

Main Field: Answer all 3 questions

Second Field: Answer I and either II or III

Note: In all questions with subsections, answer all subsections; each subsection counts equally

I. Econ and Stats

Economics

“The horrifying events of 9/11 made Americans aware of their vulnerability to terrorist attacks and triggered the creation of the Department of Homeland Security (DHS) along with a substantial increase in federal spending to both thwart terrorist attacks and to increase the ability to respond to such emergencies. Much of this large increase in spending is in the form of direct transfer to states and cities through several grant programs.” Since 2002, the grant programs include grants to states, law enforcement terrorism protection grants, “citizen corps” grants, urban area security grants, and transit security grants in urban areas. Most of the grants are distributed based on formulas, with a minimum amount of funding to each state; the largest portion of the formula is allocated based on state population, and the remainder of the grant is discretionary, aimed at high-threat, high-density urban areas.

- a) What market failure (if any) justifies government intervention as a response to the threat of terrorist attacks? (Your answer should pertain to the justification for the intervention of government in response to terrorist threats in any mature, capitalist economy.) If there is no market failure, explain why and what the likely market response would be. If there is a market failure, why is that likely, and what might be an efficiency-enhancing government (or collective, non-government) response? (You may want to argue that there is room for both a market and a non-market response.)
- b) The description above characterizes current policy in the U.S. What political or non-market failures (if any) are likely to characterize that policy? Why are these failures likely (or not likely) to occur?

Statistics

A publication examined the allocation of DHS grants in 2014 to the 50 U.S. states and Washington, D.C. (N = 51). The dependent variable was total Homeland Security grants (in \$) per 10,000 people in 2014. The independent variables are the following:

Income is per capita state income in 2010 (in \$)

Electoral votes is the number of per capita electoral votes in the state after the 2010 reapportionment

Closeness is the absolute difference between the Republican presidential candidate's vote percent in 2012 and 50 percent (a measure of closeness; smaller values mean a closer race)

Emplaned is the number of persons boarding a commercial airline flight per capita in each state in 2012

Density is persons per square mile in each state in 2010

Nuke is a binary (dummy) variable = 1 for states that have nuclear generation capacity

Coast is a binary variable = 1 for states with ocean frontage

Border is a binary variable = 1 for states that share a border with Mexico or Canada

The Table below reports the findings:

Table 1: Homeland Security grant allocation OLS regression estimates.

Variable	Coefficient	t-statistic
Intercept	13.85	6.08
Income	1.67	2.96
Electoral votes	3.63	16.69
Closeness	1.00	0.09
Emplaned	1.02	1.82
Density	.04	2.28
Nuke	-.115	-2.25
Coast	-.061	-1.49
Border	.044	1.01
N	51	
Adj. R-square	0.93	
F-statistic	85.33	

- What do the results in Table 1 say?
- What do the results imply about the policy questions raised in the economics question? That is, do the results suggest probable "public interest" or "political" interest, or a mix of both? Why?
- To what extent do the results reported in Table 1 conform to the requirements for unbiased coefficient estimates? Are the t-statistics valid? How would you improve the model?

II. Economics for Policy Analysis

In most cities, the city clears the streets following a snowstorm, but not the parking lots of privately-owned firms/apartment buildings. Parts 3.1 and 3.2 refer to snow removal; part 3.3 does not.

2.1 Using arguments from public economics, explain why street clearing is publicly provided but parking-lot clearing is not. Be sure to define a public good and to discuss whether snow-plowing fits the economic definition of a “public good.”

2.2 It costs \$100 to clear Sesame Street following a snow storm. Table 2 reports the willingness to pay of each of the 7 residents of Sesame Street to have it cleared following a snow storm. Is it socially efficient to plow the street, and why? Below what price would the private market clear the street? Above what price would it be inefficient to clear the street?

Table 2. Residents of Sesame Street Willingness to Pay for Snow Removal

Resident	WTP (\$)
Ernie	25
Bert	50
Oscar	10
Big Bird	30
Elmo	40
Grover	20
Cookie Monster	25

2.3 Oscar is grouchy, and his surly attitude bothers the other inhabitants of Sesame Street. Left unregulated, is Oscar’s “grouchiness level” likely to be socially optimal? Is the socially optimal level of Oscar’s grouchiness zero? Carefully explain both verbally and graphically. [Put “Grouchiness” on the X-axis]. What “Coase Bargaining” type of solution might reduce Oscar’s grouchiness? Under what circumstances would such an approach work?

III. Program Evaluation

The state of Vermont's Department of Education is seeking to identify the effect of class size on student achievement. To do so, they randomly assigned all third-grade students *and* teachers into either small (15 student) or large (30 student) classrooms. A commonly used standardized test, the Iowa Test of Basic Skills (ITBS), was administered on the first and last day of the school year. ITBS scores are national percentiles with a potential range of 0 to 100. To estimate the magnitude and statistical significance of the effect of being in a small classroom, the research team compared the mean test-score gain of the treated group to the control group. The difference in means was 12 percentile points and the t-statistic was 5.2. $N = 125,000$ students

3.1: How do you interpret the results? Is regression analysis necessary? Why is this research design preferred over a quasi-experimental or observational analysis of the relationship between class size and student achievement?

3.2: Describe the concept of external validity and assess the external validity of this study.

3.3: The parents of about 10,000 students who were randomly assigned to larger classes complained to their local school board, superintendent, and school principal until their child was switched to a small class. Does this affect the internal or external validity of the experiment? Explain.

3.4: Suppose that teachers became aware that they were part of a class-size experiment. Carefully explain how teachers in both small and large classes might alter their effort levels in response, and how, if at all, this affects the internal and external validity of the experiment.