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Labor Economics I
Problem Set 5

1. Estimated Returns to Tenure

   Consider a two period model of the labor market. In period t, each worker receives a wage offer w_t that is drawn independently from distribution $F(w)$.

   (a) Suppose the true return to seniority is $s > 0$, so that the two possible second period wages are

   $$w(X = 2, T = 2) = w_1 + s$$
   $$w(X = 2, T = 1) = w_2$$

   where X is experience and T is tenure. Suppose also that mobility is completely random: with probability p a worker must leave the first period job and accept the second period wage offer, and with probability $1 - p$ the worker must stay on the first period job. What is the measured return to seniority in a cross-section, $E(w(X = 2, T = 2)) - E(w(X = 2, T = 1))$?

   (b) Suppose that mobility is endogenous rather than random. Suppose each worker chooses the second period job that offers the higher wage. Is the return to tenure estimated in a cross section equal to, greater than, or less than the true return s?

   (c) Now suppose that there is no true return to seniority, i.e. $s = 0$. Suppose that mobility is partly random and partly endogenous. With probability p the worker must move to a new job in the second period. With probability $1 - p$ the worker chooses the second period job which offers the higher wage. What is the sign of the measured return to seniority in a cross section?

   (d) Finally, put it all together. Suppose that $s > 0$ while mobility is partly random and partly exogenous as in (c). Without knowing p what can we say about the bias in the return to seniority estimated in a cross section? (Hint: consider the limits as p approaches zero and one).

2. Option Value of a Job

   Consider again a two period job choice problem. In period one, a risk neutral worker is offered a job that pays w_1. If the worker accepts the job then the second period wage offer will be random with mean w_1. The worker also has the option of self-employment in each period and can quit the job after seeing the second period wage offer. Suppose the payoff from self-employment is q per period.

   For simplicity, ignore discounting. The worker's first period problem then amounts to choosing between $2q$ from self-employment and an income of

   $$w_1 + E\left[\max\left(w_2, q\right) \mid w_1\right]$$

   from accepting the first period job offer and choosing whether to work in the second period once w_2 is revealed.

Suppose the conditional distribution of w_2 given w_1 is uniform on the interval $[w_1 - x, w_1 + x]$, for some $x > 0$. Solve for w_1^*, the minimum value of w_1 that will persuade the worker to accept the job. Show that w_1^* is less than q but approaches q as x approaches 0.