Written Exam for the M.Sc. in Economics summer 2013

Health Economics

Final Exam

June 22th 2013

Suggested answers

Question 1

Question 1 draws on the textbook by Morris et al. (2012) chapter 2 and Grossman (2000) "The human capital model", *Handbook of Health Economics*, Vol. 1, chapter 7, and Cutler and Lleras-Muney (2006).

a) Explain why individuals demand medical care according to the pure investment model of Grossman (1972)? And what is the reason in the pure consumption model?

Students may start out explaining the key features of the Grossman model, including both the investment and the consumption aspect. In explaining the model, they may draw on either the textbook explanation or the more formal explanation in Grossman's handbook chapter. Students are not required to derive the model formally, but should be able to explain the main principles of the demand for health based on Grossman's model. Thus, individuals enjoy both health and other goods, which is reflected in their utility function. Health capital evolves over time, with increases due to individual investments and reductions due to depreciation of health. Individuals produce their investments in health as in a household production function with the inputs of their own time and goods, including health care. Time of death is endogenously determined in the model. Individuals choose to invest in health until the point where the marginal benefit of the investment equals the marginal cost.

According to Grossman's model, there are two main motives for why individuals demand medical care:
- An investment motive – hence the pure investment model: When individuals invest in their health, they gain more healthy days to spend in the labour market or to spend consuming other goods.
- A consumption motive – hence the pure consumption model: In this submodel, individuals gain from enjoying better health per se. Better health may improve the quality of their leisure or their enjoyment of consumption goods.

In reality, individuals will be interested in better health for both motives. However, it can be convenient to look at the two motives separately, i.e. the pure investment model and the consumption model.

b) Discuss why education may matter for the demand for health and discuss empirical evidence considering this.

An increase in education will raise the efficiency of non-market production. Thus, this will enhance the efficiency of individuals' production of health investments and raise the optimal health stock. The effect on the demand for health care is ambiguous.

Empirical evidence generally supports a positive correlation between education and health. The empirical evidence is summarized in Cutler and Lleras-Muney (2006).

The literature suggests three possible channels of the link:
1. More education improves health.
2. Good health improves ability to learn and enhances education.

3. Some other factors (e.g. family background or time preferences) affect both health and education in the same direction. We observe that education and health co-move, but relationship is not causal (in any direction).

The first explanation is that there is a causal link going from more education to better health. The problem with establishing a causal link is that education is a choice variable which can be correlated with unobserved factors that are also correlated with health. True experimental designs to investigate whether causality runs this way are rarely possible. In order to find exogenous variation in education, researchers have exploited changes in the education level through natural experiments.

Causality may also move in the opposite direction, from health to education (explanation 2). And finally, it may be that individual characteristics (3) impact both education and health in the same direction, e.g. family background, genetic traits, ability, preferences, e.g. time preference. To the extent that these are unobserved and correlated with education, simple OLS estimates of the relationship may suffer from omitted variable bias.

To explain a causal link, Cutler and Lleras-Muney (2006) discuss reasons for a causal link:

    i.   Education affects income and occupation
    ii.   Education increases health knowledge
    iii.   Education improves decision-making and the use of information
    iv.   Education determines social rank which affects levels of stress

They suggest that the third explanation plays a major role for explaining the relation between education and health.

    c) What role does information play in the Grossman model? Can you imagine that some patients will react more to an information campaign than others? Based on the Grossman model and empirical evidence: What is the likely impact of an information campaign about a given treatment?

The Grossman model assumes perfect information. Yet, the Grossman model assumes a more efficient production by the more educated. This could arise because the more educated are better at using the information, as suggested by the empirical evidence summarized in Cutler and Lleras-Muney (2006). Therefore, the more educated may make use of new health related information first, as e.g. campaigns on smoking hazards. Therefore a general information campaign is likely to increase the health of the better educated more than of the less educated, thereby increasing social inequality in health.

Question 2

The answer to this question can be based on chapter 6 in Morris et al. (2012) and Neun and Santerre, chapter 6.

    a) According to the standard economic model of health insurance (e.g. Rothschild & Stiglitz, 1976), when and why do people demand health insurance?

