

# Eliminating Selection Bias in Criminal Justice Evaluations: What do you have to Control?

## -- A Case Study



**Akiva M. Liberman**  
**KiDeuk Kim**  
**John K. Roman**  
**Urban Institute**

***Jerry Lee Crime Prevention Symposium***  
**April 24, 2012**

*The views expressed are those of the authors and should not be attributed to The Urban Institute, its trustees, or its funders.*



**URBAN INSTITUTE**  
Justice Policy Center

# The Larger Study\*

- What is the impact of arrest on juvenile offending?
  - Does arrest affect future offending?
    - Reductions? – as suggested by deterrence
    - Increases? – as suggested by labeling theory

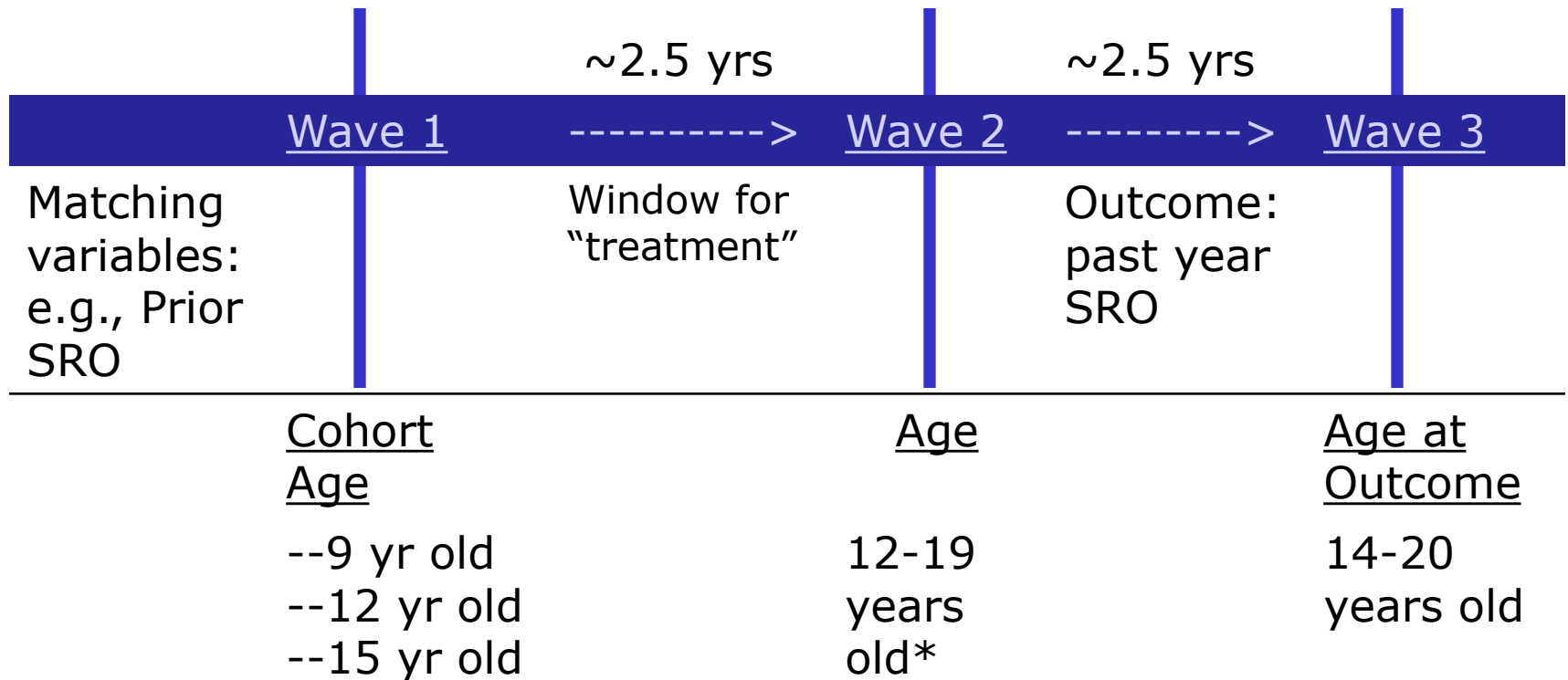
- Observational study with propensity score matching
- Project on Human Development in Chicago Neighborhoods (PHDCN) data
  - Three waves of data collection
  - Rich dataset with many variables for propensity score matching
- For today's talk, limited to those without prior arrests

# Police Contact vs. Official Arrest

- Many juvenile police contacts do not result in an official arrest record
  - “station adjustments”
  - warned and released

CONTROL	TREATMENT	
<b>No Contact</b> (n=1,258)	<b>Substantial Contact -- with No Official Arrest</b> (n=74)  youth self-report: -- warn & release, arrest	<b>Official Arrest</b>  <i>still in progress; not in today's presentation</i>

# Design



\* Study limited to those arrested younger than 18

# The Methodological Challenge

- Most prior literature suggests that arrests are associated with more offending
- But more subsequent offending would be produced by selection – if not controlled
  - More offending propensity
    - → more probability of subsequent offending
    - → more probability of police contact, arrest
- What does it take to control or eliminate the selection effect?
  - allowing one to estimate the true effect

# Selection, Propensity Scores

- Propensity scores' control of selection is limited by the variables used to estimate propensity
  - One cannot empirically estimate the adequacy of the propensity score to control selection
- In some substantive domains, there have been experiments to identify the minimum set of variables needed for propensity scores estimates to approximate experimental results

# Methodological Experiment

- Estimate effect using propensity score estimated from rich set of PHDCN covariates
  - We assume here that this give reasonable purchase on eliminating the selection problem
- Reestimate using propensity scores estimated from subsets of the data available
  - How close do they get?
- For today's talk, this methodological experiment is limited to the effect of substantial policy contact – *without* an official arrest



# Outcomes

- Outcome Measure (Wave 3)
  - Self Reported Offending (SRO) -- past year
    - Violent: any of 6 items
    - Drug sales: any of 3 items
- Incidence, recoded, averaged across items
  - 0: 0;
  - 1: 1-2
  - 2: 3-9
  - 3: 10+

# Propensity Score Matching

- 96 variables used to estimate probability of having substantial police contact
  - 44 sig different pre-matching
  - 1 sig after matching
- Propensity score matching
  - 1:1 matching, with replacement
  - nearest neighbor matching, with caliper at 0.05

# Covariates Used in Propensity Score Matching

## **Domain1: DEMOGRAPHICS**

- Gender, Age, Race

## **Domain2: OTHER ADMIN DATA**

- Immigration status
- Household SES
- Parental marital status
- Number of children in household
- Residential stability
- IQ
- Parental criminality, substance use, and psychological problems
- School mobility
- Special remediation classes
- Repeated grade

# Covariates (cont'd)

## Domain 3: PRIOR OFFENDING

### A. SIMPLE

- Whether or not R engaged in:
  - drug offense
  - property offense
  - violent offense
  - public order offense

### b. FULL

- Frequency:
  - Drug offense
  - Violent offense
  - Property offense
  - Public order offense
- Variety of offending
- Cigarette use
- Alcohol use
- Marijuana use
- Truancy

