Temperature Shocks, Crime and Social Welfare Programs: Evidence from India

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Outline

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Motivation

- Climate change has increased incidence of conflict & crime (Miguel et al., 2004; Ranson, 2014; Bayson et al., 2019).
- Mechanism
  - Direct:Increased temperature , increases aggression resulting criminal behaviour (Anderson et al., 2000; Mars, 2013)
  - Indirect:Increased temperature, hampers related economic activity and attributes to criminal behaviour (Becker, 1968; Gangopadhyay & Nilakantan, 2018).
- Social welfare scheme has helped to reduce conflicts in Maoists and Naxalite regions in India (Fetzer,2020)
- There is lack of evidence on does social welfare programs helps to mitigate incidence of crime, in event of extreme temperature?

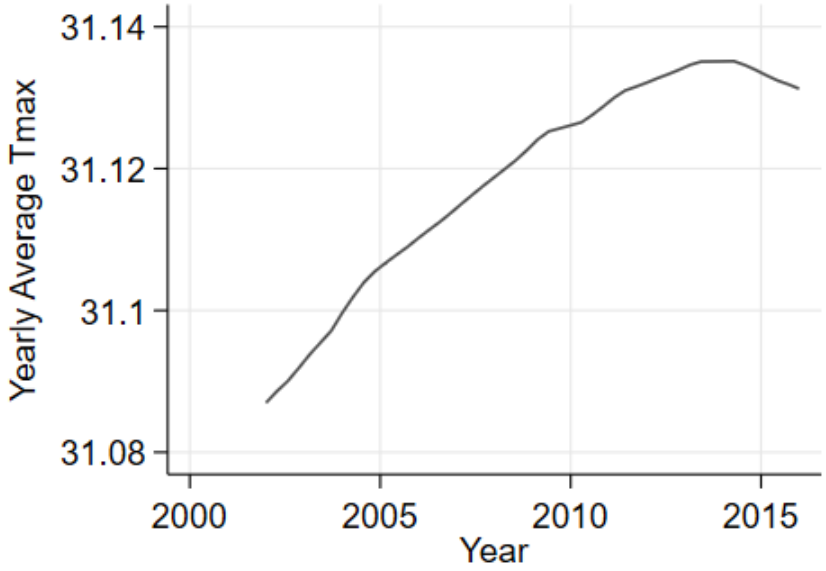
Brief Overview of Literature

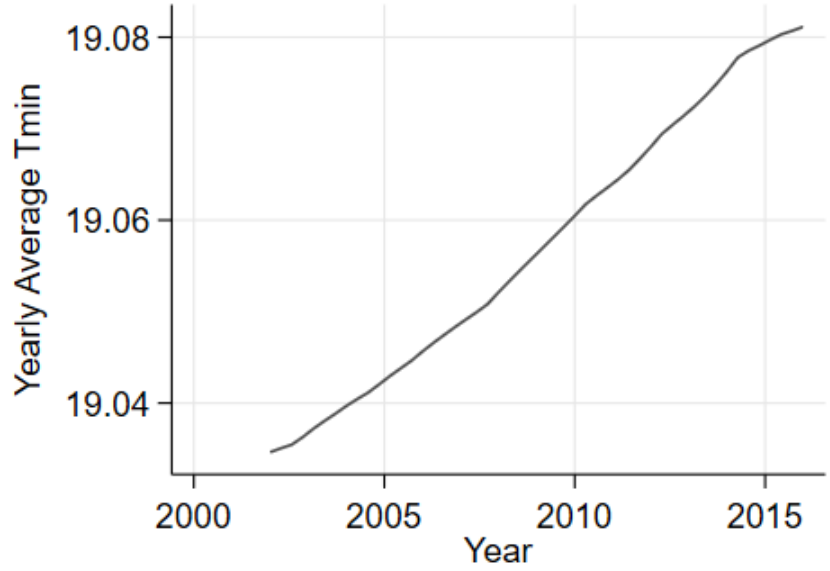
- Empirical Literature on Impact of Weather Shocks on Human Life
  - Weather shocks impacts agricultural output (Hubler et al., 2008), individual physical and mental health (Grace et al., 2015; Mullins & White, 2019), mortality(Burgess et al., 2017) and economy (Dell et al., 2014).
  - Increased temperature will lead to increase in rape, murder, assault, robberies, burglaries compared to the crime would have happened in absence of climate change.(Ranson, 2014)
- Studies on Weather Shocks and conflict in Indian Context
  - Drought and rainfall shocks strongly impacts incidence of crime (Blakeslee & Fishman, 2018)
  - Individuals are sensitive to the violence even if the temperature goes high on the single day (Blakeslee et al., 2021)
- Impact of Social Welfare Program in Indian Context
  - Social Welfare Schemes have led significant drop in conflict in Maoists and Naxalite region (Fetzer, 2020)
  - MGNREGA has mediating impact on climate shocks and domestic violence (Sharma, 2022)

