

Problem Set I
Econ 350, Spring 2022
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1. Comparisons of wages across demographic groups are made everyday, comparing Black and White wages and male and female hourly wages and annual earnings. Using the NLSY79 data from its inception to the latest wave, answer the following questions.
 - a. Go to the “NLSY79 investigator” webpage **here** to download the NLSY79 data. Notice that if you do not have an account, you need to register. In the worst case scenario, approval may take a number of days, so register to the website early! (If you have a problem, please contact the TA). Once you are logged in, choose ”NLSY79 (National longitude Survey of Youth 79). You would then need to choose which variables you need to download to answer the questions in this PS. In your answers please list which variables you chose, and what data cleaning process were applied.
 - b. For each year, what % of the sample of women 25-54 is working? Answer the same question for males. Do this by race for Black and Hispanics. What are the characteristics of workers (age; marital status; children; asset income)?
 - c. Plot the distributions of wages by gender and race for (i) all persons, and (ii) for working persons. Do these plots conditional and

unconditional on education, work experience, marital status, number of children and parents education. Use broad educational categories (<HS, HS, some college, college, and college+) and work experience categories (≤ 5 years, 5-20 years, and 20+ years).

- d. Compare the wages of men with women over the period using hourly and annual measures:
- (i) Average wages
 - (ii) Median wages
 - (iii) Stochastic dominance
 - (iv) 75th quartile
 - (v) 25th quartile

Do this conditionally and unconditionally (use regressions of log wages on education, work experience, and participation). How much difference does it make to adjust for education and work experience? Is there a marital premium for men? For women?

- e. How much of the change in each gap over time is due to differences in
- (i) Education
 - (ii) Work experience
 - (iii) Selectivity
 - (iv) Family status
 - (v) Children

- f. What are trends in employment? What are the determinants of employment trends?
- g. How does your analysis of Problem 1 inform the study of Black-White convergence by Bayer and Charles (2018)? They analyze earnings differences between Black men and White men from 1940-2010 using quantile regression.
- (a) Using your previous analysis, what is the justification (if any) for comparing quantiles across the two race groups? How do the wage quantiles map into skill prices (S_1, S_2) ? Are persons at the same quantile of the same skill level?
- (b) Suppose that in the labor market, there are at least two tasks (T_1, T_2) and two or more skills (S_1, S_2) per task. Using a simple Roy model, compare the quantiles of Black and White earnings in terms of (T_1, T_2) and (S_1, S_2) skills. Do inequalities in quantiles imply discrimination in the payment of skills?
- (c) How sensitive are their comparisons to the differential rates of employment decline for the two groups? (They document the decline.)
- (d) How do your estimates compare with theirs?
2. How can you identify the “psychic costs” of schooling? (Hint: see the handout, “Notes on Identification of the Roy Model and the Generalized Roy Model.”)
3. What is “the” rate of return to schooling? How do agent expectations and information sets determine it? (Distinguish ex ante from ex post)

rates of return.) What is the relationship between the rate of return to schooling and the internal rate of return? When is a Mincer coefficient a rate of return (ex ante and ex post)?

4. Consider the following model of wages, tasks, and skills. There are two tasks: A and B . These are demanded in the market (e.g., occupations, etc.). Associated are two skills: S_1 and S_2 (e.g., cognitive and noncognitive). (See Acemoglu and Autor, 2011; Deming, 2017; Heckman and Sedlacek, 1985 *JPE*, for background.)

T_j is the quantity of task j skills (formed from S_1 and S_2). (I drop individual i subscripts.) People with different skill endowments have comparative advantages in tasks. People have a skill vector (S_1, S_2) . It maps into tasks (T_A, T_B) via the following equations:

$$\begin{aligned} T_A &= \alpha_A + \beta_A^1 S_1 + \beta_A^2 S_2 \\ T_B &= \alpha_B + \beta_B^1 S_1 + \beta_B^2 S_2 \end{aligned}$$

Tasks are demanded in the market. People can perform only one task at a time (i.e., they can't do both simultaneously). Aggregates of tasks \bar{T}_A, \bar{T}_B , along with aggregate capital K , determine total output: $Y = F(\bar{T}_A, \bar{T}_B, K)$.

$$\begin{aligned} F_1 &> 0 \quad F_2 > 0 \quad F_3 > 0 \\ F_{11} &< 0 \quad F_{22} < 0 \quad F_{33} < 0 \end{aligned}$$

F operates under constant returns to scale. Aggregation is in terms of the sums of the persons using A and B in the market, respectively.

Market prices for tasks are determined from competitive equilibrium:

$$\begin{aligned}\pi_A &= \frac{\partial F}{\partial T_A} \\ \pi_B &= \frac{\partial F}{\partial T_B} \\ \pi_K &= \frac{\partial F}{\partial K}\end{aligned}$$

- a. Define and distinguish comparative and absolute advantage in choice of tasks.
- b. What are skill prices in terms of task prices π_A, π_B ? As aggregate endowment of S_1 increases, what is the effect on π_A, π_B ? (E.g., suppose everyone wakes up with twice as much S_1 . Also consider the case where only the bottom half of the S_1 distribution has a 25% increase in endowment.)
- c. Use this model to compare the wages earned of two groups (for example, female and male workers with different skill endowments). What is the meaning of a quantile (e.g., median) difference in wages between males and females if male S_1 relative endowment is half that of females, but the S_2 endowments of men and women are the same? What is the meaning of the comparison of median wages over time if male participation is declining? How does this map into estimates of

discrimination? (Consider Bayer and Charles, 2018.)

- d. What are the causal effects of race and gender in this model?
5. In a two-sector Roy model with employment and nonemployment, are the nonparticipants the ones with the lowest potential market wages? As employment \uparrow , does the average wage necessarily decline, holding the prices of skills constant?

Use your analysis to examine Mulligan and Rubinstein (2008) and the analysis in Maasoumi and Wang (2019) on the wage growth of women. How much is real and how much is a selection bias effect? Interpret the selection bias effect.

References

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