Public Policy for the Poor? A Randomized Evaluation of the Mexican Universal Health Insurance Program

Gary King
Institute for Quantitative Social Science
Harvard University

Joint work with Emmanuela Gakidou, Kosuke Imai, Jason Lakin, Ryan T. Moore, Clayon Nall, Nirmala Ravishankar, Manett Vargas, Martha María Téllez-Rojo, Juan Eugenio Hernández Ávila, Mauricio Hernández Ávila, Héctor Hernández Llamas

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Project References

- Gary King et al., A 'Politically Robust' Experimental Design for Public Policy Evaluation, with Application to the Mexican Universal Health Insurance Program *Journal of Policy Analysis and Management*, January 2007.

- Kosuke Imai, Gary King, and Clayton Nall. The Essential Role of Pair Matching in Cluster-Randomized Experiments, with Application to the Mexican Universal Health Insurance Evaluation *Statistical Science*, forthcoming.

- Gary King et al., Public Policy for the Poor? A Randomized 10-Month Evaluation of the Mexican Universal Health Insurance Program *The Lancet*, forthcoming.

Seguro Popular: A Massive Reform

- medical services, preventive care, pharmaceuticals, and financial health protection
- beneficiaries: 50M Mexicans (half of the population) with no regular access to health care, particularly those with low incomes.
- Mexican Health Policy: centralized $\rightsquigarrow$ decentralized $\rightsquigarrow$ stewardship
- Cost in 2005: \$795.5 million in new money
- Cost when fully implemented: additional 1% of GDP
- One of the largest health reforms of any country in last 2 decades
- Most visible accomplishment of the Fox administration
- Major issue in the 2006 presidential campaign

Goals of SP & Evaluation Outcome Measures

- Financial Protection (money for the poor rarely makes it there)
  - Out-of-pocket expenditure
  - Catastrophic expenditure (8.4% of households, & 10% of the poor, spend $>$ 30% of annual disposable income on health)
  - Impoverishment due to health care payments
- Health System Effective Coverage
  - Percent of population receiving appropriate treatment by disease
  - Responsiveness of Seguro Popular
  - Satisfaction of affiliates with Seguro Popular
- Health Care Facilities
  - Operations, office visits, emergencies, personnel, infrastructure and equipment, drug inventory.
- Health
  - Health status
  - All-cause mortality
  - Cause-specific mortality

SP Evaluation

- Frenk and Fox asked: How can one democratically elected government "tie the hands" of their successors?
  - Commission an independent evaluation
  - (They are true believers in SP)
  - Like in science: make themselves vulnerable to being proven wrong
  - If we show SP is a success: elimination would be difficult
  - If SP is a failure: who cares about extending it
- The largest randomized health policy experiment in history
- One of the largest policy experiments to date
- First cohort: 148 geographic areas, 1,380 localities, $\approx 118,569$ households, and $\approx 534,457$ people

Lessons from Previous Public Policy Experiments

- Most large scale public policy experiments fail
- Many failures are political
  - politicians: need to pursue short term goals
  - citizens: you plan to *randomly* assign *me*?
  - all perfectly legitimate; a natural consequence in a democracy
- E.g., Oportunidades program: Some governors "miraculously" found money for control groups to participate too (numerous similar examples worldwide)
- Previous evaluation designs ignored democratic politics
- We developed a new research design & new methods for Mexico:
  - includes fail-safe components for when politics intervenes
  - uses data far more efficiently to find effects and save money

Example of Fail-Safe Design Procedure (CR vs. MPR)

1. Complete Randomization (used in Oportunidades evaluation)
   - Flip coin to assign program to each area
   - If one area is lost:
     - treated and control groups are incomparable
     - all advantages of randomization are gone
2. Matched-Pair Randomization (used in Seguro Popular evaluation)
   - Match areas in pairs on background characteristics
   - Flip coin once for each pair: one area within each pair gets the program
   - If one area is lost:
     - Drop the other member of the pair
     - Remaining pairs are kept
     - Treated and control groups are still protected by randomization: advantages of the experiment survives
   - With our new statistical methods, the design:
     - More efficient: up to 38 times!
     - Smaller standard errors: up to 6 times smaller
     - We can find effects where complete randomization cannot
     - Far less expensive for the same impact

Detailed Design Summary

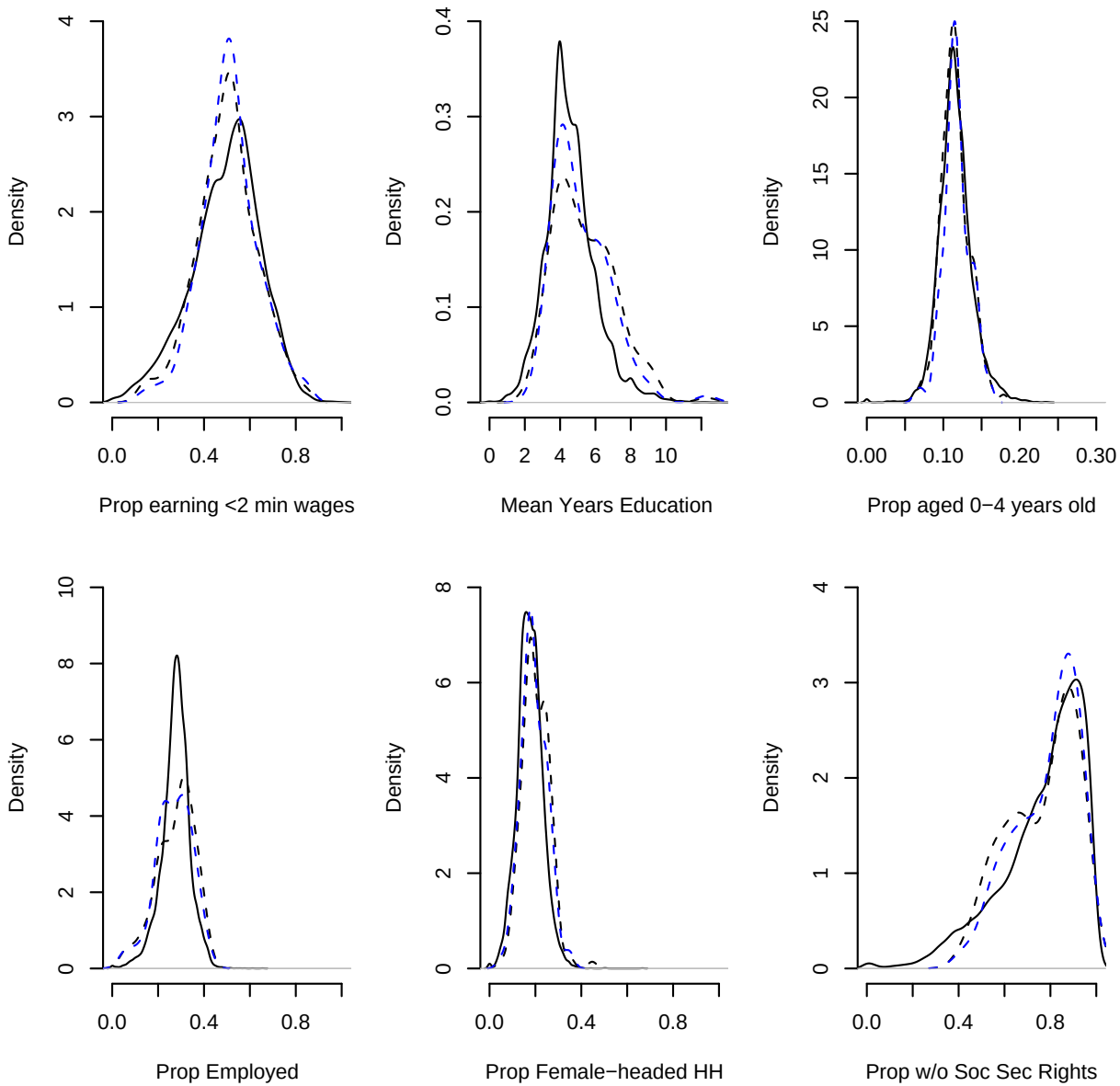
1. Define 12,284 "health clusters" that tile Mexico's 31 states; each includes a health clinic and catchment area
2. Persuaded 13 of 31 states to participate (7,078 clusters)
3. Match clusters in pairs on background characteristics.
4. Select 74 pairs (based on necessary political criteria, closeness of the match, likelihood of compliance)
5. Randomly assign one in each pair to receive encouragement to affiliate, better health facilities, drugs, and doctors
6. Conduct baseline survey of each cluster's health facility
7. Survey ≈32,000 random households in 50 of the 74 treated and control unit pairs (chosen based on likelihood of compliance with encouragement and similarity of the clusters within pair)
8. Repeat surveys in 10 months and subsequently to see effects

