Do criminal sanctions deter amphetamine users?

Don Weatherburn and Steve Yeong

Background

“….the most dangerous drug in America.”

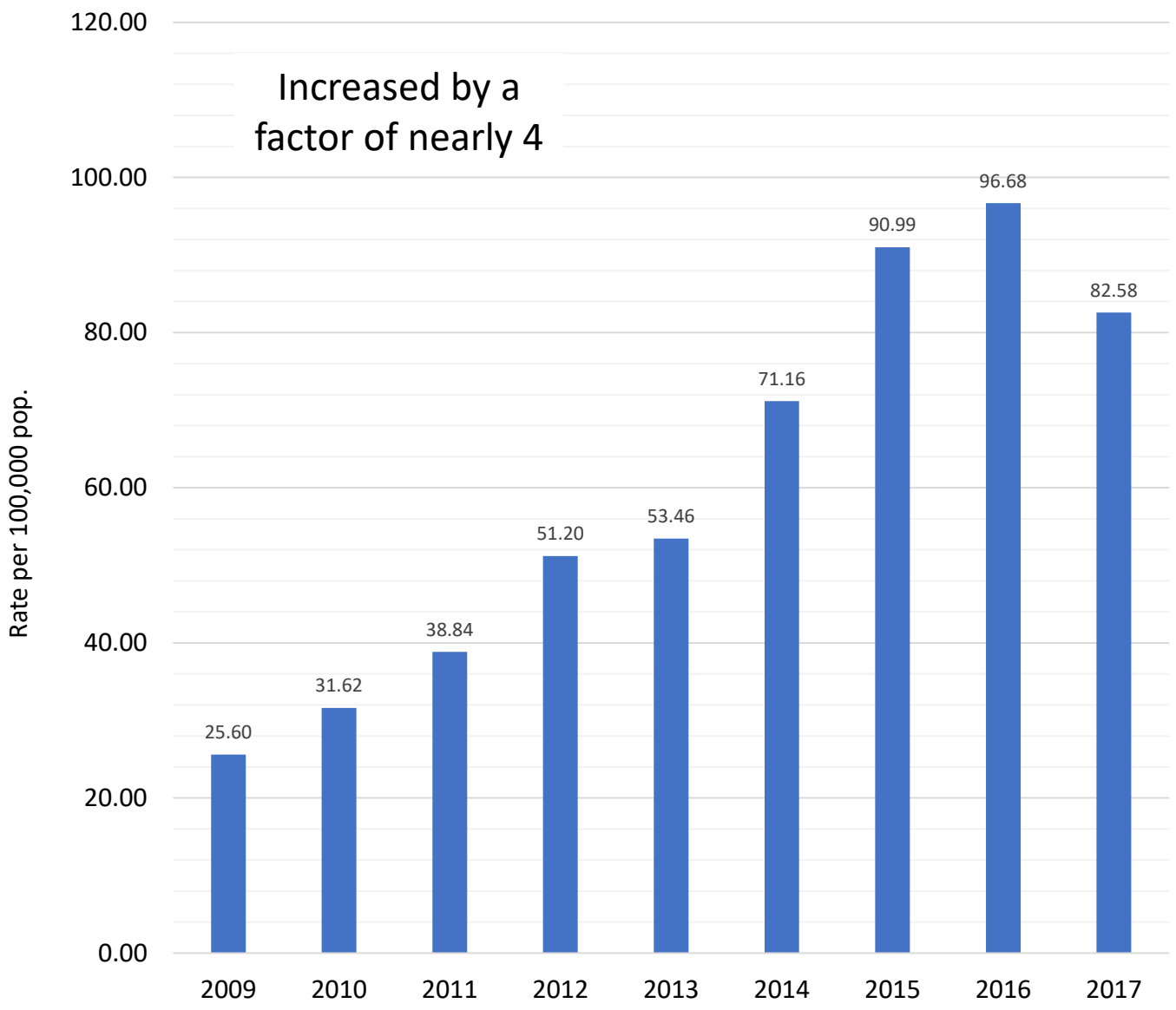
former US Attorney General Alberto Gonzales

‘Don’t flush your drugs m’kay’: police warn of the possibility of ‘meth-gators’

It’s also a big problem in Australia

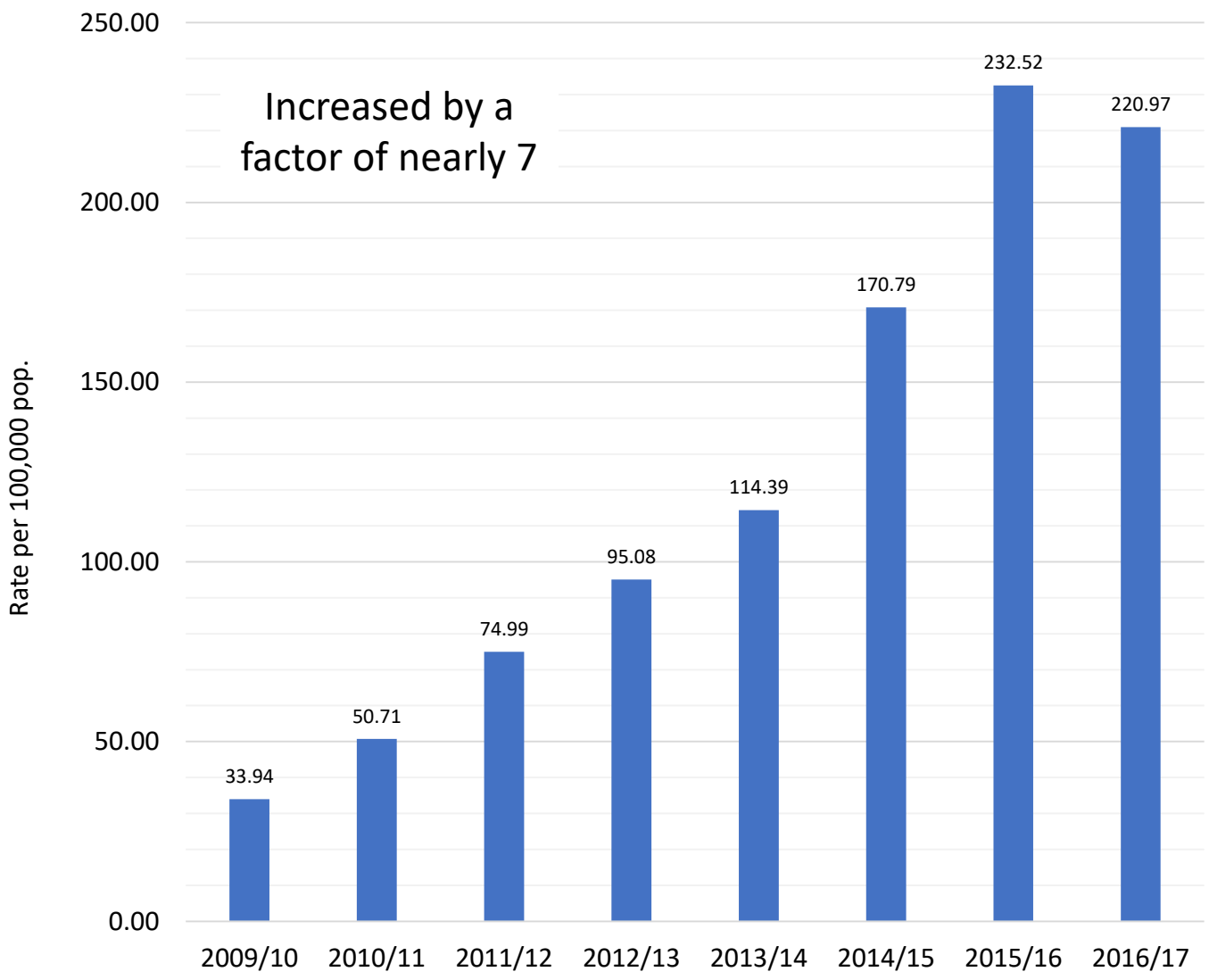
755kg of methamphetamine imported from Mexico to Australia in cow hides (AFP: 29th August 2019)

