Written Reexam for the M.Sc. in Economics winter 2015-16

Health Economics

Final Reexam

February 15, 2016

(3-hour closed book exam)

Please note that the language used in your exam paper must correspond to the language of the title for which you registered during exam registration. I.e. if you registered for the English title of the course, you must write your exam paper in English. Likewise, if you registered for the Danish title of the course or if you registered for the English title which was followed by “eksamen på dansk” in brackets, you must write your exam paper in Danish.

This exam question consists of 4 pages in total (excluding this front page).

Part I: Public Health and the Mortality Decline

Introduction: Tuberculosis (TB) mortality fell in many Western countries from above 200 per 100,000 in 1880 to below 100 per 100,000 before 1940. Denmark was particularly successful in combating TB. This fact has been ascribed to the policies pursued in Denmark, instigated by the *National Foundation for the Fight Against Tuberculosis*. Among other public health measures, the National Foundation established so-called TB dispensaries which were rolled-out across time and space (i.e., cities) differentially. The role of the TB dispensaries was to prevent the spread of TB by diagnosing and information.

Question 1.1: Briefly explain the most prominent theories of why mortality started to decline in Western countries in the late 19th century.

In order to quantify the effect of the dispensaries on the development of TB mortality in Denmark, the following estimation equation is proposed:

$$M_{ct} = \beta Dispensary_{ct} + \alpha_c + \gamma_t + \varepsilon_{ct}, \tag{1}$$

where M_{ct} indicates the TB mortality rate in city c at year $t \in (1908, 1909, .., 1939)$. $Dispensary_{ct}$ is an indicator equal to one after the introduction of a TB dispensary in city c, the α_c's are city fixed effects, the γ_t's are year fixed effects, and ε_{ct} is the error term.

Question 1.2: What is the principal idea behind the proposed estimation equation?

Question 1.3: Explain how and why estimates of β are likely be biased, along with possible solutions in the form of robustness tests.

Question 1.4: Assume that data on other causes of death has been collected as well. These are: cancer, influenza, pneumonia, and accidents. How could one exploit these data to test the validity of the proposed research design? Explain/discuss.

Question 1.5: Assume that the TB dispensaries in fact had a significant negative impact on TB mortality in Denmark (i.e., $\hat{\beta} < 0$). In relation to the literature on health, productivity, and economic growth, discuss how this might have influenced the economic development of Denmark—as measured by human capital and income—both in the short and long run.

Part II: Economics of Health Innovation

Introduction: Consider the following hypothetical setting. For many years two pharmaceutical companies were the only producers of medication that could treat a fatal disease. If treated, the life expectancy would increase, but at a low quality level of the remaining life. With no treatment people would die within a month, with no quality of the remaining life. For the price of 150000 UK pounds the first company could provide a treatment gaining five quality adjusted life years (QALYs). The second firm supplied medication that gained 3 QALYs at the price 50000 UK pounds. After a number of years new medical products entered the market, and today the products in table 1 (assume that prices are the same across the world) are available:

Table 1 The current market

Treatment	Price (UK £)	QALY
A	0	0
B	25000	2
C	15000	2,5
D	100000	5
E	125000	6
F	50000	3
G	50000	5
H	150000	5

Question 2.1: In the current market situation, which products are potentially cost-effective? Which product is offered within National Health Services (NHS) in UK and MediCare (health insurance for people aged 65+) in US respectively? Explain your results.

Question 2.2: The pharmaceutical company that produces product H gets a research breakthrough. The price of the product is reduced by £25000, while the QALY increases to impressively 11. To meet this competition the producer of product E reduces its price per treatment by £45000. Simultaneously, the producer of treatment D realizes that doubling the amount of the active drug in their pills also doubles its effect on QALYs. They launch this drug, and to make it competitive, they even lower its price by £10000 compared to their old product.

Which drugs are now offered within NHS in UK and MediCare in US respectively? Explain your results.

Question 2.3: How are QALYs typically measured and how could such measurements affect the analysis of question 2.1?

Part III: Information Economics:

Question 3.1: What is the "adverse selection death spiral"? Explain the theoretical foundations for why it may appear and illustrate it graphically.

Question 3.2: Discuss empirical evidence of an adverse selection death spiral in real markets and reasons why it may not occur.