Matched-Pair Cluster-Randomized Designs in Polisci

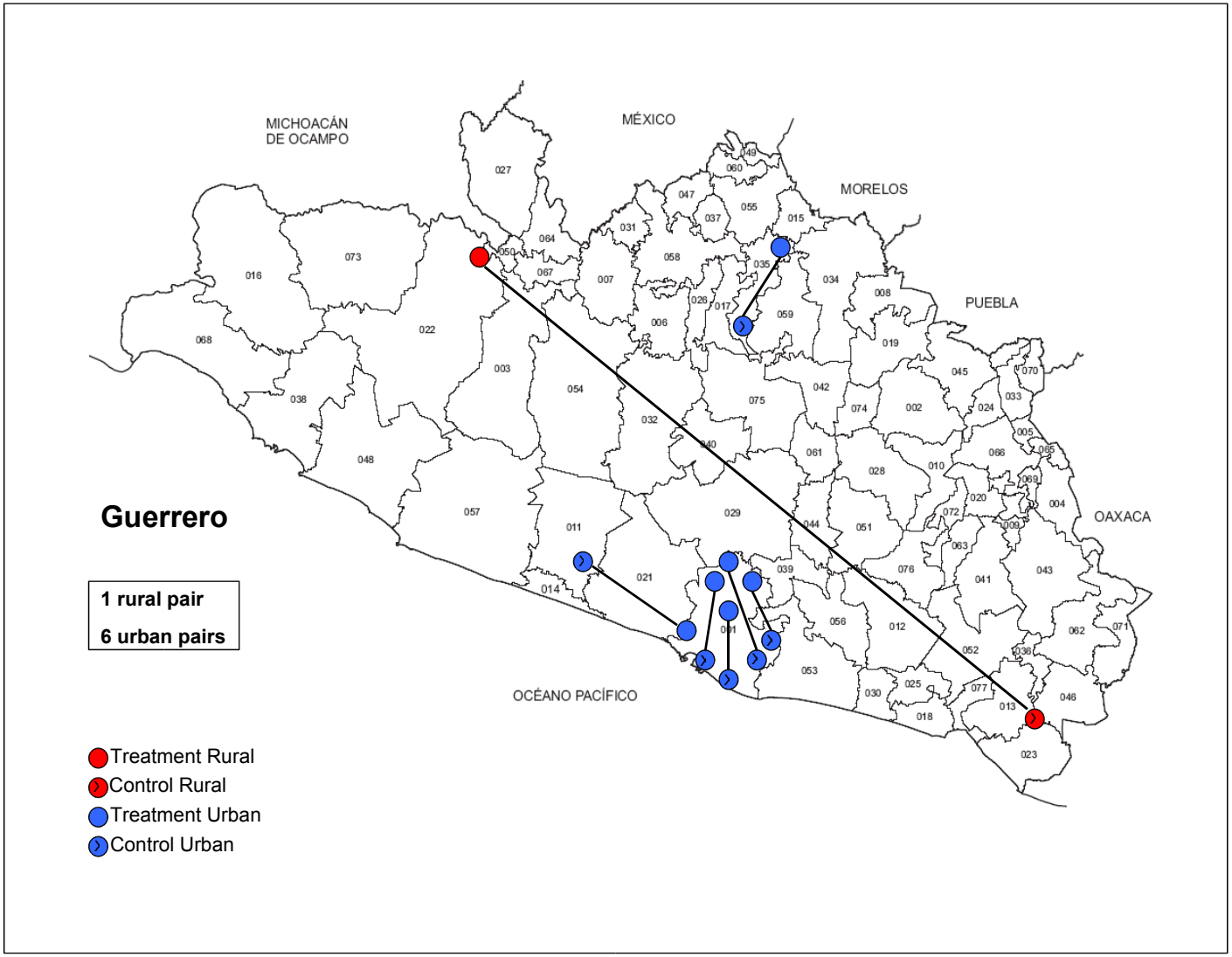
- Special research designs require special methods
- Prop. of polisci CREs which ignore the design: 100%
- Prop. of polisci CREs making more assumptions than necessary: 100%
- MPDs$\geq$Complete Randomization w.r.t.: efficiency, bias, power, estimator simplicity, and robustness to political intervention
- Proportion of previous CREs in polisci that use MPDs: 0%
- Conclusion: we're leaving a lot of information on the table!
- Imai-King-Nall: prove above results and offer simple estimators for MPDs making minimal assumptions for both intent to treat and complier average treatment effects

