# Problem Set 3
# Global Poverty and Economic Development

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NB: This problem set is due on the $6^{th}$ of December by 5.00pm. Please submit your work on OLAT in the section "Problem Set 3" with your name in the title of the document and also on the first page.

## 1 Data Exercise - IV estimation

For this exercise please use the dataset *Data_IV.csv* (or *Data_IV.dta*) available online. It looks at the effect of a treatment on an outcome $y$. The variable *assignment* represents the assignment to treatment and control, while the variable *treated* represents those who actually received treatment.

1. What proportion of those assigned to treatment did not receive treatment?
2. Run a simple OLS regression of the outcome on the actual treatment status. Present your results.

It is considered standard empirical practice to use the assignment to treatment as an instrument if you are worried about selection issues.

3. Using OLS, run a reduced form regression (ITT). Present your results.
4. Finally, run an IV (LATE) regression, and present your results.
5. Calculate by hand the Wald estimate.
6. Compare the results from the OLS reduced form regression and the IV regression. Do you get the same estimate? Why or why not?
7. It is often the case that the treatment effect in one group is different from another. Calculate the ITT effect by gender (in two separate regressions)
8. Calculate the LATE by gender (in two separate IV regressions). What is the treatment effect you are capturing here?

9. Discuss the results from the previous two regressions. The ITT is higher for one gender, while the LATE is higher for the other gender. Why might this be the case?

10. Now estimate the LATE by gender using a single regression.

## 2 Theory - Centralized vs. Decentralized Corruption

Truck drivers must drive through $i = 1, 2, ...., N$ identical checkpoints ($N \geq 2$), each of which charges a bribe per trip $p_i$. Define $P$ as the total bribe truck drivers pay along the trip: $P = \sum_i p_i$. Demand for driving is $Q(P) = \frac{\alpha}{2} - \beta * P$. There is also a cost $c$ for collecting bribes, included in the profit function.

**Centralized Corruption:** Consider a centralized price-setter who maximizes total profits from corruption: $\Pi = P * (Q(P) - c)$

1. Which bribe does the monopolist set in each of the $N$ identical checkpoints? Let's call this bribe level $p^C$

2. What are the total profits from corruption in this equilibrium? Let's call them $\pi^C$

**Decentralized Corruption:** Consider now a case where each checkpoint $i$ sets bribe per trip, $p_i$, independently.

3. What is the price $p_i$ that the checkpoint $i$ would set, if we assume that 2 checkpoints set $p_i = 0$ and the other $N - 3$ checkpoints set $p^C$? Would it differ from $p^C$ ?

4. Consider a symmetric Nash Equilibrium where all the checkpoints set the same bribe per trip. What's the equilibrium bribe per trip? How does it compare to $p^C$?

5. What are the total profits from corruption in this case? How do they compare with $\pi^C$?

6. Suppose you are running an anti-corruption program. You can't eliminate corruption but you can ensure it is either centralized or decentralized. Which one would you choose? Why?