

Part I Question 1

The typical American driver has a weekly commuting budget of \$68 to spend on gallons of gas (x) and other necessities (y). Assume that we can represent his preferences by the utility function $u(x,y) = \min[3x,y]$.

- a) (2 points) Suppose that the price of gas is \$1 per gallon and the price of other goods is \$1 per unit. Illustrate the budget set below.
- b) (6 points) Given the preferences what is the best bundle at these prices? Illustrate the best bundle and include an indifference curve through that bundle in your diagram above.

Representative Abeler proposes to tax gasoline. in particular she would like to place a tax of \$.25 per gallon (so the price will rise to \$1.25).

- c) (2 points) In your diagram for part (a) illustrate the effect of Representative Abeler's proposal on the budget set.
- d) (4 points) What is the new best bundle of the typical driver? Illustrate the new best bundle in your diagram.
- e) (2 points) What are the tax revenues raised by the gasoline tax.

Representative Carlson took intermediate micro and he argues that a per unit tax is an inefficient way to raise revenues. He proposes that drivers should pay a flat fee instead of a per unit tax on gasoline (and so the price of gasoline would remain \$1).

- f) (1 point) If we are to make a revenue neutral comparison between the per unit tax and the flat fee then what would be the value of the flat fee?
- g) (4 points) Assuming that the value of the flat fee is set as in part (f) then what would be the best bundle given the flat fee? Illustrate the budget line and this best bundle in your diagram above.
- h) (1 point) Is the typical driver strictly better off with the flat fee than with the per unit tax?
- i) (2 points) What (value) is the excess burden of the per-unit tax?

Part I Question 2

In 2000 Jerry buys cans of mackerel (x) and cans of trout (y). His preferences on mackerel (x) and trout (y) can be represented by the utility function $U(x,y) = 2\ln x + \ln y$.

- a) (6 points) If the price of a can of mackerel is P_x , the price of a can of trout is P_y and he has I to spend each week on mackerel and trout then find his demand functions for mackerel and trout.
- b) (4 points) Suppose that $P_x = \$2$, $P_y = \$10$ and $I = \$60$. Using your answer to (a) find his demands for mackerel and trout. Illustrate your answer in a diagram on the next page. Include an indifference curve through his best bundle.

By 2008 the price of a can of mackerel has risen to \$4 and a can of trout has fallen to \$2.50 per can.

- c) **(1 point)** Which good has become relatively cheaper?
- d) **(5 points)** By how much would we have to adjust his income so that he could continue to afford his best bundle from 2000 in 2008? Illustrate the budget line associated with this adjusted level of income in your diagram above. Will Jerry purchase the same bundle of goods in 2008 that he purchased in 2000? If not then which good will he consume more of in 2008?
- e) **(1 point)** Is he better or worse off if his income is adjusted as in part (d)?
- f) **(2 points)** The rate of inflation is defined as the growth rate of a fixed weight price index. Assuming that the fixed weights are from the 2000 best bundle is the rate of inflation positive or negative in this example (you do not need to calculate the rate of inflation)? Briefly explain your answer.
- g) **(4 points)** Show that if his income is unchanged (so remains at 60) then Jerry is not made worse off nor better off by the price change between 2000 and 2008.
- h) **(2 points)** What is the compensating variation to the price change from 2000 to 2008

Part I Question 3

Cecilia can work 160 hours in a month. She has the opportunity to work for \$10 per hour. With the income that she earns from working she purchases cans of beans at a price of \$1 per can. She has no other income.

- a) **(2 points)** Putting hours of leisure on the x-axis and cans of beans on the y-axis illustrate Cecilia's budget set. Be sure to label (put the coordinates) on both intercepts.

The government introduces a cash assistance program for low income individuals. If an individual has no income then the government will pay that individual \$320 for the month. For each dollar that the individual earns the government reduces the payment by \$1. So for example if a person earns \$50, the government assistance would be reduced by \$50 to \$270. If the individual earns more than \$320 then he receives no payments from the government.

- b) **(4 points)** In your diagram for part (a) illustrate Cecilia's budget set after the introduction of the government's assistance plan. Your budget set will contain two "kink" points. You must label the coordinates of both kink points to receive full credit.

Assume that Cecilia was working 28 hours before the introduction of the assistance plan

- c) **(5 points)** How many hours will she work after the assistance plan is introduced? Illustrate her best bundles before and after the introduction of the assistance plan in your diagram for part (a).

On the next page **redraw** the budget lines from your diagram above (do not redraw the indifference curves).

An alternative program would be for the government to give each individual \$320 per month as before but to reduce the payments at a rate of only \$.20 per \$1 earned. Thus if an individual earned \$50 the payments would be only reduced \$10.

