POLS201 Spring 2019

Robustness Checks

April 10

Agenda

- Small Changes to the schedule (a Moodle moment)
- A homework review is coming next week
- Presentations will be April 22, 24, 26, & 29
- Friday's lab will cover regressions, changing regression specifications, and some worthwhile "stupid R tricks"
    - Same format: R Studio Cloud

Robustness

- After you run an analysis, you want to test if your results are "robust".
- That is: Do your results hold up to multiple specifications?

Robustness

- Examples of Multiple Specifications
  - Alternative Operationalizations of Variables
  - Include / Exclude Control Variables
  - Exclusion of Outliers
  - Different Samples (especially theory driven)
  - Report Multiple specifications of regressions in different columns.
  - Extra tests of causal validity

Robustness and Internal Validity

- To test whether your causal story is valid, use tests of **convergent** and **divergent** validity.
- Even if you control for observable confounds, your analysis might still fail to support causal inference.
- Also need to examine measurement error in confounds.
- Can you address unobservables with logic?

Convergent Validity

- **Convergent Validity**: The extent to which your IV **is** related to variables which should associate with it.
- The BEST tests of convergent validity follow closely with the author's theory.
- Failing a test of convergent validity puts the author's theory into doubt, not just the hypothesis.

In Practice

- Imagine you have identified a plausible **intervening** variable.
- Test to see whether your IV causes your intervening Variable.
- Do a second test to see if your intervening variable causes your DV.

Example

- Recall Jacobson's AFL-CIO Article.
- Suppose the AFL-CIO's video campaign was effective? Presumably, people see the video target ads and then make up their opinion about the candidate.

So: The Ad Campaign $>$ Awareness of Content in Campaign $>$ Vote choice.

Example

- Regression 1:
  - IV: Ad Campaign; DV: Awareness
- Regression 2:
  - IV: Awareness; DV: Vote choice
- The first regression helps moves your analysis forward. If you fail the first test, there is limited reason to bother with the second test.

Table 1. Models of Perceived Ideologies of Democratic Incumbents

	Ideological placement of Democratic incumbent	Perceived ideological difference
Party identification	–0.25*	–0.80*
	(0.01)	(0.01)
DW-NOMINATE score	0.75*	0.61*
	(0.17)	(0.20)
Health care reform	–0.73*	–0.64*
	(0.10)	(0.11)
Stimulus	–0.13	–0.22*
	(0.11)	(0.10)
Cap and trade	–0.18*	–0.08
	(0.07)	(0.08)
Constant	4.85*	2.51*
	(0.13)	(0.12)
R^2	0.17	0.48
Unweighted *N*	21,878	21,576

Note: Cell entries are ordinary least squares regression coefficients with standard errors in parentheses. The data are weighted with sampling weights and the standard errors are calculated to reflect clustering within congressional districts. Ideological placement is coded 1 (very liberal) to 7 (very conservative). Perceived ideological difference is coded –6 (more conservative than incumbent) to +6 (more liberal than incumbent).
*$p < .05$

Do carry laws reduce crime?

- Hypothesis: Concealed Carry Laws Reduce Crime? Concealed carry and open carry laws begin with this premise.
- Theory: Concealed Carry increase the risk of would-be lawbreakers.
- Test of Convergent Validity: Do would-be lawbreakers who live in concealed carry states actually believe more people carry guns?
- If not: as far as the theory goes, why does it matter whether or not crime has dropped? It necessarily has dropped for other reasons.

Divergent Validity

- **Divergent Validity**: The extent to which your IV is NOT related to variables which it theoretically should NOT be associated with.
- Sometimes called "Placebo Test". If you take a placebo and feel better, we know the effect was not caused by the actual drug.
- Passing a good tests of divergent validity can counter arguments that an unmeasurable confound is driving the results.
- Failing a test of divergent validity might suggest to the researcher that confounds are still a problem

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- If the Senate is just as polarized as the House, we violate divergent validity.

Notice this basic feature of causal logic:

- Suppose we know that: If A, then B.
- It follows that: If Not B, then Not A.
- More practically: if we see A but not B, we have raised questions about the A to B causal relationship. . .
- . . . if only to suggest that something else must be operating in the picture.

Another Example:

- If we pass an "Open Carry" law then we will reduce murder
- If that causal claim is true and IF everything is controlled for:
- If we see MORE murder, there should be NO open carry law.
- If this logic breaks down, there is evidence that you haven't controlled for everything. Not necessarily that the causal claim is wrong.

Another example: Diffusion of Tax Limits

- Theory: Political Information Cause Policy Diffusion. That is: policies will spread and become adopted as people learn about their success.
- Analyze: US States Over Time
- IV: # Neighbors with Tax Limits
- DV: Passing Tax Limits
- Divergent Validity Test: Tax limits in neighboring states that fail should not cause you to pass a tax limit!

Gender Empowerment and GDP

- Theory: Gender empowerment will improve economic performance
- Mypothesis: More women in government will increase the GDP
- Data: Countries for a given period of time
- IV: Women in Government
- DV: Gross Domestic Product

Gender Empowerment and GDP

- Convergent Validity Test:
  - More women in government leads to more women in the workforce.
  - More women in the workforce improves the GDP. increases GDP.
- Divergent Validity Test:
  - Gender empowerment should effect women's economic outcomes MORE than men's economic outcomes.
  - If women in government does not affect women's economic outcomes more than men, then the hypothesis fails this particular test.

Does this failure mean the theory is wrong?

- No. But it does mean the theory needs more development, and some kind of variable is working in the mechanism.

The Take Home Practical Advice

- For a test for convergent validity, you are often taking an intervening variable and using first as a DV.
- You then run a second model and use the intervening variable as an IV (for your original DV).
- For a test of divergent validity, you are generally subbing out your DV for an alternative DV.

Your turn:

- Using your sketch a test of convergent validity and a test of divergent validity.
- For convergent validity: think of a possible intervening variable in your hypothesis.

My IV _____ causes an intervening variable _____ My intevener _____ causes my DV _____

- For divergent validity: An alternative DV that would cast doubt on my hypothesis might be:

  _____