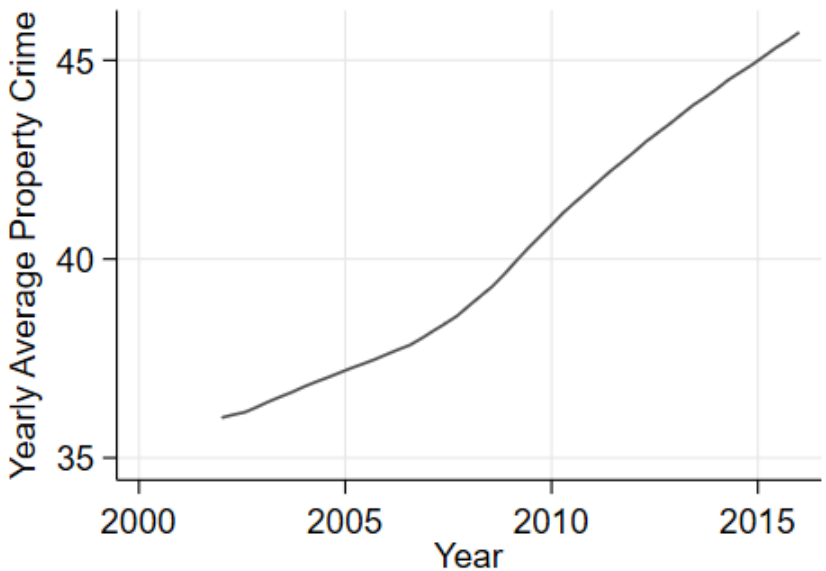
Research Question

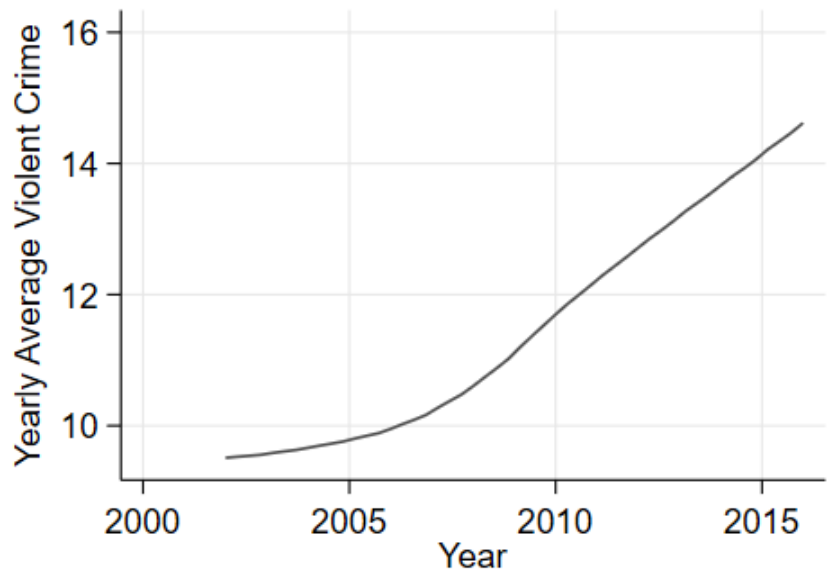
Does the social welfare schemes helps to reduce the incidence of crime, given the rise in temperature?

Temperature and Incidence of Crime: At a glance









Social Welfare Program: MGNREGA

1. Introduced in September 2005 and rolled out in 3 phases.
2. Provides at least 100 days of employment with guaranteed wages in rural India for an adult household ($>$18years of age) willing to do unskilled manual work.
3. Emphasis on $1/3^{rd}$ of total beneficiaries should be women
4. Major focus:To strengthen livelihoods resource base of poor.
5. Phase 1 (2006): 200 backward districts, Phase 2 (2007): 130 Phase 3 (2008): Pan India.