Due to the standard economic model of health insurance, consumers demand health insurance if the expected utility of wealth with insurance is larger than expected utility without insurance. This situation generally occurs if people are risk averse. Risk averse consumers will therefore demand health insurance to avoid unexpected income variation. The standard theory is derived without explicit reference to health and health care, i.e. health insurance is *not* demanded because it provides access to health care that in turn affects health. Students may illustrate graphically, explaining concepts of risk aversion and fair insurance premiums.

b) How does the theory of Nyman differ from the standard model?

According to standard theory in health economics, individuals can pay (e.g. by loans) for health care and works with an a priori willingness to pay (WTP) for health care. This model assumes that insurance is demanded only for (income) risk avoidance. Due to standard theory, demand does not depend on health state.

Nyman, however, observed that many people cannot afford health care. He therefore postulates that insurance is demanded not only for a general reduction in income variation but because of the income transfer when ill. The income transfer may provide access to otherwise unaffordable health care. In addition, Nyman allows for preferences to depend on the health state, i.e. an a posteriori willingness to pay for health care, acknowledging that most people have a higher WTP for health care when ill than when well.

For these reasons increased consumption from insurance is not entirely overuse, as health often improves when health insurance is offered, as consumers demand health improvements that they could previously not afford.

c) What is adverse selection in health insurance markets, and how can it be alleviated?

Adverse selection is observed when individuals with relatively high risks of the event they are insured against are relatively more likely to buy insurance. If all individuals pay the same premium, people with relatively lower risks of illness may choose not to buy insurance at this price. Adverse selection arises because of asymmetric information between the insurer and the insured.

One way to alleviate adverse selection in health insurance is experience rating, i.e. differential premiums for different risk groups. Two problems with this model are present: 1) Information costs associated with obtaining additional health information about potential health insurance customers, and 2) "Cherry picking" problems related to the fact that only low-risk people may obtain insurance, while high-risk people may face problems getting insurance.

d) What is the moral hazard in health insurance markets, and how can it be alleviated?

Moral hazard relates to insurance in general and can be related to changes in incentives for both consumers and providers of health care. On the consumer side, moral hazard is related to the idea that people who are insured against risk and its consequences may show more risky behaviour. In relation to health insurance markets this may lead to less self-protective behaviour and an increase in the use of health care. On the health care provider side, moral hazard relates to the idea that health care providers may be more inclined to suggest additional treatment to the patient, whenever

the income to the health care provider depends on the number of treatments. Moral hazard on the health care supplier side relates to supplier induced demand which the student may also discuss. Moral hazard may occur in health care markets due to e.g. asymmetric information.

Students may also discuss Nyman's distinction between inefficient (standard) moral hazard and efficient moral hazard.

Question 3

This chapter draws on Morris et al. (2012) chapter 11 and 12.

   a) What is a QALY and why is it needed?

QALY: Quality adjusted life year – is a concept frequently used in health economics. QALY measures both gains in life expectancy and gains in health-related quality of life, by multiplying added life-years by weights describing quality of life. It is needed to be able to compare interventions with different impacts on life-years and life-quality.

QALYs are used in prioritizing and decision making in health care.

   b) Describe different methods to measure a QALY and their pros and cons

Even without putting monetary values on QALYs, there are challenges when measuring QALYs. Students may discuss how to design surveys where respondents prioritize between different types of health dimensions through e.g. the EQ-5D helath-related quality of life classification. Furthermore, students may discuss how these concepts could be included in the time-trade-off model or the standard gamble to derive weights for quality-of-life in a given health state.

   c) How can we measure the monetary value of a QALY?

Generally, it is a challenge to measure preferences for health in monetary terms in the absence of a market. The literature points to using either revealed preferences or stated preferences.
In the case of stated preferences, students may discuss the possibilities of either asking consumers directly or inferring willingness to pay indirectly by offering hypothetical choices. Also, students may discuss alternative monetary valuations of health states or health changes, i.e. willingness to pay (WTP) versus willingness to accept, compensating variation (CV) versus equivalent variation (EV). Moreover, the student may discuss discounting costs and benefits in health and uncertainty. Furthermore, the student could discuss cost benefit versus cost effectiveness.