Arrests for amphetamine use/possession have risen rapidly



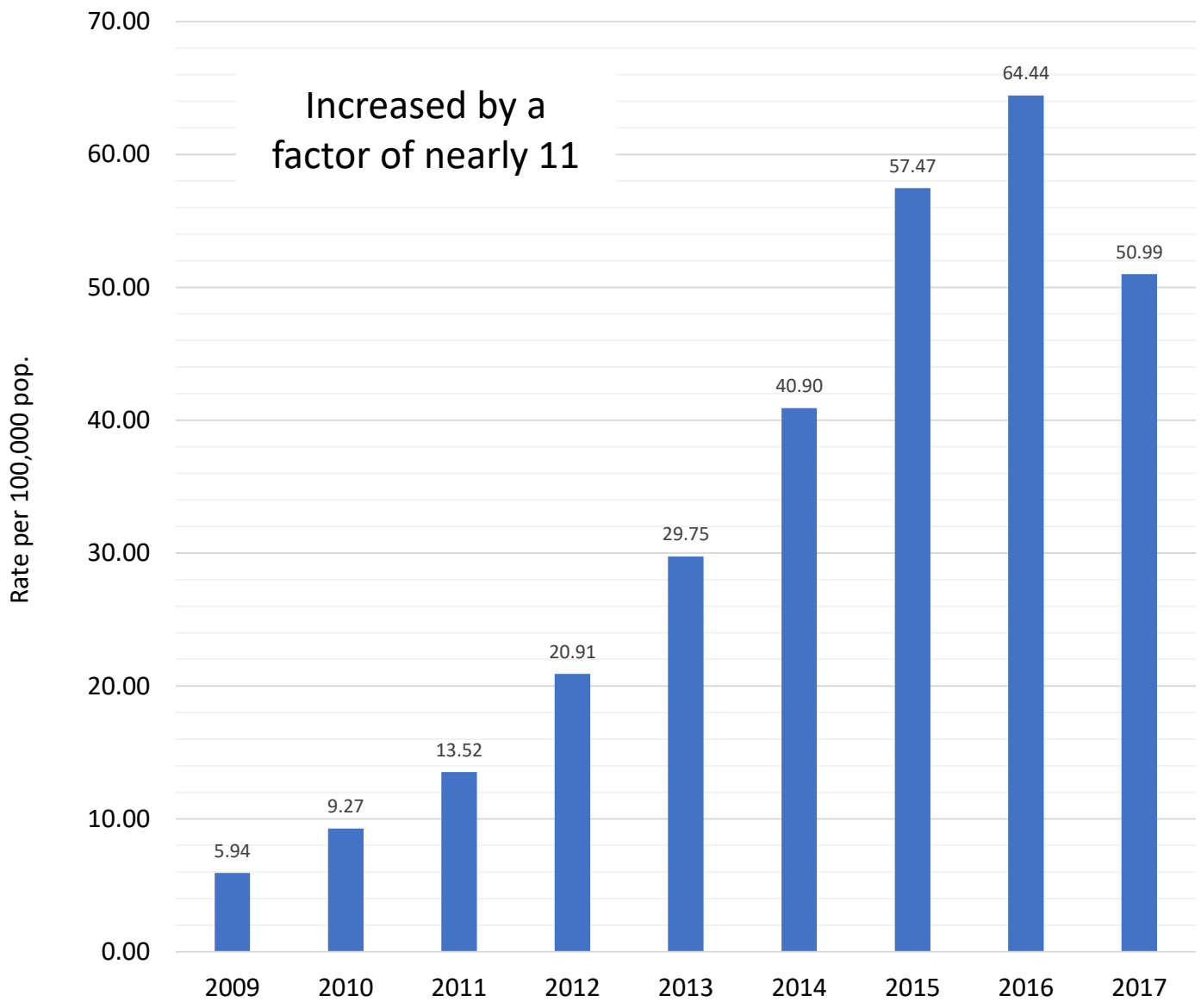
Source: NSW Bureau of Crime Statistics and Research (2019)

