Labor Economics Field Exam
April 2022

Instructions

This is a closed book examination. No written materials are allowed. You can use a calculator.

You have 3 hours to complete the exam. The exam is composed of three questions. Each question is worth 100 points. You must obtain at least 75 points in at least two of the three questions to pass the exam in your field.

Please answer each question in separate booklets.

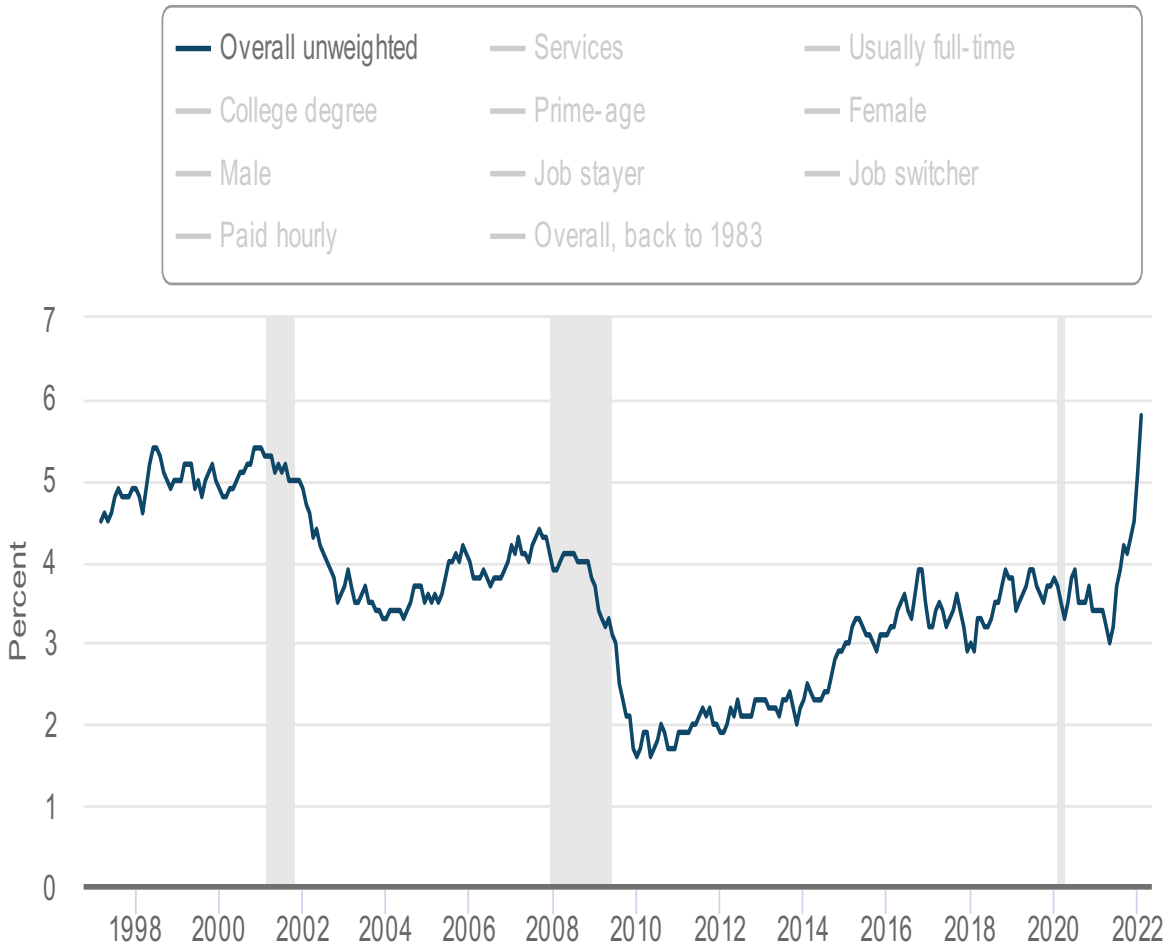
First Question. 100 Points

Consider the figure on the next page. It shows that wages are currently growing at the highest rate in the last 25 years. The next question asks you to think about the main factors that have the potential to explain such a large wage growth.

1. (15 points) Describe the main factors that you believe are behind the large wage growth documented in the figure.
2. (15 points) Rank the factors in order of importance and explain why you believe this is the correct ranking.
3. (15 points) Consider only the first factor in your ranking. Write down a model that accounts for this factor.
4. (15 points) Using your model, show the effect of your factor on wage growth
5. (10 points) Using your model, derive a testable implication that enables you to determine whether your model is consistent with the pattern displayed in the figure.
6. (10 points) Discuss the data you need to test the implication you just derived.
7. (15 points) Suppose you want to estimate the model parameters using Simulated Maximum Likelihood (if you were using general functions up to this point, replace them with specific functional forms). Describe the steps needed to implement the method.
8. (5 points) Pick one parameter in your model and describe which data and which variation in the data would allow you to identify that parameter.

Wage Growth Tracker

three-month moving average of median wage growth, hourly data



Sources: Current Population Survey, Bureau of Labor Statistics and author's calculations

Second Question. 100 Points

Info for Items 1 and 2 below: Consider a static, perfectly competitive labor market in the style of Katz and Murphy (1992). There are two worker groups, skilled and unskilled. There is a representative firm operating a Constant Elasticity of Substitution (CES) technology, and within groups, workers are perfect substitutes.

1. (10 points) Write an expression for the production function $F(L_S, L_U)$ and explain what each of the parameters represents. What is the relationship between wage ratios and labor demand ratios?

