The effects of DNA databases on the deterrence and detection of offenders

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JUSTICE
TECH LAB

Does DNA profiling deter criminal behavior?

- Use of DNA databases and similar high-tech tools is expanding around the world
  - Work primarily by increasing the probability of getting caught (instead of punishment)
  - These tools have great potential, but surveillance brings privacy costs
    - Citizens want to know what they're getting in exchange for their privacy

- We consider effects of DNA databases on recidivism in Denmark, using the timing of a massive database expansion as a natural experiment

Research Question:

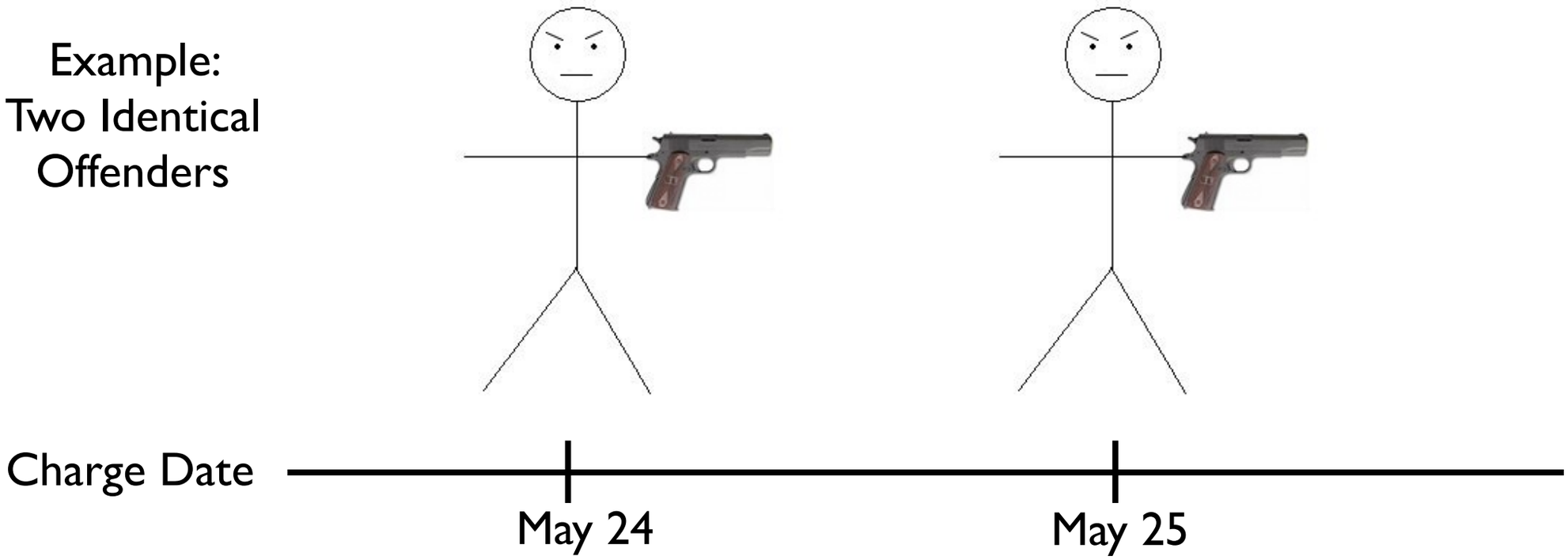
What are the effects of DNA databases on individuals in the database?

Literature on DNA databases

- There's very little evidence on databases' causal effects on behavior
  - Doleac (2017) found that DNA databases in the U.S. reduced probability of subsequent convictions by 17% for convicted violent felons and 6% for convicted property felons
  - Data were limited and messy — Denmark has much better data
  - Current policy frontier is adding arrestees, not convicts

