Econ 523 PhD Public Finance
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Problem Set 1

1. Rosen Roback and The Introduction of A Corporate Tax

Preferences Suppose utility is Cobb Douglas over goods and land with an amenity shifter:

$$u(x, l^c, s) = s^{\theta_W} x^{\gamma} (l^c)^{1-\gamma}$$

where x is consumption of private good, l^c is consumption of land, and s is the level of amenities. θ_W and γ are parameters that govern the importance of amenities and the consumption of private goods and land. The price of the private good is normalized to one. Workers provide one unit of labor and earn wage w. r is the rental price for land.

Technology The production technology is: $X = f(N, L^p) = ZN^{\alpha}L^{1-\alpha}$, where Z is a productivity shifter, N is employment and L^p is total amount of land used by firms. w is the price of a labor and r is the rental price for land.

(a) What is the expression for indirect utility $V(w, r, s)$? [Hint: first solve for demand for x and l^c]

(b) What is the expression for total costs $C(w, r, Z)$ and unit costs $c(w, r, Z)$?

(c) Please graph the expressions for indirect utility and unit costs with w on the y-axis and r on the x-axis. Please label equilibrium wages and rents and explain the intuition for the slope of the two curves.

(d) If productivity Z fell to Z', what would happen to the unit cost curve and to wages and rental costs in equilibrium?

(e) If a strictly positive profit tax τ were introduced so that $Z' = Z(1 - \tau)$, what would happen to the unit cost curve and to wages and rental costs in equilibrium?

(f) Analytically and intuitively, what governs how much wages respond to the profit tax?

2. Empirics: Fiscal Amenities

Please use the dataset ps1.dta on my website to complete this problem.

(a) Open the dataset ps1.dta and use binscatter[1] to show the relationship between local area wages and population shares.

- Specifically, plot mean wages for population share bins using the following command "binscatter wages popshare" where popshare is the share of the total US population in that local area.

(b) Please run the following regression and save the residual:

$$\log w_c = \beta_0 + \beta_1 \log r_c + A_c \tag{1}$$

where $\log w_c$ is log wages and $\log r_c$ is local rents. Try to make the wage and rent terms economically comparable (hint: how many hours do full time workers typically work in a month).

(c) Please list the top 10 local areas by $\hat{A}_c$, which equals $(\log w_c - \hat{\beta}_0 - \hat{\beta}_1 \log r_c)$.

(d) Please create a scatter plot that shows where local areas lie on the graph of $\hat{A}_c$ on the y-axis and wages w_c on the x-axis. Please superimpose the best fit line. Why do you think some cities fall above and below the best fit line? Please repeat this analysis but with population shares on the x-axis.

(e) Please regress $\hat{A}_c$ on the three tax rate variables for sales, income, and corporate taxes. Please run bivariate regressions and then include all three tax rates in the same regression. Please describe and interpret the sign and magnitudes of the coefficients. How do these coefficients compare to the relationship between $\hat{A}_c$ and other amenity measures in the dataset?

(f) How might sorting or compositional differences across locations affect the relationship between amenities and state tax rates?

[1] You can open stata and type "ssc install binscatter" and/or go to this website for more info: `https://michaelstepner.com/binscatter/`