

Six Lessons For Analyzing Legal Impacts in Panel Data

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From Correlation to Causation

- Empirical studies of impact of new laws have been controversial and influential (Ehrlich, Lott)
- We've made important progress on estimating causal effect.
- When law hits different jurisdictions at different times, panel data tests with fixed effects was gold standard.
- But every solution (fixed effects, IV, and now propensity scores) has limitations.

Time and Space

- How to Specify the Impact of Law Across Time and Jurisdictions
 - How Unconstrained Can Your Specification Be?
- How to Estimate the Standard Deviation of the Impact
 - How many observations do you really have?

How to Specify the Impact of Law Across Multiple Years and Multiple Jurisdictions?

- Reasonable to Start With Simple Dummy Variable Model
 - But this constrains model to estimate a constant time and constant jurisdiction effect
- Need to estimate less constrained models and test whether implicit constraints are rejected

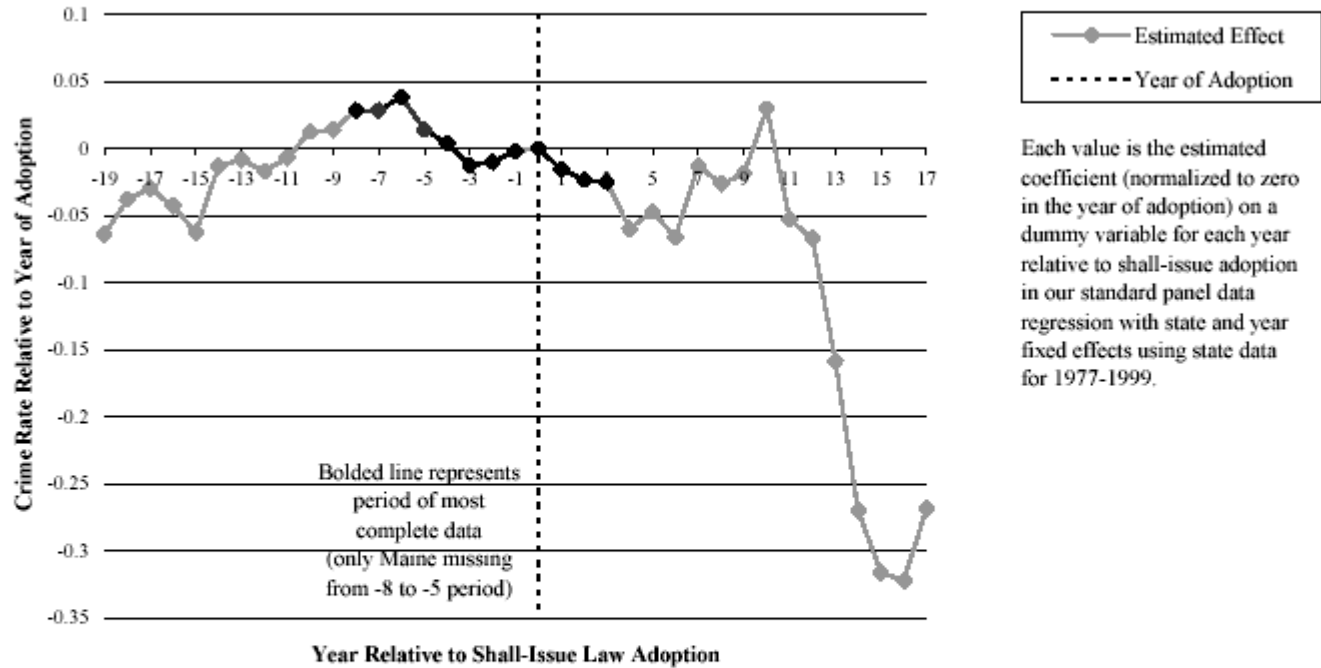
- You should relax constant time or constant jurisdiction assumption
 - Can't completely relax both (not enough observations).
- Individual state effects (test to see if equal)
- State-specific, Quadratic specification allows both intercept, first-order and second-order effect
 - Statistical net effects of hybrid specification easily calculated because “integration” of curve is linear combination of coefficients

