Problem Set 2

It's OK to work together on problem sets.

1. Consider the comparative statics of a single commodity market in competitive equilibrium, subject to exogenous variation in a parameter α. Demand is characterized as $D(p, \alpha)$, supply as $S(p, \alpha)$. Excess demand is $z(p, \alpha)$. The market equilibrium condition is $z(p,\alpha) = D(p,\alpha) - S(p,\alpha) = 0$. Comparative statics of equilibrium is then

$$\frac{dz}{d\alpha} = \frac{\partial z}{\partial p}\frac{dp}{d\alpha} + \frac{\partial z}{\partial \alpha} = 0$$

$$\frac{dp}{d\alpha} = -\left(\frac{1}{\frac{\partial z}{\partial p}}\right)\frac{\partial z}{\partial \alpha} = -\frac{\frac{\partial z}{\partial \alpha}}{\frac{\partial z}{\partial p}} \quad = -\frac{D_\alpha - S_\alpha}{D_p - S_p} \quad .$$

The denominators of the two expressions on the right hand sides is the Jacobian of the system.

Then suppose that α represents an upward shift in supply, D is unaffected by the change in α, and that D and S have the usual slopes with respect to p. Find an expression for $\frac{dp}{d\alpha}$. Can you determine the sign of $\frac{dp}{d\alpha}$?

2. Same setting as question 1. Now suppose that α represents an upward shift both in supply and demand, and that D and S have the usual slopes with respect to p. Find an expression for $\frac{dp}{d\alpha}$.

Can you determine the sign of $\frac{dp}{d\alpha}$?

3. Same setting as questions 1 and 2. In economists' discussion of the effect of immigration on the US economy, there have been two principal points of view. Oversimplifying: Borjas (Harvard) says increasing supply of labor

drives down wage rates. Card (Berkeley) says the earnings of immigrants add to aggregate demand including demand for labor and thus leave wage rates changed little if at all.
Interpret α above as immigration. Restate the Borjas and Card arguments in terms of $\frac{dp}{d\alpha}$.

4. Who really pays a tax levied on buyers?

Let α = excise tax, p^o = price received by seller, $p^o + \alpha$ = price paid by buyer

$D(p, \alpha) = D(p + \alpha, 0)$, $S(p, \alpha) = S(p, 0)$

Find conditions so that the tax α levied on buyers is not shifted; it is paid fully by buyers. That is, find conditions so that $\frac{dp^o}{d\alpha} \approx 0$.

5. Same setting as problem 4. Find conditions so that the tax on buyers is shifted to sellers, that is so that $\frac{dp^o}{d\alpha} \approx -1$.

6. Mas Colell, Whinston and Green, problem 10.C.4.

7. MasColell, Whinston and Green, problem 10.C.5, using the implicit function theorem as the problem suggests. As stated it's a bit obscure, but let's do some homework. The equilibrium condition is

$$Z(p,t) = \sum_i \varphi_i'^{-1}(p+t) - \sum_j c'_j(p) = 0$$

Stating the equilibrium condition in this way and applying the implicit function theorem should give the answer. Do <u>not</u> use the technique of MasColell's Example 10.C.1.

8.(a) Same setting as problems 4 and 5. Consider an excise tax on gasoline, intended to reduce dependence on petroleum fuels. The conventional view is that the demand for gasoline is short-run price inelastic inasmuch as the complementary stock of motor vehicles is fixed on the short-run. Long-run, the stock of motor vehicles is changeable --- drivers can switch between low and high mileage vehicles. Use the model of problems 4 and 5 to describe

the effect of the excise tax. Do demanders pay the tax as a price increase? Do suppliers absorb the tax as a reduction in net price?

(b) Ross doesn't know the answer to this question, but it looks interesting. Same question as part (a) but suppose the supplier is a monopolist equating marginal revenue to marginal cost.

9. Not required. Please help. I'm trying to find a canned nontrivial moderately simple problem in comparative statics in a textbook. Most of the problems for MasColell, Whinston and Green section 10.C just look too messy. Three brownie points to anyone who comes up with a satisfactory choice.