Using database expansion to measure causal effect on behavior

Example:
Two Identical
Offenders



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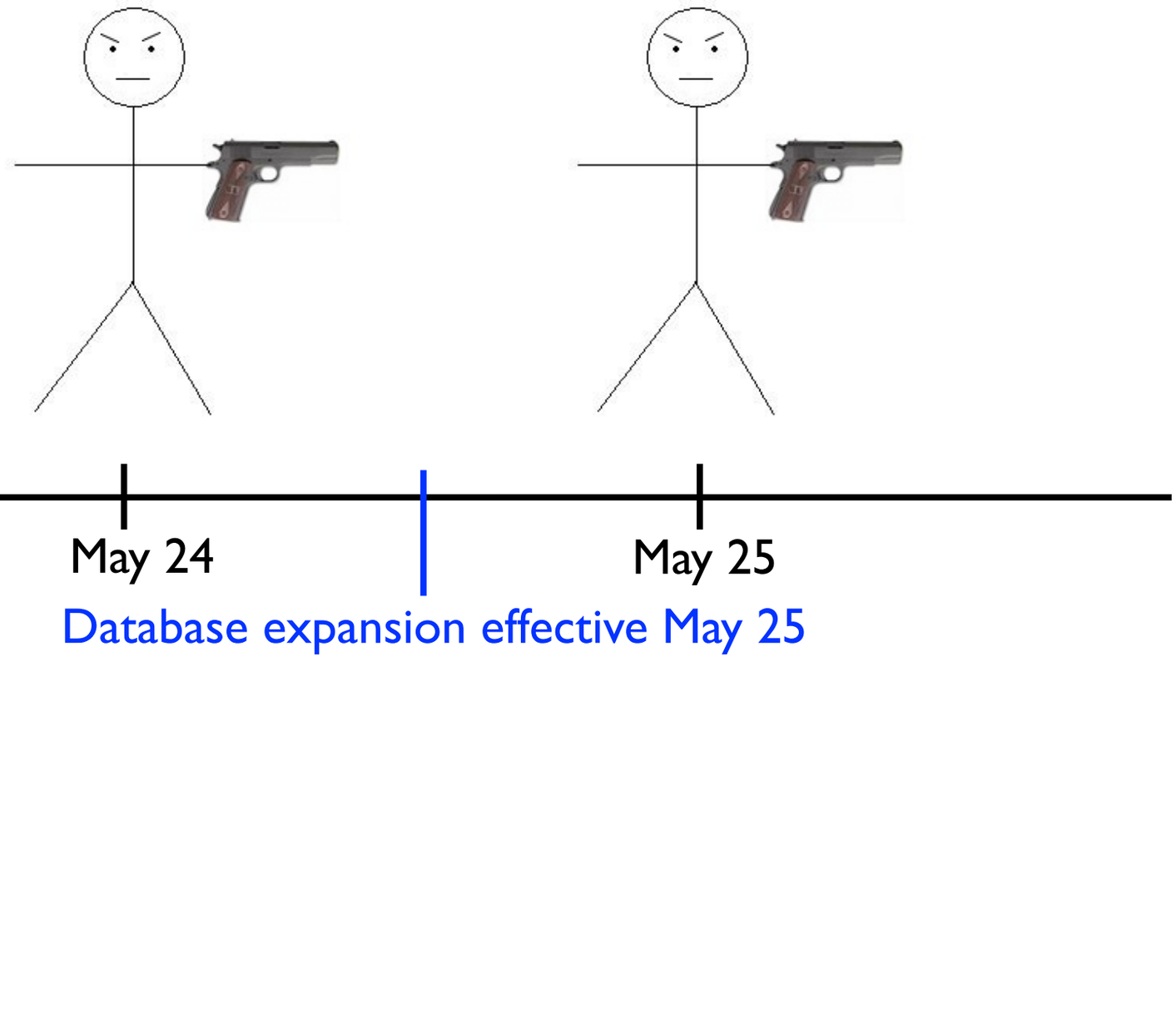