# Covariates (cont'd)

- **Domain 4: NEIGHBORHOODS**
  - Concentrated affluence/poverty
  - Collective efficacy
  - Violent crime rate/victimization
  - Residential stability
  - Perceived physical disorder
  - Perceived social disorder
  - Neighborhood-level legal cynicism
  - Tolerance of deviance
  - % Foreign born
  - % Minorities
  - Neighborhood demographics

# Covariates (cont'd)

- **Domain 5: CBCL: PSYCHOLOGICAL**
  - Internalizing symptoms
  - Anxiety/Depression symptoms
  - Somatic symptoms
  - Withdrawn symptoms
  - Externalizing symptoms
  - Aggression
  - Delinquent behavior
  - Temperament

# Covariates (cont'd)

- **Domain 6: OTHER**

- Sensation seeking
- Persistence
- Activity
- Emotionality
- Sociability
- Shyness
- Religiosity
- Self-control
  
- Parent-child conflict
- Family supervision
- Parental warmth
  
- Family support
- Family control
- Family conflict
- Family religiosity
- Family outings
- Family hostility
  
- Peer support/attachment
- Peer pressure/deviance
- Peer attachment to school
  
- Condition of exterior of home
- Condition of interior of home

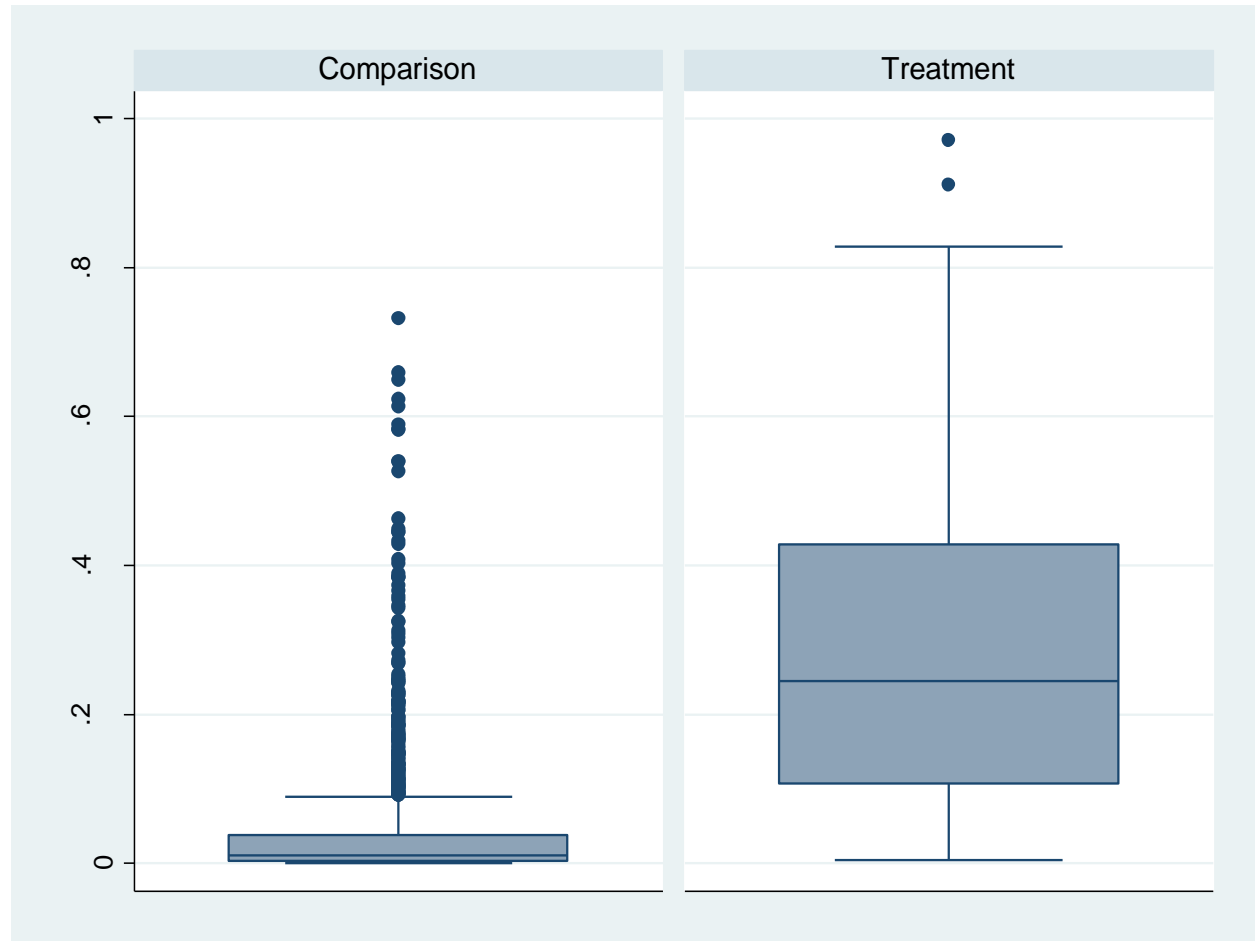
# Balance

- After matching, groups are balanced on propensity score
- Sig diffs on 1 of 96 covariates  
(1<sup>st</sup> generation immigrant dummy)