Data Description

1. Climate Service Portal
   - Time frame: 2000 - 2015
   - The data provides the daily mean of maximum and temperature in Celsius over 1.0×1.0 latitude longitude grid.
   - We match IMD temperature data with the district co-ordinates within a 250-kilometers radius (Banerjee and Maharaj, 2020)
   - We get a sample of 523 districts.
2. National Crime Records Bureau
   - Time frame considered : 2000 - 2015
   - Crimes recorded under Indian Penal Code (IPC)[1]
     - Violent Crimes (murder, attempt to murder, rape, kidnap)
     - Property Crimes (burglary, theft, riots, robbery, dacoity)
3. Mahatma Gandhi NREGA
   - Data obtained from official Gazette.

[1] We use (Blakesless & Fishman, 2017; Blakesless et al., 2021) as reference.

Empirical Model

$$logE(C_{dt}) = \alpha temp_{dt} + \beta MGNREGA_{dt} + \gamma(temp_{dt} \times MGNREGA_{dt}) + \theta_d + k_t + \epsilon_{dt}$$

$logE(C_{dt})$ = log of outcome variable of officially reported crime in district d at time t.

$temp_{dt}$ = mean of temperature of $district_d$ in year t

$MGNREGA_{dt}$ = indicates if MGNREGA is available in dist d at time t.

θ_d is district fixed effects, k_t is year fixed effect & ϵ_{dt} is the error term.

Standard errors are clustered at district level.
Our coefficient of interest is γ.

Main Results: Impact of NREGA on Property Crimes

Table: DID estimate of MGNREGA on property crimes during extreme temperature

	Property Crimes (Absolute)				
Variables	Burglary	Theft	Riots	Robbery	Dacoity
MGNREGA × Temp	-4.959***	-17.84**	-2.703**	-5.224*	-0.245*
	(1.707)	(7.162)	(1.153)	(2.643)	(0.122)
N	7,714	7,714	7,710	7,640	7,640
District FE	✓	✓	✓	✓	✓

Results: Impact of NREGA on Property Crimes

Table: DID estimate of MGNREGA on property crimes during extreme temperature

	Property Crimes (Normalized)				
Variables	Burglary	Theft	Riots	Robbery	Dacoity
MGNREGA × Temp	-0.227*	-0.770*	-0.477***	-0.131*	-0.000822
	(1.707)	(7.162)	(1.153)	(2.643)	(0.122)
N	7,714	7,714	7,710	7,640	7,640
District FE	✓	✓	✓	✓	✓

Results: Impact of NREGA on Violent Crime

Table: DID estimate of MGNREGA on violent crimes during extreme temperature

	Violent Crimes (Absolute)			
Variables	Murder	Attempt to Murder	Rape	Kidnap
MGNREGA × Temp	0.0175	0.0169	-0.0098	-0.147**
	(0.0151)	(0.0505)	(0.0154)	(0.0476)
N	7,715	7,715	7,715	7,715
District FE	✓	✓	✓	✓

Results: Impact of NREGA on Violent Crime

Table: DID estimate of MGNREGA on violent crimes during extreme temperature

	Violent Crimes (Normalized)			
Variables	Murder	Attempt to Murder	Rape	Kidnap
MGNREGA × Temp	-0.0023***	-0.0035**	-0.0006	-0.0075***
	(0.0008)	(0.0016)	(0.0008)	(0.0023)
N	7,715	7,715	7,715	7,715
District FE	✓	✓	✓	✓

Parallel Trend: Test 1 - (2003-2004)

Table: Parallel Trend test: DID estimate of MGNREGA on incidence of crime

	Panel A: Property Crimes (Absolute)				
Variables	Burglary	Theft	Riots	Robbery	Dacoity
MGNREGA × Temp	3.782	-9.631	-1.177	-1.1777	-0.442
	(0.075)	(0.463)	(0.057)	(0.003)	(0.003)
N	1,020	1,026	1,026	1,020	1,020
	Panel B: Violent Crimes (Absolute)				
Variables	Murder	Attempt to Murder	Rape	Kidnap	
MGNREGA × Temp	0.0014	0.004	0.0007	0.001	
	(0.001)	(0.0035)	(0.0015)	(0.0019)	
N	1,028	1,028	1,028	1,020	
District FE	✓	✓	✓	✓	✓