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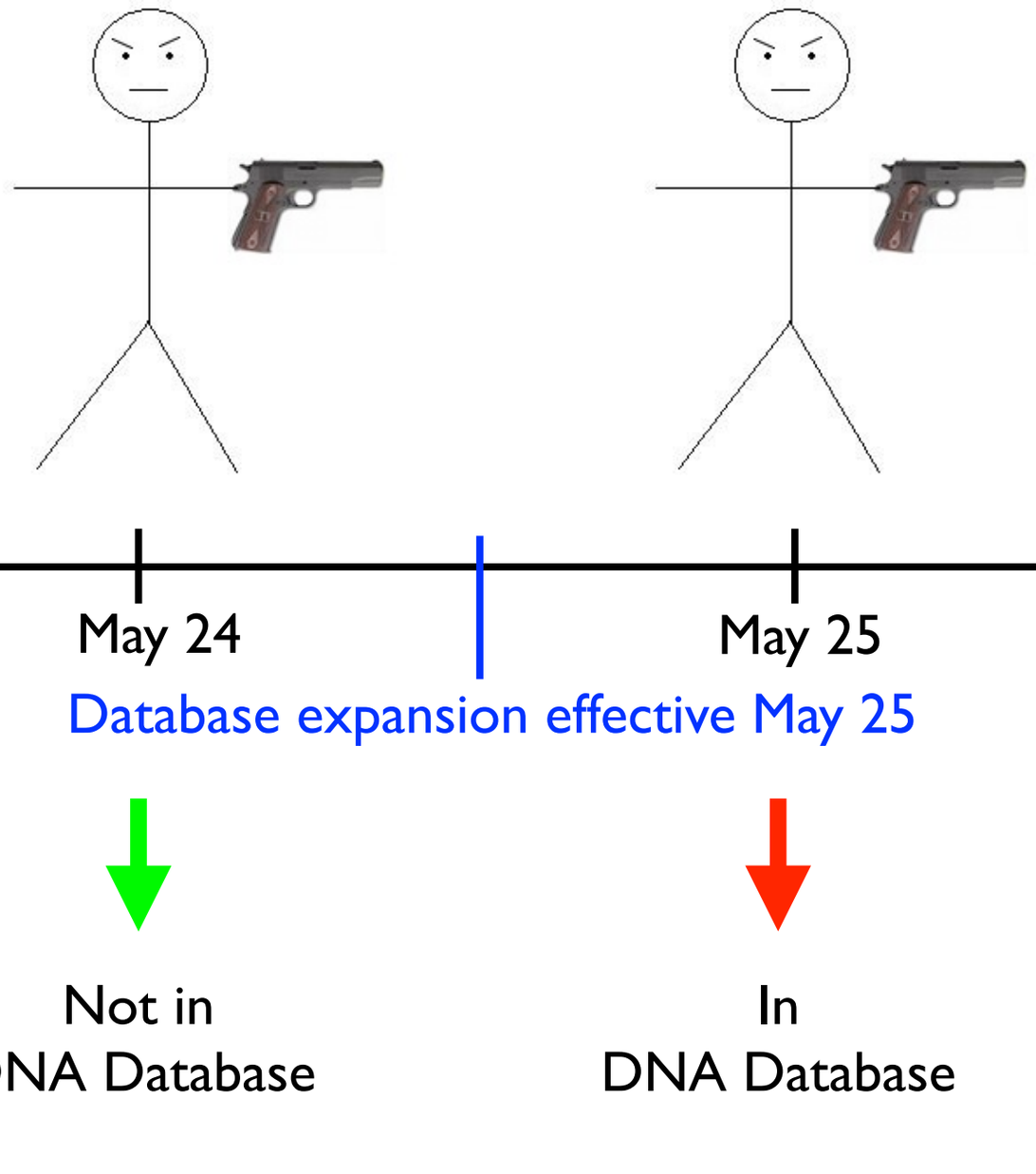