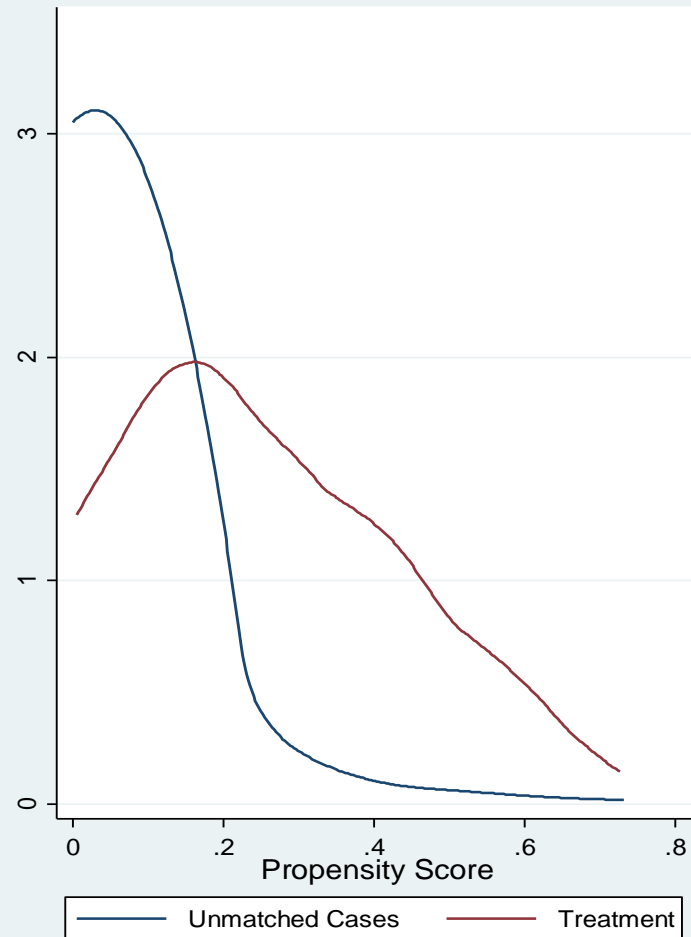
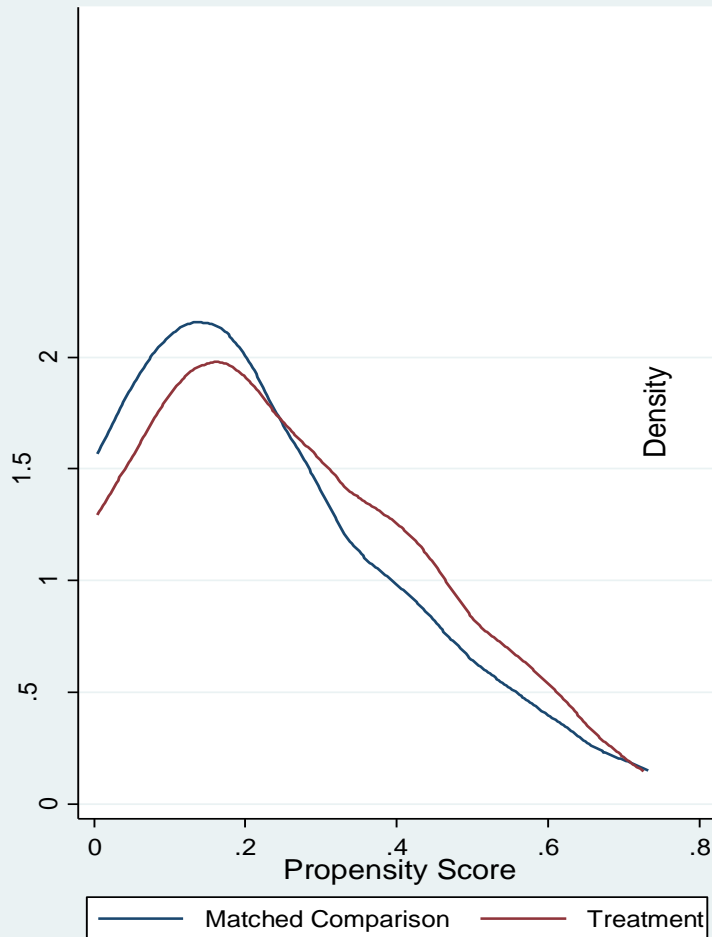


