Additional Figures and Tables

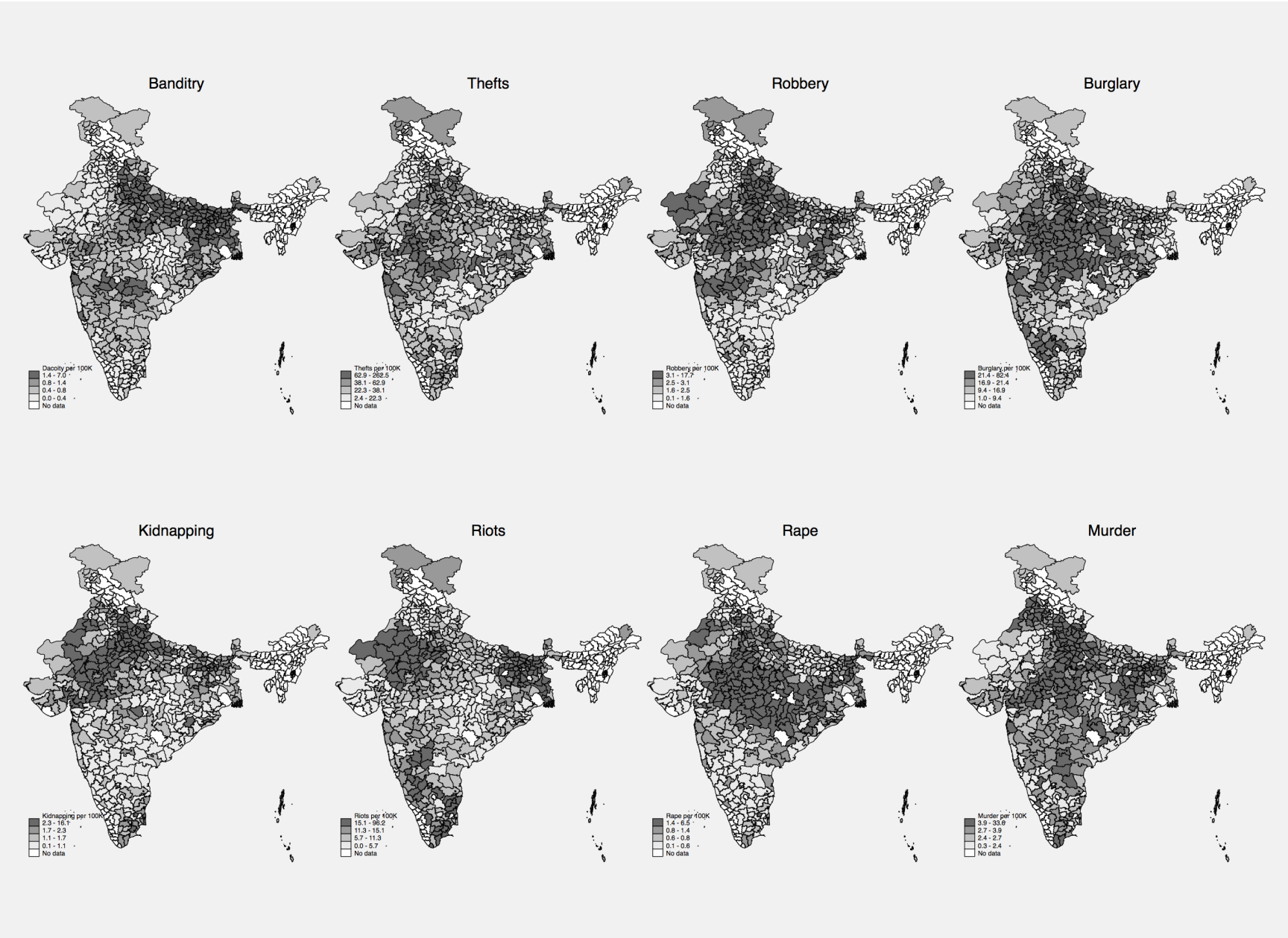

Figure A.1: The spatial distribution of average 1971-2000 crime rates (crimes committed per 100,000 population).