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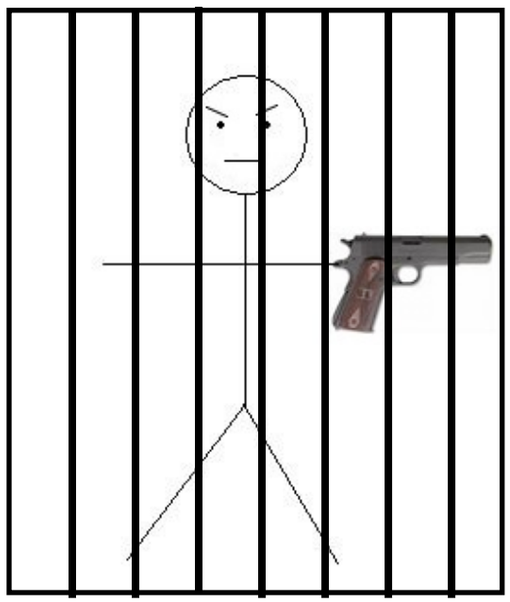
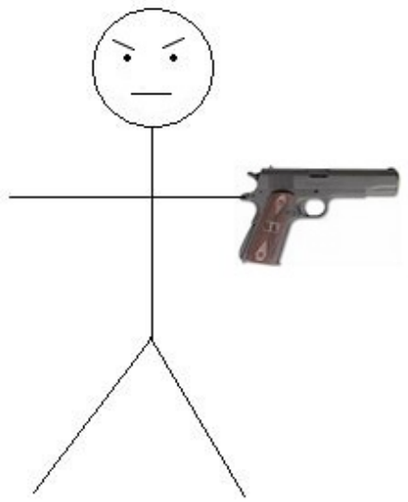




Can attribute differences in subsequent behavior to the effect of the "treatment" (DNA profiling)

Charge Date

May 24

May 25

Database expansion effective May 25

Not in
DNA Database

In
DNA Database

What we are measuring

- All other societal changes & changes to the criminal justice system (including a general increase in the collection & use of DNA evidence) will affect those charged before and after the reform