# Common Support – full model

- Maximum propensity for controls = .73
- 69 of 74 treatment subjects matched



# Propensity Score Distribution





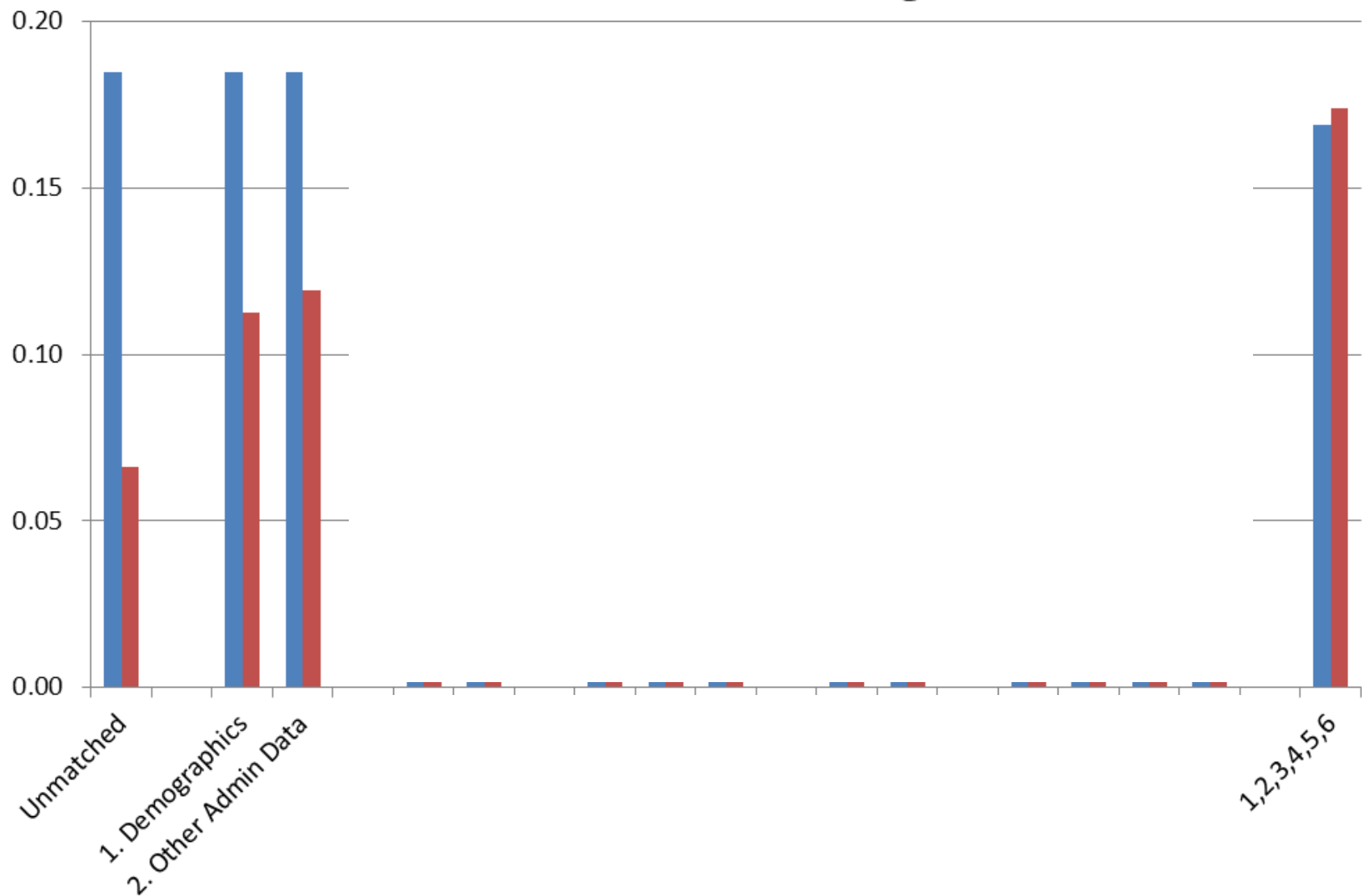
# Violent Reoffending

Treated Controls



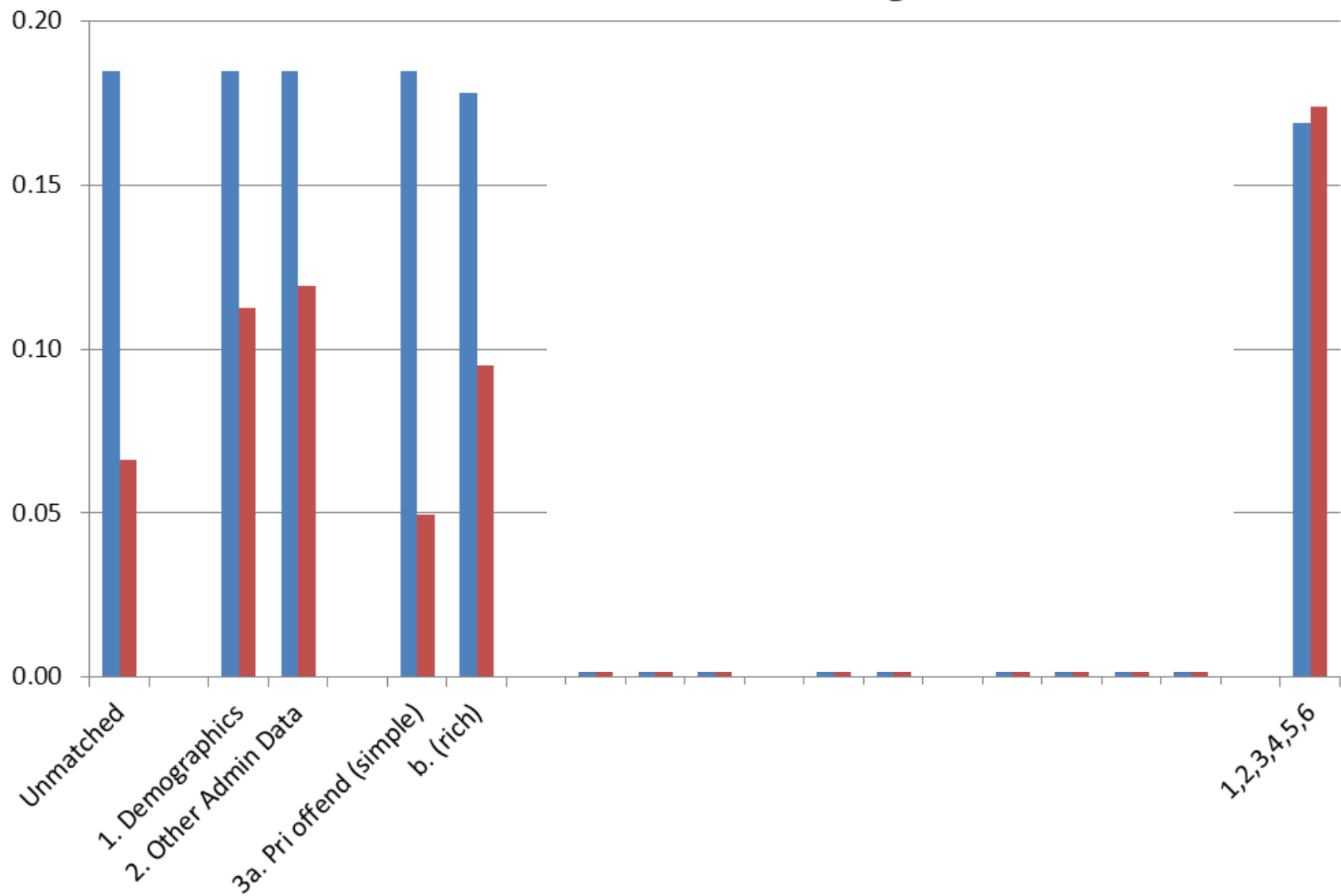
# Violent Reoffending

Treated Controls



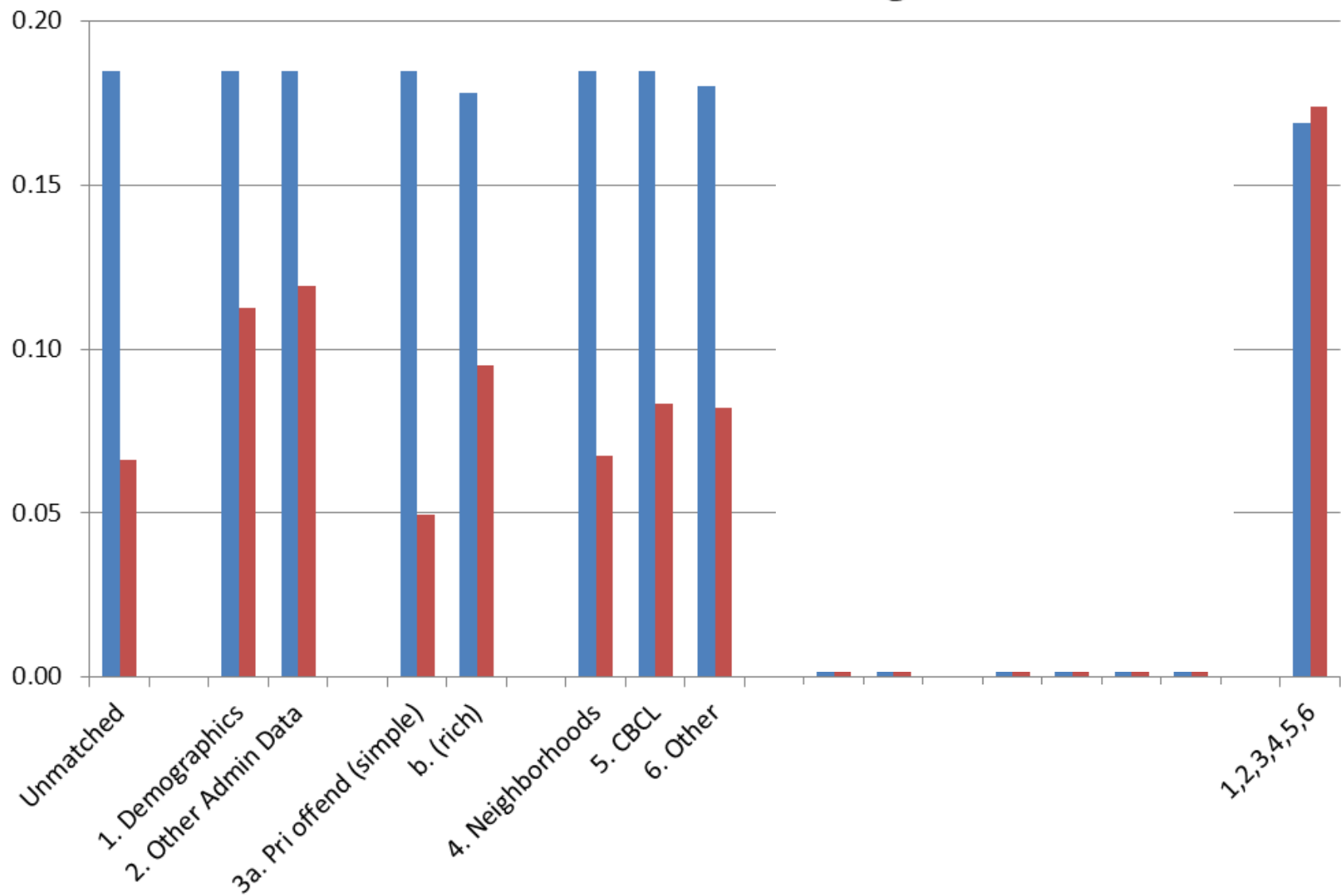
# Violent Reoffending

Treated Controls



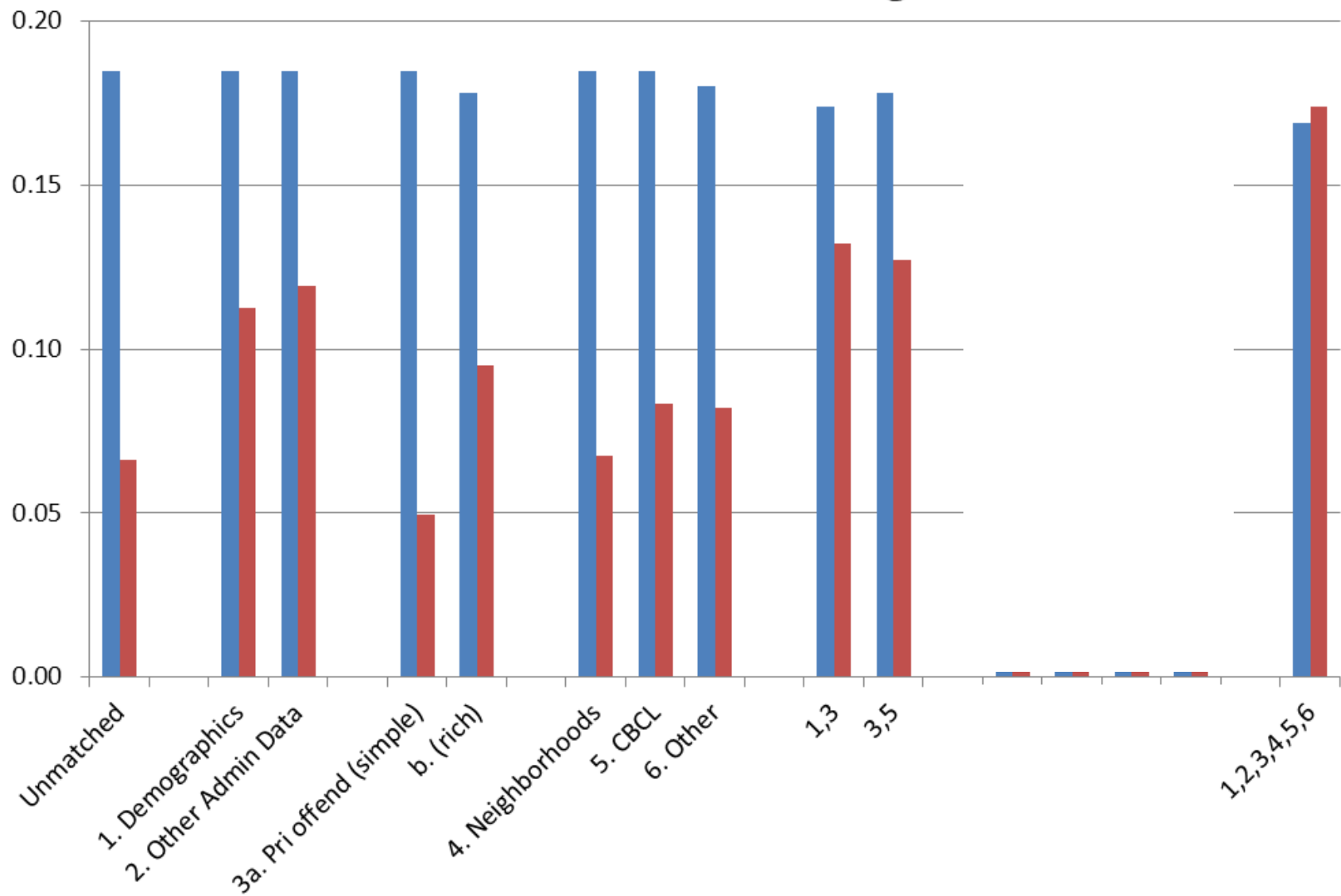
