

Problem Set on Adverse Selection and an Individual Mandate

Developed by Amanda Kowalski, Austin Schaefer, Jack Welsh, and Megan Wilson

This problem set is based on Hackmann, Kolstad, and Kowalski (2015) *Adverse Selection and an Individual Mandate: When Theory Meets Practice*, found in the *American Economic Review*, Vol. 105, No. 3, pp. 1030–64 or at: <http://dx.doi.org/10.1257/aer.20130758>. It is important to read this paper carefully, with special attention to sections II and V. The Online Appendix provides derivations of many of the paper's formulas and will therefore be useful to understanding them.

These questions are designed to test your understanding of the theoretical underpinnings of adverse selection and how the Massachusetts health reform's individual mandate sought to alleviate it in practice. There are no questions that require the use of econometric software, but careful understanding of the theoretical model and its attendant graphs is critical to successful completion of this problem set.

1. Conceptual Questions (50 points)

1.a. What does the average cost curve look like under adverse selection? How is it different under advantageous selection? Which types of individuals join the insurance pool first under each scenario?

[5 points]

1.b. How does community rating with guaranteed issue exacerbate adverse selection?

[4 points]

1.c. Why might the health reform have a larger impact on enrollment in the individual market than in the group market? How might it affect costs?

[4 points]

1.d. What are two potential sources of welfare gain from the health reform as outlined in the paper?

[4 points]

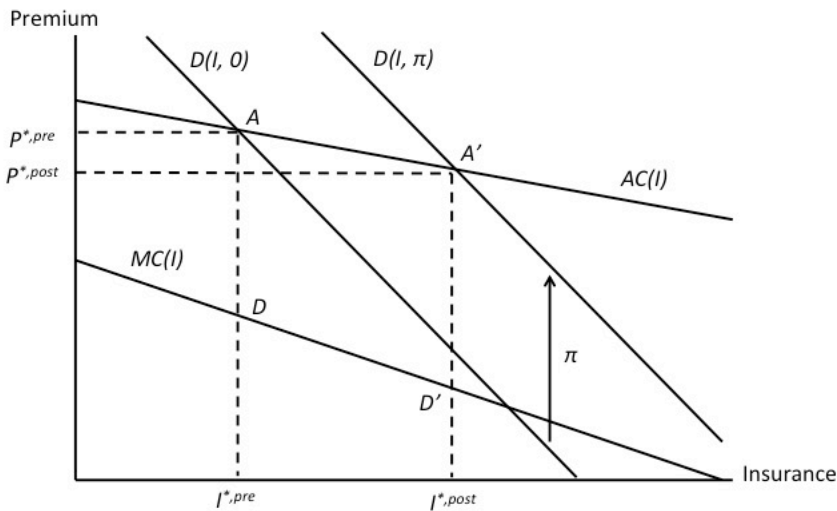
1.e. How does a penalty effectively lower the price of insurance?

[4 points]

1.f. Why does the tax penalty induce a shift in the demand curve but only a walk along the marginal cost curve?

[4 points]

Questions 1.g-j use Figure 2:



1.g. Which region of the graph indicates the pre-reform welfare cost of adverse selection? Why is it this region?

[4 points]

1.h. What range of insurance coverage levels corresponds to individuals who would buy insurance after the reform but not before? How does the individual mandate change their behavior?

[4 points]

1.i. Label the point where $P^{*,post}$ intersects the old demand curve. What is the difference between individuals to the left and to the right of this point? Who is better off after the mandate?

[4 points]

1.j. Why does the pre-reform equilibrium occur at point A? Why can't it occur at the intersection of the marginal cost curve and the demand curve?

[4 points]

1.k. What is the optimal value of the tax penalty (the value of the tax penalty that minimizes welfare loss)? Stated differently, how do we know if the tax penalty is too big or too small?

[4 points]

1.l. If the data contained extra variables (age, sex, race, etc.), would it be a good idea to control for them in the regressions used to determine welfare? Why or why not?

