The effect of police on crime and arrests: *Are police deterring or incapacitating criminals?*

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Research Question 1

What is the causal effect of police numbers on crime?

- Theory says police reduce crime.
- Can be through deterrence.
- Can be through incapacitation.
- Both deterrence and incapacitation effects work to reduce crime.

So whats the problem?

Most empirical studies (outside of economics) find that police either increase crime or have no effect on crime.

1. Detection bias: $\uparrow$ police $\Rightarrow$ $\uparrow$ detection $\Rightarrow$ $\uparrow$ crime.
2. Reporting bias: $\uparrow$ police $\Rightarrow$ $\uparrow$ reporting $\Rightarrow$ $\uparrow$ crime.
3. Simultaneity:
   - Dynamic: $\uparrow crime_t \Rightarrow \uparrow police_{t+1} \Rightarrow \uparrow crime_{t+1}$.
   - Static: $\uparrow crime_i \longleftrightarrow \uparrow police_i$.

Research Question 2

What is the causal effect of police numbers on arrests?

- Theory doesn't make any definitive claims regarding arrests.
- Deterrence lowers the arrest rate.
- Incapacitation requires a higher arrest rate.
- Effects move against each other when it comes to arrests.
- And we still have to deal with detection, reporting and simultaneity bias.

Literature I

- All studies estimating these causal effects deal with reporting and detection bias by looking at crimes unaffected by these problems.
  - Murder, robbery, break and enter, theft and motor vehicle theft.
  - I also look at these crimes.
- These studies differ in how they deal with the simultaneity problem.
- Separate studies into four groups based on their approach to simultaneity.
- Here I briefly review one of my favourites from each group.

Literature II

1. Time series:
   - Control for seasonality/pre-existing trends and then determine whether or not an increase in police numbers in one period lead to reductions in crime in the following period.
   - Marvell and Moody (1996) find Granger-causation between crime and police.
2. Instrumental Variables:
   - Utilise a third variable, called an instrument, that is correlated with police numbers but otherwise unrelated to crime rates.
   - Instrument allows us to isolate for variation in police numbers that is otherwise unrelated to crime.
   - Levitt (1997) uses election cycles as an instrument for police numbers.

Literature III

3. Difference-in-Differences:
   - Compare treatment group exposed to policy intervention to a control group before and after.
   - Di Tella and Schargrodsky (2004) use variation in police numbers resulting from a terrorist bombing Argentina to look at MV thefts.
4. Unconventional approaches:
   - Klick and Tabarrok (2005) use variation in the daily terror alert level to infer the impact of police on crime in Washington D.C.

Literature IV

- Only one prior study has estimated the causal relationship between police and arrests.
- Owens (2013) instrument police numbers with hiring grants allocated by congress to estimate the effect of police on rates of arrests.
- She finds police to have no significant effect on arrests.
- Implies police reduce crime through deterrence (rather than incapacitation).

Data

- Monthly Local Area Command (LAC) level counts of police, crime and arrests over the period July 2000 - December 2005.
- Look at homicide, robbery, theft, motor vehicle theft and break and enter.