    - Importantly, police can get a warrant to obtain DNA from anyone identified as a suspect in a crime
    - Being added to the DNA database increases the probability that someone is identified as the perpetrator in cases where they would not otherwise be a suspect
        - This is the effect we are identifying

Background on Denmark's DNA database

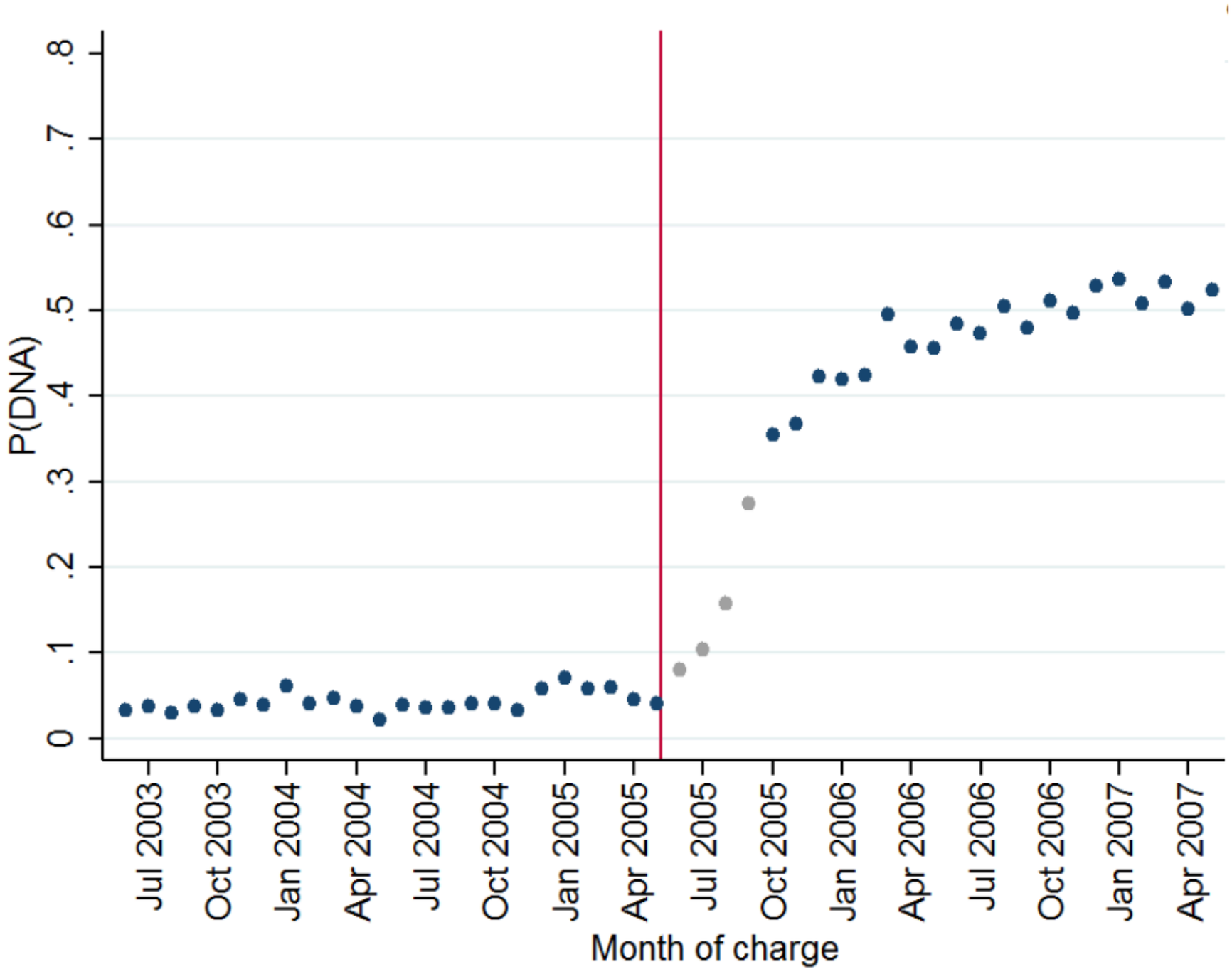
- Database first established in 2000, included only those charged with serious violent offenses
    - DNA only collected if necessary for the current investigation