[5 points]

2. Understanding the model (30 points)

2.a. How does the regression model control for initial level and trend differences between Massachusetts and other states? What are some likely reasons health care costs may differ between Massachusetts and other states?

[5 points]

Questions 2.b-g use Figure 3:

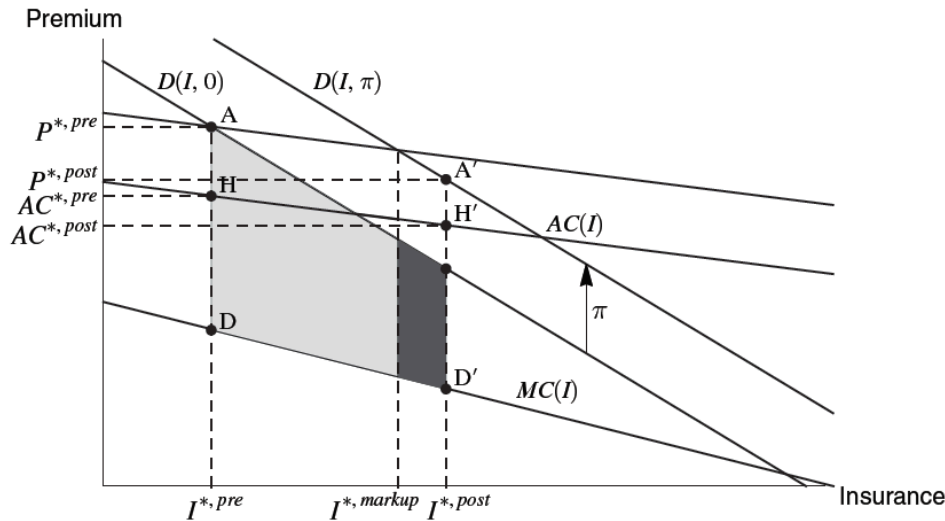


FIGURE 3. ADVERSE SELECTION AND THE MANDATE WITH MARKUPS

2.b. What do the light grey and dark grey regions indicate?

[5 points]

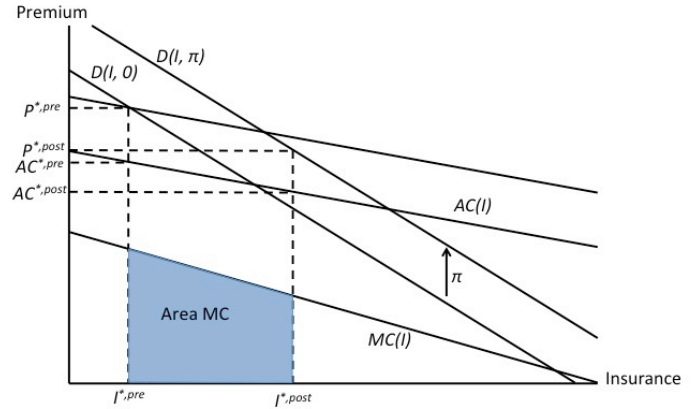
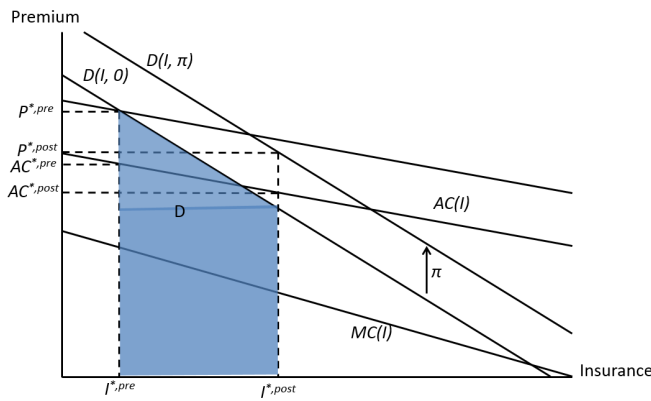
2.c. The total welfare effect is visible geometrically in the graph. What are the boundaries of the total welfare region? In other words, which curves form the upper and lower bounds, and what levels of insurance form the left and right bounds?

