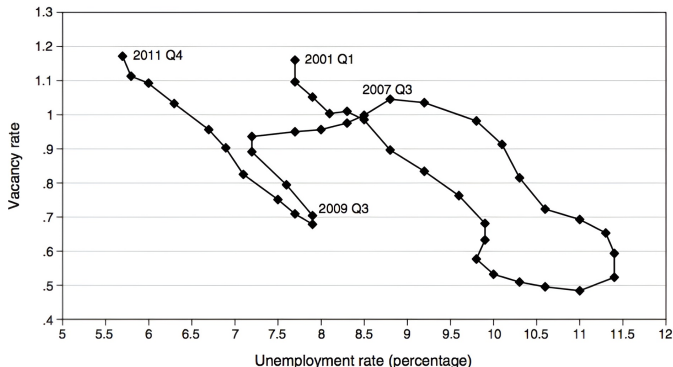# Problem Set 3

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Short Question 1

1. Labor Market Efficiency

- **True**: An inward shift (to the left or down) of the Beveridge Curve indicates an increase in labor market efficiency.

Short Question 2

According to the baseline job search model discussed in class, an UI-induced increase in the reservation wage along with a boom in firms' demand for labor (i.e. a rise in the job offer arrival rate) will unambiguously lower the exit rate from unemployment.

- **Statement:** False.
- The Hazard Rate is defined as:

$$h = \lambda[1 - F(\phi)]$$

- **Effect:** An increase in the arrival rate λ and the reservation wage ϕ yields an **ambiguous** result on the hazard rate.

Short Question 3

3. A spike in a country's unemployment rate during winter months is indicative of cyclical unemployment. It shall be cured by expansive fiscal policies

- **Statement:** False.
- This represents **seasonal unemployment**, not cyclical unemployment.
- Consequently, expansive fiscal policy would be misguided in this context.

Question 1: Interpretation of β

$$rV^u = b - \psi(e) + \beta\lambda(e)\int_\phi^\infty [V^e(w) - V^u]dF(w)$$

Interpret β:

- Search efficiency: Decomposition of λ into labor market matching efficiency β and effort based contact rate $\lambda(e)$.

Intuition why an increase of this parameter may increase an individual's duration of unemployment:

- Higher $\beta \Rightarrow$ Higher job arrival rate λ for given effort e. Reducing e also decreases search cost $\psi(e)$..
- Higher $\phi \Rightarrow$ Lower hazard rate $h = \lambda[1 - F(\phi)]$.

Question 2: Optimal reservation wage ϕ

$$V^e - V^u = \frac{w - rV^u}{r + q}$$

ϕ is the lowest acceptable wage, thus:

$$V^e(\phi) - V^u = 0 = \frac{\phi - rV^u}{r + q}$$

$$\phi = rV^u$$

$$\phi = b - \psi + \frac{\beta\lambda}{r + q} \int_{\phi}^{\infty} [w - \phi] dF(w)$$

Question 3: Optimal effort

Now suppose that $\lambda(e) = \lambda e$, $\psi(e) = 0.5ke^2 + c_o$ and $\beta > 0$. Use the initial definition of the value function
$rV^u = b - \psi(e) + \beta\lambda(e) \int_\phi^\infty [V^e(w) - V^u]F(w)$ to derive the optimal effort level.

$$rV^u = b - (0.5ke^2 + c_0) + \beta\lambda e \int_\phi^\infty [V^e(w) - V^u]dF(w)$$

FOC: $\frac{\partial V^u}{\partial e} = 0 = -ke + \beta\lambda \int_\phi^\infty [V^e(w) - V^u]dF(w)$

$$e^* = \frac{\beta\lambda}{k} \int_\phi^\infty [V^e(w) - V^u]dF(w)$$

Question 4: Application minimum policy

Suppose the government introduces a minimum search requirement that enforces unemployed individuals to submit at least two applications per week. How does this policy affect the net income of job search in a given period in case the individual submitted 1 (3) applications per week before the policy reform (keeping all other factors constant)?

- net income: $b - \psi(e)$
- Increase applications from 1 to 2 (increase e) $\rightarrow$ net income falls
- non-binding for > 2 applications

Question 5a

- **Empirical framework:** Marinescu uses Stacked Differences-in-Differences, which aligns the treatment timing (largest potential benefit duration (PBD) increase) across states to examine the differential effect of PBD increases on labor market outcomes.

Why is a Control Group needed?

- To account for time trends that may affect both treatment and control groups simultaneously.
- Allows isolation of the treatment effect (PBD increase) from other influencing factors.

