
Final Exam

You have three hours to complete this exam. The exam can be taken at any time up to and including May 8th. Please include your start time and stop time on your exam. Completed exams should be emailed to me (jnp@wm.edu). Time taken to scan and email answers does not count against your three hours. You can combine graphs and written answers in a single file or use one file for written answers and a second for graphs. If you choose to use multiple files, please send them in a single email.

Answer all questions completely but concisely. Including additional incorrect information in an otherwise correct answer may result in the loss of points. As a rough guide, each five points on the exam typically requires about two sentences to correctly answer. The exam is open notes and open book. You may use your notes, the textbook and any of the materials posted on our course Blackboard site. Other materials are not permitted. Good luck!

1. (25 points) Consider the SO₂ allowance program as described in Stavins (1998). This question will consider the efficiency consequences of how permits are allocated.
 - (a) Recall from the Stavins reading that the chosen form of market-based approaches has been to freely allocate tradeable permits. An alternative would be to auction off the permits. Would you expect auctioning off permits rather than freely allocating them to increase or decrease efficiency? What would be the equity implications of auctioning permits rather than freely allocating them? Be certain to fully justify your answers.
 - (b) We discussed the fact that tradeable permits should lead to an efficient distribution of pollution reductions given a particular number of permits but does not guarantee the efficient level of overall pollution reductions. Consider the following scenario:
 - i. There are two firms, Firm *A* and Firm *B*. Both firms have marginal costs of SO₂ reductions that increase linearly with reductions.
 - ii. At any given level of reductions, Firm *A*'s marginal costs of reducing SO₂ emissions by one more unit are higher than Firm *B*'s marginal costs of reducing emissions by one more unit.
 - iii. The marginal benefits of SO₂ emission reductions are constant.
 - iv. At the efficient level of emission reductions, Firm *A* is emitting 100 units of SO₂ and Firm *B* is emitting 50 units of SO₂.
 - v. The government allocates an equal number of SO₂ permits to each firm.
 - vi. Firm *A* and Firm *B* can buy and sell permits from one another.

Suppose that the government is overly aggressive in terms of trying to reduce emissions and sets the total number of permits to be inefficiently low. Use a graph with SO₂ emission reductions on the horizontal axis to demonstrate the deadweight loss associated with an inefficiently low total number of permits. Be certain to clearly label your graph. Also provide a written explanation, making specific reference to your graph, of why this deadweight loss exists.

2. (25 points) Consider Boldrin and Levine's arguments against intellectual monopoly.
 - (a) To what extent do the main points made by Boldrin and Levine apply to the pharmaceutical industry?
 - (b) Compare and contrast the efficiency consequences of eliminating patents versus eliminating copyrights. Consider patents generally, not just pharmaceutical patents.
3. (25 points) Suppose that workers tend to accurately assess their risk from on-the-job injuries but underestimate the long term health risks from exposure to dangerous chemicals. Federal regulators are deciding between three approaches to regulating workplace safety hazards: (i) do nothing, (ii) require employers to post safety warnings around the workplace, (iii) directly regulate safety by mandating specific employer actions to reduce workplace hazards.
 - (a) Which of these three approaches would you recommend for regulating workplace safety hazards related to on-the-job injuries? Be certain to fully explain your answer.
 - (b) Which of these three approaches would you recommend for regulating workplace safety hazards related to chemicals posing long term health risks? Be certain to fully explain your answer.
4. (25 points) Beekeeping provides a positive externality to the beekeeper's neighboring farms: the bees help pollinate any nearby crops. As the beekeeper maintains more and more bees, the size of the marginal externality associated with an additional bee decreases: each one of the first few bees pollinates a substantial number of plants, once there are many bees, the next bee pollinates very few additional plants. The demand for honey from bees is given by a downward sloping straight line. The marginal cost to the beekeeper of producing an additional jar of honey is constant. Use a clearly labeled graph with number of jars of honey on the horizontal axis and dollars on the vertical axis to show the following:
 - (a) The equilibrium number of jars of honey if the market for honey is perfectly competitive.
 - (b) The socially efficient number of jars of honey.
 - (c) The subsidy per jar of honey that would lead consumers to buy the efficient amount of honey.
 - (d) The change in benefits to local farmers (not including beekeepers) that would occur if the government instituted this subsidy.