- 2005 expansion added anyone charged with a crime punishable by at least 1.5 years (comparable to all felonies in the U.S.)
    - Removed requirement about relevance to investigation

- Effective May 25, 2005
    - Summer holidays meant police department severely understaffed during June-August, so implementation of the law was slow
    - Probability that a charged individual was added to the database increased from 4% to about 40% by October

Likelihood of DNA profiling

(a) Likelihood of DNA profiling



Data

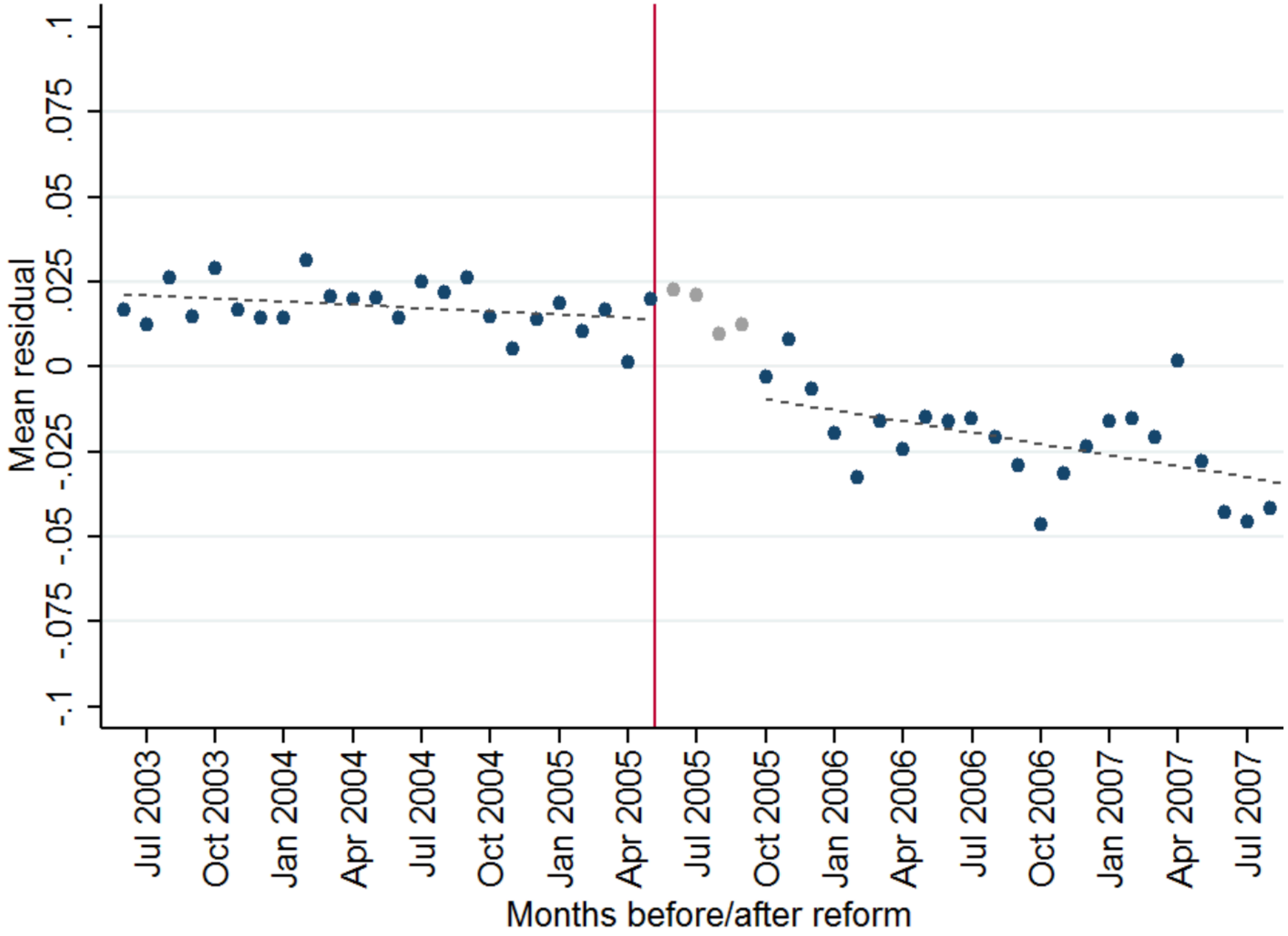
- Longitudinal criminal history data for the full country
  - Includes when an individual was added to the database, as well as timing and details of future offenses and charges
  - Focus on recidivism over one to three years from the date of the charge
  - Drop individuals who don't reside in Denmark (mostly tourists)
  - Men only, ages 18-30 at time of charge
- These data are linked with information from the Danish register — in particular, marriage, residence, children, employment, education

