Written Preliminary PhD. Examination

Applied Economics Graduate Program
University of Minnesota

June 20, 2013

POLICY ANALYSIS

Instructions:

• IDENTIFY YOURSELF BY CODE LETTER, not name, on all answer pages.

• Start your answer to each question at the top of a new page.

• Number all answer pages consecutively.

• Answer FOUR (4) out of the following SIX (6) questions. If you answer more than four questions, only the first four will be graded.

• You have four hours to complete the examination.

This is a closed book exam. No notes, articles, books or other sources may be used. A calculator should be used on Question 2.
Question 1: (Answer all parts)

The financial problems facing state government are forcing a re-evaluation of the financial relationships between federal, state, and local government in the United States. Demonstrate your knowledge of the economics behind multi-level governmental finance by answering the following questions.

a. Under what conditions will public sector provision of services increase economic efficiency in a perfectly competitive market economy? Provide examples of three different types of market failures which would require government intervention and explain the nature of the market failure and how public sector action can overcome those failures.

b. Explain how the public preferences are reflected in the level of spending and taxation chosen in a community. Begin by assuming a single community containing residents with non-identical preferences and a single elected official. In the long run, whose preferences will the community’s spending and tax collections represent? Will this lead to a pareto optimal result? Explain why or why not.

c. Expand your conceptual model to include the existence of many units of government, no barriers to mobility, and no economies or diseconomies of size in the production of the service. Does this increase economic efficiency? Will it lead to a pareto optimal result? Explain why or why not.

d. Show how a system of aid from state to local governments can help to overcome some market failures. What key assumptions are necessary for state aid to successfully change the allocation of local services? Explain why this will or will not guarantee that local government services will be provided at optimum levels. How is the allocation of services provided by the state (other than the aid to local government) affected?

e. Some argue that growth in local government spending over time should reflect only increases in population served and prices, that is, that real, per capita local government spending should remain constant. Evaluate that statement, what are the assumptions necessary for the statement to be true?
**Question 2: (Answer all parts)**

A white male-owned business enterprise alleges that the state’s department of transportation’s disadvantaged business enterprise (DBE) goals of 20% on federally financed highway construction projects discriminates against non-DBEs by forcing prime contractors to accept higher priced bids from DBE subcontractors than from non-DBE competitors. The plaintiff’s expert has assembled information on all subcontracts for winning and losing prime contractors. The unit of observation is individual subcontractor bids. The dependent variable is the probability that the subcontractor’s bid is the low bid. Independent variables include a vector of characteristics of the subcontractor (credit risk, size and tenure of firm) and of the contract (e.g. type of work to be performed, location, bonding requirements, etc.) The model also controls for whether the subcontractor is a DBE and whether there is a goal on the prime contract. A goal is defined as the percentage of the total contract dollars awarded that will be received by DBEs. Thus, if total contract awards equal $1billion, then a 20 percent goal means $200M in awards to DBEs.

The following logistic equation is estimated:

$$\Pr(\text{low bid}) = \frac{1}{1 + \exp(-\sum \beta_i x_i + \phi DBE + \theta Goal)}$$

Where X’s denote characteristics of the subcontractor and of the subcontract; DBE indicates whether or not the firm is a disadvantaged business enterprise; and Goal indicates whether there is a goal placed on the prime contract. The estimated coefficients on X, DBE and Goal are given by $\beta$, $\phi$ and $\theta$.

The plaintiff’s expert obtains the following results:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Estimated Coefficient</th>
<th>p-value</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBE</td>
<td>-.4559</td>
<td>.001</td>
<td>.15</td>
</tr>
<tr>
<td>Goal</td>
<td>+.4559</td>
<td>.065</td>
<td>.20</td>
</tr>
<tr>
<td>Prob (Low Bid)</td>
<td>----</td>
<td>----</td>
<td>.325</td>
</tr>
<tr>
<td>Prob (Low Bid, DBEs)</td>
<td>----</td>
<td>----</td>
<td>.25</td>
</tr>
<tr>
<td>Prob (Low Bid, Non-DBEs)</td>
<td>----</td>
<td>----</td>
<td>.40</td>
</tr>
</tbody>
</table>

a. Compute the difference in the probability of low bid for DBEs vs. Non-DBEs. Controlling for subcontractor and subcontract characteristics, what is the difference in low bid probabilities between DBEs and non-DBEs? Does this result support the plaintiff’s claims of discrimination?

*(Question 2 continues on next page)*
Question 2 (continued):

b. Compute the difference in the probability of low bid for subcontracts with and without goals, controlling for characteristics of subcontractors and subcontracts. Does this result support the plaintiff’s claims?

c. How would the results change if the plaintiff’s expert had estimated separate logistic regressions for DBEs and non-DBEs and computed the counterfactual of the low bid probability for DBEs that are identical to non-DBEs? Write out your results and explain.

d. What, if any, bias is introduced by using information on bids as opposed to information on bidders: the probability that a given bid is a low bid vs. the ratio of low bids to all bids submitted by a given firm?

e. Explain why the dependent variable in this instance does or does not measure the type of discrimination the plaintiff claims.

f. Suggest an alternative model specification and estimation technique that would improve upon the model described above in testing for discrimination.
Question 3: (Answer all parts)

Roland Fryer and Glenn Loury in a forthcoming *Journal of Political Economy* article on diversity examine the efficiency of race-neutral vs. race-conscious policies designed to increase the representation of underrepresented racial and ethnic minority group members in desirable positions or jobs. An example of a race-neutral policy is one where college admissions slots are reserved for applicants who are among the top 10 percent of their high school graduating class for admission to a selective college. An example of a race-conscious program is one where applicants from underrepresented racial groups receive extra points in the evaluation of their applications.

