# Lecture 19

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Levitt and Snyder (1997)

- Today - application of IV to solve omitted variable bias.

- Question: how strong is the link between federal spending in a district and winning reelections for incumbent members of Congress?

- Idea: representatives want to win reelection, so they will try and bring federal money into their district.

- Problem: weak empirical evidence:

  - Individual representatives don't have much impact on bringing federal spending or employment to their district.

  - Additional spending doesn't appear to improve election outcomes.

- Why does this happen?

- Omitted variable bias: representatives who are vulnerable will exert more effort to bring in federal dollars.

- Model:

$$V_{sdt} = \beta_1 X_{sdt} + \beta_2 Z_{sdt} + \varepsilon_{sdt}$$

- $s$ = state; $d$ = district; $t$ = year.

- $V_{sdt}$ = share of votes.

- $X_{sdt}$ = federal spending in district.

- $Z_{sdt}$ = measure of incumbent's electoral vulnerability.
  - quality of challenger, campaign funds, local scandals, national partisan swings.

- Problem: we don't observe $Z_{sdt}$.

- If we leave out $Z$ and just regress on $X$ alone...

$$\begin{aligned}\widehat{\beta}_1 &= \frac{Cov(\widehat{X_{sdt}}, V_{sdt})}{Var(\widehat{X}_{sdt})} \\ &\rightarrow^p \beta_1 + \beta_2 \frac{Cov(X_{sdt}, Z_{sdt})}{Var(X_{sdt})}\end{aligned}$$

- We expect $Cov(X_{sdt}, Z_{sdt}) > 0$, and $\beta_2 < 0$.

- Estimates are downward-biased.

- Strategy: need an instrument for $X_{sdt}$.

- Intuition: want something that is correlated with $V$ only through $X$.

- Correlated with $X$, but not error.

- Candidate instrument: Federal spending in other districts.

- Probably only weakly correlated with $Z$.

  - Might be violated if legislator effort spills over to other districts.

  - Or if there are common electoral shocks across districts.

  - Common for people in seminars to think of clever ways that this argument breaks down.

- Correlated with $X$:

- Large number of actors besides representative affect flow of funds to district.

- i.e., senators, governors, mayors, president.

- Correlation of spending across districts is 0.24.

$$V_{sdt} = \beta_1 X_{sdt} + \beta_2 Z_{sdt} + \varepsilon_{sdt}$$
$$X_{sdt} = \theta Z_{sdt} + \eta_{st} + \mu_{sdt}$$
$$Z_{sdt} \text{ unobservable.}$$

- Expect $\beta_1 > 0$, $\beta_2 < 0$, $\theta > 0$.

- Assume that $\varepsilon$, $\eta$, $\mu$ are uncorrelated with each other and with $Z$.

- $\varepsilon$ is uncorrelated with $X$.

- Three main models estimated:

- Let $\overline{X}_{sdt} = \frac{1}{D} \sum_{d=1}^{D} X_{sdt}$.

- Let $\overline{R}_{sdt} = \frac{1}{D-1} \sum_{j \neq d}^{D} X_{sjt}$.

- M1: $V_{sdt} = \gamma X_{sdt} + \varepsilon_{sdt}$.

- M2: $V_{sdt} = \delta \overline{X}_{st} + \varepsilon_{sdt}$.

- M3: IV on M1 instrumenting with $\overline{R}_{sdt}$.

- $\eta$'s represent common shocks to spending across districts.

- Assumption that $\eta$ is uncorrelated with $Z$ makes $\overline{R}_{sdt}$ a valid instrument.

- Can easily show the following about estimates from M1 and M2:

$$E[\widehat{\gamma}] = E\left[\frac{Cov(X_{sdt}, V_{sdt})}{Var(X_{sdt})}\right] = \beta_1 + \beta_2 \frac{\theta\sigma_Z^2}{\theta^2\sigma_Z^2 + \sigma_\mu^2 + \sigma_\eta^2}$$
$$E[\widehat{\delta}] = E\left[\frac{Cov(\overline{X}_{sdt}, V_{sdt})}{Var(X_{sdt})}\right] = \beta_1 + \beta_2 \frac{\theta\sigma_Z^2}{\theta^2\sigma_Z^2 + \sigma_\mu^2 + D\sigma_\eta^2}$$

- Both estimates are asymptotically downward biased, but bias is smaller in M2.

