Lecture 11:
Paper overview

PPHA 34600

Prof. Fiona Burlig

Harris School of Public Policy
University of Chicago

Recap

TL;DR:

1. We can leverage time series data for identification
2. This is more powerful when combined with cross-section
3. The resulting diff-in-diff is one of the better quasi-experiments

An example: Mobile phones and markets

Policy issue:

- Imperfect information can complicate markets
- Can cell phones help?

Approach:

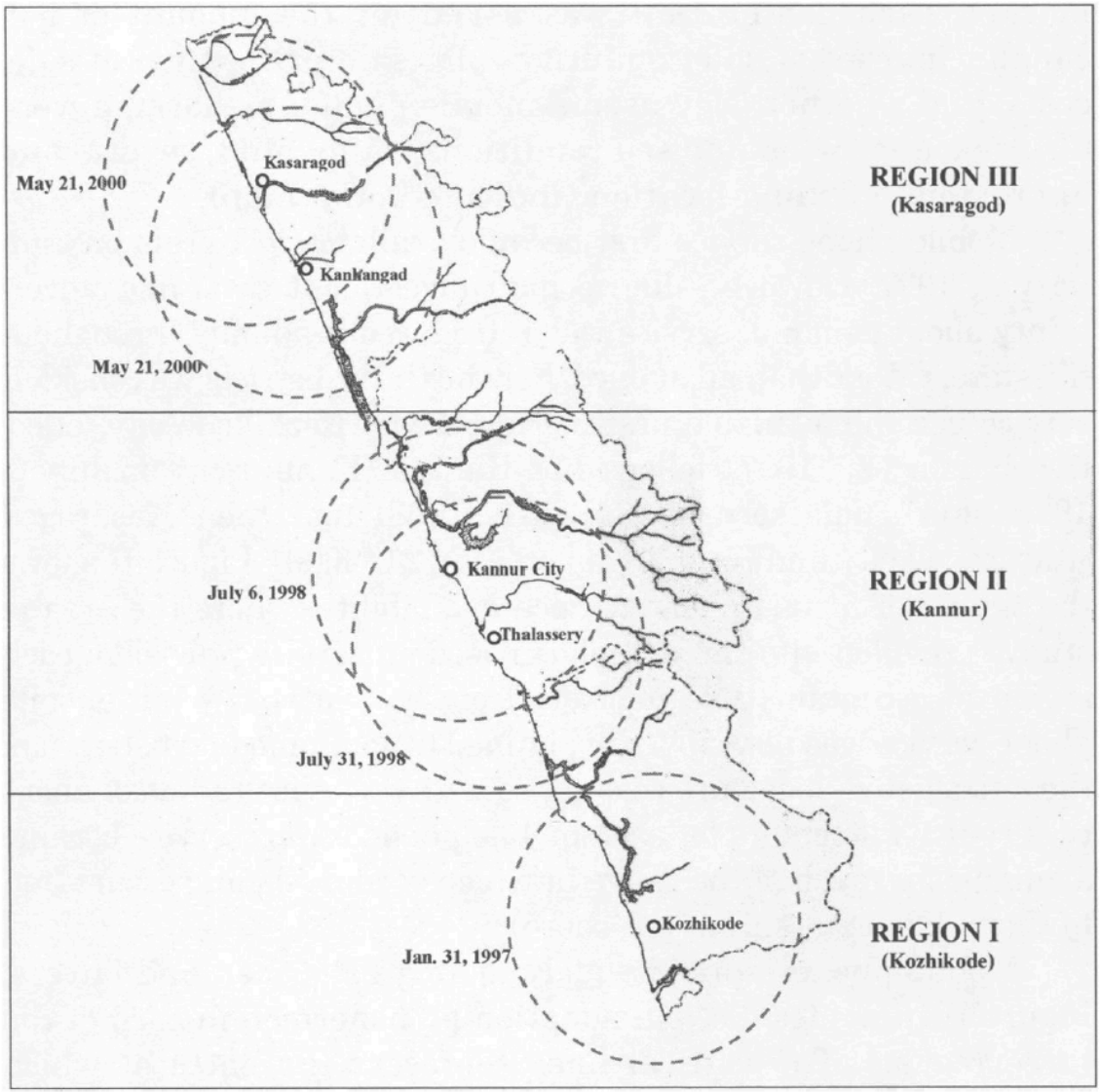
- Mobile phone service came to Kerala between 1997 and 2001
- We want to know the effect of phones on welfare
- Nobody ran an RCT to roll phones out...
- ...but phones got to different locations at different times

