SØK 3514.

Question 1.

a) A researcher starts out with an analysis of the relationship between the regional unemployment rate, UNEM and the price of oil, POIL based on regional panel data from Norway from 2003 to 2019. He exploits that some regions are more exposed to variations in oil prices than others because of geographical location and industrial composition. Let OILEXP denote a regional time invariant indicator for exposition to oil prices. Formulate an econometric model that enables you to investigate the effect of oil prices on regional unemployment.

b) A commentator suggests that the analysis in a) can be used to estimate the causal impact of regional unemployment on regional teacher shortages, measured by the regional share of teachers without approved teacher education. Formulate the corresponding econometric model and discuss the assumptions required to estimate the causal relationship between teacher shortages and unemployment using the suggestion from the commentator.

Question 2.

Researchers studying data from the Tennessee STAR experiment on the relationship between student achievement and class size report anecdotal evidence that school principals were pressured by some parents to place their children in small classes. Suppose that some principals succumbed to this pressure and transferred some children into small classes. How would such transfers compromise the internal validity of the study of the STAR experiment? Describe how you could use methods to deal with this problem to restore the internal validity of the study.

Question 3.

In an article on the reading list, Fabian Waldinger exploits the dismissal of Jewish faculty in German universities in the Nazi period to estimate the effect of faculty quality on PhD student outcomes within the following equation system (see article for variable definitions)

$$\text{Outcome}_{idt} = \beta_1 + \beta_2(\text{Avg. Faculty Quality})_{dt-1}$$
$$+ \beta_3(\text{Student/Faculty Ratio})_{dt-1} \qquad (1)$$
$$+ \beta_4\text{Female}_{idt} + \beta_5\text{Foreigner}_{idt} + \beta_6\text{CohortFE}_t$$
$$+ \beta_7\text{DepartmentFE}_d + \varepsilon_{idt}.$$

$$\text{Avg. Faculty Quality}_{dt} =$$
$$\gamma_1 + \gamma_2(\text{Dismissal-Induced Reduction in Faculty Quality})_{dt}$$
$$+ \gamma_3(\text{Dismissal-Induced Increase in Student/Faculty Ratio})_{dt} \qquad (2)$$
$$+ \gamma_4\text{Female}_{idt} + \gamma_5\text{Foreigner}_{idt} + \gamma_6\text{Cohort}_t$$
$$+ \gamma_7\text{DepartmentFE}_d + \varepsilon_{idt},$$

$$\text{Student/Faculty Ratio}_{dt} =$$
$$\delta_1 + \delta_2(\text{Dismissal-Induced Reduction in Faculty Quality})_{dt}$$
$$+ \delta_3(\text{Dismissal-Induced Increase in Student/Faculty Ratio})_{dt} \qquad (3)$$
$$+ \delta_4\text{Female}_{idt} + \delta_5\text{Foreigner}_{idt} + \delta_6\text{Cohort}_t$$
$$+ \delta_7\text{DepartmentFE}_d + \varepsilon_{idt}.$$

a)Explain briefly this system of equations. State the conditions required for the IV-2SLS estimator to yield consistent estimators for β_2 and β_3 and explain briefly how the conditions might be tested in practice.

b)Below, we report the estimated effects of faculty quality on the probability to publish in a top journal and to obtain a full professorship as outcome variables. The standard deviation of average faculty quality is around 1.3. Interpret the estimated coefficients and construct and interpret 95% confidence intervals for the population parameters.

	Published Top		Full Professor	
	OLS (1)	IV (2)	OLS (3)	IV (4)
Average faculty quality	.056** (.018)	.102** (.015)	.037 (.021)	.076** (.015)

c)The results show that the estimated IV-coefficients for β_2 are higher than the corresponding estimated OLS coefficients. What might explain this pattern?