Empirical strategy

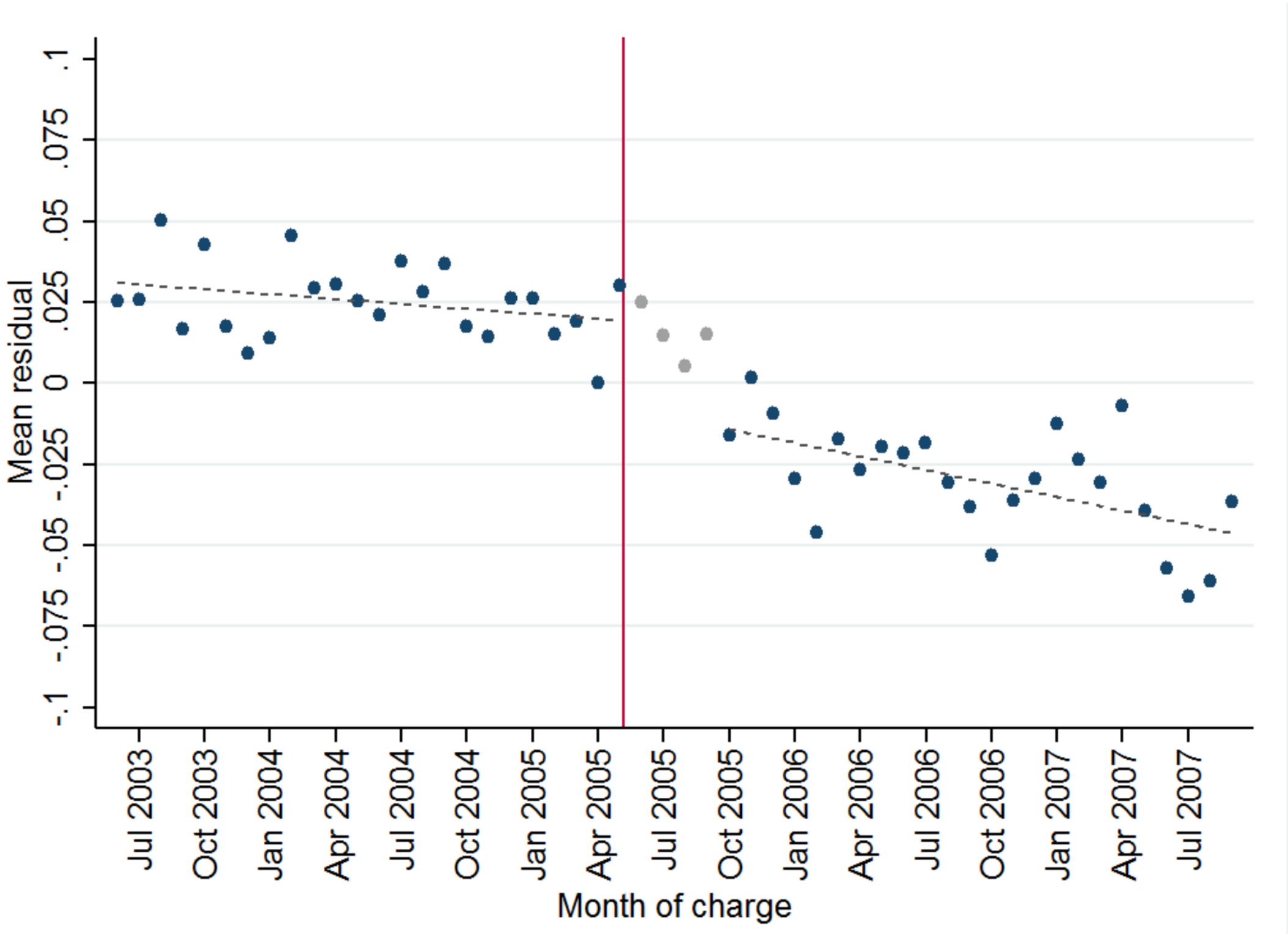
- Use an instrumental variable strategy referred to as a "regression discontinuity"
  - Timing of charge (pre/post expansion) results in a big jump in DNA collection for those charged just after the policy change
    - Does this big jump in DNA collection result in a similar jump or drop in recidivism?

- We drop summer months immediately following expansion date due to slow implementation
  - We worry that those added to the database during the implementation period are a selected sample, could bias results
  - The results are very similar if we include these summer months

Probability of new conviction within one year falls 42%



Number of new convictions within one year falls 49%



Digging into what is driving these effects

Which types of offenders are most affected?

- By initial charge type:
  - Property: 36% decline in year 1, $p < 0.10$
  - Violent: 48% decline in year 1, $p < 0.01$
- By first-time vs. repeat offender status:
  - First-time: 83% decline in year 1, $p < 0.10$
  - Repeat: 38% decline in year 1, $p < 0.01$
- By age:
  - Age 18-23: 52% decline in year 1, $p < 0.001$
  - Age 24-30: 2% decline in year 1, not significant
- By whether they had children:
  - Had kids: 55% decline in year 1, not significant
  - No kids: 41% decline in year 1, $p < 0.01$

Which types of crimes are prevented?

- By subsequent charge type:
  - Property: 42% decline in year 1, $p < 0.05$
  - Violent: 60% decline in year 1, $p < 0.05$

Discussion

- Adding someone *charged* with a felony to Denmark's DNA database reduces probability of a subsequent conviction by 42% during the first year after the initial charge ($p<0.001$)
  - Effects persist for at least 3 years
  - Effects are largest for younger offenders (ages 18-23)
  - Deterrent effects apparent for property and violent offenders, and reduce both types of crime going forward

Thank you!

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