University of Toronto
Economics 336 – Public Economics

Midterm examination
November 16, 2010

1. Under this system, two earner couples pay less tax than one earner couple of equal family income. (For full marks, the answer should explain why, or give a numerical example.) If well-being is best measured by family not individual income then this violates horizontal equity. However, individual taxation may be preferred if: (i) higher labour supply elasticity of married women implies it is optimal to tax their labour income at a lower rate than their husbands; (ii) one earner couples consumer more leisure or household production time than two earner couples, which is not captured by the market taxable income measure.

2. The question asks for a comparison between an excise tax on housing and a uniform commodity tax. According to the Corlett–Hague principle, the excise tax on housing is more desirable if housing services are complementary with leisure. That is, if people with big houses would prefer to stay at home rather than work, which seems plausible, then a tax on housing is desirable. (But an answer that argues the opposite based on the opposite assumption is perfectly acceptable.)

   Some students might choose discuss whether a tax on houses is capitalized into values of existing houses and is therefore a lump-sum tax. This is acceptable, but since the question asks for the long run impact (when the value of existing houses is fully depreciated) it is not enough for full marks. Some version of the Corlett-Hague principle must be invoked.

3. (a) SWT: Under some conditions, and efficient allocation can be decentralized with lump-sum transfers.

   (b) Anti-subsidies:
   - creates deadweight loss in markets for subsidized goods; violates SWT; e.g. market discounts for resale of Food Stamps is evidence for this
   - paternalist, not welfarist

   (c) Pro-subsidies:
   - such assistance is "self-targetting" when government cannot observe abilities and implement lump sum transfers of SWT
   - specific egalitarianism

4. Inverse elasticity rule: cut subsidy rate for rice, increase for wheat. If income elasticities differ in the way described, then this change might be regressive. It is *not* correct to answer that both subsidies should be cut in this case.

5. Because of the SOE assumption, the tax raises the cost of capital from $\bar{r}$ to $\bar{r}+t$ and reduces

the demand from $A-\bar{r}$ to $A-\bar{r}-t$. Therefore

$$
\begin{aligned}
R(t) &= tK(\bar{r}+t) = t(A-\bar{r}-t) \\
-\Delta\text{Profit} &= \int_{\bar{r}}^{\bar{r}+t} K(r)dr = R(t) + \frac{1}{2}t^2 \\
EB(t) &= \frac{1}{2}t^2
\end{aligned}
$$

6. For any tax rate t, the optimal demands are

$$
\begin{aligned}
X^* &= 5-(1+t) \\
Y^* &= 10-(1+t)[5-(1+t)]
\end{aligned}
$$

(The demand for X^* is both compensated an Marshallian - because this utility function is quasi-linear.) Demands before and after tax are

$$
\begin{aligned}
(X_0, Y_0) &= (4, 6) \\
(X_1, Y_1) &= (3, 4)
\end{aligned}
$$

so tax revenue is $R = 3$. Excess burden is

$$
EB(t) = \int_1^{1+t} X^*(p)dp - (1+t)X^*(1+t)
$$

or $EB(t=1) = 1/2$.

The other approach is the Harberger triangle approximation. Since $-\Delta X = t = 1$, the Harberger formula is

$$
EB \approx \frac{1}{2}\cdot 1 \cdot 1 = \frac{1}{2}
$$

(Since the demand curve is linear, the approximation is exact.)

7. In the basic theory of incidence in competitive markets, a tax on firm costs is fully shifted forward if the supply curve is horizontal, which is a reasonably good assumption in most cases. But in an import competing industry, the tax cannot be shifted forward because imported goods do not pay the sales tax on inputs. Therefore in such cases it would be shifted backward to workers or other immobile factors in the Ontario economy. We know that in monopolistic industries either more or less than 100% of the tax may be shifted forward, depending on demand elasticities. (A more complete answer would consider factor substitution and general equilibrium effects of the tax using the Harberger model. But this is not required for full marks.)

8. In this case, a labour income tax is equivalent to a uniform tax on food and bus trips. The Corlett-Hague principle states that when there are two taxable goods (plus labour) a higher tax should be levied on the good that is more complementary with leisure (more substitutable with labour). For this labour supply function, bus trips are a substitute for leisure (complement for labour) and food is a complement for labour (substitute for labour). So a differentiated commodity tax has lower excess burden than a labour income tax that raises the same revenue. The tax rate on food should be higher than the tax rate on bus trips.