And so have psychotic disorders due to methamphetamine use



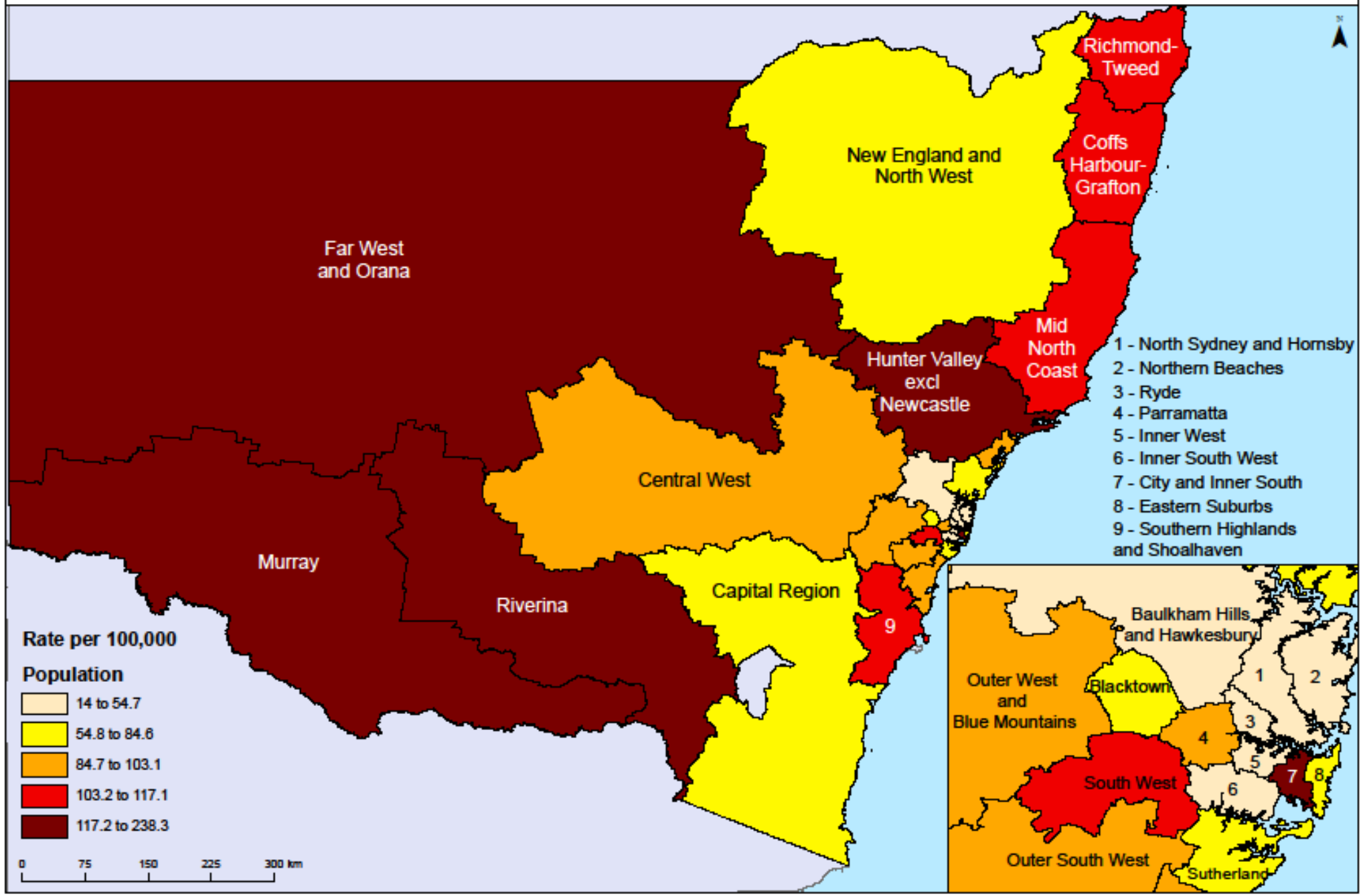
Source: AIHW (2019) (National Hospital Morbidity Database)