# Violent Reoffending

Treated Controls



# Violent Reoffending

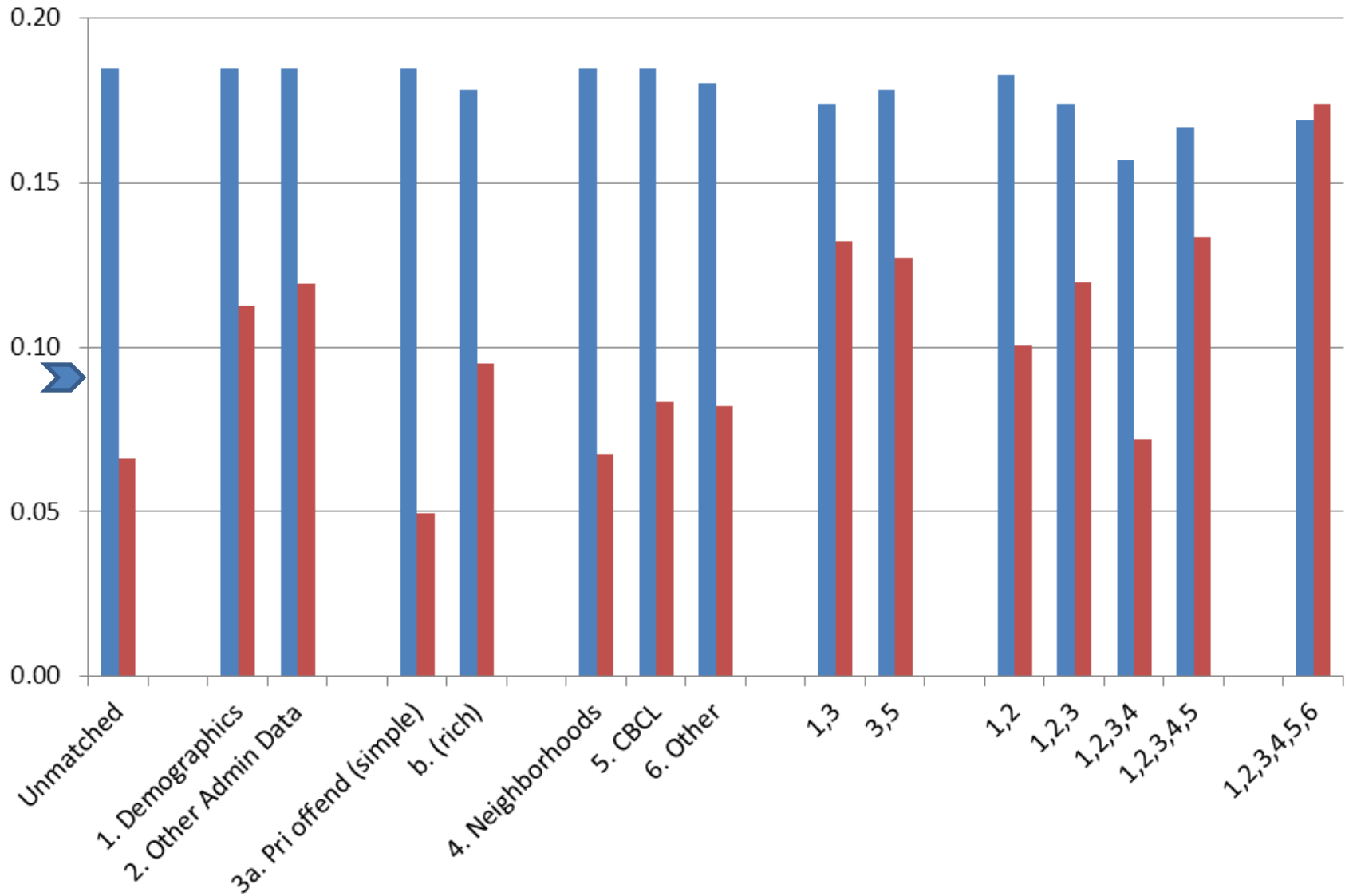
Treated Controls





# Violent Reoffending

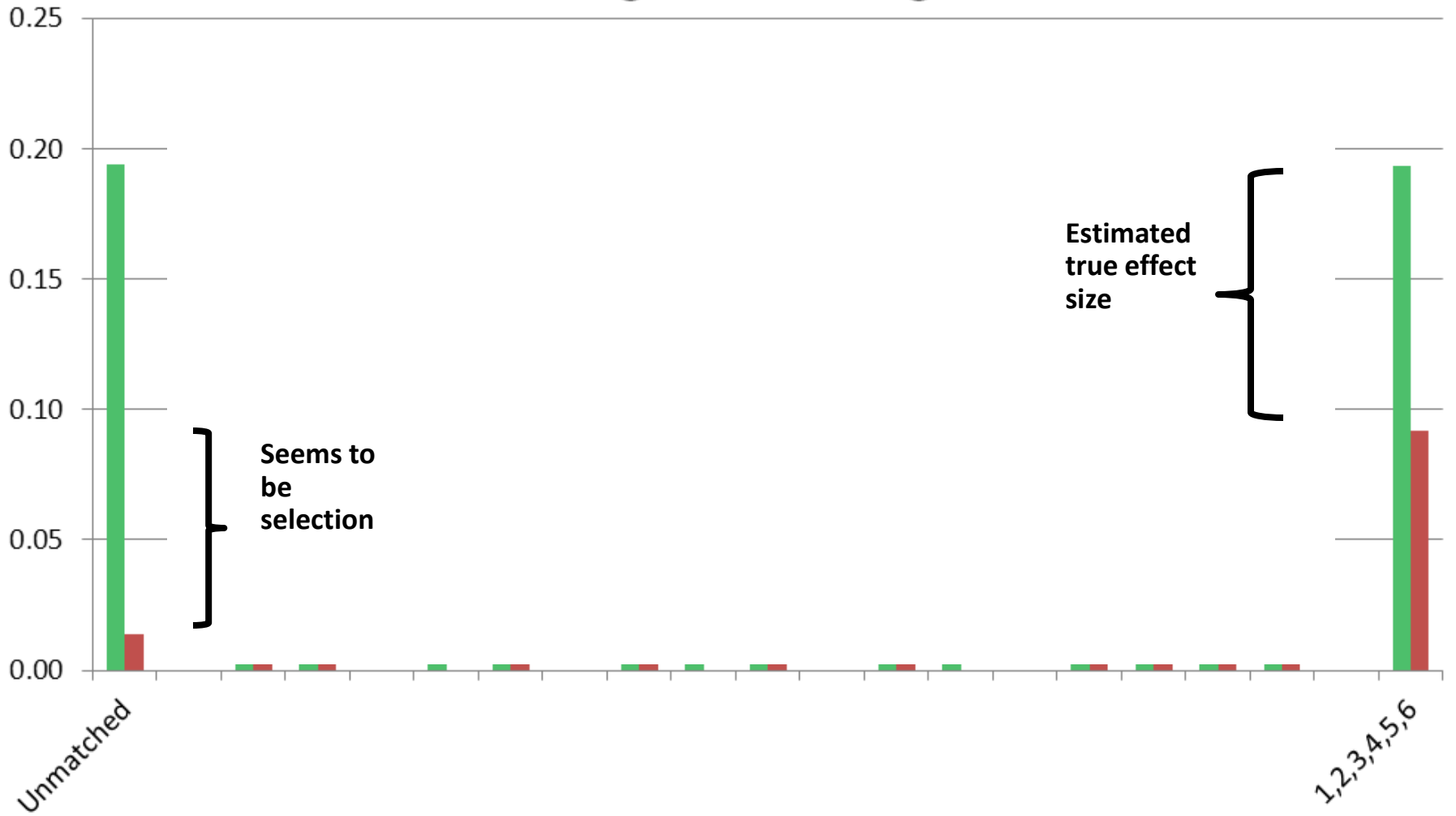
Treated Controls





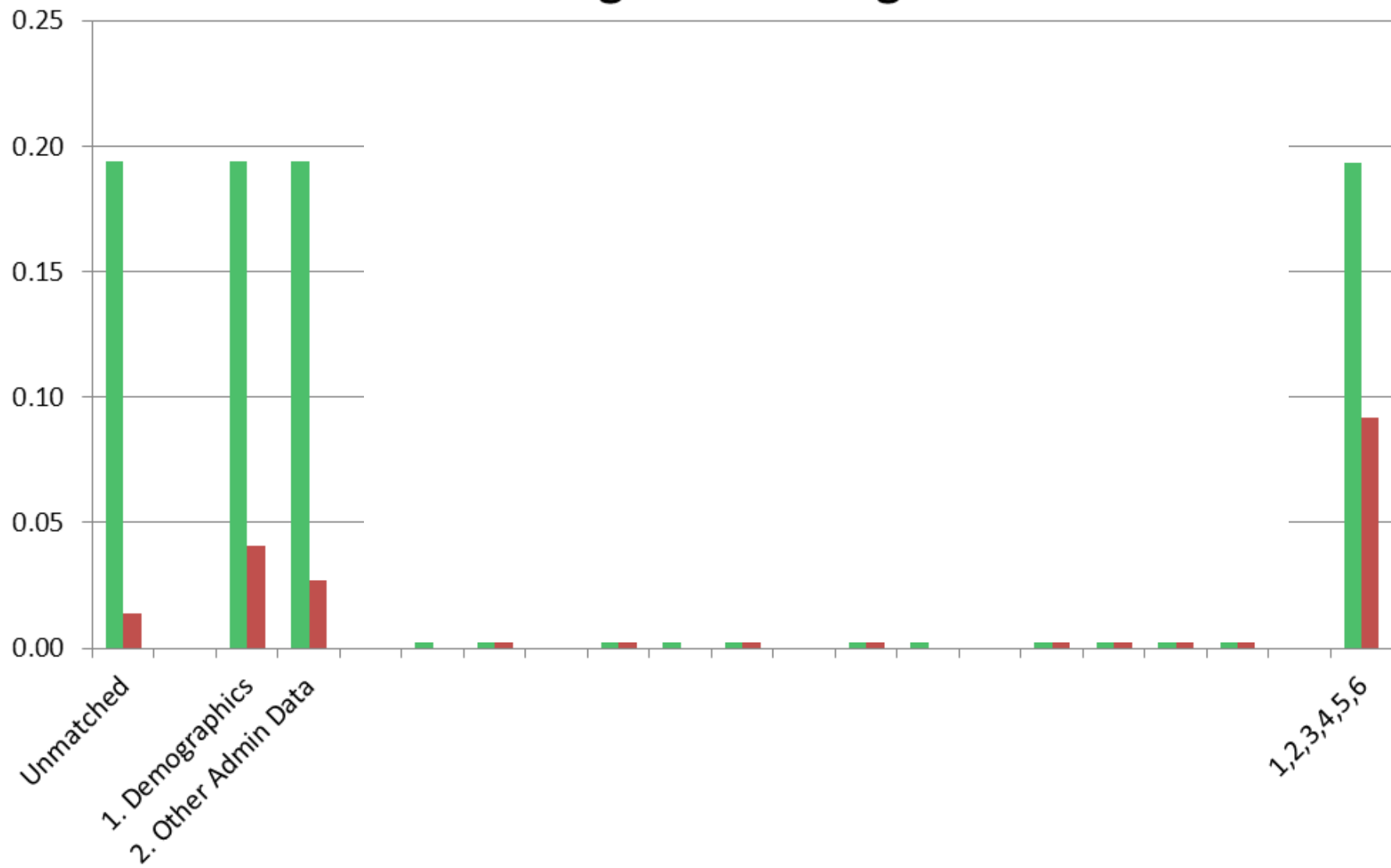
# Drug Reoffending

Treated Controls



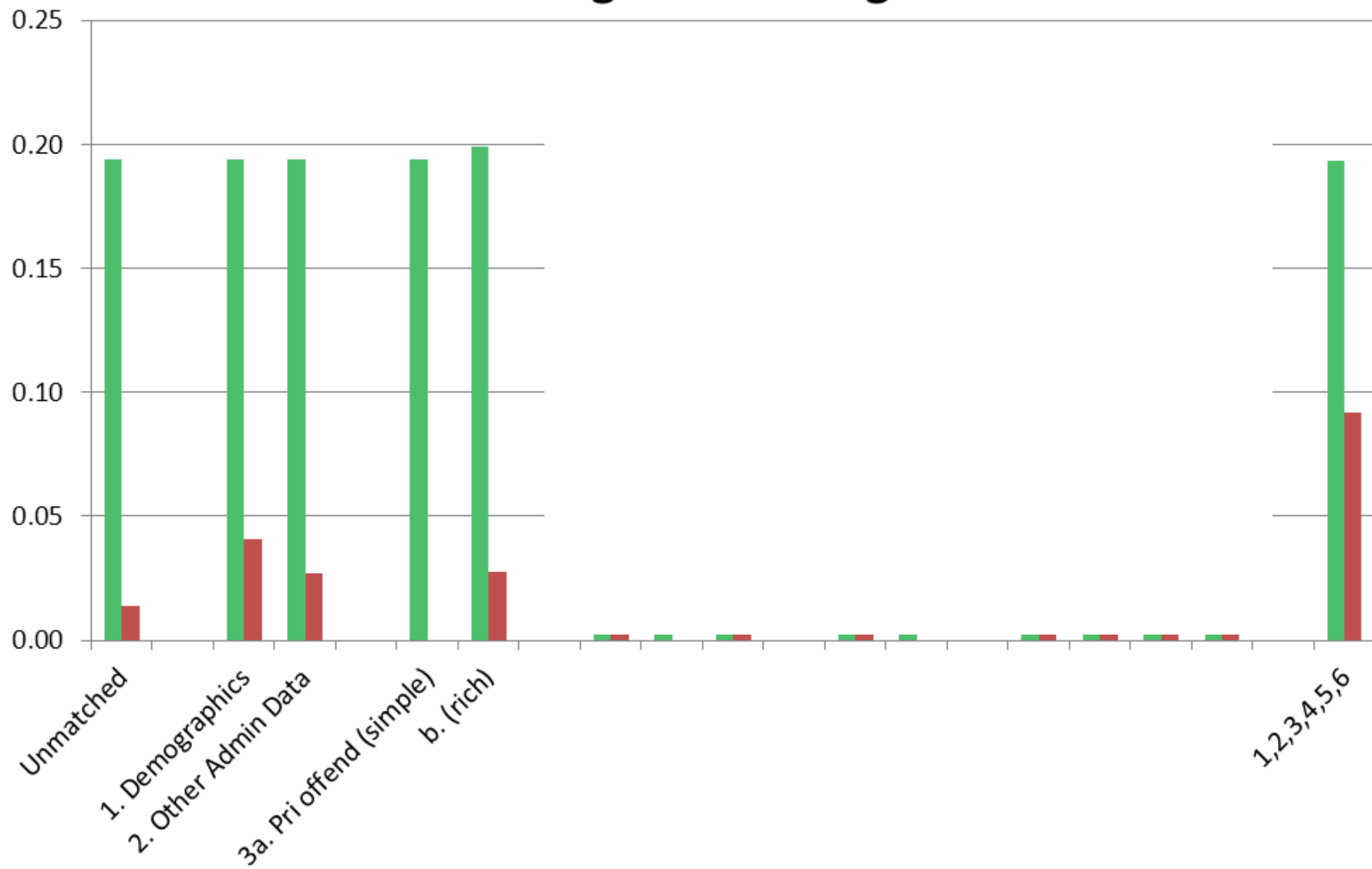
# Drug Reoffending

Treated Controls



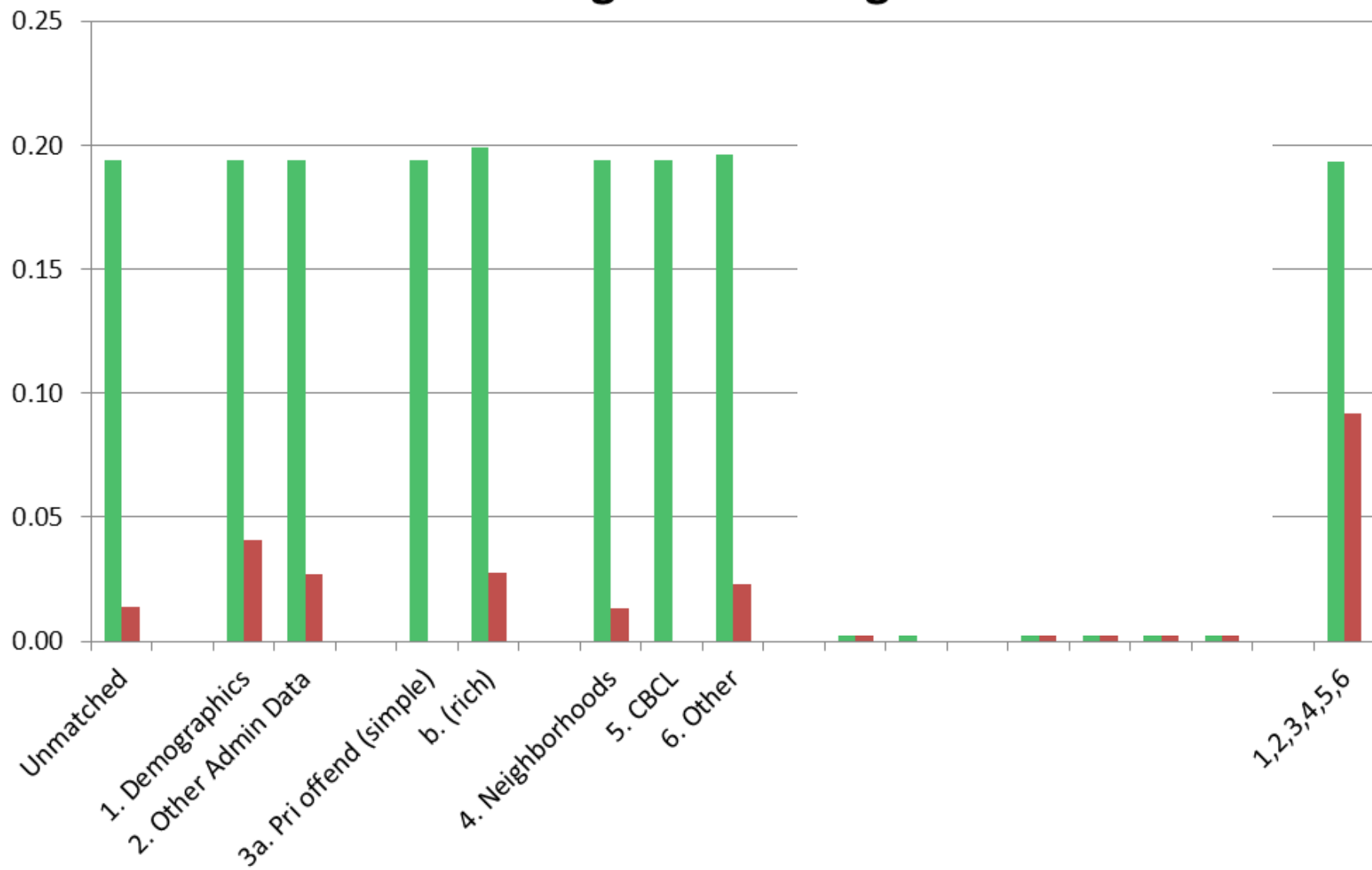
# Drug Reoffending

Treated Controls