Remaining in study: 148 clusters (74 pairs) in 7 states

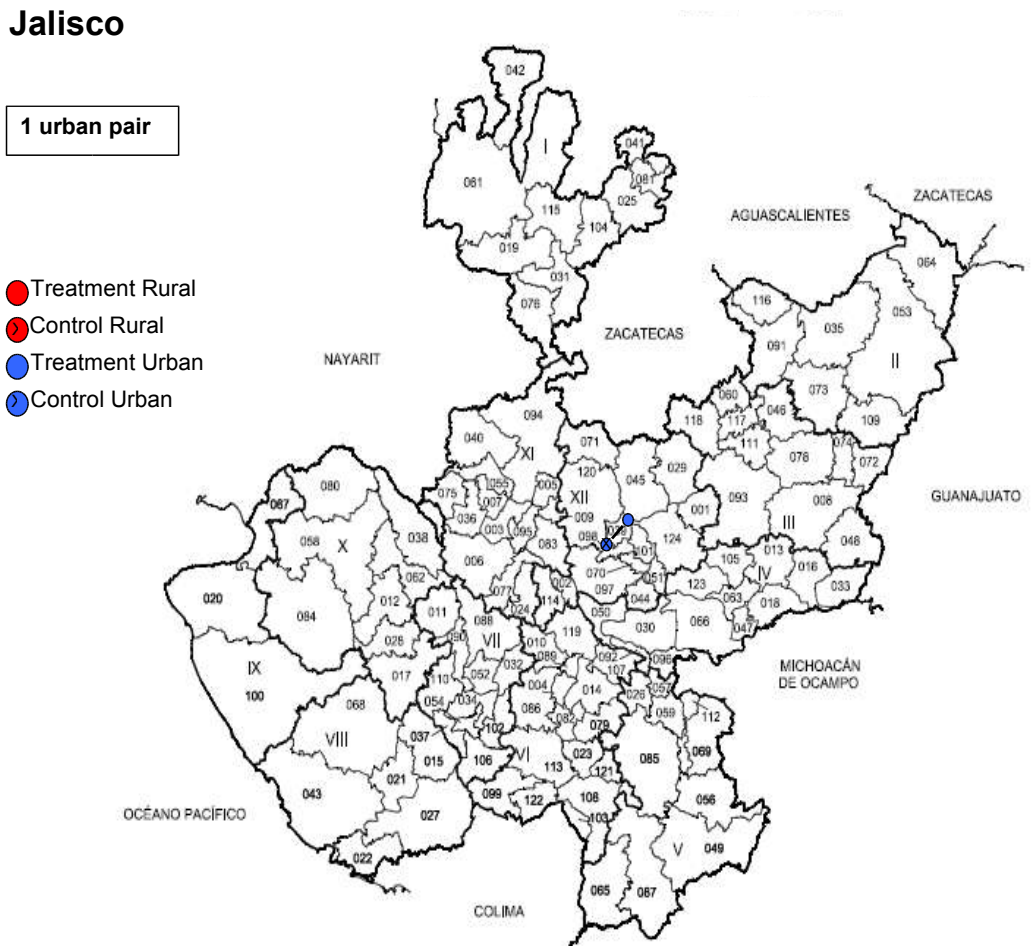
Clusters are Representative On Measured Variables