2. (20 points) Imagine that a minimum wage is imposed in this economy, binding only for unskilled workers. Can you tell what happens to aggregate production, aggregate employment of each type, and the wage gap between the two types? For full credits, you should mention which elements/parameters of the model matter the most for determining the signal and magnitude of each effect. But you don't necessarily need to solve the question using math.

Info for Item 3 below: Suppose a lawmaker with an economics background is worried about firms paying excessively low wages, especially to vulnerable workers (e.g., those living in poor areas). The lawmaker drafts a regulation that would identify low-wage firms using econometric techniques and then punish them with fines or other means.

Every year, the government would gather linked employer-employee administrative records for the past 12 months and estimate a model with worker, firm, and time fixed effects:

$$\log w_{it} = \alpha_i + \psi_{J(i,t)} + \delta_t + \epsilon_{it}$$

where w_{it} is the hourly wage that worker i earns at the the firm where they are employed at time t, denoted by $J(i,t)$. Firm identifiers are common for all establishments in the country owned by the same firm. Workers are observed monthly (i.e. t is months).

The model is estimated by minimizing the sum of squared errors of the residuals $\epsilon_{i,t}$. Firms with $\hat{\psi}_j$ in the bottom 10% of the population of firms would be punished.

3. List and explain eight (8) flaws or potential adverse consequences of this proposal, based on economic theory and econometrics. You will get 10 for each of the first two concerns based on theory; 10 points for each of the first two econometric concerns;

and 7.5 points for every other concern. I expect between two and five sentences of explanations on average, but that's not a hard constraint.

Third Question. 100 Points

The city of Los Angeles has developed a program to help unemployed individuals find work. Program participants are called every day and reminded to continue their job search, given advice on where to look for work, and offered words of encouragement.

Among an initial pool of unemployed individuals, the city randomized program participation, $Z \in \{0, 1\}$. There was perfect compliance, so program participation is 100% among those given a position and 0% among those not given a position.

After one year, the city collected data on the employment status of individuals, $E \in \{0, 1\}$. They also collected data on whether each individual had been arrested at any point that year, $A \in \{0, 1\}$ (which we will interchangeably call "crime").

1. (15 points) A city analyst decides to use the design of the program to evaluate the impact of employment on crime, where they use program participation as an instrument for employment.

   What are three reasons why employment status might have a causal impact on crime?

2. (10 points) What would be an example of an instrument exclusion restriction violation for this empirical design?

3. (10 points) What would it mean for the monotonicity assumption to be violated in this empirical design?

4. (10 points) The employment rates separately by training status are the following:

$$\begin{aligned} E(E_i|Z_i = 0) &= 1/4 \\ E(E_i|Z_i = 1) &= 1/2 \end{aligned}$$

   Assuming monotonicity, what share of individuals are always takers? Compliers? Never Takers?

5. (10 points) Now suppose we observe the arrest rates A_i for individuals separately by

employment and participation in the program:

$$\begin{aligned} E(A_i|E_i = 0, Z_i = 0) &= 1/2 \\ E(A_i|E_i = 1, Z_i = 0) &= 1/4 \\ E(A_i|E_i = 0, Z_i = 1) &= 3/8 \\ E(A_i|E_i = 1, Z_i = 1) &= 1/4 \end{aligned}$$

What is the IV estimate of the impact of employment on arrest?

6. (10 points) Who has a higher arrest rate when employed, compliers or always takers? Who has a higher arrest rate when unemployed, compliers or never takers?

7. (10 points) The program costs the city \$1,000 per individual. However, some share of unemployed individuals receive government assistance through city welfare programs which are not available for employed individuals. The cost of welfare is \$4,000 per person who receives it. So some of the cost of the program is offset by reduced expenditure in welfare assistance. Let $W \in \{0, 1\}$ denote whether an individual receives this assistance.

   Here is the breakdown of employment and assistance status by program participation:

$$\begin{aligned} E(E_i = 1, W = 0|Z_i = 0) &= 1/4 \\ E(E_i = 0, W = 1|Z_i = 0) &= 1/4 \\ E(E_i = 0, W = 0|Z_i = 0) &= 1/2 \\ E(E_i = 1, W = 0|Z_i = 1) &= 1/2 \\ E(E_i = 0, W = 1|Z_i = 1) &= 1/8 \\ E(E_i = 0, W = 0|Z_i = 1) &= 3/8 \end{aligned}$$

   What is the net fiscal cost to the city of each spot in the program?

8. (15 points) Suppose the city plans to increase the quality of the program the following year. They believe that through better trained staff and improved program planning, the employment rate for participants will be 0.6 instead of 0.5.

   Should we expect that the impact on crime for the marginally employed individuals (i.e. the 10% who are employed because the program is now better but would not have

been employed before) will be larger or smaller than the impact for those induced into employment from the first year? *Hint: Assume a linear MTE and use the Brinch, Mogstad, and Wiswall (2017) approach.*

9. (10 points) Suppose that instead of estimating the impact of employment on crime using the training program as an instrument, we had instead conducted a difference-in-differences design comparing crime the year of the program with the year before and comparing those who gain employment in the program year with those who do not. Assume that employment for the prior year is 0 for everybody, and assume that the assumptions of the difference-in-differences design are satisfied.

   Whose treatment effect is identified from this design? What is your best guess for how that treatment effect would differ from the effect identified using the training program as an instrument?