- d) (4 points) In your new diagram illustrate the budget line associated with this second government assistance program. You must calculate the y-intercept of this budget line to receive full credit.
- e) (2 points) Illustrate preferences for Cecilia such that given the second assistance plan she prefers to work a positive number of hours.
- f) (2 points) Illustrate the cost to the government of the second program (assuming that Cecilia is working a positive number of hours). Which program is cheaper for the government?

Part II Question 1 Do 1 of 2 questions in Part II

Bernie has \$1000 to invest and he is considering the purchase of bonds of CIT. The current price of is \$1 per bond. In the future if CIT does not default then the price of a bond will double to \$2. However, if CIT defaults then the bond will be worth \$0. The probability that CIT defaults is .20. A dollar held in cash will be worth one dollar in the future. Finally assume that his preferences over money can be represented by the utility function $u(x) = \sqrt{x}$

- a) (6 points) Suppose that Bernie has the option of investing 0%, 60% or 100% of his \$1000 in CIT. What is the expected value of each of these options? Given his expected utility which one will he choose?
- b) (3 points) In part (a) you should have found that investing 60% was best (if you did not then assume the answer is 60% from this point forward). What is the certainty equivalent to the 60% portfolio?
- c) (3 points) What is the risk premium associated with this portfolio?
- d) (4 points) Illustrate his utility function and the expected utility of the 60% portfolio in the diagram below. In the diagram label the expected value of the portfolio, the certainty equivalent and the risk premium.

Suppose that AGI offers to sell Bernie a credit default swap (CDS). If Bernie purchases a CDS then if CIT defaults AGI will pay him \$1 per CDS. In the case that CIT does not default then the CDS pays \$0. The price of a CDS is \$r (so \$1 of CDS coverage costs \$r).

- e) **(4 points)** What is the *actuarially fair* price of a CDS, i.e. for what r is the purchase of a CDS a fair bet?
- f) **(3 points)** Assume that Bernie has invested 60% in CIT bonds. If the price of a CDS is fair then how many will he buy? Illustrate your answer in the diagram in (d).
- g) **(4 points)** If Bernie has the option of buying CDSs at the actuarially fair price that you found above then would he like to change his investment decision in part (a), i.e. would Bernie still choose the 60% portfolio? Briefly explain your answer and use the diagram to illustrate your answer.
- h) **(3 points)** The option of buying actuarially fair insurance has made the buying of bonds more attractive so it should raise their price from \$1. What is the highest price per bond that Bernie would pay for a bond given that he can also buy the fair insurance?
- i) **(3 points)** Show algebraically that if Bernie buys 600 bonds at the price in (j) and fair insurance then he will be no better nor worse off than if he bought NO bonds.

Part II Question 1 (32 points) Do 1 of 2 questions in Part II

Suppose that we can represent Saul's preferences for cans of pop (the x-good) and pizza slices (y-good) with the utility function $u(x, y) = xy^2$. The Marshallian demand functions associated with this utility function are given by the following demand functions:

$$x = \frac{I}{3P_x} \quad \text{and} \quad y = \frac{2I}{3P_y}$$

In the above P_x and P_y are the prices of cans of pop and pizza slices respectively and I is the income he will spend per week.

- a) **(3 points)** If $P_x = \$1.5$, $P_y = \$1$ and $I = \$36$ then how many cans of pop and pizza slices does he demand? Illustrate his best bundle below and label the bundle **A**.

The government decides to levy a per unit tax on cans of pop. The tax rate is set at \$10.50 per can.

- b) **(3 points)** What will be his best bundle after the tax raises the price of a can to \$12? Illustrate his new budget line and best bundle in your diagram above. Label the best bundle **B**. What is the level of his utility at bundle B?

Suppose instead of a per unit tax the government decides to levy a lump sum tax.

- c) **(1 point)** How much revenue did the per unit tax raise?
- d) **(2 points)** Assume that the government sets the lump sum tax equal to the tax revenues of the per unit tax. Illustrate in your diagram the effect of the lump sum tax on Saul's choice of best bundle. You do not need to calculate his best bundle.

Label this best bundle C.

- e) **(1 point)** Write the expenditure minimization problem for Saul's utility function.
- f) **(6 points)** Solve for Saul's Hicksian demands for pop and pizza as a function of prices and utility level (there is additional space on the next page).
- g) **(6 points)** Use your Hicksian demands to find a bundle, D, such that 1) Saul is indifferent between D and B; 2) Saul would choose bundle D at the original prices. What is the cost of bundle D at the original prices?
- h) **(2 points)** Illustrate bundle D in your indifference curve diagram.
- i) **(6 points)** What is the equivalent variation to the price change caused by the per unit tax on pop? What is the excess burden of the per unit tax on pop? Illustrate both of these values in your indifference curve diagram.
- j) **(2 points)** What bundle of goods will Saul purchase if prices remain at their original value and his income was reduced by the equivalent variation that you calculated in part (i) above?