So have ED admissions for methamphetamine use…

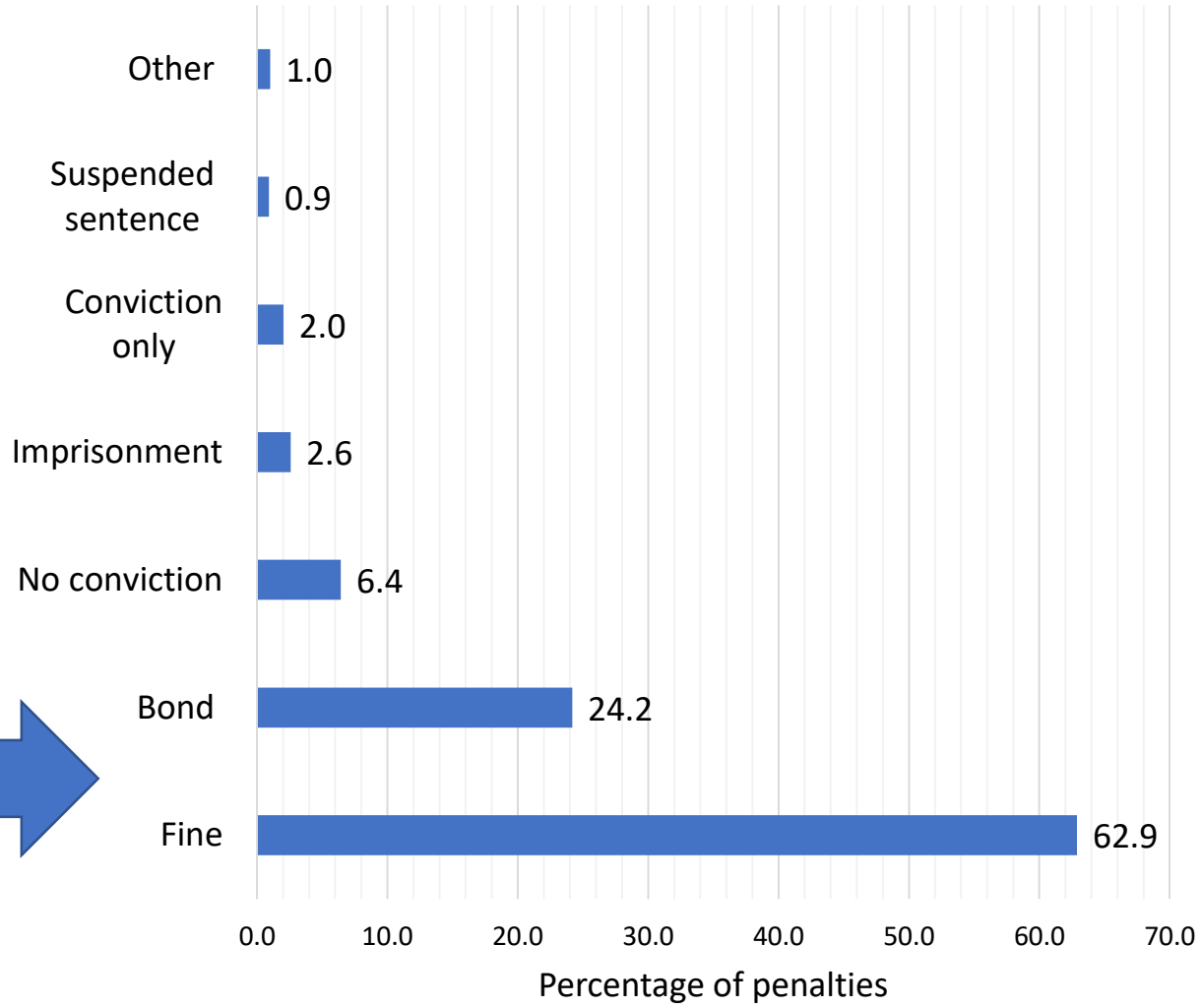


Source: NSW Health (2019)

Rate per 100,000 population for incidents of possession or use of amphetamines in the 12 months to December 2018 by Statistical Area