- We can only estimate M2 if we only have state level data.

- State level data is longer and more comprehensive.

- Also, we have a simple specification test:

  1. Coefficient from M1 $<$ M2 $<$ M3.

  2. Less bias in M2 on states with more districts.

## The Data

- FAADS data - district level outlays from 1983 - 1990.

- e.g., social security, medicare, payments to agricultural producers, community development grants, highway procurement funds.

- Not included: federal procurement expenditures, employee wages, some insurance and loan programs.

- FAADS averages 56% of total federal budget ($523 b in $1990).

- 956 programs, which are divided into two types:

- Low-Variation (16):
  - Broad-based, geographically diffuse entitlement.
  - Social security, medicare, low-income housing payments, veterans' retirement benefits.

- High-Variation:
  - Targeted to states, regions or constituencies.
  - Agricultural payments, urban mass transit grants, environmental restoration funds, specific education and research grants.

- High variation programs are probably more discretionary, and more amenable to political manipulation.

- Incumbent representatives can probably more easily claim credit for benefits that come to their district as a result of high variation programs than low variation programs.

- Low variation programs are usually transfer programs that give direct payments to individuals.

- High variation programs are administered by state and local governments.

- How large are shocks across states? $1.00 increase in high variation spending in other districts leads to $0.333 increase in the district. $0.983 for low variation.

- Regression equation:

$$\text{DemVote}_{sdt} = (\lambda_t + \alpha X_{sdt} + \beta \%\Delta\text{Income}_{st}) \times I_{sdt} + \nu_{sd} + \omega_t + \varepsilon_{sdt}$$

- Dependent variable: share going to Democrats.

- $X_{sdt}$ average per capita federal spending in district.

- $\%\Delta\text{Income}_{st}$ percent change in state per capita personal income.

- $I = 1$ if incumbent is Democrat, -1 if Republican, 0 otherwise.

- $\nu_{sd}$, $\omega_t$ - district, year dummies.

- Main result: $100 increase in per capita high variation spending increases vote share by...

- M1: 0.42%; M2: 0.99 %; M3: 2.09%.

- Pattern of these results is consistent with theory above.

- Low variation spending is small in magnitude and negative.

- Negative value may be due to local economic hardship that isn't proxied by state economic growth.

- Other estimates show expected signs (economic growth, incumbency advantage).

State level data

- Longer time series and more programs available for state level data.

- Table 4: estimates of M2. Results are consistent with previous estimates.

- $100 of additional spending leads to 0.89 % increase in vote share.

- DOD contracts are smaller, but noisy measure of where the money is actually spent.

- Transfer spending is small and not significant.

- Omitted variable bias should decrease with state size - columns 2 and 3 show larger coefficient in larger states.

- Last 2 columns: want to test whether importance of constituency service increased.
  - More important to spend more time in constituency.
  - Before 1976: nontransfer spending increases vote share by 0.09; After: by 0.4.6

- Campaign expenditures: endogeneity: vulnerable incumbents spend more on campaigns.

- Won't be omitted variable bias if orthogonal to federal spending.

- Examine this by including campaign expenditures for races where same two candidates face off on multiple occasions.

- By including the candidate pair fixed effect, should reduce endogeneity.

- Idea: fixed effect controls for candidate quality (need to assume it doesn't vary over time).

- Find similar results, even when campaign spending is included.

- Also find effect of spending doesn't vary by political party.

- Economic significance? Estimate increasing number of votes by 1 costs $14,000.

- S.D. of per capita h.v. spending across districts is $250.

- Increase by 1 S.D. leads to 5% increase in vote share.

- 10% of all elections involving house incumbents have been won with less than 55% of the vote.

- Only 5% of incumbents have been defeated.

- Thus, changing this 10% would have a large impact on reelection rates.

- 27% of all incumbents involved in at least 1 race where they obtained 45-55% of the vote.

- Change in reelection rate from 0.95 to 0.85 would decrease expected number of terms from 20 to 6.67.

- Decrease probability of surviving 10 terms from 0.60 to 0.20.

- Changes in federal outlays can have big effects.