University of California, Berkeley
Department of Economics
Field Exam

Labor Economics

January 2023

There are three questions on this exam. **Please answer all three.** You should plan to spend about one hour per question. Calculators are not necessary. Please explain your notation in order to maximize chances of partial credit.

ECON 250A

Suppose a monopsonist faces a firm specific labor supply function $L(w) = w^{\eta}$ with elasticity $\eta > 0$. Every worker hired can produce q units of output. The firm's output is sold internationally at price \$1.

1. Derive the wage offered by the monopsonist in terms of η and q.

2. What is the elasticity of offered wages w with respect to productivity q?

3. How does your result above compare to empirical estimates of the "pass through" elasticity of worker productivity to wages?

4. Derive an expression for the firm's profit function $\pi(q)$.

5. Derive the elasticity of profits π with respect to productivity q.

6. Now suppose there are J towns, each with a monopsonist facing a labor supply schedule with elasticity η. Worker productivity q_j varies across towns. Denote the variance of log productivity $(\ln q_j)$ across towns as σ_q^2 and the variance of log profits $(\ln \pi_j)$ across towns as σ_π^2. Show that the elasticity η is identified by these variances.

7. Suppose it is found that $\sigma_\pi^2 < \sigma_q^2$? Why would this present a problem for the current model? Can you think of an extension that would rationalize this finding?

ECON 250B

A well-funded foundation is undertaking an experimental evaluation of a basic income program, wherein poor families are given unconditional cash transfers of \$1,000 per month for three years. Let i index families, and let T_i denote the randomized treatment status of family i, with $T_i = 1$ representing families who receive the transfer and $T_i = 0$ the control group. We are interested in understanding the impact of this treatment on children in the treated households. For simplicity, assume that each household in our sample has exactly one child aged 0-15, and let Y_i represent the earnings at age 30 of that child. We are interested in estimating the effect of treatment on Y.

1. Describe the data using potential outcomes notation, and use this to write out the estimator for the treatment effect assuming that Y_i is observed.
2. Now suppose that we aren't willing to wait 30 years to conduct the evaluation. Instead, 5 years after treatment is delivered we want to predict the effect of treatment on Y. At this point, we don't observe the children's age-30 earnings. Instead, we observe a set of shorter-run outcomes $Z_{1i}, Z_{2i}, Z_{3i} \ldots$.. These outcomes might be the child's health, his or her grades and progress in school, and so on. Using your own words, explain the surrogate index approach of Athey et al. (2019) for identifying the effects of T on Y.
3. Using the potential outcomes notation from (1), explain the assumptions under which the surrogate index approach will identify the effect of T on Y. Are these assumptions plausible in this setting?
4. Hoynes et al. (2016) studied the impacts of childhood access to safety net benefits on childrens' outcomes much later. Because they conducted their study decades after the intervention they were studying, they could observe the long-run outcomes directly. But suppose that they also had access to a rich set of observed earlier outcomes for the children in their study. Describe how they could use these to assess the surrogate index approach to thir problem. What sort of evidence would support or counter-indicate the use of that approach to study the long-run impacts of safety net programs?

ECON 244

You are interested in studying the effect of a binary treatment, D_i, on an outcome Y_i. Let $Y_i(1)$ and $Y_i(0)$ denote potential outcomes for individual i with and without treatment, and let X_i represent an observed covariate for individual i. Suppose potential outcomes are given by

$$Y_i(d) = \alpha_d + \gamma_d X_i + \delta_d X_i^2 + \epsilon_{id},\ d \in \{0, 1\},$$

where $E[\epsilon_{i1}|X_i] = E[\epsilon_{i0}|X_i] = 0$ and $E[\epsilon_{i1}^2|X_i] = E[\epsilon_{i0}^2|X_i] = \sigma_\epsilon^2 > 0$. The observed outcome for individual i is $Y_i = Y_i(0) + [Y_i(1) - Y_i(0)]D_i$.

1. Suppose that $\gamma_1 = \gamma_0 \equiv \gamma$, $\delta_1 = \delta_0 \equiv \delta$, and $\epsilon_{i1} = \epsilon_{i0} \equiv \epsilon_i$. Explain in words what these restrictions mean. You can assume that these restrictions hold for the remaining parts of the question.

2. Consider the restriction $E[\epsilon_i|X_i, D_i] = 0$. Explain in words what this restriction means. You can assume this restriction holds for the remaining parts of the question.

3. You are interested in the parameter $\beta \equiv \alpha_1 - \alpha_0$. You run an ordinary least squares (OLS) regression of Y_i on D_i, ignoring X_i. Provide an expression for the omitted variables bias in the resulting coefficient, $\beta_{1,OLS}$. When is the omitted variables bias zero?

4. Consider the restriction

$$E[D_i|X_i] = \pi_0 + \pi_1 X_i.$$

Explain in words what this restriction means. You can assume this restriction holds for the remaining parts of the question.

5. You run an OLS regression of Y_i on D_i and X_i, omitting a control for X_i^2. Provide an expression for the omitted variables bias in the resulting coefficient, $\beta_{2,OLS}$. In addition, provide an expression for the asymptotic variance of the corresponding OLS estimator, $\hat{\beta}_{2,OLS}$, computed in an *iid* sample of N observations on $\{Y_i, D_i, X_i\}$.

6. Now you add a control for X_i^2 to the regression from part 5. Provide expressions for the omitted variables bias in the resulting coefficient, $\beta_{3,OLS}$, and the asymptotic variance of the corresponding OLS estimator, $\hat{\beta}_{3,OLS}$. Compare the asymptotic precision of $\hat{\beta}_{2,OLS}$ and $\hat{\beta}_{3,OLS}$. Is there any scenario under which you might prefer $\hat{\beta}_{2,OLS}$?