Economics of Taxation
(Econ 512M)
Midterm

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Instructions: Answer all questions. Credit will be given only to well-argued answers. Write legibly.

1. (18 points) Dori has the following utility function

$$U(c, L) = \ln c + \ln(1 - L),$$

where c denotes consumption and L labor supply. Her non-labor income is $m = 24$ dollars, her gross of tax wage $w = 48$ dollars, and she faces a 25% tax on her wage ($\theta = 0.25$) income and a 20% on her consumption ($t = 0.20$).

  (i) Write down the equations for her budget constraint.

 (ii) The tax structure Dori faces is equivalent to another tax structure consisting of a wage tax and a lump-sum tax. What are those taxes?

(iii) Find how much she works and how much she consumes.

(iv) Derive her labor supply curve (for general values of w, m, and the tax rates), and show that her labor supply is independent the consumption tax, t.

 (v) Is her labor supply always upward-sloping? Why or why not?

(vi) Use the Slutsky equation to prove that her *compensated* labor supply curve is always upward-sloping.

2. (16 points) Consider the following demand and supply equations:

$$
\begin{aligned}
P^c &= 10 - 2X \\
P^s &= 3X.
\end{aligned}
$$

  (i) Draw these curves and find the equilibrium quantity, consumer and producer price.

(ii) Consider a per unit tax of 33% placed on producers. Find the new equilibrium quantity, consumer price and producer price. Do consumers or producers pay a larger portion of the tax?

(iii) Calculate the demand and supply elasticities at the new equilibrium point. Which is more elastic or inelastic? Does this reinforce or contradict your answer in (b) about the incidence of the tax? Explain.

(iv) Find the tax revenue that the government collects.

(v) Find the excess burden of the tax using the elasticity formula?

3. (10 points) Denote production by Y, private consumption by X, government consumption by G, labor by L, capital by K, producer pice of consumption goods by p, price of government goods by p_G, gross of tax wage by w, gross returns to capital by r, the consumption tax rate by θ, the wage tax rate by τ, and capital income tax rate by t. Thus, the consumers' and the firms' budget constraints are written as:

$$
\begin{aligned}
p(1+\theta)X &= w(1-\tau)L + r(1-t)K, \\
pY &= wL + rK.
\end{aligned}
$$

(a) Write out the government's budget constraint for this closed economy.

(b) Write out the equation that specifies the resource constraint in this closed economy.

(c) Prove that the satisfaction of one of these constraints, along with the two above equations, imply that the other constraint is automatically satisfied.

4. (20 points) Taxation in general equilibrium.

(a) Write the equations for a two-sector, two-factor general equilibrium model consisting of all conceivable taxes. Make sure that you define all variables carefully.

(b) Specify all the exogenous variables.

(c) Specify all the endogenous variables.

(d) What is the Walras Law and what is its implication for the equations that characterize this model?

(e) What does it mean when we say a sector is labor intensive?

(f) Suppose that in this model we are to tax the good which is labor intensive.

    i. What is the implication of this for who (labor or capital) bears the burden of the tax.

    ii. What is the the factor substitution effect and how relevant is it for the tax incidence in this instance?

5. (12 points) On the efficiency loss of taxation.

    (i) What is "Excess burden"?

    (ii) Assume there are two goods y and x with a tax on x in place. How do we define the excess burden associated with eliminating this case?

    (iii) Illustrate this via drawing a diagram in y, x space (using indifference curves).

    (iv) Translate this measure into an area under a curve.

6. (24 points) State True or False and explain:

    (a) Assume the state of Illinois (a small state in an open economy) places a tax on capital. The incidence of the tax would be entirely on the owners of capital.

    (b) The higher the elasticity of supply, the greater will be the incidence of a tax on producers.

    (c) The greater the magnitude of the substitution effect, the smaller the excess burden.

    (d) A doubling of a tax will double the excess burden.

    (e) The higher the elasticity of demand, the greater will be the incidence of a tax on producers.

    (f) The higher the elasticity of substitution between capital and labor in an industry subject to a capital income tax, the worse off would be the workers.