

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

**Health Economics**

Final Exam

December 22, 2015

(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: Health and Productivity

**Introduction:** Iron deficiency reduces productive capacity in adults and impairs cognitive development in children below the age of 5. In 1943, the United States government required nationwide fortification of bread with iron to reduce iron deficiency in the US working age population. A number of surveys prior to 1943 revealed that the prevalence of low iron consumption varied markedly across geographic areas in the US.

**Question 1.1:** From a health-theoretical perspective, explain why simple correlations of health (e.g., iron consumption) and economic outcomes (e.g., earnings) are unlikely to measure the causal effect of iron consumption on earnings.

In order to quantify the contemporaneous productive effects of the national fortification program, the following estimation equation is proposed:

$$Y_{its} = \beta (Iron_s \times Post_t) + \delta_t + \delta_s + X_{its}\Gamma + \varepsilon_{its}, \quad (1)$$

where  $i$  indexes individual,  $s$  indexes state, and  $t$  indexes time periods, which are 1930, 1940, 1950, and 1960. The outcome variable,  $Y_{its}$ , is the average annual wage income of individual  $i$  living in state  $s$  at time period  $t$ ,  $Iron_s$  denotes the pre-intervention average iron consumption in state  $s$ ,  $Post_t$  is an indicator equal to one if  $t > 1943$ , the  $\delta_t$  are time-period dummies, the  $\delta_s$  are state fixed effects,  $X_{its}$  is some vector of individual-level controls, and  $\varepsilon_{its}$  is the error term.

**Question 1.2:** (i) Explain the principal idea behind the proposed estimation equation. (ii) If iron deficiency indeed impairs productivity, should the estimate of  $\beta$  then be positive or negative? Explain.

**Question 1.3:** Outline different robustness tests which can be used to check the credibility of the proposed identification strategy, while discussing potential threats to identification related to, for example, other health improvements of the 1940s.

**Question 1.4:** Exploiting the national fortification program of 1943, write down an estimation equation that quantifies the impact of iron deficiency during early childhood on productivity in adulthood using 1970 US census microdata, which, crucially, contains information on age, birth state, and annual wage income.

**Question 1.5:** Say that estimating the coefficient of interest in the estimation equation from Questions 1.4 reveals that iron deficiency in early childhood has a severe negative effect on adult productivity. Discuss this finding in relation to the theoretical predictions of the Grossman model.

## Part II: Information Economics

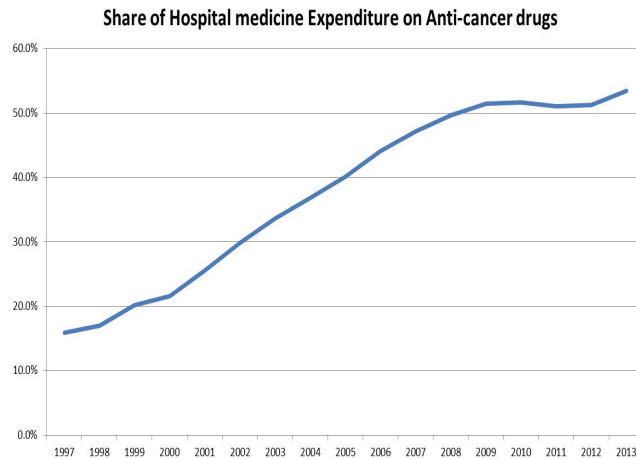
**Question 2.1:** Analyze potential failures in health insurance markets characterized by asymmetric information between the insurer and the individual demanding insurance, and where individuals have differential risks of falling ill, while those who have the lowest risks are in fact more willing to pay for insurance. Explain your analysis in a graphical illustration.

**Question 2.2:** What are the welfare implications of mandating full insurance in this framework? Explain your result in a graphical illustration.

**Question 2.3:** Given micro data containing information about the individual degree of insurance coverage and claims, how can we empirically test whether the situation outlined in question 2.1 is present in the health insurance market? Explain potential biases of such a test.

# Part III: Economics of Health Innovations

**Figure 1:**



Notes: The picture shows the evolution in the percentage of drug expenditure in Danish hospitals spend on anti-cancer drugs. Source: [www.medstat.dk](http://www.medstat.dk)

**Question 3.1:** Explain how different factors affecting prices and quantities consumed in the market for anti-cancer drugs may drive the pattern in figure 1.

**Question 3.2:** Discuss pros and cons of policies to reduce government expenditures on hospital medication.