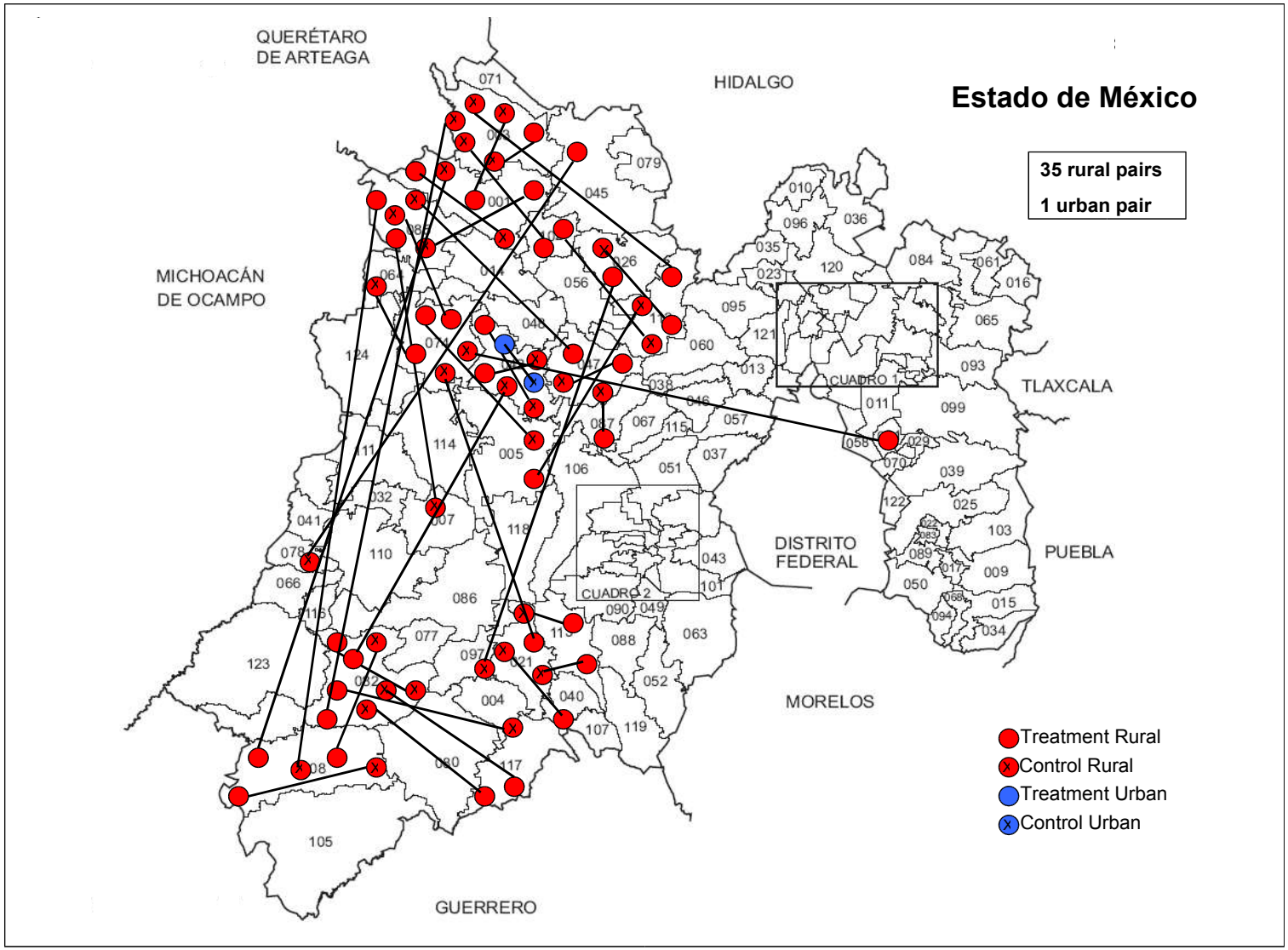
Matched Pairs, Guerrero



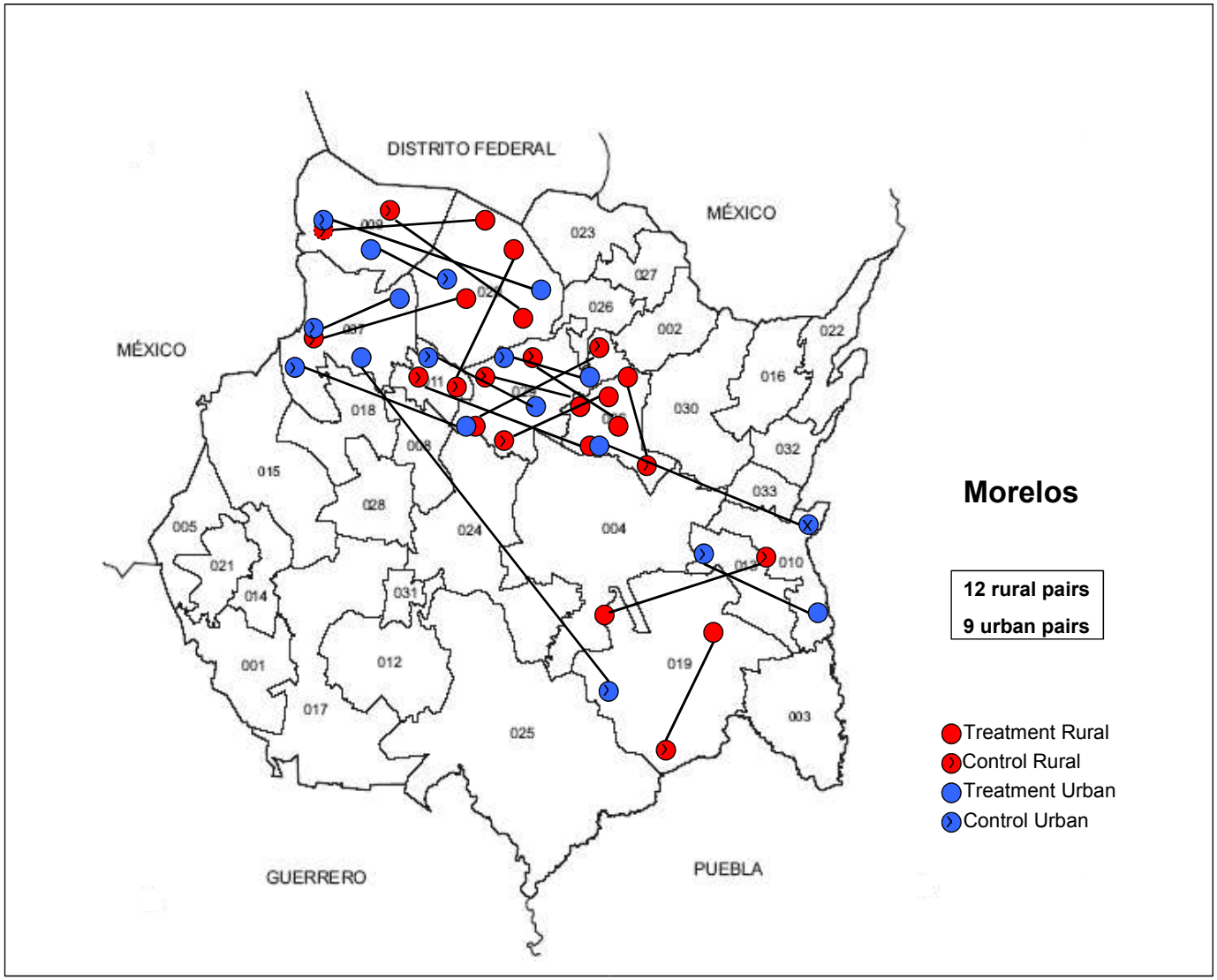
Matched Pairs, Jalisco



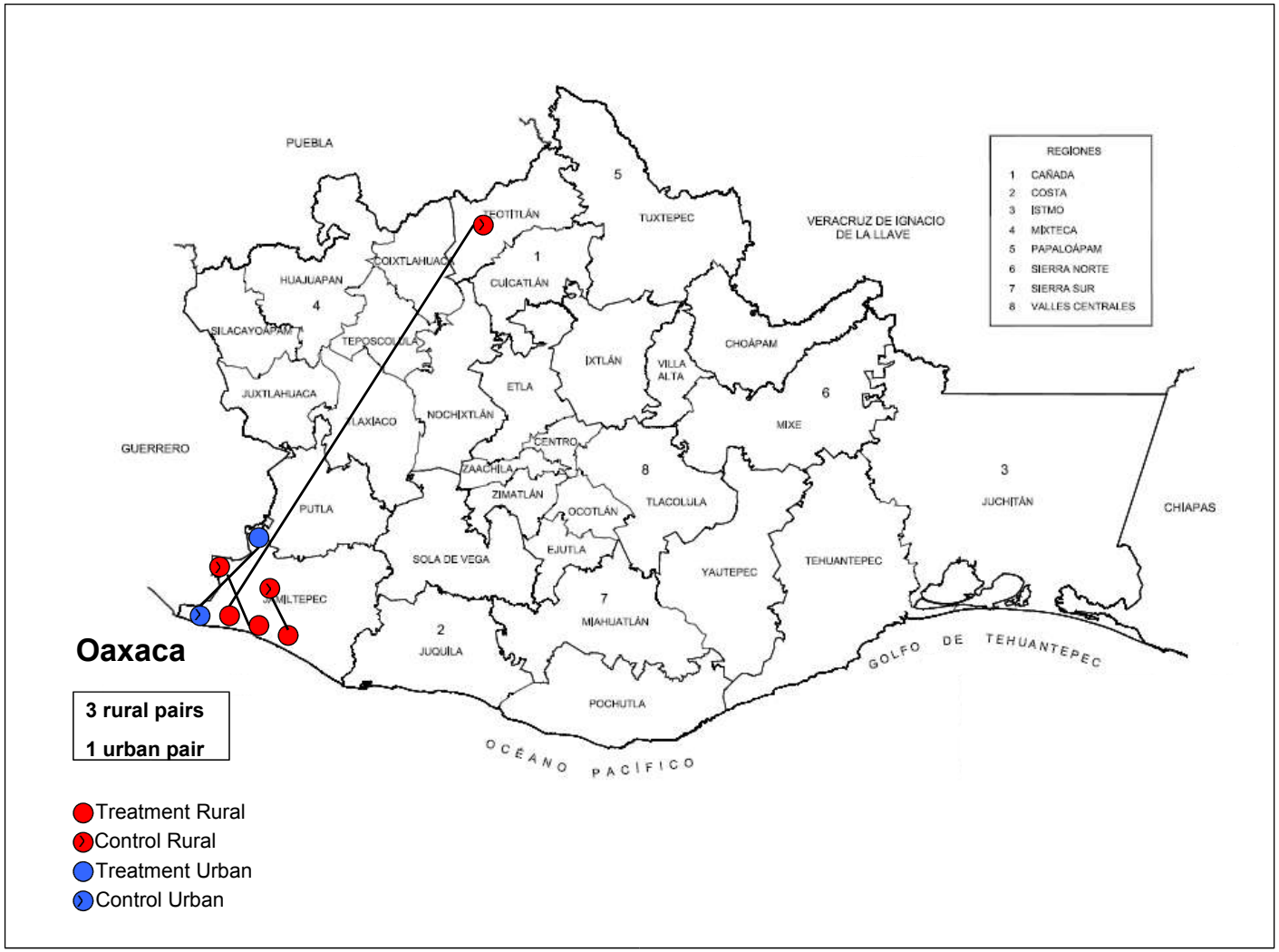
Matched Pairs, Estado de México



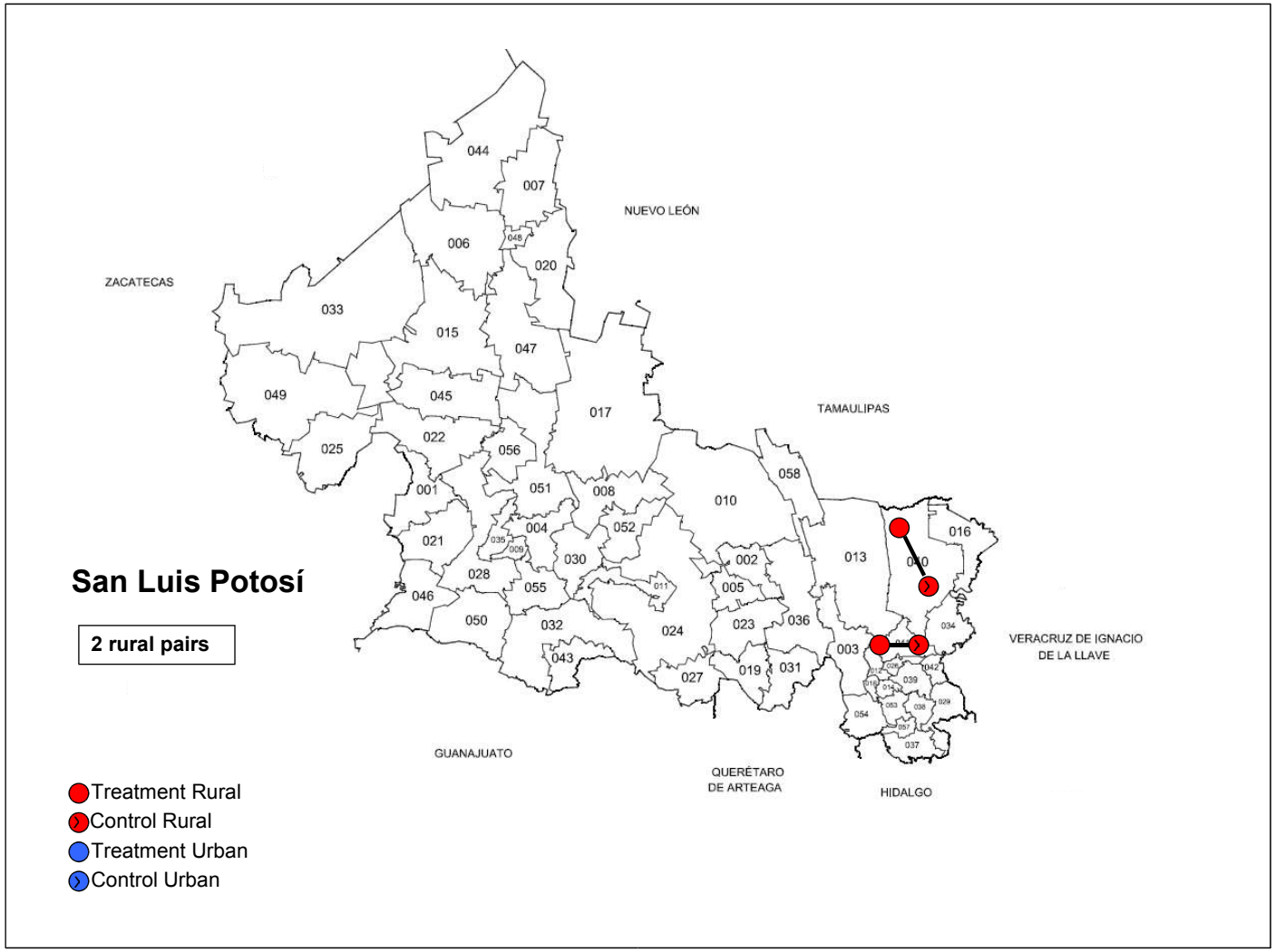
