ECONOMICS OF PUBLIC SECTOR
Review Questions
Instructor: Anna Rubinchik-Pessach
note: Final will have 3 questions (one from each category).
May 3, 2002

1. Part 1: Appetizer

Evaluate a claim (true / false / partially true). Explain.

1.a. Government spending should be financed by issuing the debt only, as the debt does not introduce any distortions in the economy, while any tax does.

**SKETCH OF THE ANSWER**
First, debt is just a delayed tax, thus a delayed distortion.
Second, government deficit may crowd out private investment. Formulate the crowding out effect. Graph the market for investment.

1.d Land tax and tax on economic profits are not distortionary

Cellular phones have close substitutes (regular phones, pagers, etc.), thus the tax can generate substantial distortions (demand is very elastic).

Subsidy for "high-tech" industry will divert the funds that would otherwise be invested in the other industries. The distortion will be higher with higher elasticity of supply of investment.

Taxing all computer software will create less distortions than taxing Excel, as demand for Excel is more elastic (there are close substitutes for Excel) than demand for all the software (what are the substitutes in this case?).
2. Part 2: Main dish

Problem 1. See hw # 5, (the last one) the problem about the income tax of the businessman.

Problem 2. Before 1987 tax payers who itemized their returns could deduct interest payments on consumer loans, such as car loans and credit card debt. since 1987 such deductions have not been possible. (The only loan the interest payments for which are tax deductible is home equity loan.) How should the non-deductibility of consumer loans affect saving behavior of individuals? Use the model of intertemporal choice, describing the choice of consumption this period and consumption next period, to answer this question. Present your answer graphically. Ignore limits on borrowing.

SKETCH OF THE ANSWER

Lenders (savers) no effect.

Borrowers:

income effect: less income leads to a decrease in consumption in both periods including current period, thus savings should increase (borrowing decreases).

substitution effect: today’s consumption is more expensive (the price rises from \((1 + (1 - t)r)\) to \((1 + r)\)), this leads to decrease in today’s consumption and increase in tomorrows consumption. According to this criterion, the savings should increase as well (borrowing decreases).

Conclusion: lenders’ behavior does not change, borrowers borrow less and save more (can become lenders/savers).

Graph budget constraint change for consumption today and consumption in the future (see fig. 16.9, p.386 in the textbook).

3. Part 3: Dessert

Problem 1.
Assume three states form a federation. They create an "omnibus bill" that contains projects inducing local benefits to each of the participants while the costs of the three projects will be shared equally between the members of the federation.

Assume that project of size $x$ generated benefit to state $i = 1, 2, 3$ of the federation according to the following formula:

$$B_i(x_i) = 10x_i - \frac{1}{2}x_i^2,$$

so that the marginal benefit is equal to $MB_i(x_i) = 10 - x_i$. Assume that the cost of the project of size $x$ for any state is $2x$, so that the marginal cost is constant and equal to 2.

Calculate the optimal sizes of the projects for each state.

**ANSWER**

$$MB_i(x_i) = MC_i$$

$$10 - x_i = 2$$

$$x_i = 8$$

Calculate the sizes of the projects that will appear in the "omnibus bill".

**ANSWER**

Each representative realizes that he is liable for only a third of the total cost of a project. He will increase the project size as long as its marginal benefit is above the marginal cost imposed on his region, which one third of the total marginal cost.

$$MB_i(x_i) = \frac{1}{3}MC_i$$

$$10 - x_i = \frac{2}{3}$$

$$x_i = \frac{28}{3} > 8$$

Is the bill socially optimal?

**ANSWER**

No, the regions overspend.

Net benefit from the three projects is maximizes when $x_i = 8$. The sum of the benefits from the three projects is

$$3 \left( 10 * 8 - \frac{1}{2} * 64 \right) = 144,$$
the total cost is
\[ 3 \times 2 \times 8 = 48, \quad (3.8) \]
thus the net benefit is \(144 - 48 = 96\). On the other hand with the omnibus bill
the net benefit is
\[ 3 \left( 10 \times \frac{28}{3} - \frac{1}{2} \times \left( \frac{28}{3} \right)^2 \right) - 3 \times 2 \times \frac{28}{3} = 93 \frac{1}{3} < 96 \quad (3.9) \]

3.1. Example suggested by Condorcet.

Suppose there are eighty one voters with the following ordering of possible candidate

dates named Peter, Paul and Jack.

<table>
<thead>
<tr>
<th>Number of voters</th>
<th>30</th>
<th>1</th>
<th>29</th>
<th>10</th>
<th>10</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest ranked</td>
<td>Peter</td>
<td>Peter</td>
<td>Paul</td>
<td>Paul</td>
<td>Jack</td>
<td>Jack</td>
</tr>
<tr>
<td>Second ranked</td>
<td>Paul</td>
<td>Jack</td>
<td>Peter</td>
<td>Jack</td>
<td>Peter</td>
<td>Paul</td>
</tr>
<tr>
<td>Lowest ranked</td>
<td>Jack</td>
<td>Paul</td>
<td>Jack</td>
<td>Peter</td>
<td>Paul</td>
<td>Peter</td>
</tr>
</tbody>
</table>

a. Which candidate will be chosen under Borda rule?

**ANSWER**

Peter gets \(3 \times 31 + (29 + 10) \times 2 + (10 + 1) \times 1 = 182\)

Paul gets \(3 \times (29 + 10) + 2 \times (30 + 1) + 1 \times (1 + 10) = 190\)

Jack gets \(3 \times 10 + 2 \times (1 + 10) + 1 \times (30 + 29) = 111\)

Paul wins under Borda rule.

b. Which candidate will be chosen under majority rule?

**ANSWER**

Peter against Paul: Peter gets \(30 + 1 + 10 = 41\) votes and Paul gets the rest \(29 + 10 + 1 = 40\) votes.

Peter will beat Paul in majority voting.

Peter against Jack: Peter gets \(30 + 1 + 29 = 60\) votes and Jack gets the rest \(21\).

Peter beats Jack in majority voting.
Thus Peter is Condorcet winner.

c. Is there a Condorcet winner?

**ANSWER.**

Yes, see above.

d. Assume there are only two candidates to choose from: Paul and Peter (Jack is not running.)

Will your answer to a. change? If so, how?

**ANSWER**

Yes, Peter will win. Assume (without loss of generality) that with the two candidates the highest ranked alternative gets a score of 2 and the lowest gets 1.

Peter’s score is $2 \times 41 + 1 \times 40 = 122$, while Paul’s score is $2 \times 40 + 1 \times 41 = 121$.

e. Will your answer to b. change if Jack is not running?

**ANSWER**

No Peter beats Paul in majority voting as before.

f. Condorcet suggested that the Borda rule is “defective” based on this example. Why do you think he claimed it?

**ANSWER**

Jack was not a winner. Dropping Jack from consideration changed the identity of the winner from Paul to Peter under Borda rule.

On the other hand, under majority rule, with or without Jack the identity of the winner (Peter) did not change.

Borda rule does not satisfy the independence of irrelevant alternatives.