Motivating evidence

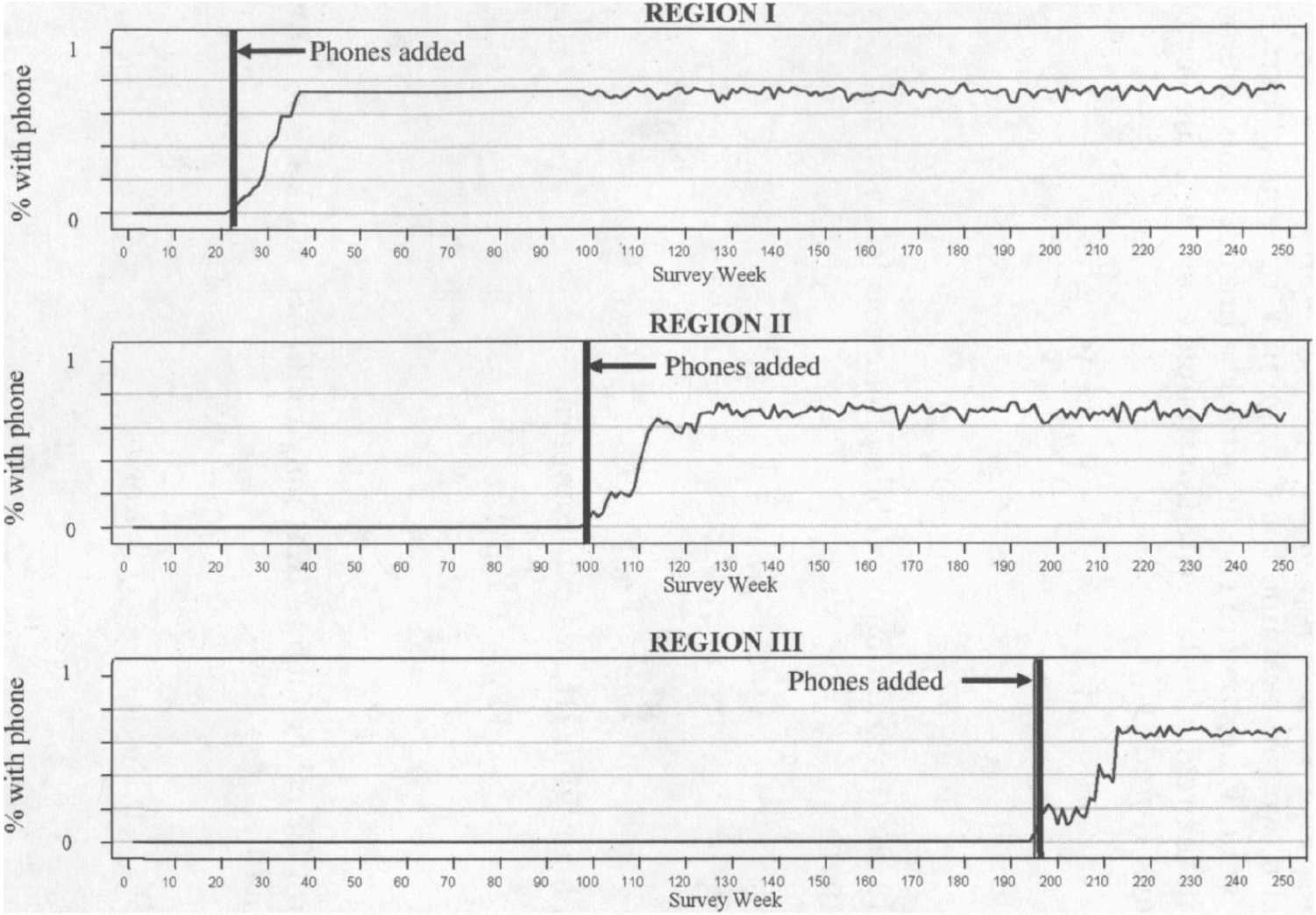
PRICES AND EXCESS SUPPLY AND DEMAND IN FIFTEEN SARDINE BEACH MARKETS

	Price (Rs/kg)	Excess buyers	Excess sellers
Kasaragod District			
Hosabethe	6.2	0	0
Aarikkadi	4.0	0	0
Kasaba	0.0	0	4
Kanhangad	7.2	0	0
Thaikadappuram	9.7	11	0
Kannur District			
Puthiangadi	8.7	2	0
Neerkkadavu	6.9	0	0
Ayikkara	8.4	1	0
Thalassery	4.3	0	0
New Mahe	6.2	0	0
Kozhikode District			
Chombala	9.9	15	0
Badagara	0.0	0	11
Quilandi	9.8	12	0
Puthiyangadi	0.0	0	6
Chaliyam	6.4	0	0

The natural experiment



The natural experiment



Estimating the effects of mobile phones on welfare

The authors will run a (simplified) version of:

$$\hat{\tau} = (\bar{Y}(treat, post) - \bar{Y}(treat, pre)) - (\bar{Y}(untreat, post) - \bar{Y}(untreat, pre))$$