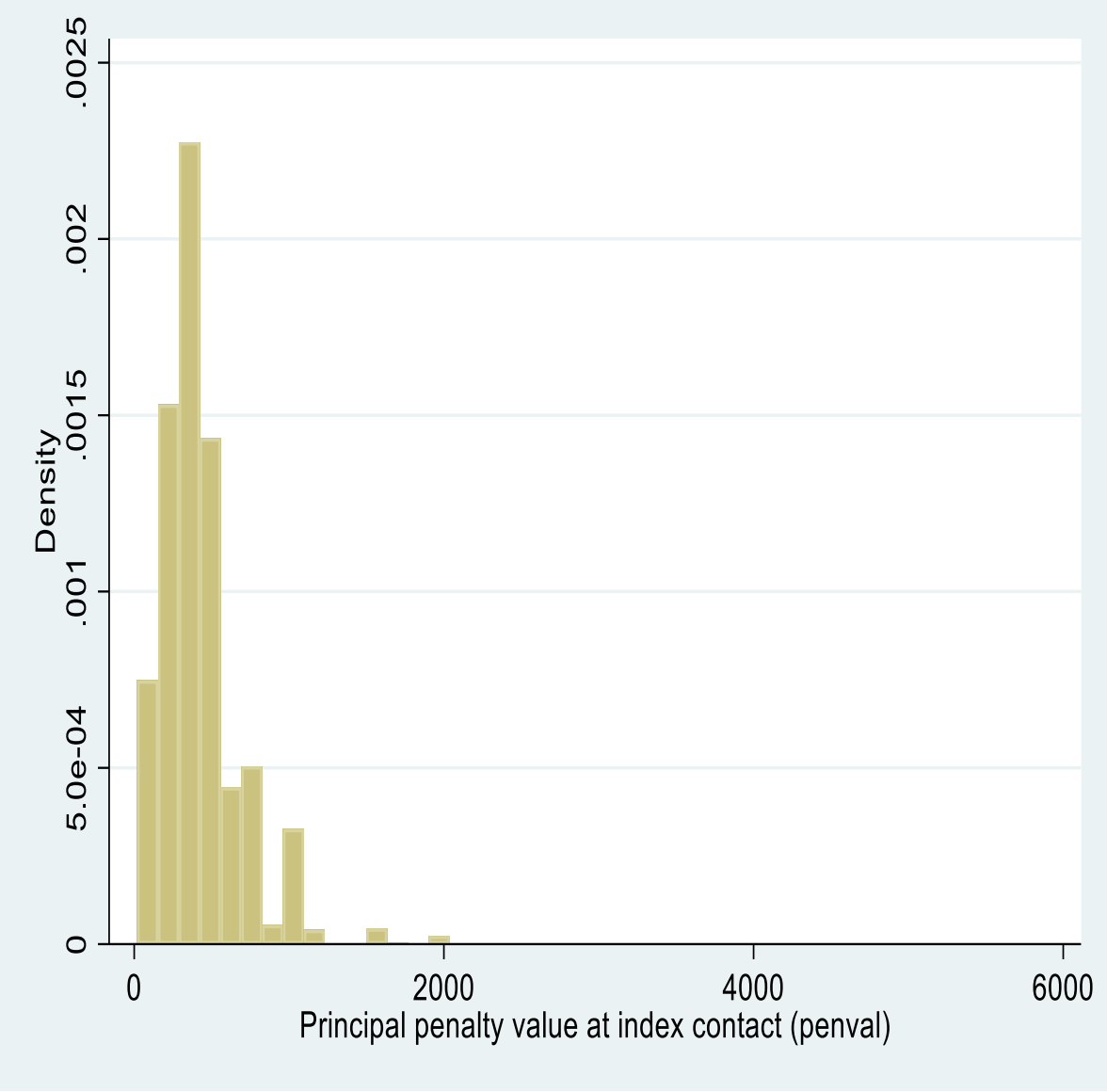


Our primary response to amphetamine use/possession is a bond or a fine

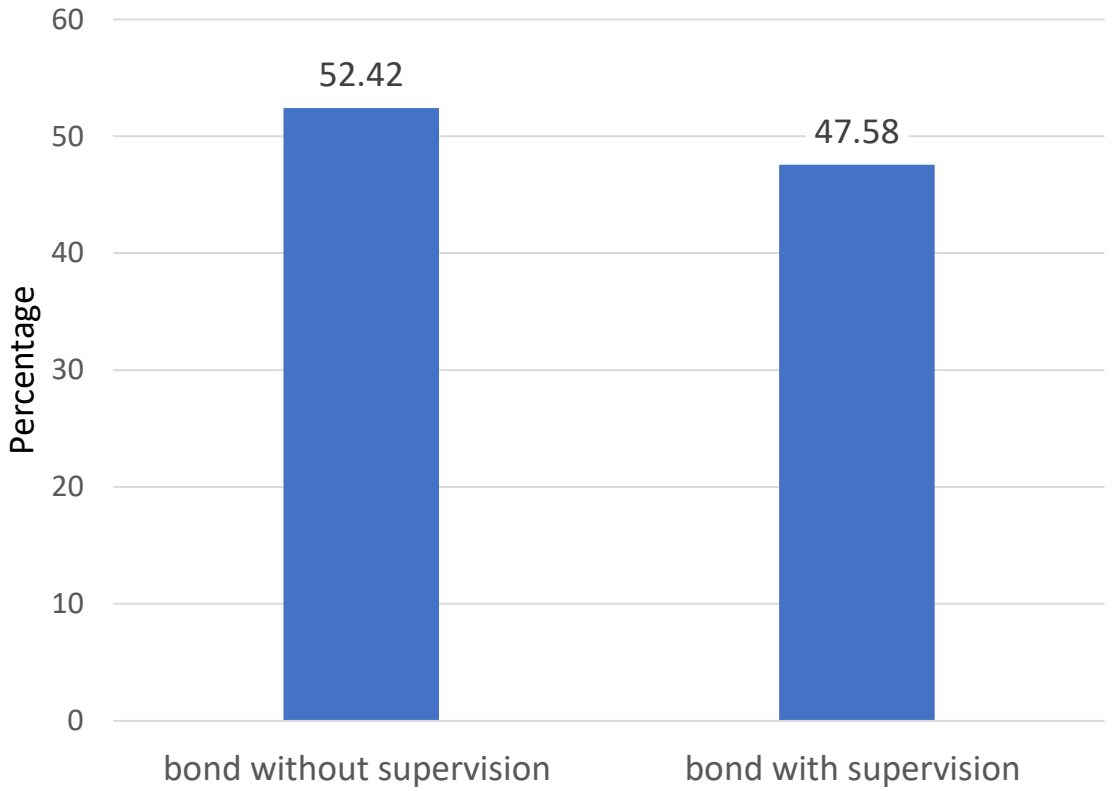


Fines vary greatly in severity

Mean = $420, median = $400, s.d. = $268, range = $5,380



As does the severity of bonds



Conditions apply e.g. regular reporting, restrictions on movement, coerced treatment etc

To date, we know little about the effects of these sanctions on drug users. All we know is….

- Criminal conviction reduces an individual's employment and earnings prospects
  - *Lenton, Humeniuk & Christie (2009); Waldfogel (1994), Grogger (1995), Borland and Hunter (2000) Murray et al. (2014) and Raphael (2017)*
- Mandatory minimum fines sometimes reduce the incidence of offending
  - *Wagenaar et al. (2007) vs Weatherburn & Moffatt (2011)*
- Drug offenders placed on probation are less likely to reoffend than those imprisoned
  - *Spohn & Holleran (2006)*

Aim of the current study is to determine:

1. Whether correctional supervision reduces the risk of another amphetamine use/possession offence
2. Whether correctional supervision reduces the risk of another drug offence (of any type)
3. Whether higher fines reduce the risk of another amphetamine use/possession offence
4. Whether higher fines reduce the risk of another drug offence (of any type)

Does supervision reduce re-offending risk?

Source, sample, outcome and method

- **Source:**
  - ROD = BOCSAR reoffending database
- **Data:**
  - 2,255 people given a bond for amphetamine use/possession between 1994 & 2017
- **Treatment (T)**:
  - Bond with supervision, n = 1073
- **Control (C):**
  - Bond without supervision, n = 1182
- **Outcomes:**
  - Reconviction for a new drug offence in the 48 months free time
  - Reconviction for a new use/possess amphetamine offence within 48 months free time
- **Method:**
  - Augmented inverse probability of treatment weighting

What is AIPW?

- **Doubly Robust Estimation of Causal Effects**
  - Funk, M., Westreich, D., Wiesen, C., Stürmer, T., Brookhart, A. & Davidian, M. *American Journal of Epidemiology*, Volume 173, Issue 7, 1 April 2011, pp. 761–767.

- "Doubly robust [augmented] estimation combines a form of outcome regression with a model for the exposure (i.e., the propensity score) to estimate the causal effect of an exposure on an outcome. Only 1 of the 2 models need be correctly specified to obtain an unbiased effect estimator."

Controls

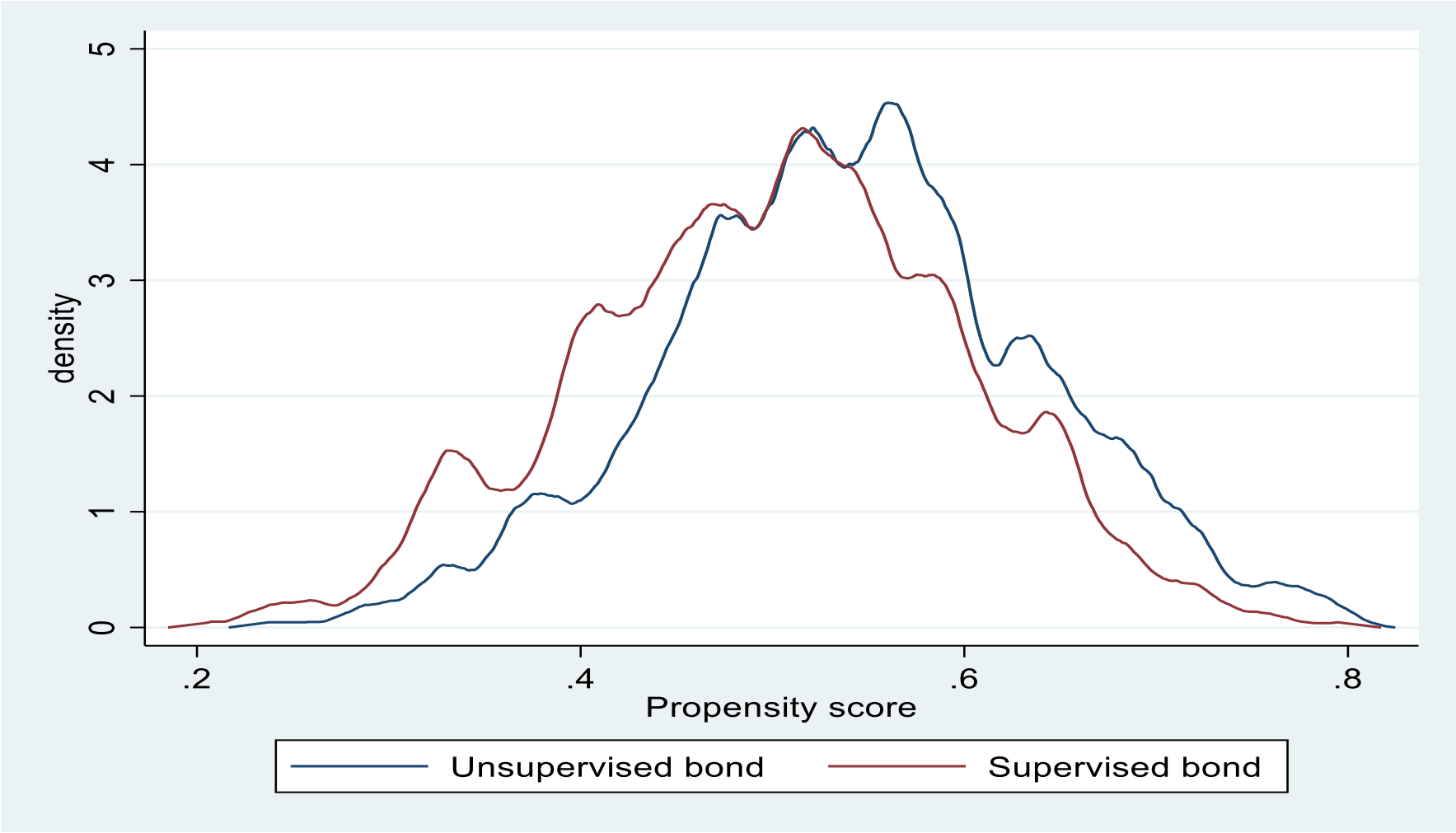
- **Demographics:**
  - age, sex, Indigenous status, area, socioeconomic status;
- **Index court appearance:**
  - **#** concurrent offences; # counts of principal offence;
- **Prior CJS contacts:**
  - age at first CJS contact, whether previously convicted of a drug offence, number of prior convictions
- **Exposure controls:**
  - plea, legal representation