Matched Pairs, Morelos



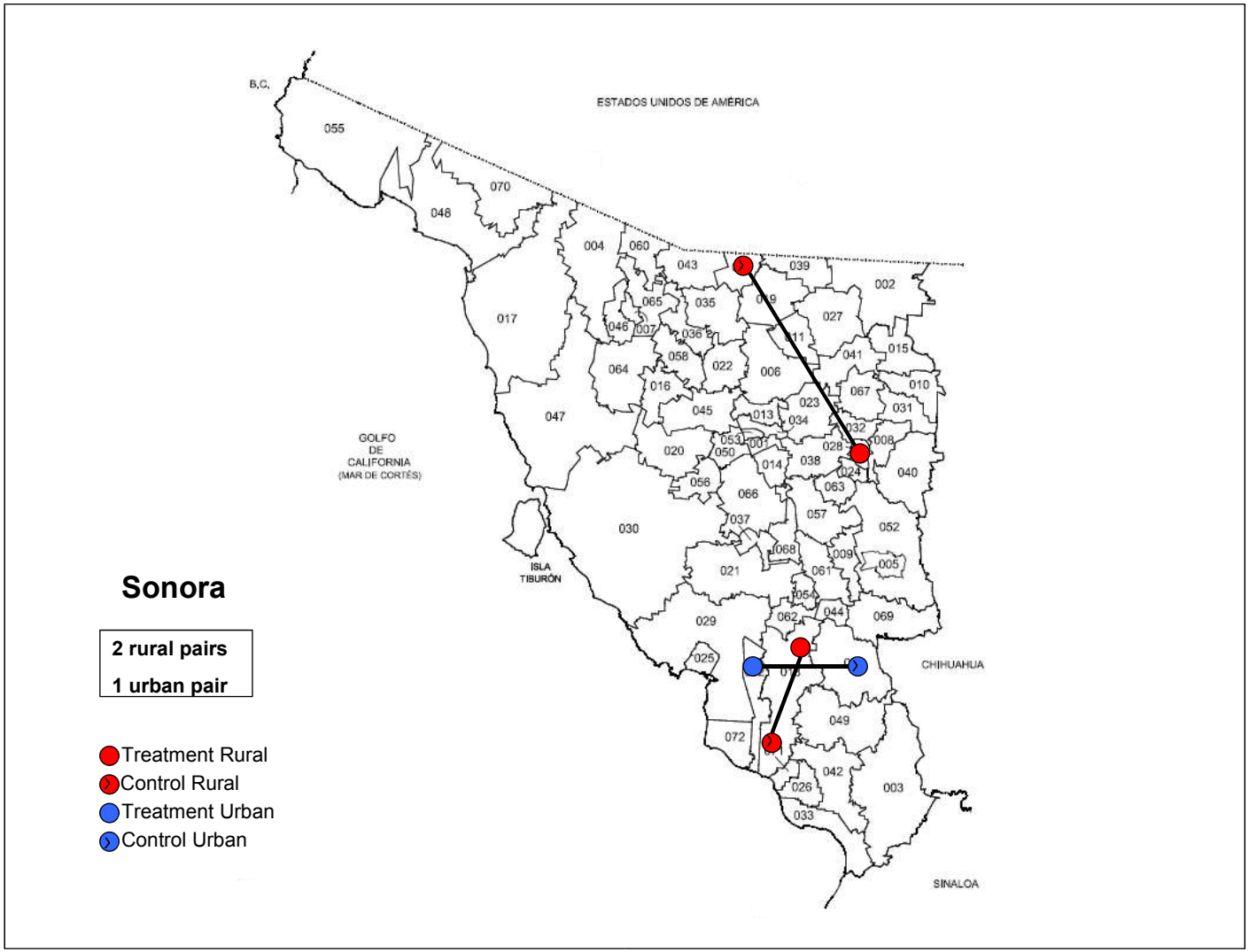
Matched Pairs, Oaxaca



Matched Pairs, San Luis Potosí



Matched Pairs, Sonora



Design and Analysis Strategy is Triply Robust

Design has three parts

1. Matching pairs on observed covariates