Where:
$\bar{Y}$ is the average of the outcome

- (He'll actually do this for regions I, II, and III separately)

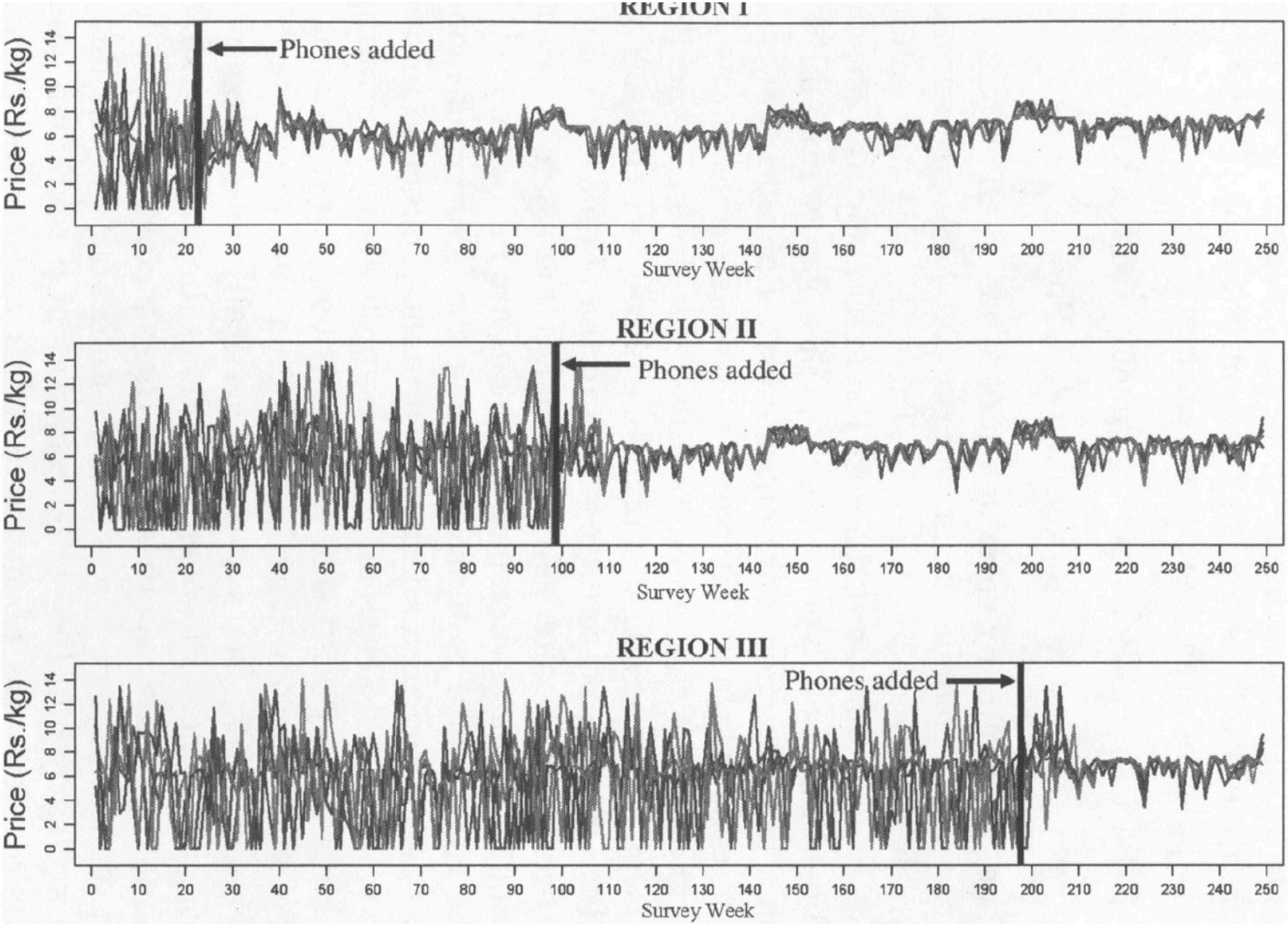
Balance

	Period 0 (pre-phone)
Percent of fishermen who fish in local catchment zone	
Region I	0.98
	(0.003)
Region II	0.99
	(0.002)
Region III	0.98
	(0.002)
Percent of fishermen who sell in local catchment zone	
Region I	1.00
	(0.00)
Region II	1.00
	(0.00)
Region III	1.00
	(0.00)
Number of fishing units	
Region I	83
Region II	69
Region III	53