	Freq.	Percent
Gender		
Female	3,999	21.08
Male	14,972	78.91
Missing	3	0.02
Indigenous status		
Indigenous	1,049	5.53
Non-Indigenous	15,568	82.05
Unknown	2,357	12.42
Area		
Major cities	13,502	71.16
Inner regional	2,981	15.71
Outer regional	718	3.78
Remote/very remote	81	0.43
Missing	1,692	8.92
SES status		
Highly advantaged	3,541	18.66
Advantaged	4,666	24.59
Disadvantaged	4,495	23.69
Highly disadvantaged	4,575	24.11
Missing	1,697	8.94
Principal offence counts		
One	18,009	94.91
More than one	965	5.09
Number of concurrent offences		
1	14,094	74.28
2	3,382	17.82
3+	1,498	7.9

Prior drug in last five years	Freq.	Percent
No	15,074	79.45
Yes	3,900	20.55
Prior convictions		
0	6,382	33.64
1	2,982	15.72
2	1,988	10.48
3	1,491	7.86
4+	6,131	32.31
Plea to the principal offence		
Guilty	13,251	69.84
No plea entered/other	5,193	27.37
Not guilty	530	2.79
Legal representation		
Not represented	9,643	50.82
Represented	8,857	46.68
Unknown	474	2.5
New u/p amphetamine offence in 48 months		
No	17,316	91.26
Yes	1,658	8.74
New drug offence in 48 months		
No	15,483	81.6
Yes	3,491	18.4
Bond type		
Non supervised bond	1,143	52.58
Supervised bond	1,031	47.42
Age (mean, sd)	31.35	9.22
Age first contact with CJS (mean, sd)	25.07	8.81

Common support & covariate balance

- We can’t do AIPW if there’s a combination of variable values that predicts treatment membership perfectly
  - So is there overlap in the propensity score distributions?
- We can’t get an unbiased treatment effect estimate without covariate balance
  - So are the covariates balanced between treatment and control groups?


density
0
1
2
3
4
5
.2
.4
.6
.8
Propensity score
Unsupervised bond
Supervised bond

Covariate balance

	Standardized difference		Variance ratio	
	Raw	Weighted	Raw	Weighted
Sex				
Male	-0.110	-0.001	1.157	1.002
Indigenous status				
Aboriginal	0.002	-0.002	0.996	1.003
Unknown	-0.034	0.002	0.922	1.005
Age	-0.032	-0.001	0.999	1.033
Area				
Inner regional	0.121	0.003	1.201	1.005
Outer regional	0.016	0.003	1.066	1.011
Remote/very remote	0.029	-0.003	1.359	0.970
Disadvantage				
Advantaged	0.016	-0.001	1.019	0.999
Disadvantaged	-0.010	0.002	0.990	1.002
Highly disadvantaged	0.048	0.001	1.040	1.001
Principal offence counts				
More than one	0.081	-0.003	1.317	0.990
No. concurrent offences				
Two	0.031	0.001	1.035	1.001
Three or more	0.135	0.005	1.206	1.007
Age first CJS contact	-0.052	0.000	0.952	0.985
Prior drug conviction				
Yes	0.175	0.001	1.103	1.000
No. prior convictions				
One	-0.178	-0.002	0.708	0.997
Two	0.019	-0.003	1.043	0.994
Three	0.006	-0.002	1.016	0.996
Four or more	0.159	0.002	1.034	1.000
Plea				
No plea entered/other	0.042	0.001	1.213	1.003
Not guilty	0.032	0.001	1.183	1.005
Legal representation				
Represented	0.126	0.001	0.845	0.999
Unknown	-0.052	0.002	0.659	1.013

Over-ID test for covariate balance. X^2 (24) = 10.09, p = 0.99 (Co-variates are balanced)

Should be negative

Results

Should be significant

Any new drug offence	Coef.	Robust Std. Err.	z	P>z	Lower 95CI	Upper 95 CI
ATE						
Bond type						
Supervised v unsupervised	0.006	0.018	0.36	0.720	-0.029	0.042
Potential outcome mean						
Unsupervised bond	0.211	0.013	16.2	0.000	0.186	0.236

Any new u/p ATS offence	Coef.	Robust Std. Err.	z	P>z	Lower 95CI	Upper 95 CI
ATE						
Bond type						
Supervised v unsupervised	0.016	0.013	1.260	0.209	0.009	0.040
Potential outcome mean						
Unsupervised bond	0.080	0.008	9.370	0.000	0.063	0.096