Parallel Trend: Test 2 - (2002-2003)

Table: Parallel Trend test: DID estimate of MGNREGA on incidence of crime

	Panel A: Property Crimes (Absolute)				
Variables	Burglary	Theft	Riots	Robbery	Dacoity
MGNREGA × Temp	0.918	8.056	-8.873	0.223	0.263
	(6.942)	(21.81)	(6.398)	(1.396)	(0.342)
N	1,020	1,020	1,020	1,020	1,020
	Panel B: Violent Crimes (Absolute)				
Variables	Murder	Attempt to Murder	Rape	Kidnap	
MGNREGA × Temp	0.0007	-0.0002	-0.0005	-0.0008	
	(0.0017)	(0.0013)	(0.0017)	(0.0023)	
N	1,028	1,028	1,028	1,020	
District FE	✓	✓	✓	✓	✓

Parallel Trend: Test 3 - (2002-2004)

Table: Parallel Trend test: DID estimate of MGNREGA on incidence of crime

	Panel A: Property Crimes (Absolute)				
Variables	Burglary	Theft	Riots	Robbery	Dacoity
MGNREGA × Temp	4.242	15.56	-2.935	-1.065	-0.320
	(5.047)	(17.76)	(4.317)	(1.121)	(0.296)
N	1,530	1,530	1,530	1,530	1,530
	Panel B: Violent Crimes (Absolute)				
Variables	Murder	Attempt to Murder	Rape	Kidnap	
MGNREGA × Temp	-0.0004	0.0028	-0.0008	-0.0011	
	(0.0013)	(0.0016)	(0.0010)	(0.0014)	
N	1,542	1,542	1,542	1,542	
District FE	✓	✓	✓	✓	✓

Heterogeneity: SCSTs Minority Districts and Property Crimes

Table: DID estimate of MGNREGA on property crimes during extreme temperature

	Property Crimes (Absolute)				
Variables	Burglary	Theft	Riots	Robbery	Dacoity
MGNREGA × Temp	-5.519***	-12.10*	-3.43**	-2.70**	-0.1107*
	(1.746)	(6.273)	(1.39)	(1.09)	(0.059)
N	6,511	6,511	6,507	7,640	6,452
District FE	✓	✓	✓	✓	✓

Heterogeneity: SCSTs Minority Districts and Property Crimes

Table: DID estimate of MGNREGA on property crimes during extreme temperature

	Property Crimes (Normalized)				
Variables	Burglary	Theft	Riots	Robbery	Dacoity
MGNREGA × Temp	-0.226*	-0.560**	-0.471***	-0.0716*	0.008
	(1.13)	(0.285)	(0.179)	(0.0391)	(0.0065)
N	6,511	6,511	6,507	6,452	6,452
District FE	✓	✓	✓	✓	✓

Heterogeneity: SCSTs Minority Districts and Violent Crimes

Table: DID estimate of MGNREGA on violent crimes during extreme temperature

	Violent Crimes (Absolute)			
Variables	Murder	Attempt to Murder	Rape	Kidnap
MGNREGA × Temp	0.0141	-0.00445	-0.00550	-0.122***
	(0.0168)	(0.0560)	(0.0143)	(0.0320)
N	6,512	6,512	6,512	6,512
District FE	✓	✓	✓	✓

Heterogeneity: SCSTs Minority Districts and Violent Crimes

Table: DID estimate of MGNREGA on violent crimes during extreme temperature

	Violent Crimes (Normalized)			
Variables	Murder	Attempt to Murder	Rape	Kidnap
MGNREGA × Temp	-0.0019**	-0.0022	0.0000	-0.0049***
	(0.0007)	(0.0017)	(0.0007)	(0.0016)
N	6,512	6,512	6,512	6,512
District FE	✓	✓	✓	✓

Conclusion

- The paper concludes that with the $\Uparrow$ temperature leads to $\Uparrow$ property and violent crime [Blakeslee & Fishman (2017) and Blakeslee et.al (2021)].
- With the increase in the deviation of temperature from its long term mean, incidence of crime increases.
- Introduction of NREGA significantly helps to reduce the incidence of crime [Fetzer (2020) & Sharma (2020)]
- SCSTs minority districts commit significantly less crimes, especially the property crimes.

Thank You !!!

Questions & Feedback

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