Balance

	Period 0 (pre-phone)
Max–min spread (Rs/kg)	
Region I	7.60
	(0.50)
Region II	8.19
	(0.44)
Region III	8.24
	(0.47)
Coefficient of variation (percent)	
Region I	.68
	(0.07)
Region II	.62
	(0.04)
Region III	.69
	(0.09)
Waste (percent)	
Region I	0.08
	(0.01)
Region II	0.05
	(0.01)
Region III	0.07
	(0.01)

Supporting evidence: Prices



Results

TABLE V

ESTIMATED EFFECTS OF MOBILE PHONES ON MARKET OUTCOMES: SEPARATE TREATMENTS

	Max–min spread	Coefficient of variation	Waste
Estimated effects of adding phones to region I			
(a) Using region II as the control group	−4.8	−.46	−0.064
$(Y_{I,1} - Y_{I,0}) - (Y_{II,1} - Y_{II,0}) = \beta_{RI\_P1} - \beta_{RII\_P1}$	(0.68)	(0.07)	(0.005)
(b) Using region III as the control group	−4.8	−.42	−0.060
$(Y_{I,1} - Y_{I,0}) - (Y_{III,1} - Y_{III,0}) = \beta_{RI\_P1}$	(0.68)	(0.07)	(0.005)
Estimated effects of adding phones to region II			
(c) Using region I as the control group	−5.8	−.39	−0.039
$(Y_{II,2} - Y_{I,1}) - (Y_{I,2} - Y_{I,1}) = \beta_{RII\_P2} - \beta_{RII\_P1} - \beta_{RI\_P2} + \beta_{RI\_P1}$	(0.43)	(0.05)	(0.003)
(d) Using region III as the control group	−4.9	−.36	−0.038
$(Y_{II,2} - Y_{II,1}) - (Y_{III,2} - Y_{III,1}) = \beta_{RII\_P2} - \beta_{RII\_P1}$	(0.43)	(0.05)	(0.003)
Estimated effects of adding phones to region III			
(e) Using region I as the control group	−4.9	−.38	−0.055
$(Y_{III,3} - Y_{III,2}) - (Y_{I,3} - Y_{I,2}) = \beta_{RI\_P2} - \beta_{RI\_P3}$	(0.48)	(0.05)	(0.004)
(f) Using region II as the control group	−4.7	−.35	−0.054
$(Y_{III,3} - Y_{III,2}) - (Y_{II,3} - Y_{II,2}) = \beta_{RII\_P2} - \beta_{RII\_P3}$	(0.48)	(0.05)	(0.004)

Results

VIOLATIONS OF THE LAW OF ONE PRICE

	Period 0 (pre-phone)	Period 1 (region I has phones)	Period 2 (region II has phones)	Period 3 (region III has phones)
Overall				
Region I	0.54	0.03	0.04	0.03
Region II	0.57	0.55	0.06	0.05
Region III	0.60	0.58	0.58	0.08
With time + depreciation				
Region I	0.50	0.01	0.02	0.02
Region II	0.53	0.52	0.03	0.03
Region III	0.57	0.55	0.54	0.05
All markets combined				
Without time + depreciation	0.47	0.35	0.20	0.05
With time + depreciation	0.44	0.31	0.16	0.03

Results

TABLE VIII

EFFECTS OF MOBILE PHONES ON PRODUCERS AND CONSUMERS: POOLED TREATMENTS

	(1) Quantity sold	(2) Price	(3) Price (if >0)	(4) Revenue	(5) Costs	(6) Profits	(7) Profit users	(8) Profit nonuser	(9) Consumer price	(10) Consumer surplus
Phone	23	−.05	−.44	205	72	133	184	97	−.39	.14
	(8.4)	(0.03)	(0.03)	(62)	(5.6)	(60)	(90)	(47)	(0.22)	(0.04)
Region I	36	.25	−.19	370	3.7	367	458	306	.51	−.11
	(6.6)	(0.03)	(0.03)	(56)	(4.9)	(54)	(77)	(44)	(30)	(0.03)
Region II	22	.03	−.07	173	3.3	170	204	130	.38	−.03
	(5.2)	(0.02)	(0.02)	(42)	(3.0)	(40)	(57)	(35)	(0.27)	(0.02)
Period 1	−5.3	.48	.36	66	7.6	58	63	61	.22	−.16
	(10)	(0.03)	(0.03)	(59)	(4.2)	(58)	(94)	(43)	(0.05)	(0.04)
Period 2	−17	.64	.51	34	2.3	32	−6.3	62	.65	−.30
	(14)	(0.04)	(0.03)	(80)	(3.7)	(80)	(122)	(57)	(0.27)	(0.05)
Period 3	−7.8	1.0	.84	215	16	200	212	189	.81	−.48
	(16)	(0.05)	(0.04)	(99)	(6.0)	(97)	(145)	(74)	(0.35)	(0.05)
Observations	74,700	74,700	73,335	74,700	74,700	74,700	41,012	33,688	3,735	3,735