[5 points]

2.d. The total welfare effect is calculated by subtracting area MC from area D (shown below). Using the variables in the graph, give an equation for the area of D, the area of MC, and the equation resulting from subtracting the two areas.

(Hints: Area D can be divided into a rectangle and a triangle. Area MC can be found with the help of the online appendix.)

[5 points]



2.e. How does the model separate the welfare effect of increased competition from the welfare effect of decreased adverse selection?

[5 points]

$$\begin{aligned}
 (2) \quad \Delta W_{full} &= (P^{*,pre} - AC^{*,pre}) \times (I^{*,post} - I^{*,pre}) \\
 &\quad - (AC^{*,post} - AC^{*,pre}) \times (I^{*,pre} + (I^{*,post} - I^{*,pre})) \\
 &\quad + \frac{1}{2} ((P^{*,post} - \pi) - P^{*,pre}) \times (I^{*,post} - I^{*,pre}).
 \end{aligned}$$

2.f. Equation 2 (above) separates the full welfare effect into three terms. Match each term to its intuitive meaning:

[5 points]

Terms

1. $(P^{*,pre} - AC^{*,pre}) \times (I^{*,post} - I^{*,pre})$
2. $(AC^{*,post} - AC^{*,pre}) \times (I^{*,pre} + (I^{*,post} - I^{*,pre}))$
3. $\frac{1}{2} \times ((P^{*,post} - \pi) - P^{*,pre}) \times (I^{*,post} - I^{*,pre})$

Meanings

- A. The role of the demand shift through the mandate
- B. The role of the pre-reform markup
- C. The role of changes in selection

3. Empirical Questions (20 points)

3.a. Interpret the results presented in each column of the first row of Table 2.

[3 points]

3.b. What can we infer about changes in competitiveness if we see that post-reform markups decreased relative to pre-reform markups?

[3 points]

$$(2) \quad \Delta W_{full} = (P^{*,pre} - AC^{*,pre}) \times (I^{*,post} - I^{*,pre}) \\ - (AC^{*,post} - AC^{*,pre}) \times (I^{*,pre} + (I^{*,post} - I^{*,pre})) \\ + \frac{1}{2} ((P^{*,post} - \pi) - P^{*,pre}) \times (I^{*,post} - I^{*,pre}).$$

3.c. Discuss how changing the calibrated value of π changes the full welfare effect by giving the sign of each of the lines of Equation (2) above. Assume, following the application in the paper, that $P^{*,pre} > AC^{*,pre}$, $P^{*,post} < P^{*,pre}$, $AC^{*,post} < AC^{*,pre}$, and $I^{*,post} > I^{*,pre}$, but $I^{*,post}$ is less than optimal coverage. What happens as π increases? What happens as it decreases?

[3 points]

3.d. Assuming that premiums, average costs, and insurance coverage all take on the same values reported in the paper, calibrate the value of the penalty at 21.3 percent and calculate the full welfare effect. Show your work. (Hint: Substitute all of the values into Equation 2 and see footnote 35).

[3 points]

3.e. Assuming that premiums, average costs, and insurance coverage all take on the values reported in the paper, calibrate the value of the penalty at 33.2 percent and calculate the full welfare effect. Show your work.

[3 points]

3.f. Relate your answer in 3.c. to your answers in 3.d. and 3.e.

[2 points]

3.g. How much does the full welfare effect change when the calibrated penalty increases from 21.3 percent to 33.2 percent? In your subjective opinion, how robust is the estimated welfare effect to changes in the calibrated penalty? Give one reason why the authors examine robustness to the calibrated penalty.

[3 points]