SUID:

Peter J. Wilcoxen   Department of Public Administration
Economics for Public Decisions   The Maxwell School, Syracuse University

Exam 2
Fall 2016

DO NOT OPEN THIS EXAM UNTIL YOU ARE TOLD TO DO SO.

Instructions

1. Write your SUID in the upper right corner of this exam. Do NOT write your name.

2. SHOW ALL YOUR WORK. Answers without supporting work will receive little or no credit.

3. There are 72 points possible on the exam and you'll have 80 minutes to work on it. Budget your time accordingly.

4. Do all your work on this exam. If you need extra space, write on the backs of the pages. However, if you do write an answer on the back of a page, **be sure you've noted that near the question**.

5. Some formulas for areas:

$$A = \frac{1}{2}bh \qquad A = \left(\frac{b_1 + b_2}{2}\right)h$$

6. Some algebraic relationships for exponents:

$$(AB)^c = A^c B^c \qquad A^c A^d = A^{c+d} \qquad \frac{1}{\left(\frac{A}{B}\right)^c} = \left(\frac{B}{A}\right)^c \qquad (A^c)^d = A^{cd}$$

7. The general form of the Cobb-Douglas utility function and its demand equations:

$$U = X^g Y^{1-g} \qquad X = \frac{gM}{P_x} \qquad Y = \frac{(1-g)M}{P_y}$$

Question 1 (12 points)

Venezuela has been going through a catastrophic food shortage brought about in part by price controls. This question examines the situation in the market for cornmeal, a staple of the Venezuelan diet. Suppose that in the absence of price controls the equilibrium price of a kilogram (kg) of cornmeal would be $0.80 (US dollars, for convenience) and the equilibrium quantity would be 2 billion kg. However, the price control limits the price to $0.20 per kg. The supply elasticity of cornmeal is believed to be 1 and the demand elasticity is known to be -0.25.

(a)   *12 points*. Please determine: ☐ the amount of cornmeal on the market with the price control in effect; ☐ the changes in CS and PS caused by the policy; ☐ the DWL it creates; ☐ and indicate the likely black market price under the policy.

Question 2 (12 points)

One of the households in the table to the right has Cobb-Douglas preferences. In the remainder of the exam, this will be referred to as the CD household.

HH	Year	Income	Px	Py	X	Y
A	2015	2880	24	16	48	108
A	2016	3192	20	18	75	94
B	2015	2400	24	16	40	90
B	2016	3600	20	18	72	120
C	2015	3640	24	16	65	130
C	2016	3360	20	18	60	120

(a)   Please: □ determine which one is the CD household and calculate its value of g; □ draw a diagram illustrating the CD household's 2016 equilibrium; and then □ *derive* the expenditure function for the CD household. (Be sure to show all the steps, not just the final result.)

Question 3 (12 points)

Now suppose that in 2016 the government wishes to reduce the CD household's consumption of X and raise its consumption of Y. To do that, it imposes a $4 tax on X and $6 subsidy on Y. To help cover the cost of the subsidy, it also imposes a "lump sum" tax of $300 on the household (that is, the household's income falls by $300 under the policy). You may assume the supplies of X and Y are perfectly elastic so Px would rise to $24 and Py would fall to $12.

(a)   Please calculate: □ the new values of X and Y under the policy; □ the overall effect on the government's budget; and □ the CV. Then indicate: □ whether the policy breaks even; and □ whether the household is better or worse off.

Question 4 (12 points)

One of the households in the table to the right regards X and Y as perfect complements and always buys *d* units of good Y for each unit of good X. In the remainder of the exam, this will be referred to as the PC household.

HH	Year	Income	Px	Py	X	Y
A	2015	2880	24	16	48	108
A	2016	3192	20	18	75	94
B	2015	2400	24	16	40	90
B	2016	3600	20	18	72	120
C	2015	3640	24	16	65	130
C	2016	3360	20	18	60	120

(a)   Please: ☐ *derive* the PC household's demand equations for X and Y in terms of *d,* Px, Py and income M (be sure to show the steps involved, don't just write down the demand equations); and ☐ determine which one of the households in the table has perfect complements preferences and calculate the value of *d*.

Question 4, continued

Now suppose that in 2016 government imposes a slight variation on the policy from Question 3: a $4 tax on X raising its price to $24 (same as before), a $6 subsidy on Y lowering its price to $12 (same as before), and a $336 lump sum tax (slightly different).

(c)   Please compute: ☐ the PC household's new equilibrium; ☐ the overall effect on the government's budget; ☐ the CV; and ☐ the change in SS. Finally, show the new equilibrium in a well-labeled diagram.

Question 5 (12 points)

A household buys two goods, X and Y, and its preferences can be represented by the utility function shown below. Also shown are the household's demand equations and its expenditure function. Be careful about subscripts: the denominators in the demand equations are different.

$$U = (X - 50)^{0.5}(Y + 50)^{0.5} \qquad X = 50 + \frac{0.5 * (M - 50P_x + 50P_y)}{P_x}$$

$$M = 50P_x - 50P_y + 2 * U * P_x^{0.5}P_y^{0.5} \qquad Y = -50 + \frac{0.5 * (M - 50P_x + 50P_y}{P_y}$$

Initially, Px=$5, Py=$5 and M=$1000. The government is considering a policy that would place a $1 tax on X while also giving the household a $10 cash transfer. The supply of X is perfectly elastic and Px would rise to $6.

(a)   Please calculate: ☐ the initial equilibrium before the policy is enacted (both X and Y); ☐ the new value of X with the policy in place (it's OK to skip the new value of Y); ☐ the net tax revenue the household pays; ☐ the CV for the policy; and ☐ the policy's income and substitution effects for the X good.

Question 6 (12 points)

Now consider a second household with the same preferences as in Question 5 but with higher income: M=$1500. For clarity, call this household "H" and the household from Question 5 "L". H and L face the same initial prices and would be subject to the same tax on X. However, the government wants to make sure the overall policy isn't regressive. Since H has higher income than L, the government is considering levying a $10 lump sum tax on it instead of giving it the $10 cash transfer L receives (essentially it would make the transfer subject to means testing).

(a)   Please calculate: ☐ H's initial equilibrium before the policy is enacted (both X and Y); ☐ H's new value of X with the policy in place (it's OK to skip the new value of Y); and ☐ the net tax revenue H pays. Then: ☐ indicate whether the government was successful in keeping the policy from being regressive (be sure to provide quantitative evidence). *Extra credit*: ☐ use the initial consumption of X by L and H (before the policy) to determine the income elasticity of X for these preferences; and ☐ discuss how the elasticity relates to the regressivity issue.