ECONOMICS 124 / PUBLIC POLICY 190-5/290-5

Quiz 1 (5 October 2004)

ANSWER SHEET

Instructions: Read the whole quiz before answering any questions. Write all of your answers in blue examination booklets. Put your name on the outside of your blue book. If you use more than one (unlikely), number them 1 of .., 2 of .., etc. The quiz is designed to take 45 minutes. Each question has the same weight. .

Students enrolled in PP 290-5 should answer **all five** questions. Students enrolled in Economics 124 or PP 190-5 should answer the **first four** questions. Your answers do not have to be lengthy; they should be directly to the point of the question.

1. **True or False (explain your answer): Intellectual Property has historically been the main way of paying for R&D outputs.**

   - **False** – *5 points* (max five if they don't get the false portion)
   - IP only has been used in the last 400 years – *2 points*
   - Main method of financing innovation was sponsorships (monarch), grants, and prizes (less) – *2 pts*
   - Details about how grants (and/or foundations) have evolved in 19th and 20th century – *1 pts.*
   - *Extra 1 pt.* Details about the history of innovation (Egypt, Greece, Romans, Guilds, etc).

2. **Answer the Following two questions:**

   a. **List the main virtues of IP as an incentive system – 5 pts. Max (5 for first three)**

   5 Points if they get all of the first three – Max 4.5 if they miss two of first three

   - Concentrates costs on the users – *1.5 pt*
   - Weak test of efficiency – *1.5 pt, or 1pt if they just mention that reward is tied to value*
   - Does not require negotiation with sponsor – *1.5 pt*
   - *Extra or makeup 1 pt.* Gather diffused ideas, value assessments, and risk information – *1 pt*
   - *Extra or makeup 1 pt.* Risk if born by investors/individual – *1 pt*

   b. **List some defects of IP as an incentive system**

   5 Points if they get all of the first three – Max 4.5 if they miss two of first three

   - Deadweight loss – *1.5 pt*
   - Does not lead to right amount of R&D (suboptimal innovation) - *1.5 pt*
   - Poor allocation. Does not choose efficiently among firms with different ideas or expertise. – *1.5 pt*
   - *Extra or makeup 1 pt.* Reward is not related to cost or effort of invention. So some ideas receive rewards that are too high and unneeded to get the innovation.

3. **If the cost (value) of an innovation is observable is there anything wrong with making a prize equal to the cost (value)?**

   COST – 5 pts - Max of 3 points if they don't get that sponsor may pay more than value

   - *5 pts* - COST! – The sponsor may end up paying for innovations that are worth less than their costs
   - They point out that economic cost does not equal accounting cost - *Extra or makeup (1.5 pts).*

- Prize goes only to one innovator and its value may not cover the duplicate costs of all the innovators who applied for the targeted prize if they do not have information about the number of competitors and likelihood of success.(with incomplete info they may over or underestimate their likelihood of success. - *Makeup only (1 pts).*
- *Makeup only (1pts).* Too few firms enter and the probability of success may be too low.

VALUE – 5 pts max

- The prize is so large that it may elicit duplication of effort. *(3.5 pts)*
- It is costly to raise more money than necessary to elicit the innovation – taxation imposes its own form of deadweight loss (*1.5 pts*)

4. Based on what you have learned in class, list as many determinants of the rate of innovation as you can think of and explain the role each plays. Give an example of an innovation and explain which factors were the most important in generating it.

- Supply of innovation (max *3 pts*)
  - tech opportunity – state of relevant knowledge
  - cost and availability of inputs (trained researchers, etc)
  - government funding
  - Population size (more people mean more ideas)
- ability to capture increased profit (appropriability), i.e., ability to recoup costs – which is determined by length/breadth of patents or other IP protection, among other things (*1 pt*)
- Demand for innovation (max *3 pts*)
  - amount of cost reduction
  - consumer benefit from new or improved product
  - size of market/population
  - identification of societal needs
- serendipity (accidents) (*1 pt)*

Example: nanotechnology advances depend on the invention of appropriate instrumentation (electron microscope), which is an input supply factor/scientific development. *(up to3 pts for a good example)*

5. *(Graduate students only)* If the reward to innovation is given as an intellectual property right, there are various considerations in choosing the size of the reward. What are the important considerations in two different cases.

a. When "ideas are scarce"
Nordhaus tradeoff *(1 point for mentioning it, 4 points for explanation):* A large reward will encourage innovation, but at the cost of deadweight loss on infra-marginal innovations.

b. When "ideas are common knowledge" (so that a patent race is likely)
In addition to the Nordhaus tradeoff, there is a second reason to keep the size of the reward modest, namely too avoid too much entry into a patent race. – (*5 pts*)