Risk of re-offending

Ditto

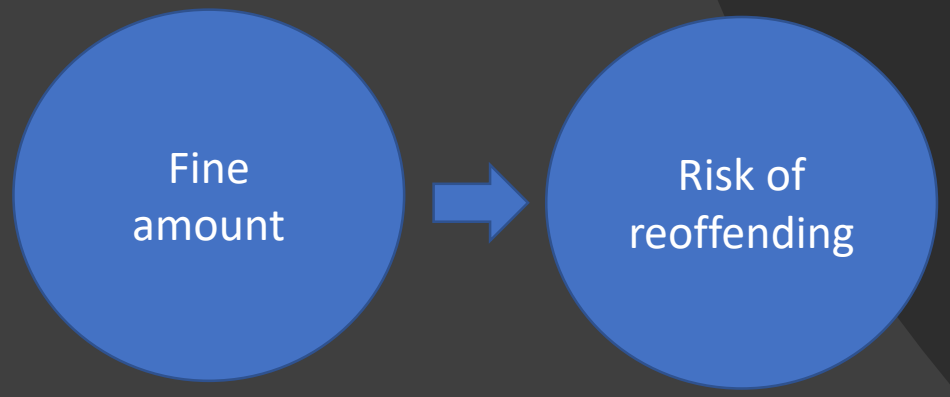
Do higher fines reduce reoffending risk?

Source, data, outcome, controls

- **Source:**
  - ROD
- **Data:**
  - 9,219 people fined for amphetamine use/possession between 1994 & 2017
- **Fine statistics:**
  - Mean = $420, median = $400, sd = $268, range = $5,380
- **Outcome:**
  - Conviction for any drug offence in 48 months free time
  - Conviction for use/possession of amphetamines in 48 months free time
- **Controls:**
  - Age, disadvantage, gender, Indigenous status, legal representation, number of concurrent offences, number of prior drug convictions, number of prior convictions, PAC, + month x year fixed effects
- But what about endogeneity……?

The endogeneity challenge

Fines may reduce the risk of re-offending but those with a high risk of re-offending are more likely to get a high fine so the causal process runs both ways



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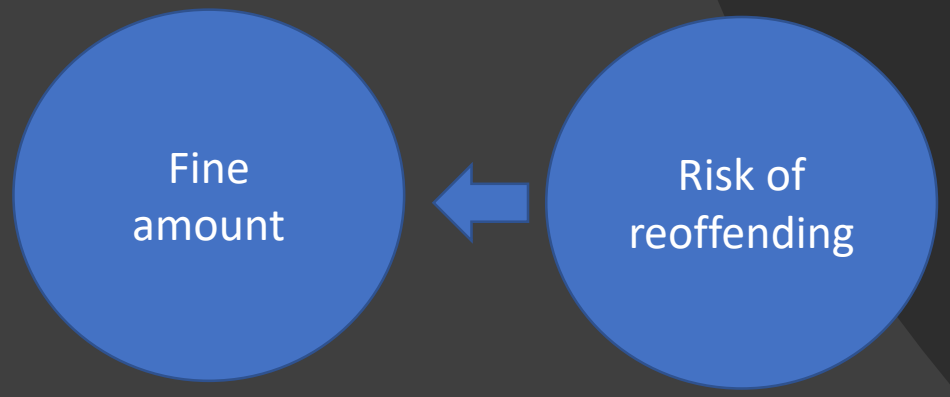


The 2SLS solution

1. Find a factor (instrument) that influences treatment but which has no effect on the outcome (re-offending), other than through treatment
2. Regress treatment intensity (fine amount) against instrument + controls (1st stage)
3. Regress re-offending against ***predicted*** treatment intensity + controls (2nd stage)
4. Now by construction the independent variables have been ‘purged’ of their correlation with the error term)

2SLS equations

$$ln(fine_{ijt}) = \pi_0 + \pi_1 \ln(Z_{ij}) + \boldsymbol{\zeta X}_i' + \lambda_t + v_{ijt} \qquad (1st\ stage)$$

intercept, instrument, controls, Month/ Year FE, Error term

$$\Pr(y_{ijt} = 1) = \alpha_0 + \alpha_1 \ln(\widehat{fine}_{ijt}) + \boldsymbol{\theta X}_i' + \lambda_t + e_{ijt} \qquad (2nd\ stage)$$

