Labor Economics "Mini" Field Exam
Econ 261B — Haanwinckel
June 2024

Items 1 through 6 are about the classic model of compensating differentials in the tradition of Rosen (1986). Consider an economy with a large number I of workers, indexed by i. Workers have heterogeneous preferences $u_i(c, a)$ over a consumption good c and non-wage amenities a at the job where they are employed. Utility is increasing in both arguments for all workers. Workers are also heterogeneous in their non-wage wealth s_i; consumption is determined by the sum of that non-wage wealth and the wage they get at the job. There are two types of jobs, A and B. Denote the wages and amenities offered by those jobs by w_A, w_B, a_A, and a_B. The labor market is perfectly competitive and workers are identical in all other aspects besides preferences and non-wage wealth.

1. (15 points) Using the notation introduced above, write the expression that implicitly defines the compensating wage differential $d_{i,A}$ that would make a worker i, initially employed at firm A, indifferent between that job and a job at firm B.

2. (7.5 points) Suppose you defined $d_{i,B}$ in a corresponding way, that is, for an alternative scenario where the same worker i is initially employed at B. A fellow economist claims that, by symmetry, we should expect $d_{i,A} + d_{i,B} = 0$. Is this true in general? Why or why not? Be concise in the justification (one or two sentences).

3. (10 points) In equilibrium, what does $w_A - w_B$ tell us about worker preferences? Be as precise as you can; no need for a long/complicated explanation.

For items 4 and 5 below, continue with the previous assumptions, but now let's add structure to the demand side. There is a large number of potential entrepreneurs that can freely enter the market by creating a job of type $j \in \{A, B\}$, paying entry cost k_j. Every job is filled by a single worker. Assume that $a_B > a_A$, $k_B > k_A$, and that there is positive entry of both types of firms in equilibrium. *Hint: given free entry, firm profits should be zero.*

4. (10 points) If we observe the average wage differential between jobs A and B in the competitive equilibrium, do we learn anything about the costs k_j? If so, what, exactly?

5. (5 points) Consider this claim: "In this economy, preferences are irrelevant in determining equilibrium outcomes." Is it true or false? Provide a one or two-sentence explanation.

6. (7.5 points) Now, abstract from the specific assumptions above and think about real-life research on compensating differentials. List one potential issue in the data that may break the clean mapping between wage differentials and preference/technology parameters that you discussed in items 3 and 4.

Info for the remaining questions: Consider an economy with a large number N of workers that are identical in productivity, but have idiosyncratic preferences for firms in the spirit of Card, Cardoso, Heining, and Kline (2018). There is an exogenous number of firms $j \in \{1, \ldots, J\}$, heterogeneous in productivity z_j and amenity levels a_j. If the firm posts a wage w_j, it attracts $n_j = a_j \frac{{w_j}^\beta}{\Omega}$, where β is the elasticity of labor supply to the firm and Ω is an equilibrium variable that individual firms take as given. Firm revenues are $y_j = z_j n_j$. Assume that workers have no option other than working at those firms. Thus, in equilibrium, all workers are employed, such that $\sum_j n_j = \sum_j a_j \frac{{w_j}^\beta}{\Omega} = N$.

7. (15 points) Derive the first order condition that determines the optimal choice of posted wage w_j for a given firm j. Give it a one or two-sentence interpretation.

8. (7.5 points) In equilibrium, what do the firm amenities a_j determine?

9. (7.5 points) Suppose that a minimum wage is introduced in this economy. It is higher than the lowest posted wage in the unconstrained equilibrium, but lower than the highest wage. What happens to **aggregate employment** in this economy?

10. Suppose that we observe this economy for two periods. Assume that, from one period to the other, a random subset of workers receives a shock that makes them re-draw their idiosyncratic preferences, such that they move from one firm to another at random. An econometrician observes the resulting matched employer-employee dataset with worker identifiers, firm identifiers, and wages. Given all of the assumptions above:

    (a) (7.5 points) Can the econometrician non-parametrically identify the distribution of z_j (up to a scaling factor)? Choose between "Yes, for all firms", "Yes, for a subset of firms", and "No."

    (b) (7.5 points) Can the econometrician non-parametrically identify the distribution of a_j (up to a scaling factor)? Choose between "Yes, for all firms", "Yes, for a subset of firms", and "No."

