

FALL 1999

Labor Economics Comprehensive Exam

Masters/Wong

PART I Answer three out of four questions: 40 minutes each.

- 1a. How will the effects of a tax increase on labor supply differ depending on whether the increase is in the income tax or a property tax (e.g. a tax on the value of a worker's home).
- b. How will the results differ depending on whether an income tax increase is expected to be permanent or temporary?
- c. What labor supply effects might we expect if we shifted from an income tax that is progressive in terms of family income to one that is progressive in terms of individual income (i.e. if tax rates were determined by individual income rather than by family income)?
- d. How would the labor supply effects of an increase in the overtime wage premium likely differ from the effects of an increase in the worker's ordinary wage rate?
- 2a. What is the distinction between firm-specific and general human capital? How is each kind of human capital likely to be related to the expected mobility of labor?
- b. Who is likely to pay for each kind of human capital? Why?
- c. How does each kind of human capital affect a) the bargaining power of a group of workers? b) The importance of worker perceptions of equity as a factor that profit-maximizing firms need to consider? Explain.
- d. Why are senior workers likely to provide firm-specific training to junior workers? How does the provision of such training by senior workers affect how labor markets operate?
- 3a. What is labor market discrimination?
- b. Compare the theories of preference and statistical discrimination? How does each relate to the principle of profit maximization? Discuss the effects of an excess supply of labor on each kind of discrimination.
- c. Discuss the strengths and weaknesses of various ways of determining the extent of labor market discrimination.
- d. What is the distinction between disparate treatment and disparate impact? How does this distinction relate to the legal issue of determining whether discrimination exists under United States law.

- 4a. Discuss theoretically the effects we might expect minimum wage legislation to have on
1. employment
 2. unemployment
 3. benefits
 4. on-the-job training
 5. working conditions
- b. Discuss at least two ways of estimating the effects of an increase in the minimum wage on employment. What are the strengths and weaknesses of the alternative approaches?
- c. What does the empirical evidence from the United States tell us about
1. the likely employment effects of small changes in the minimum wage?
 2. the likely employment effects of large changes in the minimum wage?
- d. How large would the employment effect have to be in order for the increase in the minimum wage to reduce the aggregate earnings of affected workers?

PART II Answer all. Suggested time: 2 hours.

1. Each firm offers one vacant job. Firms open vacant jobs until all rents from new jobs are exhausted. The cost of recruiting is $c > 0$. Each worker occupies either one of the two states: unemployed or employed. Only unemployed workers search for jobs. Let the search cost for unemployed workers be zero. Search cost represents foregone leisure in b . If a worker stays on a job, the worker faces the uncertainty on the match productivity shock, and continues to stay only if the shock is above the reservation productivity.

The productivity of a job is $p + \alpha x$. The aggregate productivity, p , is common to all types of jobs. The job-specific element, x , is scaled by the dispersion, σ . The cumulative distribution function of x is $F(x)$, x is bounded by $[0, \bar{x}]$. A job is created with the highest job productivity and after which, job productivity follows a stochastic process. The process that changes the productivity of a job arrives according to a Poisson process with rate λ . Should the productivity shock, λ , bring about productivity that is lower than the reservation productivity, R , then the job-worker match terminates and leads to a job destruction. Otherwise, the worker stays and improves on productivity.

The matching technology, $m(v, u)$, is a function of the number of vacancies, v , and the number of unemployed workers, u . Let $m(v, u)$ be concave and homogeneous of degree one, and it can be rewritten as $m(\theta)$, where $\theta = v/u$ represents *market tightness*.

- a. What are the steady-state expected present values of employers, $J(x)$, and of workers, $W(x)$, once a match forms?
- b. What are the steady-state expected present values of vacancy, V , and unemployment, U ?
- c. Derive the Beveridge Curve, the Job Creation Curve, and the Job Destruction Curve.

d. Suppose wage is negotiated as the outcome of a bilateral bargaining problem. Let β denote the worker's *bargaining power*. Define the net capital surplus of a continuing job-worker match to be $S(x) = J(x) + W(x) - U - V$. How does β affect the reservation productivity and market tightness?

2. Consider two types of agents to be matched, male and female, denoted as m and f respectively. Agents are *ex ante* identical. But *ex post* match qualities differ. Let X denote the random-match quality of any pair, with a cumulative probability distribution denoted as $F(x)$. Only unmatched agents search. Potential partners meet sequentially at random and at finite rates. Meetings are generated by a Poisson arrival process with the arrival rate λ . Assumed further that the fraction of single male equals that of single female, u , and so the random meeting rate with single agents is λu , and that with matched agents is $\lambda(1-u)$. While single, the benefit flow of an agent is b_i , $i = m$ or f . If the potential partner met is single, the capital gain is the agent's share of the surplus capital value of the match. If the potential partner met is matched, then the gain is the net surplus capital value of the new partner and the existing partner.

Once a match is formed, the total match product is the realized match quality x . A match is destroyed at an exogenous rate δ .

a. Let r be the discount rate, and $S(x)$ be the surplus capital value of a match to be shared between the two partners. Further, let θ be the fraction obtained by female. Write down the expected present value of an existing match $W(x)$, the expected present value of being single for male, V_m , and for female, V_f , respectively.

b. Solve for the steady-state fraction of singles.

c. Do self-interested decisions made by agents induce socially optimal level of single agents? Prove.

3. Consider a dynamic programming problem of maximizing expected returns. Suppose that the states are positive finite integers, and let A be the set of all possible actions, a finite set. When the state is i and the action $a \in A$ is chosen, denote the reward earned to be $R(i, a)$ and the next state j occurs with probability $P_{ij}(a)$. For any policy π , the expected total return is $V_\pi(i)$ when $X_0 = i$:

$$V_\pi(i) = E_\pi \left[\sum_{t=0}^{\infty} R(X_t, a_t) \mid X_0 = i \right], i \geq 0.$$

Let $R(\cdot) \geq 0$. If for any policy π , policy h is defined by

$$R(i, h(i)) + \sum_j P_{ij}(h(i)) V_\pi(j) = \max_a \left[R(i, a) + \sum_j P_{ij}(a) V_\pi(j) \right].$$

Is it true that $V_h \geq V_\pi$? Prove or give a counterexample. If it is not true, give a sufficient condition under which it would be valid.