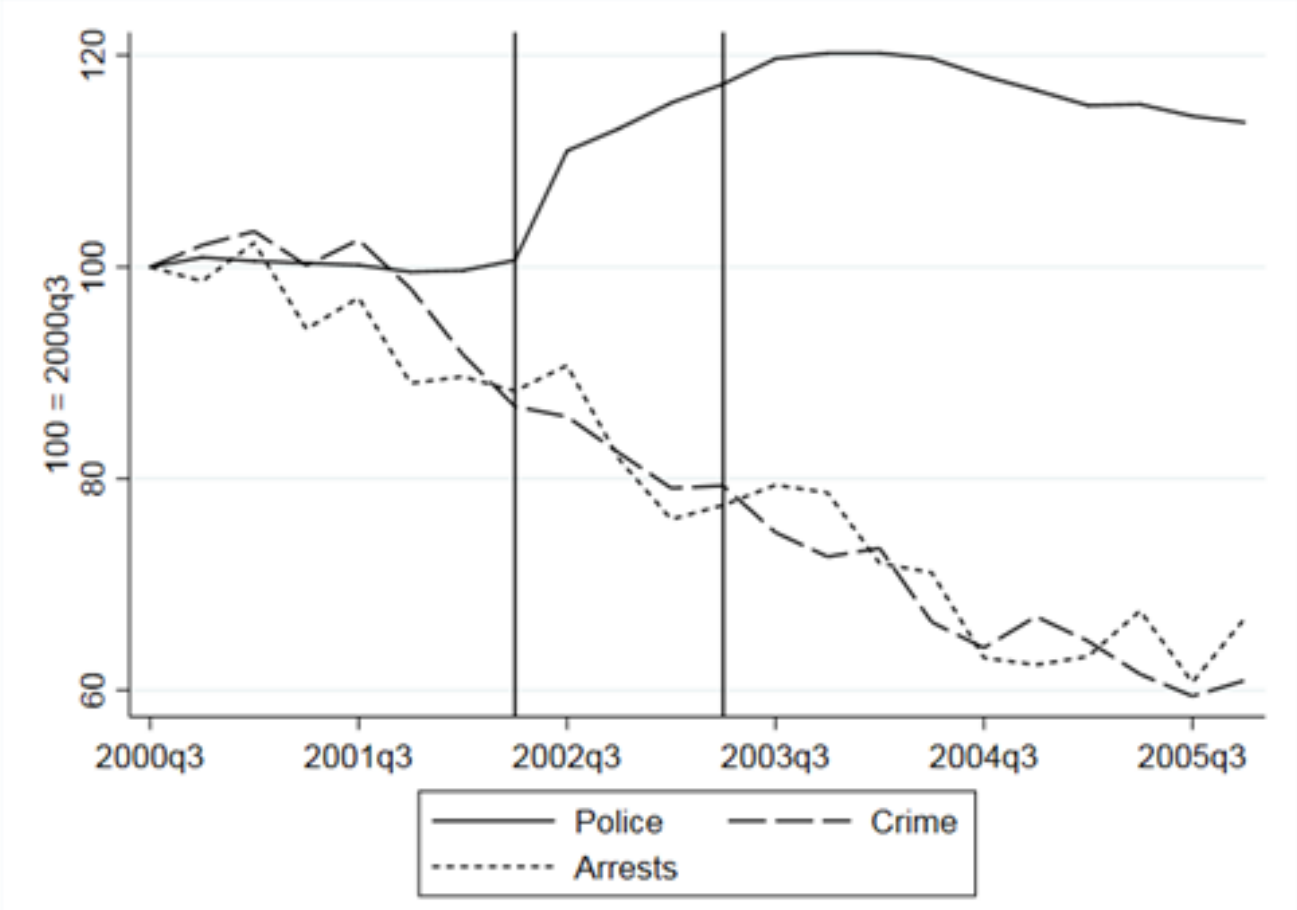
Lead up to the 1999 State Election

- Major parties to get tough on crime: *'Tough Times Require Tough Action'*.
- NSW Premier, Bob Carr, promises to increase the number of sworn police officers to 14,307 by December 2003 (up from about 13k in 1998).
- After winning the election nothing happens until about a year out from the next election.

Lead up to the 2003 State Election

- Major parties get tough on crime: *'Ethnic gang crime on the rise'*.
- May 2002: Temporary Police Campus in Richmond opens.
  - 2002 Annual police report: *'establishment of the additional campus will enable police numbers to reach 14,407 by December 2003'*.
- December 2002: Carr government meets the 14,407 election commitment almost a year early.
  - 2003 Annual police report: *'In the last 12 months we have taken on a record number of new recruits, with more than 1800 probationary constables sworn in'*
- March 2003: Bob Carr wins the 2003 election.
- April 2003: Police numbers begin to fall.

Politics, Police, Crime & Arrests



Identification strategy

My strategy has three steps:

1. Estimate the effect of the hiring campaign on police numbers.
2. Estimate the change in crime and arrest rates during campaign.
3. Use these two estimates to compute the change in crime/arrests resulting from the change in police numbers.

Identifying assumption: No factor that varies across *both* LACs and time that influences crime (or arrests) during April 2002 - April 2003.

- Example: Moffatt, Weatherburn & Donnelly (2005).

Step 1: Hiring campaign on police numbers (model)

$$ln(P_{it}) = \beta^{First} D_t + \phi \mathbf{X_{it}} + \theta_i + \lambda_t + e_{it} \quad (1)$$

- P_{it} is the number of police in LAC i during month-year t.
- D_t is a binary variable equal to one during the hiring campaign, zero before.
- $\mathbf{X_{it}}$ controls for LAC level linear trends in police hiring.
- θ_i controls for static simultaneity (i.e. some LACs have more crime/police than others).
- λ_t controls for seasonality across NSW (in crime and unemployment rates for example).
- e_{it} represents everything we can't see in the data.
- β^{First} is the average percentage change in the size of the police force resulting from the campaign.