Key Identifying Assumption:

- No omitted variable affected the outcome of interest at the time of the largest PBD increase

Question 5 b

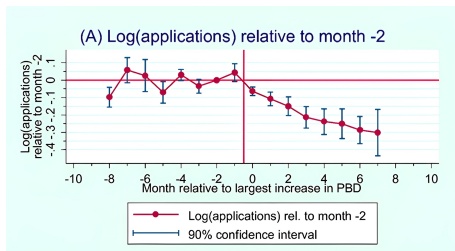(A) Log(applications) relative to month -2

Table 2

The impact of the largest increase in potential benefit duration (PBD) on log applications log vacancies, and labor market tightness, timing of events regressions.

Source: Department of Labor, and CareerBuilder.com for applications and vacancies.

	Diff (1)	DiD (2)	Diff (3)	DiD (4)	Diff (5)	DiD (6)
Total PBD in weeks	−0.0035***	−0.0042***	−0.0012	−0.0018	0.0024*	0.0024*
	(0.0013)	(0.0010)	(0.0013)	(0.0011)	(0.0013)	(0.0013)
After		−0.0214***		−0.0200*		0.0014
		(0.0063)		(0.0104)		(0.0139)
Observations	318	5257	318	5257	318	5257
R-squared	0.9970	0.9971	0.9926	0.9900	0.9832	0.9730

Robust standard errors clustered by state in parentheses.

All regressions include state, quarter and year fixed effects.

Note: The largest increase in potential benefit duration (PBD) is defined, for each state, as the largest increase that does not correspond to a change in the schedule, and is not due to a temporary interruption of EUC. Tightness is defined as vacancies/applications. In columns 2, 4 and 6, I include, for each state, all states that had constant PBD during the event window for the largest increase in PBD. In columns 2, 4 and 6, "After" is an interaction of the event window indicator and a dummy for the date being after the largest increase in PBD. In columns 2, 4 and 6, state by event window fixed effects are included (see text for more details).

*** $p < 0.01$.

** $p < 0.05$.

* $p < 0.1$.

Question 5 b

Effect of PBD on Search Effort

- Search effort falls after the largest increase in PBD.

Significance (Table 2 Interpretation)

- **Applications:** Significant and negative impact. Higher PBD decreases search effort.
- **Vacancies:** No significant impact.

Pre-trend Analysis

- No visible pre-trend in the data before treatment; estimates stay close to 0.

Question 5b II

Is this consistent with theory?

- Yes. Recall the flow value of unemployment:

$$rV^u = b - \psi(e) + \beta\lambda(e) \int_\phi^\infty [V^e(w) - V^u]F(w)$$

- **Mechanism:**
  1. Benefits (b) increase $\Rightarrow$ Value of unemployment (V^u) increases.
  2. To reduce the search cost $\psi(e)$, the agent reduces search effort e.
- *Note:* If β is low, search becomes inefficient.

Question 5c I

Goal: Causal effect of search effort on unemployment duration.

Why might OLS be biased?

- **Endogeneity:** Search effort is likely endogenous.
- Unemployment duration may affect search effort (reverse causality).
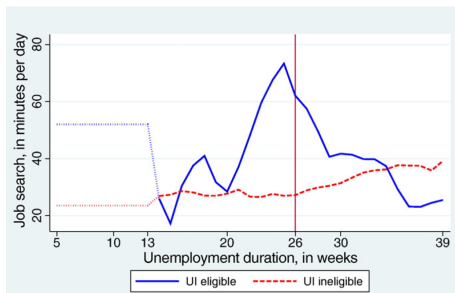
Question 5c II

Instrument Requirements LATE theorem:

1. **Independence:** The instrument should as good as randomly assigned.
2. **Exclusion Restriction:** The instrument has no direct effect on the outcome, except indirectly through the treatment.
3. **First-Stage:** Non-zero association between IV and treatment. The PBD reform must affect search effort.
4. **Monotonicity:** No defiers $\rightarrow$ The instrument affects everyone's treatment status in the same direction.

Question 5c: Failure of the Exclusion Restriction

1. Reservation Wage: $F(\phi)$ may increase directly with PBD, affecting unemployment duration directly, via lower hazard rate.

2. The "Rat Race" Channel (Supply Side)

- **Mechanism:** PBD reduces aggregate search effort (e).
- **Impact:** In a matching function $M(e, V)$, lower e reduces congestion.
- **Result:** Labor market tightness $\theta = \frac{v}{e}$ rises; all workers find jobs faster.

3. The Job Creation Channel (Demand Side)

- **Mechanism:** Higher PBD raises reservation wages (ϕ).
- **Impact:** The expected value of a filled job falls.
- **Result:** Firms post fewer vacancies (V falls). This depresses the job finding rate $q(\theta)$ for everyone.