Therefore, q represents the delivery capacity of health care for the doctor, assuming that L represents her labour input, while ϕ represents pharmaceutical inputs; furthermore assume her utility is concave in net income and health. Finally, assume that marginal productivity can be negative, if too many inputs are used.

- a) Suppose the doctor receives a fixed salary, so that π is a constant. Determine the optimal allocation between her labour and her use of pharmaceuticals. Illustrate (graph) your result for each input, as well as for the optimal combination. Compare the advantages of this approach to the disadvantages of this payment approach, and whether or not it is relevant in Africa. What assumptions did you have to make? **(4 marks)**
- b) Suppose the doctor is paid based on the service provided, so that $\pi = \pi(q)$. Determine the optimal allocation between her labour and her use of pharmaceuticals. Illustrate (graph) your result for each input, as well as for the optimal combination. Discuss the advantages and disadvantages of this payment approach, and whether or not it is relevant in Africa. **(4 marks)**
- c) Suppose that, due to pharmaceutical company perquisites, the doctor receives a payment that is based on her sales of pharmaceutical products, i.e., $\pi = \pi(\phi)$. Determine the optimal allocation between her labour and her use of pharmaceuticals. Illustrate (graph) your result for each input, as well as for the optimal combination. Discuss the advantages and disadvantages of this payment approach, and whether or not it is relevant in Africa. **(6 marks)**
- d) Given your answer to part c., can pharmaceutical companies induce demand? Why do you say that? Discuss the implications of patent laws (and the length of patents) on consumer welfare, given your answer regarding induced demand. Provide any illustration or model that you might like to, as well as any references. **(6 marks)**