Step 1: Hiring campaign on police numbers (results)

Table 2: First stage estimates for the effect of the hiring campaign on police numbers

	Full sample	First quartile	Second quartile	Third quartile	Fourth quartile
	(1)	(2)	(3)	(4)	(5)
Hiring campaign	0.072***	0.049**	0.104***	0.055***	0.080***
	(0.010)	(0.025)	(0.025)	(0.015)	(0.014)
SW Chi-Sq Statistic	52.62***	4.58**	19.75***	15.11***	36.73***
SW F-Statistic	48.60***	3.99*	17.23***	13.18***	31.91***
Observations	2550	646	646	646	612
LAC FEs	Y	Y	Y	Y	Y
Time FEs	Y	Y	Y	Y	Y
Linear trends	Y	Y	Y	Y	Y

*Table 2 reports estimates of the relation between hiring campaign and the size of the police force. SW = Sanderson-Windmeijer, LAC = Local Area Command, FEs = Fixed Effects, cluster robust standard errors in pantheresses, clusters refer to LACs of which we have 75 in each regression, p<0.1 *, p<0.05 **, p<0.01***.*

Step 2: Hiring campaign on crime (or arrest) rates (model)

$$ln(C_{it}) = \beta^{RF} D_t + \phi \mathbf{X_{it}} + \theta_i + \lambda_t + v_{it} \quad (2)$$

- C_{it} is the count of crimes (or arrests) in LAC i during month-year t.
- v_{it} represents everything we can't see in the data.
- β^{RF} is the average percentage change in the crime (or arrest) rate of during the hiring campaign.
- Everything else has the same definition as before.

Steps 2 & 3: Hiring campaign on crime rates (results)

Table 3. Two stage least squares estimates for the effect of police numbers on crime

	Break and enter	Theft	Motor vehicle theft	Property crime	Robbery	Homicide	Violent crime
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Hiring campaign	-0.008	-0.058***	-0.082**	-0.045**	0.056	-0.017	0.051
	(0.029)	(0.018)	(0.036)	(0.021)	(0.045)	(0.036)	(0.047)
Elasticity	-0.105	-0.801***	-1.144**	-0.628*	0.774	-0.242	0.714
	(0.408)	(0.285)	(0.528)	(0.321)	(0.650)	(0.507)	(0.673)
Observations	2,550	2,550	2,550	2,550	2,550	2,550	2,550
Estimation method:	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS
LAC FEs:	Y	Y	Y	Y	Y	Y	Y
Time FEs:	Y	Y	Y	Y	Y	Y	Y
Linear trends:	Y	Y	Y	Y	Y	Y	Y

*LAC = Local Area Command, FEs = Fixed Effects, 2SLS = Two-Stage Least Squares, cluster robust standard errors in pantheresses, clusters refer to LACs of which we have 75 in each regression, p<0.1 *, p<0.05 **, p<0.01****

Steps 2 & 3: Hiring campaign on arrest rates (results)

Table 4. Two stage least squares estimates for the effect of police numbers on arrests

	Break and enter	Theft	Motor vehicle theft	Property crime	Robbery	Homicide	Violent crime
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Hiring campaign	0.042	0.000	-0.112	-0.001	0.161**	-0.016	0.143**
	(0.065)	(0.042)	(0.076)	(0.039)	(0.065)	(0.036)	(0.070)
Elasticity	0.578	0.005	-1.560	-0.012	2.245**	-0.229	1.992*
	(0.892)	(0.588)	(1.075)	(0.550)	(0.962)	(0.507)	(1.005)
Observations	2,550	2,550	2,550	2,550	2,550	2,550	2,550
Estimation method:	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS
LAC FEs:	Y	Y	Y	Y	Y	Y	Y
Time FEs:	Y	Y	Y	Y	Y	Y	Y
Linear Trends:	Y	Y	Y	Y	Y	Y	Y

*LAC = Local Area Command, FEs = Fixed Effects, cluster robust standard errors in pantheresses, clusters refer to LACs of which we have 75 in each regression, p<0.1 *, p<0.05 **, p<0.01****

Summary of the main results

- The hiring campaign increased the size of the police force by about 7 percent.
- Property crime fell significantly during the same period.
- A 1% increase in the size of the police force generates:
  - 0.8% reduction in theft.
  - 1.1% reduction in MV theft.
  - 0.63% reduction in aggregate property crime.
  - No convincing reductions for break and enter or violent crime.
- This roughly equates to one additional officer stopping 17 thefts and 4 MV thefts each year.
- No significant effect of police on arrests for these same crimes.
- Police reduce crime through deterrence rather than incapacitation.

Policy implications

- Natural question to ask: Is the wage cost of an additional police officer offset by the benefit she provides to society in the form of crime reduction?
- In 2005 a GD made about $50,000/year.
- Using insurance claims data; Mayhew (2003) estimated the cost of a MV theft to be about $6,000/vehicle.
- Thus, an additional police officer is able to offset almost half of her annual salary by deterring MV thefts alone.
- This result is largely consistent with evidence from the U.S., England and Wales and Argentina.

Limitations

1. Generalizability of the present study to modern day NSW is questionable at best.
   - Innovations in security technology.
   - Fraction of the general population that offends is smaller.
   - Deterioration in the market for stolen goods.
2. Additional police were used to support high visibility policing operations with the explicit goal of deterring street offences.
   - If the additional police were used for a different purpose we may see a different result.
3. I only investigate a small number of violent and property crimes.

Present study is the first of its kind in Australia and therefore provides the only available guidance to policymakers in an Australian setting.

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