# Drug Reoffending

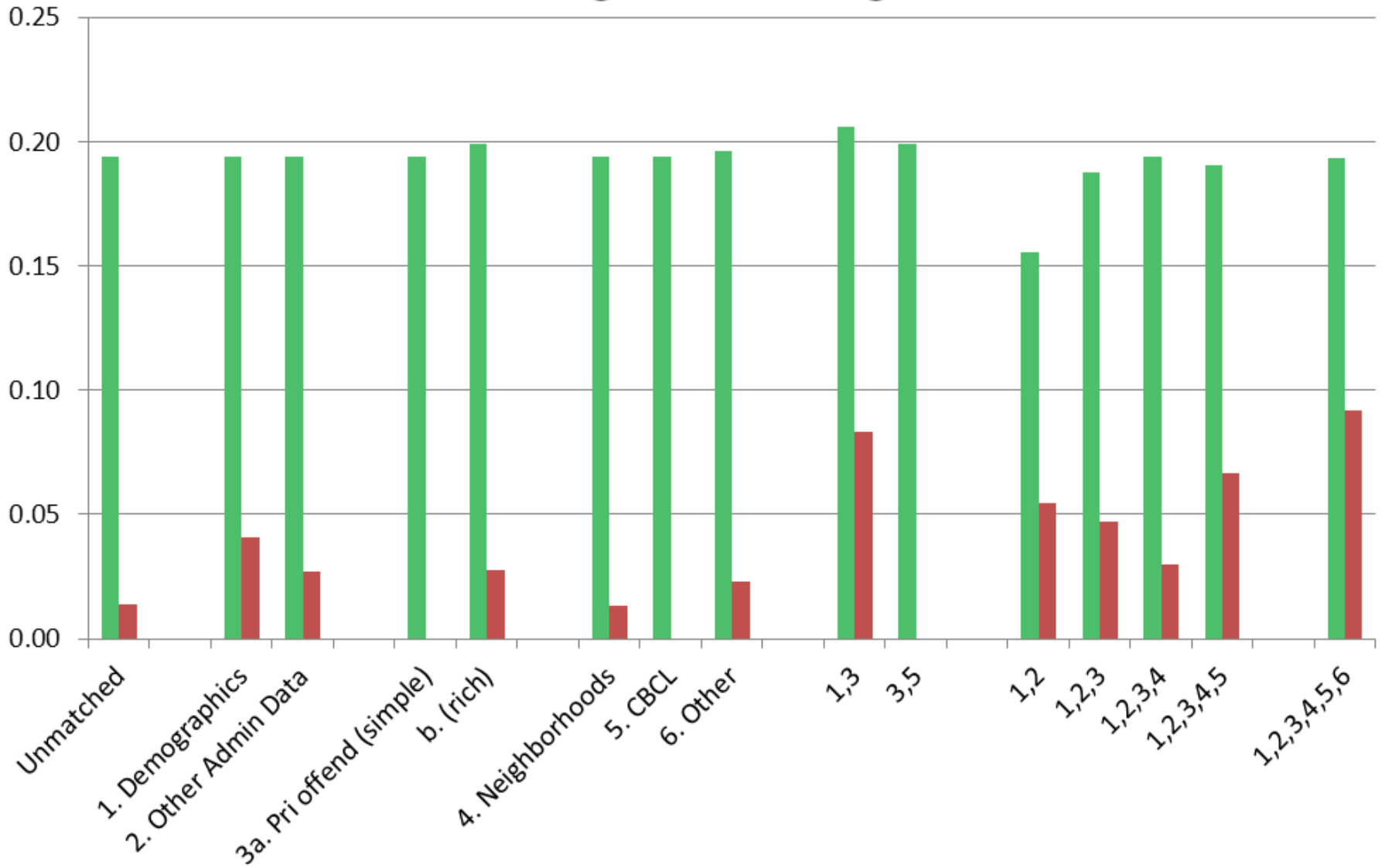
Treated Controls





# Drug Reoffending

Treated Controls





# Summary

- **For violent offending**
  - None of the subsets explored seemed to eliminate selection
    - Demographics + rich prior offending eliminated much of the selection
    - Demographics and other admin data also eliminated much
- **For drug offending**
  - Demographics + rich prior offending seemed to eliminate the selection artifact
    - Neither alone seemed adequate
  - Other covariates added little

- This is only a case study
  - A work in progress
  - We will be interested to see how the effects of official arrests compare those effects of police contact
- Many methodological experiments will be needed
  - Is there a “typical” set that suffices in CJ &/or JJ?
- Such methodological experiments are especially important in domains where many policy issues are not amenable to true experiments

## Contact Information

Akiva M. Liberman, Ph.D.

Senior Fellow, Urban Institute, Justice Policy Center  
2100 M Street, NW, Washington, DC 20037

(202) 261-5704

[ALiberman@urban.org](mailto:ALiberman@urban.org)

<http://www.urban.org/>

## Acknowledgements

- This work was funded by OJJDP grant #2010-MY-FX-0613
- Opinions are solely those of the authors, and do not imply endorsement by OJJDP, OJP, or USDOJ