Labor Economics Field Exam

June 2024

Instructions

This is a closed book examination. No written materials are allowed.

You have 1 hour to complete the exam. It is worth 100 points. You must obtain at least 75 points to pass this exam.

Consider an individual i living for T periods with utility function $U(c, l) = U(c, T - h)$, where c is consumption, l is leisure, T is total time available, and h is hours of work. Individual i is endowed with non-labor income Y, receives a wage w if working, and can save using a risk-free asset with gross return R. The government collects taxes on labor earnings, with a tax rate equal to τ for each dollar earned. There is no uncertainty. The following questions are related to the three labor supply functions and corresponding elasticities we studied in class.

1. (10 points) Write down individual i's decision problem over his life cycle.

2. (15 points) Use two-stage budgeting to derive the period t sub-problem for individual i that can be used to recover the Marshallian labor supply function (you don't have to recover the labor supply function).

3. (5 points) The utility function is such that the corresponding Marshallian labor supply function takes the following form:

$$h_t^m = \alpha + \beta \ln w_t + \gamma \frac{Y_t}{w_t} + \epsilon_t^m.$$

   Derive the Marshallian labor supply elasticity.

4. (10 points) Write down the period t sub-problem for individual i that enables you to derive the Hicksian labor supply function (you don't have to recover the labor supply function).

5. (5 points) The utility function is such that the corresponding Hicksian labor supply function takes the following form:

$$h_t^h = \phi + \delta \ln w_t - \theta w_t^{-\eta} U + \epsilon_t^h,$$

   where U is the level of utility. Derive the Hicksian labor supply elasticity.

6. (5 points) Using only the definition of Marshallian and Hicksian labor supply functions, is the Marshallian or Hicksian labor supply elasticity larger if leisure is a normal good? (Don't use the elasticities you have found in the previous parts, just the definition of Marshallian and Hicksian labor supply functions)

7. (15 points) Suppose the utility function takes the following form:

$$U(c, T-h) = \frac{C^{1+\rho}}{1+\rho} - \kappa \frac{h^{1+\sigma}}{1+\sigma}.$$

With $\eta \leq 0$ and $\sigma \geq 0$. Derive the Frish labor supply function.

8. (5 points) Recover the Frish labor supply elasticity.

9. (10 points) The government wishes to increase the marginal tax rates τ by 1 percent just for a month to reduce the budget deficit. But it is worried that the increase will reduce labor supply and, thus, the increase in tax revenue will not be enough to reduce the deficit below their target. Of the three labor supply elasticities you derived above, which one should the government use to approximate individual i's labor supply response to the temporary increase in τ? Why?

10. (10 points) The government decides to make the increase in τ permanent. How can the government approximate individual i's labor supply response to this reform?

11. (10 points) The government asks you to estimate the Frish labor supply function you derived earlier. What are the main econometric issues you need to address to estimate it?

Field exam Spring 2024 (instructor Yotam Shem-Tov)

The exam has two parts of equal weight. **The exam is closed book and *no* notes of any sort are allowed**.

Part 1

For each of the questions below choose whether both claims are correct, both are false, or one is correct and the other is false. Please provide a brief justification to your choice. No partial credit will be given.

1. Claim A: According to the training model by Acemoglu and Pischke (1998), firms will have monopolistic rents due to information frictions that will cause them to share the gains from training with the worker and will therefore choose to invest in training (although generally less than the optimal level)
   Claim B: In Acemoglu and Pischke (1998), as p (share of high-skilled workers) increases the firm will invest less in training as workers from the secondhand market will be of higher skill

   (a) Both claims are correct

   (b) Both claims are false

   (c) Claim A is correct and claim B is false

   (d) Claim B is correct and claim A is false

2. Both of the following claims relate to the Acemoglu and Pischke (1998) model. As in the slides, let p denote the share of high-skilled workers and let λ denote the likelihood that a high-skilled worker separates from their initial firm due to an exogenous shock.

   Claim A: The optimal level of training (to workers of all skill types) is unrelated to λ.