2. Randomization of treatment within pairs
3. If necessary statistically adjust for differences

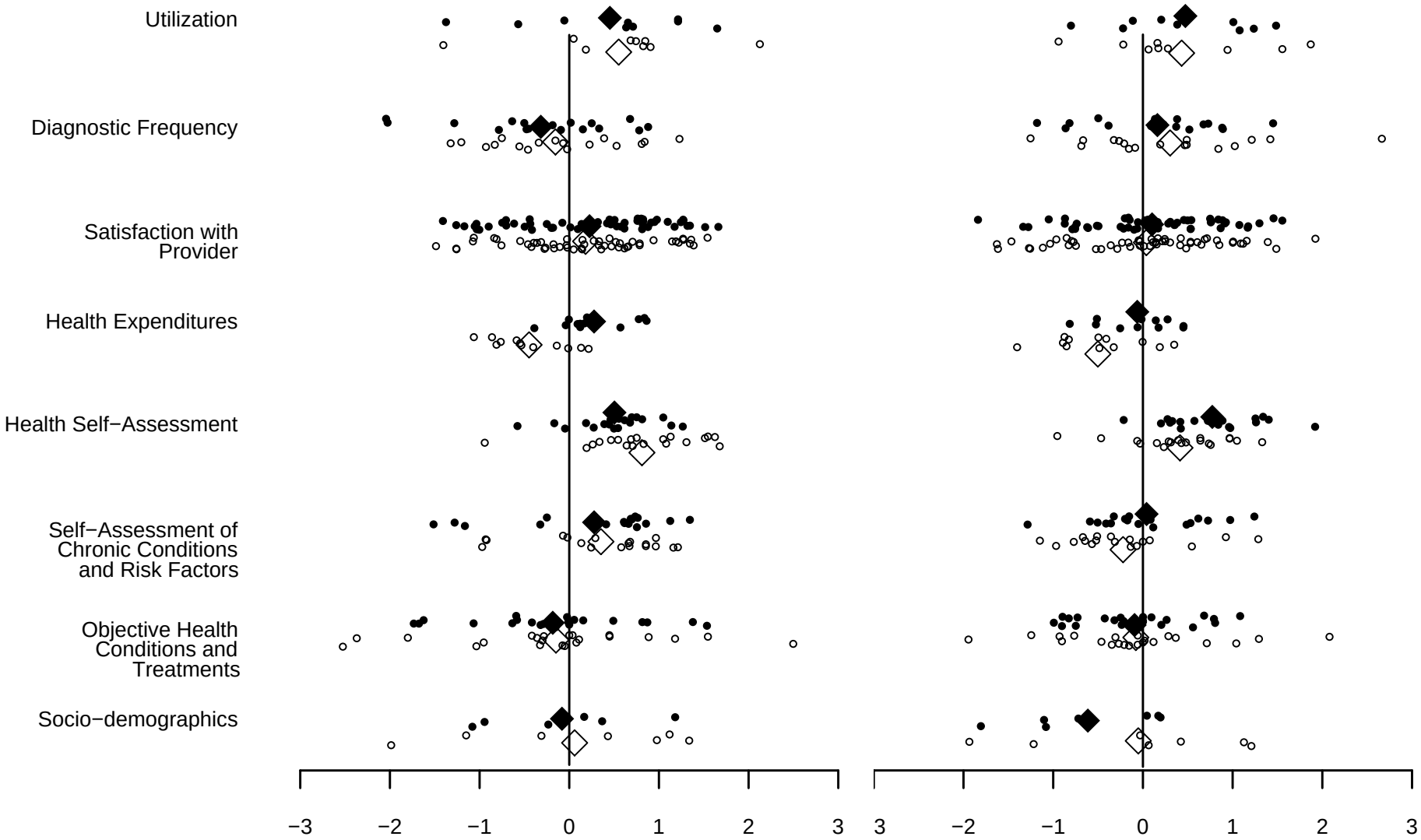
Triple Robustness

If matching or randomization or statistical analysis is right, but the other two are wrong, results are still unbiased