- Alternatively, don't estimate impacts for individual jurisdictions
- But estimate individual year impacts
 - law x time

Unbalanced Dataset

- Year Specific Estimates May Not Credible because of Unbalanced Data Set
- A Small Number of States Are Identifying Particular Years
- Comparing Apples and Oranges

FIGURE 3A: VIOLENT CRIME—NORMALIZED EFFECT BY YEAR RELATIVE TO ADOPTION (VERNICK'S CODING)



How to Estimate the Standard Deviation of the Impact

- Problem in Figuring Out the “Effective” Number of Observations with Panel Data
- County/Year Data Overstates
- County Overstates
 - Large numbers of county-level observations, but laws are passed at state level
 - Appropriate to Cluster on State

- Years overstate
 - Laws are not randomly turned on and off
 - Once it's passed, it tends to stick forever
- Bootstrapping approach
 - Monte Carlo like estimates of standard deviation of randomly assigned “faux” laws – excluding real legal variable.
 - 5% of the law coefficient should be stat sig.

Instrument Variables

- The solution to problem of endogeneity
 - Factors that caused law to be passed may also affect variable of interest.
- But instruments are often not adequately defended
 - Need to report first stage regression to show that coefficients on instruments are significant and the right size
 - Need to justify why the instruments are not correlated with dependent variable in second stage (except through impact on passage of law)

Table 9. Do the Dezhbakhsh, Rubin, and Shepherd Instruments Have the Predicted Effects on Endogenous Deterrence Variables in Their First-Stage Regressions? (1977-1996)

	Dependent variable			Net Effect on Homicide Rate ^(a)
	Probability of Arrest	Probability of Death Sentence Given Arrest	Probability of Execution Given Death Sentence	
	(1)	(2)	(3)	
Police Spending	0.03 (0.023)	-0.002*** (0.000)	-0.05*** (0.004)	0.08
Judicial Spending	-0.22*** (0.034)	0.01*** (0.001)	-0.04*** (0.006)	0.58
Prison Admission	0.01*** (0.002)	-0.0001*** (0.000)	0.004*** (0.000)	-0.04
1976 * Republican Vote Share (Ford)	-0.66** (0.311)	0.03 (0.083)	0.49*** (0.053)	0.08
1980 * Republican Vote Share (Reagan I)	0.16 (0.202)	0.004 (0.004)	0.02 (0.036)	-0.45
1984 * Republican Vote Share (Reagan II)	-0.64*** (0.196)	0.04*** (0.004)	0.29*** (0.035)	0.54
1988 * Republican Vote Share (Bush I)	-0.25 (0.216)	0.06*** (0.004)	-0.03 (0.038)	0.41
1992 * Republican Vote Share (Bush II)	-0.04 (0.215)	0.05*** (0.004)	0.14*** (0.039)	-0.45
1996 * Republican Vote Share (Dole)	-0.82*** (0.212)	0.01** (0.004)	0.96*** (0.040)	-0.77
<i>N</i>	48,070	51,143	57,637	
	Second Stage			
Coefficients	-2.27*** (0.50)	-3.62 (14.53)	-2.71*** (0.62)	

Propensity Scores (and Matching Approaches)

- More Intuitive Attempt to Compare Subparts of the Data
 - Powerful Litigation Presentation
- Responding to Concern of Extrapolation
- Estimate Propensity that Different Jurisdictions would adopt the law
- Match jurisdictions that have similar propensities
- Compare Differential Impact of Like Pairs
- But Raises Some of the Same Problems of Instrumental Variables

6 Take-Home Lessons for Future Panel Research on Legal Impacts

- Favor Less Constrained Specifications of Law's Impact
 - Simple “Integration” Test of Net Effects
- Worry about Unbalanced Cross Section
- Favor Clustering
- Favor Bootstrapping
- More care in defending instruments
- Consider Propensity Score Test

Bonus Lesson for Criminal Empiricists

- Monetize different categories of crime and use this dollar cost of crime as your central regressor
- Massively more informative than violent crime or Property Crime
- Provides summary statistic of impact – instead of 9 crime type regressions