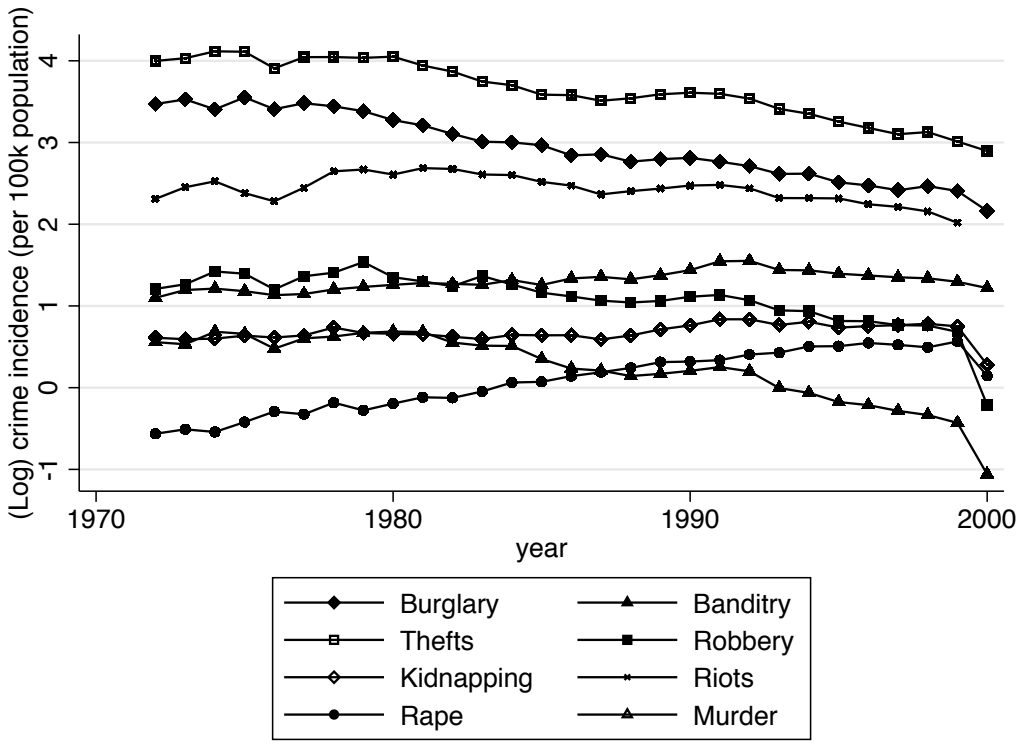

Figure A.2: Plots of the (logarithm) of India-wide average crime incidence (per 100,000 population) over time.

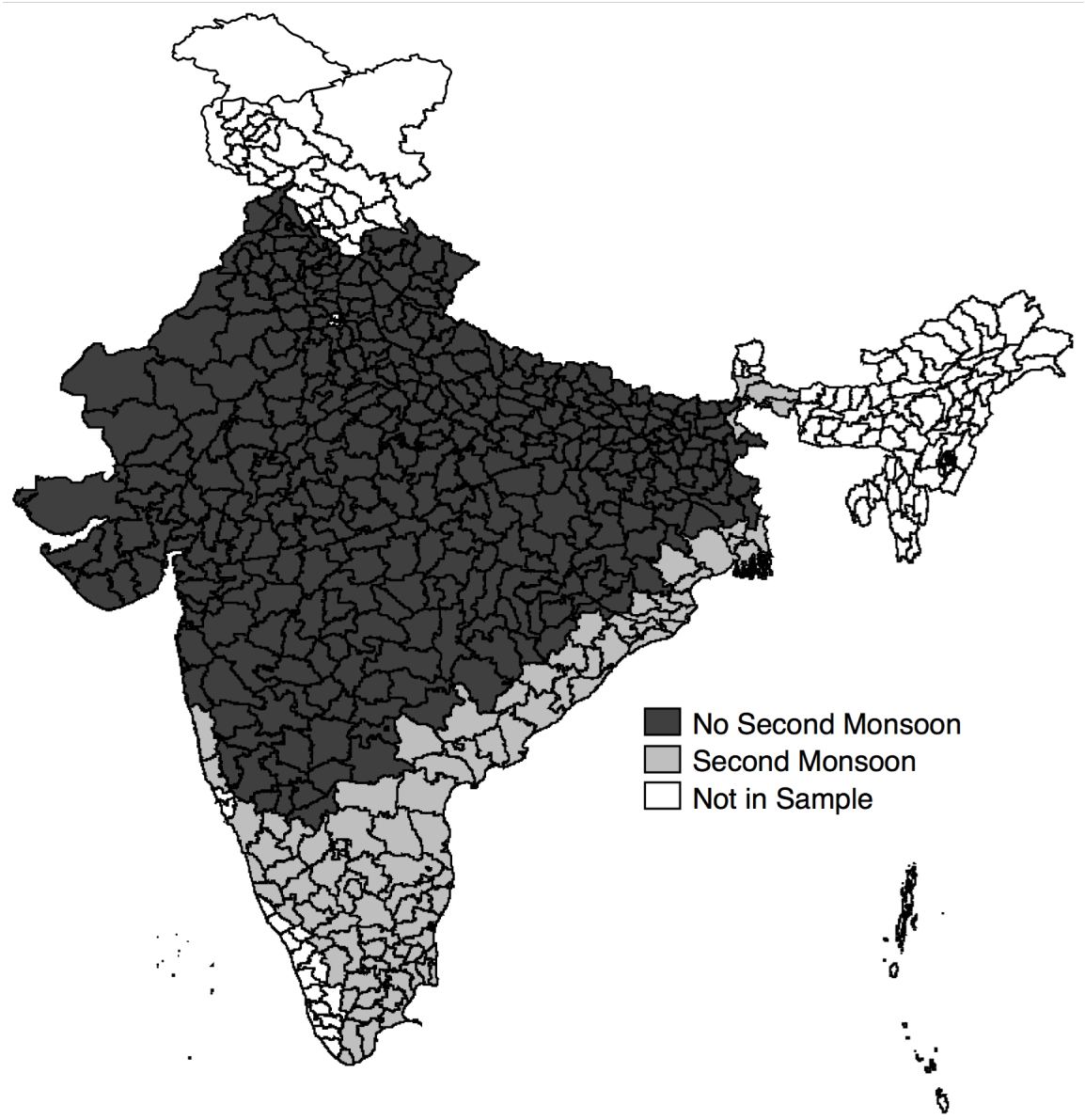

Figure A.3: A map of the districts included in the "Second Monsoon" analysis.