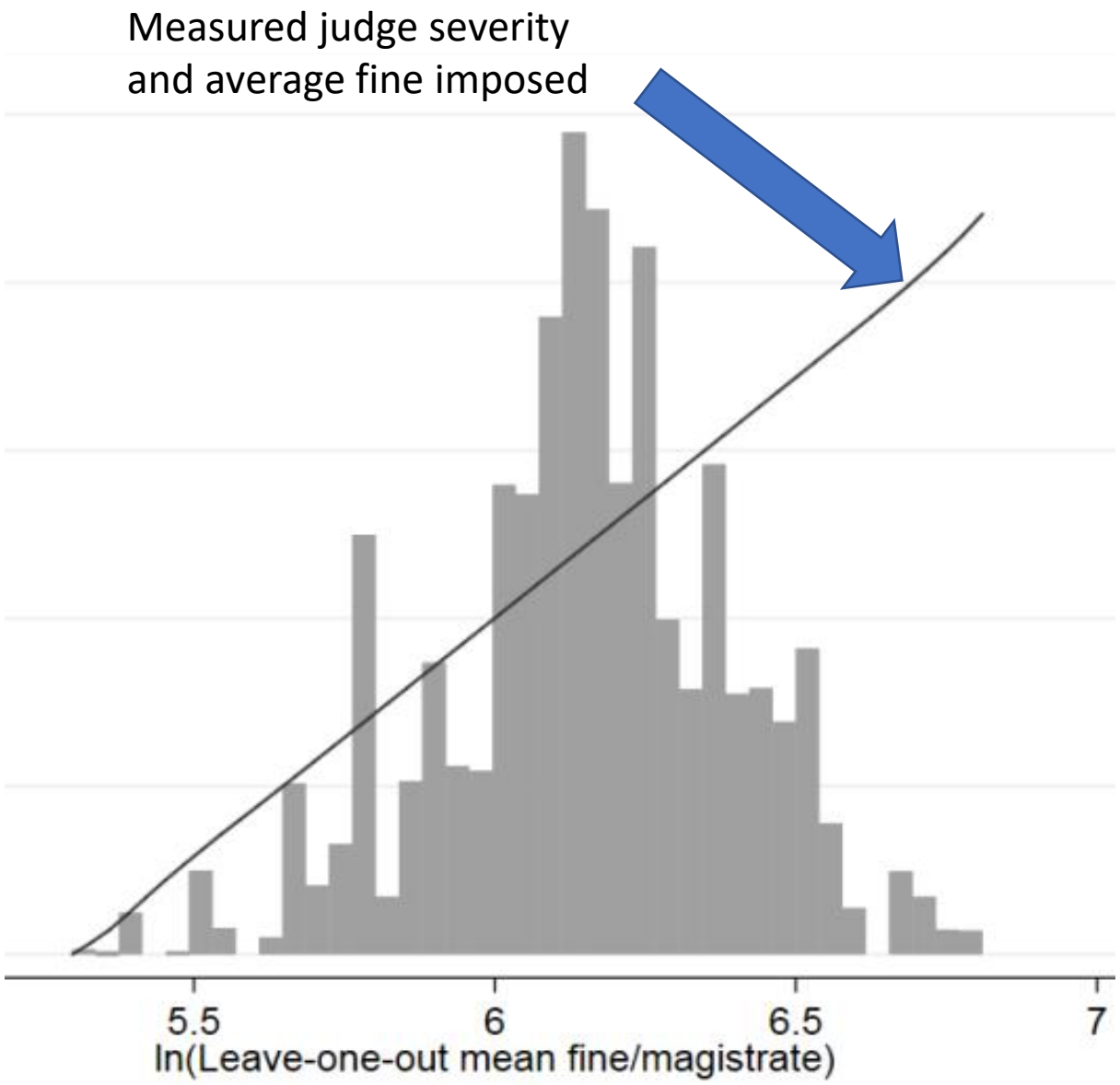
intercept, controls, Month/ Year FE, Error term

Constructing the instrument

- We calculate two measures for each magistrate
  - F = the average fine in all cases other than the one the magistrate is dealing with.
  - **r** = the average fine residual in all cases other than the one the magistrate is dealing with, where r is the variation remaining after estimating:

    F = **B*X*** + **FE** + **r**
- In other words, **r** is the leftover variation in the size of the fine after controlling for all other observed possible influences on fine amount

Instrument characteristics



Randomisation test

Randomisation test		
	(1)	(2)
	ln(Fine)	ln(Instrument)
Male	0.075***	-0.001
	(0.016)	(0.007)
Non-Indigenous	0.107***	-0.005
	(0.025)	(0.010)
Indigenous status is uknown	0.065*	0.001
	(0.033)	(0.013)
Age	-0.001	0.001
	(0.001)	(0.001)
Advantaged	0.002	0.011
	(0.021)	(0.009)
Disadvantaged	-0.032	-0.006
	(0.023)	(0.011)
Highly disadvantaged	-0.012	0.002
	(0.021)	(0.008)
More than one principal offence count	-0.180***	0.005
	(0.039)	(0.018)
Two concurrent offences	0.063***	0.014
	(0.018)	(0.010)
Three or more concurrent offences	0.075**	0.001
	(0.032)	(0.014)
Age at first CJS contact	0.000	-0.001**
	(0.001)	(0.001)

Randomisation test		
	(1)	(2)
	ln(Fine)	ln(Instrument)
Prior drug offence	0.079***	-0.007
	(0.019)	(0.006)
One prior finalised court appearance	0.010	-0.020**
	(0.021)	(0.009)
Two prior finalised court appearances	0.014	-0.016*
	(0.024)	(0.009)
Three prior finalised court appearances	0.047*	-0.020*
	(0.028)	(0.011)
Four or more prior finalised court appearances	0.015	-0.043***
	(0.028)	(0.012)
No plea entered	0.197***	0.007
	(0.018)	(0.007)
Plead not guilty	0.222***	-0.012
	(0.048)	(0.025)
Legally represented	-0.032*	-0.000
	(0.018)	(0.008)
Legal representation (Unknown)	-0.016	0.005
	(0.068)	(0.024)
F-Statistic	13.1***	1.41
Observations	8,435	8,435

* = < 0.05
** = < 0.01
*** = < 0.001

Results

Model 1: OLS
Model 2: Log fine/log instrument
Model 3: Binary outcome/log instrument
Model 4: No transformation
Model 5: Log fine/residualised instrument
Model 6: Fine/residualised instrument

	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	Continous	Binary	No transform	Log-residual	Residual
Any drug offence within 48 months	-0.023***	-0.046***	-0.069***	-0.000***	-0.048***	-0.000***
	(0.008)	(0.015)	(0.024)	(0.000)	(0.015)	(0.000)
Use/possess amphetamines within 48 months	-0.011*	-0.018	-0.027	-0.000	-0.017	-0.000
	(0.007)	(0.011)	(0.017)	(0.000)	(0.011)	(0.000)
Estimation method	OLS	2SLS	2SLS	2SLS	2SLS	2SLS
Treatment type	ln(Fine)	ln(Fine)	Binary	Fine	ln(Fine)	Fine
Instrument type	-	ln(Z)	ln(Z)	Z	Z	Z
Residualised instrument	-	N	N	N	Y	Y
PAC and month-year fixed effects	Y	Y	Y	Y	Y	Y
Observations	8,435	8,435	8,435	8,435	8,435	8,435
*Robust standard errors in parentheses	** p<0.01, ** p<0.05, * p<0.1					

Summary

- Supervision appears to exert no effect on risk of another amphetamine use/possession offence or any drug offence
- Higher fines do exert an effect but effect is very weak
- Most frequently used sanctions appear relatively ineffective
- **Caveats**
- AIPW assumes allocation to treatment is random conditional on covariates
- 2SLS assumes exogeneity of instrument, conditional on covariates
- Findings do not address issue of general deterrence
- Findings also conditional on validity of outcome measure

Conclusion

- No obvious benefit placing non-dependent amphetamine users under supervision
- Harm associated with criminal conviction for amphetamine use/possession probably exceeds benefits
- High fines a weak deterrent with negative externalities (fine default)
- Worth considering a caution scheme similar to that with cannabis