Steve Pischke

Labor Economics I
Problem Set 4

1. Wage and Employment Determination under Unionization

   Consider a union with fixed membership m that runs a closed shop at a particular firm. Union members have preference $u(w)$, i.e. they supply labor inelastically. They also have an outside opportunity paying b if not employed at the union firm (this could be unemployment benefits or a competitive wage). The union is maximizing

   $$U(w,n) = nu(w) + (m-n)u(b)$$

   where n is employment at the union firm. The firm maximizes profits

   $$\pi = pf(n) - wn$$

   (a) Assume the union acts as a monopoly union, i.e. it sets a wage unilaterally and the firm then chooses the optimal level of employment. Show that

   - The union wage w increases in b.
   - An increase in union membership m does not affect the wage rate w.
   - An increase in product price p has no effect on the wage rate w if labor demand is unit elastic.
   - The wage rate w is higher and employment lower than in competitive equilibrium with wage b.

   (b) Now suppose that the union and the firm jointly bargain over w and n and that the bargaining outcome is efficient. Show that

   - The contract curve is upward sloping in $w - n$ space.
   - Employment and wages are higher than in the competitive equlibrium with wage b.
   - An increase in the alternative wage b leads the contract curve to shift to the left.
   - An increase in the product price p leads the contract curve to shift to the right.

   (c) Suppose that the union is maximizing the total surplus instead:

   $$U(w,n) = n(w-b)$$

   Show that any efficient bargain has the same employment as the competitive equilibrium (i.e. the contract curve is vertical).

2. Differences-in-differences

   Read the article by Card and Krueger in the AER on "Minimum wages and employment: a case study of the fast food industry in New Jersey and Pennsylvania."

(a) Clearly explain the differences-in-differences strategy involved in comparing employment changes at restaurants in New Jersey and in Pennsylvania. What is the treatment and what is the control group? Derive a regression version of the differences-in-differences estimator. What is the key identifying assumption implicit in this empirical strategy? Think about this first in terms of the econometric condition, and then give an economic example where this condition is violated. Can you use the regression version of the differences-in-differences estimator and additional control variables to relax this assumption, and how?

(b) How does the difference-in-difference estimator treat the "treatment intensity" (i.e. the impact of the minimum wage at different restaurants)? Card and Krueger also use a continuous treatment variable, which they call GAP. Explain the economic rationale for this variable. Starting from the regression version of the difference-in-differences framework, describe how they use the GAP variable as a treatment variable. How does the continuous treatment variable allow them to relax the key identifying assumption in (a)? What are the implicit treatment and control groups in this approach? What is the key identifying assumption of this alternative approach? Is it possible to test this identifying assumption, and if yes, how?

(c) Compare the regression strategy in (b) with Card's paper "Using regional variation ..." by drawing an analogy between fast food restaurants and US states. The key challenge in the Card paper was to be sure that there are no state specific trends correlated with the treatment. He allows for this possibility by including state specific variables on the adult labor market. Would it be possible to use a similar variable in the New Jersey-Pennsylvania case?