Aside from the economic efficiency criterion for measuring the effectiveness of race-neutral vs. race-conscious policies is the constitutional issue of whether these policies impermissibly *discriminate against third parties*.

a. Provide an illustration of impermissible discrimination against third parties. What is the rationale for prohibiting this type of discrimination?

b. Suppose that the original underrepresentation of a racial group is attributable to Becker-type discrimination against that group. Provide a formal representation of the gains to the gainers and the losses to the losers from initial discrimination. Hint: Consider the difference in, say, the wages received by the favored group and the non-discriminatory wage as a subsidy that group receives or the difference between the wages received by the disfavored group and the non-discriminatory wage as a tax that group bears.

c. Formalize the two remedies (race-neutral vs. race-conscious) in the context of your model above. Who are the gainers? Who are the losers? Do the gainers gain more than the losers lose in either or both of the remedies?

d. Provide a test for whether the race-neutral remedy discriminates against the initially favored group. Provide a test for whether the race-conscious remedy discriminates against the initially favored group.

e. Explain within the context of your illustration when and whether race-conscious remedies provide net-social benefits over race-neutral remedies.
**Question 4: (Answer all parts)**

Here are several questions about causal inference. Answer all of them.
Consequences of the legalization of marijuana use might be predicted from the literature on the effects of marijuana use on various outcomes including adult wages. Consider representing marijuana use by a single dummy variable $M_i$ for person $i$.

a. Write out a linear regression model for estimating the effect of marijuana use on wages and describe the covariates you would likely include.

b. In your estimation model, does the estimated coefficient on the marijuana use variable represent the causal effect of marijuana use on wages? Explain.

c. One drawback with regression analysis is that the users and nonusers are likely to have different distribution of the covariates. The regression may suffer from a lack of common support. Explain what this means and provide a general example of a case where the ceteris paribus assumption inherent in regression analysis when estimating the effect of marijuana use on wages may not be supported by the data.

d. How can propensity score matching be used to estimate the effect of marijuana use on wages?

e. How can making sure that propensity score matching is balanced address the problem of the differing distributions of the covariates?

f. Researchers have employed instrumental variables estimation to try to identify the causal effect of marijuana use on wages. One instrument used has been the state tax rate on alcohol. Discuss in general terms why this instrument makes sense and reasons why it may or may not be valid.
**Question 5: (Answer all parts)**

Use relevant economic models, graphs, and empirical studies to support your answers. Write out any models you use. Your answers should reflect an advanced graduate level of economics and public finance knowledge.

a. Simplification of the tax system is often named as a goal of tax reform. Why is tax simplification a policy goal? Considering the goals of tax policy, is it always best to collect taxes in the simplest way possible? Explain.

b. Describe the Allingham-Sandmo-Yitzhaki (ASY) model of tax evasion and enforcement. Write out the model, including the taxpayer’s optimization problem. Define all of the variables in the model.

c. In the ASY model, what are the available tools (i.e., model parameters) for tax enforcement? For each parameter, explain the model’s implications for tax compliance. For example, if the tax authority increases or decreases the magnitude of a parameter, what does the model predict about the effect on tax compliance? Explain your answers.

d. Are the predictions of the ASY model consistent with observed levels of tax compliance? Explain.

e. Beyond the ASY model, what are additional tools the tax authority could use to increase tax compliance? What are the pros and cons of the tools you name?
**Question 6: (Answer all parts)**

This question consists of parts A and B on the general topic of benefit-cost analysis. Answer all parts.

**Part A.** Assume that the US federal government is attempting to undertake a cost-benefit analysis of Homeland Security Policies that were undertaken since September 2011 to prevent terrorist attacks in the U.S. Researchers have estimated many of the costs of Homeland Security, but little good evidence exists of the benefits.

a. List two general homeland security policies and explain how the costs of these policies could be estimated in dollar terms.

b. Describe the general approach to estimating the benefits of anti-terrorism programs such as Homeland Security policies. Incorporate in your discussion terms such as counterfactual and unknown probabilities of occurrence. Conclude your discussion by summarizing the usefulness of CBA in evaluating programs of this type.

**Part B.** Consider a government program that generates benefits over 50 years but costs only are incurred over the first five years. Analysts have calculated that the present value of the benefits is $100 million and the present value of the costs is $80 million.

a. Define the Internal Rate of Return and describe what information you would need to calculate the IRR on this project.

Now assume instead that the benefits are not completely known but the present value of the benefits has been estimated to be $200 million with probability 50% and $0 with probability 50%.

b. What is your estimate of the expected value of the net benefit of this project?

Now assume instead we do not have specific information on the probability of different benefit levels occurring but we have general information on the possible ranges of benefits under the two possible states of the world.

c. How could we use Monte Carlo analyses to help with decision making?