   Claim B: The firm's profit function is: $p(1-\lambda)\alpha(\tau) - c(\tau)$

   (a) Both claims are correct

   (b) Both claims are false

   (c) Claim A is correct and claim B is false

   (d) Claim B is correct and claim A is false

3. Claim A: Long-tenure workers who loss their job do not suffer from lasting earning losses

   Claim B: Lachowska, Mas, and Woodbury (2020) found that most of the earning losses of high-tenure workers due to job loss can be explained by firm specific wage premiums

   (a) Both claims are correct

   (b) Both claims are false

   (c) Claim A is correct and claim B is false

   (d) Claim B is correct and claim A is false

4. Claim A: Roussille (2021) found that controlling for dfferences in the asking wage reduces wage gaps most for new and inexperienced workers
   Claim B: White children from households at the bottom of the parental income distribution (i.e., lowest percentiles) have higher intergenerational mobility rates than Asian children with parents with similar incomes

   (a) Both claims are correct

   (b) Both claims are false

   (c) Claim A is correct and claim B is false

   (d) Claim B is correct and claim A is false

5. Claim A: Becker's model of taste based discrimination predicts that discrimination will be lower as markets become more competitive
   Claim B: In Becker's model, discrimination does not always lead to wage gaps. Wage gaps depend on whether the marginal employer is discriminatory or not.

   (a) Both claims are correct

   (b) Both claims are false

   (c) Claim A is correct and claim B is false

   (d) Claim B is correct and claim A is false

6. Claim A: Between 1950 and 2010 the participation rate of women increased dramatically while that of men remained unchanged
   Claim B: The male-female gap in earnings (adjusting for human capital controls as well as occupation and industry) remained roughly unchanged from 1989 to 2010.

   (a) Both claims are correct

   (b) Both claims are false

   (c) Claim A is correct and claim B is false

   (d) Claim B is correct and claim A is false

7. Claim A: Mulligan and Rubinstein (2008) found that accounting for differences in women participation rate over time shrink the male-female earning gap even further Claim B: According to Chetty, Hendren, Jones, and Porter (2018), black women generally have a higher income rank than white women, conditional on having the same parent household income rank.

   (a) Both claims are correct

   (b) Both claims are false

   (c) Claim A is correct and claim B is false

   (d) Claim B is correct and claim A is false

Part 2

Consider a setting individuals of either low productivity (l) or high productivity (h). Education, e, is continuous and publicly observed, but productivity is not. The productivity of the low type is $y_l(e) = \beta_1$, while the productivity of the high type is $y_h(e) = \beta_1 + \beta_2 e$. The costs of obtaining education differ between the two types: $c_l(e) = \frac{3}{2}e^2$ and $c_h(e) = e^2$. Firms compete for workers a la Bertrand after observing the educational attainment of the workers (assume there are many firms in the market and markets are competitive).

(1) Characterize the levels of education workers would obtain if ability were perfectly observable. Show that there is no separating Perfect Bayesian equilibrium (PBE) in which high types obtain their "first-best" education level.

(2) Show that there exist separating equilibria in which low types obtain their first-best education level. What is the minimum level of education for high types that supports such an equilibrium?

(3) Assume we are in the separating PBE you found in (2). Denote by s_h the share of high-productivity individuals in the economy and thus $1 - s_h$ is the share of low-productivity individuals. Suppose a researcher observes workers' education and productivity. She estimates the following OLS regression specification:

$$y = a_0 + a_1 \cdot e + \eta$$

(i) What estimand will $\hat{a}_1$ recover?

(ii) Does it represent the causal effect of additional education on productivity?

(iii) In Equilibrium, what is the average effect of increasing educational attainment?

(4) Now suppose there is a compulsory schooling requirement of $\bar{e}$, where $0 < \bar{e} < \frac{\alpha_2}{4}$. What is the minimum level of education for high types that supports a PBE in which low types obtain $\bar{e}$? Is this more or less than in (2)? Explain why.

(5) Now suppose that $y_l(e) = y_h(e) = \alpha_1 + \alpha_2 e$. Characterize education levels of low and high types in all PBE of this game. Describe the education levels of low and high types in all the PBEs of this game.

(6) Briefly describe the model in Farber and Gibbons (1996). Specifically:

(i) What are the main assumptions?

(ii) What are the three predictions of the employer learning model?

(7) This section deals with Altonji and Pierret (2001).

(i) Briefly describe the research question, model, and main findings.

(ii) Compare and contract Altonji and Pierret (2001) and Farber and Gibbons (1996)