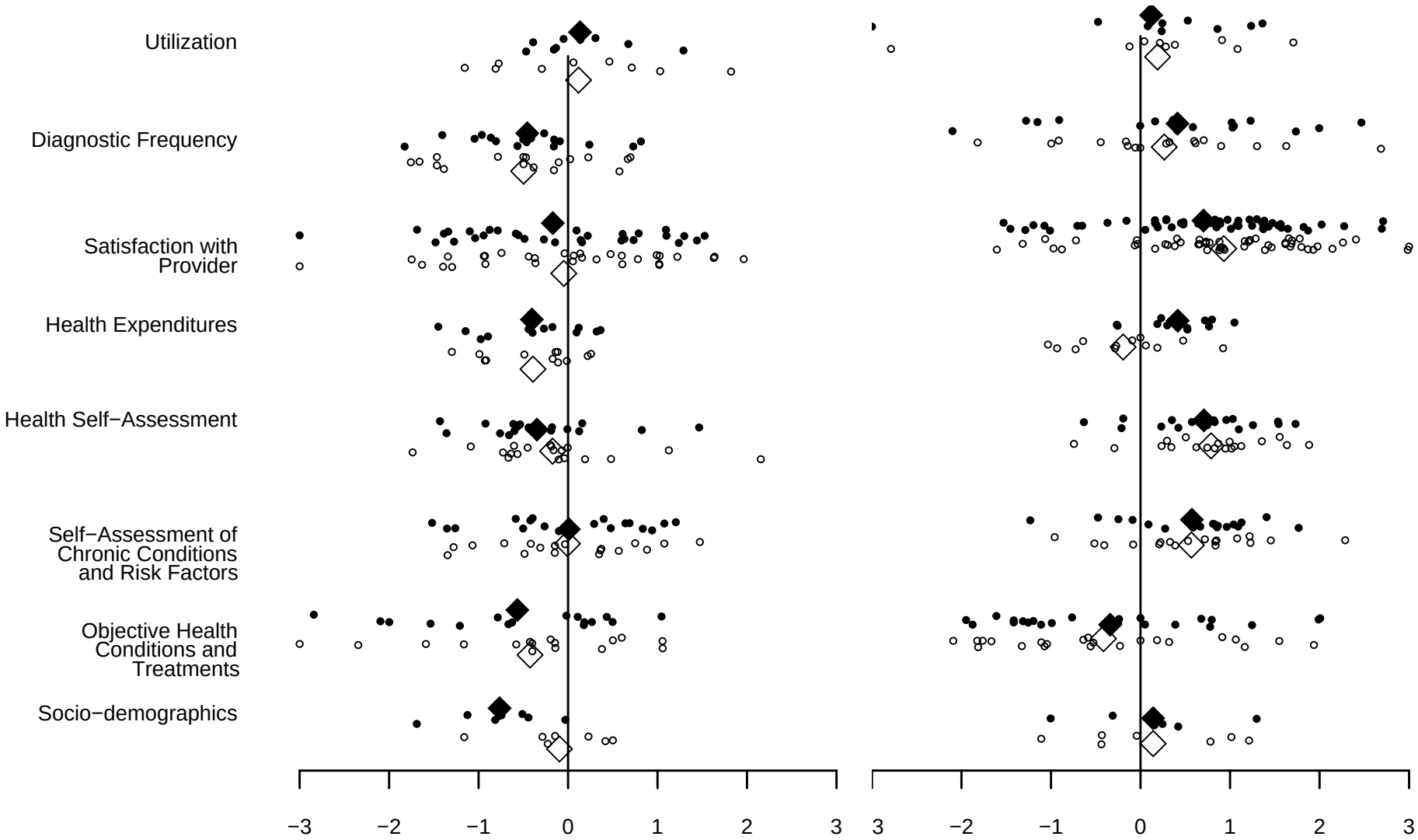
Two Additional Checks if Triple Robustness Fails

1. If one of the three works, then "effect of SP" on time 0 outcomes (measured in baseline survey) must be zero
2. If we lose pairs, we check for selection bias by rerunning this check

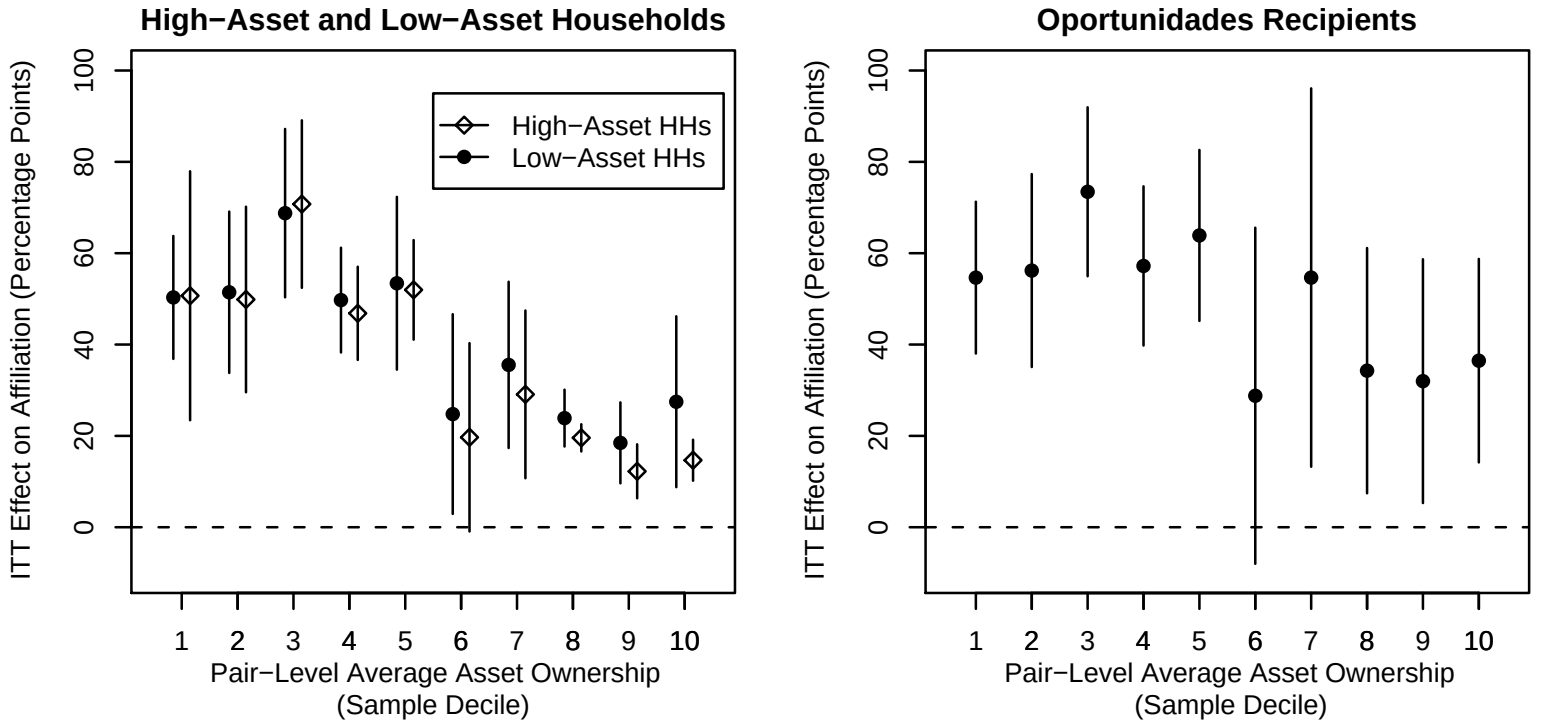
ITT on Outcome Measures at Baseline, for all families (left) and poor families, in Oportunidades (right)



ITT on Outcome Measures at Baseline, for wealthy families (left) and middle income families (right)



Effect of Encouragement on Seguro Popular Affiliation



Horizontal axes: per-capita asset ownership deciles of areas (poorer to the left). Vertical axes: percentage point causal effect of encouragement to affiliate on Seguro Popular affiliation.

Poor areas, not poor households, are affiliated the most

Effect on % of Households with Catastrophic Health Expenditures

	All Study Participants			Experimental Compliers		
	Average (Control)	ITT	SE	Average (Control)	CACE	SE
All	8.4	1.9*	(.9)	9.5	5.2*	(2.3)
Low Asset	9.9	3.0*	(1.3)	11.0	6.5*	(2.5)
High Asset	7.1	0.9	(0.8)	7.9	3.0	(2.7)
Female-Headed	8.5	1.4	(1.1)	10.6	3.8	(3.0)

"Catastrophic expenditures": out-of-pocket health expenses $>$ 30% of post-subsistence income

Effect on Out-of-pocket Health Expenditures, I (in pesos)

	All Study Participants			Experimental Compliers		
	Average (Control)	ITT	SE	Average (Control)	CACE	SE
Overall:						
All	$1631.3	$258.0	($175)	$1712.7	$689.7	($453)
Low Asset	1360.2	425.6*	(197)	1502.6	915.3*	(392)
High Asset	1867.9	128.4	(201)	1933.2	428.2	(669)
Female-Headed	1509.1	156.5	(207)	1689.9	428.6	(566)
Inpatient Care:						
All	532.5	96.9*	(44)	557.1	259.1*	(112)
Low Asset	527.1	188.2*	(73)	579.0	404.8*	(142)
High Asset	537.2	31.1	(52)	536.2	103.6	(173)
Female-Headed	452.5	115.1*	(68)	510.0	315.2*	(182)
Outpatient Care:						
All	448.3	116.7*	(63)	499.1	312.0*	(161)
Low Asset	412.3	176.7*	(73)	466.3	380.0*	(147)
High Asset	479.7	81.9	(69)	533.0	272.9	(230)
Female-Headed	416.3	110.4	(75)	496.8	302.4	(202)

Effect on Out-of-pocket Health Expenditures, II (in pesos)

	All Study Participants			Experimental Compliers		
	Average (Control)	ITT	SE	Average (Control)	CACE	SE
Medicine:						
All	521.1	20.0	(41)	534.5	53.3	(109)
Low Asset	427.3	17.8	(46)	444.7	38.3	(100)
High Asset	603.0	29.4	(47)	627.5	98.1	(157)
Female-Headed	625.6	53.6	(55)	738.9	146.8	(151)
Medical Devices:						
All	139.7	−8.8	(23)	117.8	−23.4	(62)
Low Asset	72.0	−0.2	(20)	72.8	−0.5	(43)
High Asset	198.8	−16.5	(29)	165.6	−55.1	(98)
Female-Headed	155.5	10.9	(34)	162.8	30.0	(94)

Utilization: Overall

	All Study Participants			Experimental Compliers		
	Average (Control)	ITT	SE	Average (Control)	CACE	SE
Utilization (Procedures):						
Used Outpatient Services (%)	62.6	−1.5	(1.9)	64.8	−4.0	(5.2)
Outpatient Visits (count)	1.6	−0.03	(0.09)	1.7	−0.08	(0.23)
Hospitalized (%)	7.6	−0.2	(0.5)	7.9	−0.5	(1.5)
Hospitalizations (count)	0.1	−0.003	(0.006)	0.1	−0.01	(0.02)
Satisfaction with Provider (%)	68.0	−1.0	(1.6)	69.8	−2.6	(4.5)
Utilization (Preventative) (%):						
Eye Exam Last Yr.	10.0	−0.7	(0.7)	9.8	−1.8	(1.9)
Flu Vaccine	25.7	−1.8	(1.4)	27.2	−4.9	(3.7)
Mammogram Last Yr.	5.1	−0.9	(0.6)	5.2	−2.3	(1.6)
Cervical Last Yr.	21.8	−1.3	(2.0)	22.2	−3.2	(4.8)
Pap Test Last Yr.	31.9	−2.3	(2.1)	33.2	−5.8	(5.0)

Self-Assessment: Overall

	All Study Participants			Experimental Compliers		
	Average (Control)	ITT	SE	Average (Control)	CACE	SE
Overall Health	55.7	4.2*	(2.0)	54.3	8.9*	(3.9)
Mobility	86.7	1.0	(1.0)	86.3	2.1	(2.0)
Vigorous Activity	69.2	4.6*	(2.7)	67.9	9.8*	(5.7)
Self-Care	95.3	0.4	(0.6)	95.2	0.8	(1.2)
Soreness	80.3	2.6*	(1.5)	79.3	5.5*	(3.1)
Pain	82.4	2.4*	(1.4)	81.4	5.2*	(2.8)
Sleeping	85.1	2.7*	(1.3)	84.3	5.9*	(2.5)
Depression	77.3	6.4*	(3.7)	76.0	13.8*	(7.3)
Anxiety	85.9	3.1	(2.0)	85.2	6.7	(4.1)

Self-Assessment, Controlling for Baseline Levels

	ITT		CACE	
Overall Health	0.6	(2.2)	1.7	(6.0)
Mobility	0.2	(0.9)	0.6	(2.5)
Vigorous Activity	3.3	(2.4)	8.9	(6.4)
Self-Care	−0.2	(0.6)	−0.5	(1.6)
Soreness	1.0	(1.4)	2.6	(3.8)
Pain	1.1	(1.2)	3.0	(3.3)
Sleeping	1.0	(1.0)	2.6	(2.5)
Depression	0.6	(3.0)	1.5	(7.9)
Anxiety	0.8	(1.8)	2.1	(4.8)

A difference-in-difference test: The causal effect of Seguro Popular on the change from baseline to followup in the difference between treated and control groups on health self-assessment variables.

Conclusions

- Positive effects detected now:
  - Catastrophic expenditures slashed
  - In-patient out-of-pocket expenditures drastically reduced
  - Out-patient out-of-pocket expenditures drastically reduced
  - Citizen satisfaction is high
- Positive effects not yet seen:
  - Expenditures on medicines
  - Utilization (preventative and procedures)
  - Risk factors
- Other findings:
  - Only 66% of automatically affiliated Oportunidades respondents were aware of this fact
  - More encouragement to affiliate might be devoted to finding the poor hidden within relatively "wealthier" clusters
  - Developed new and more powerful evaluation design and statistical methods, tuned to the needs of Mexico
  - Seguro Popular evaluation design: being copied around the world

For more information

http://GKing.Harvard.edu