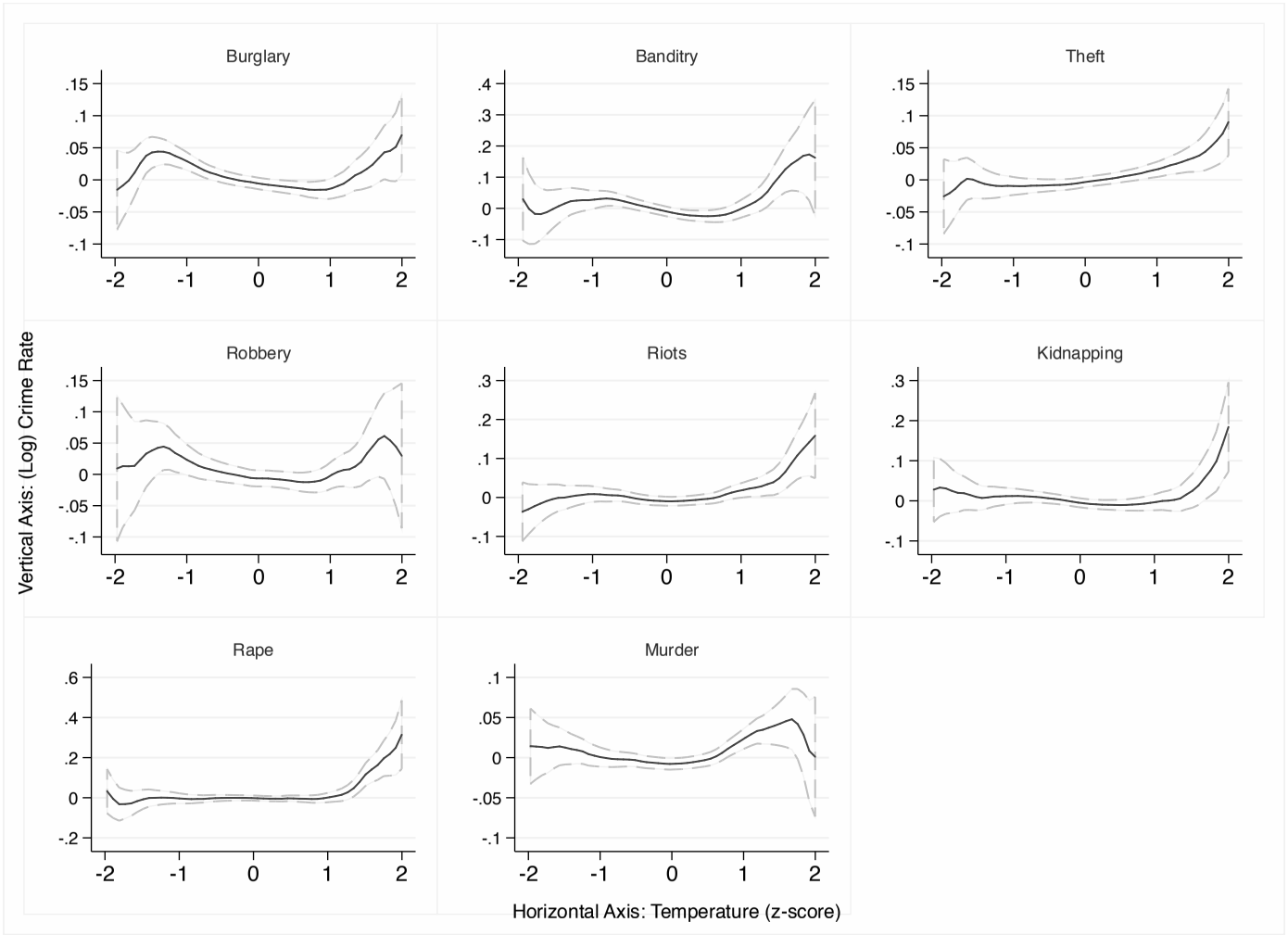

Figure A.4: Local regressions of individual crime category incidence on standardized (z-score) monsoon temperature (degree-days). To produce these plots, the pooled (logarithm of) crime rate and the weather deviation in question are both regressed on all other explanatory variables in equation (2). The residual term from the crime regression is then regressed on the residual from the weather deviation regression using a locally weighted polynomial regression with Epanechnikov kernel functions (using the STATA command lpolyci). Note: 95% confidence intervals are based on errors (dashed lines) that are not clustered as in our main specifications.

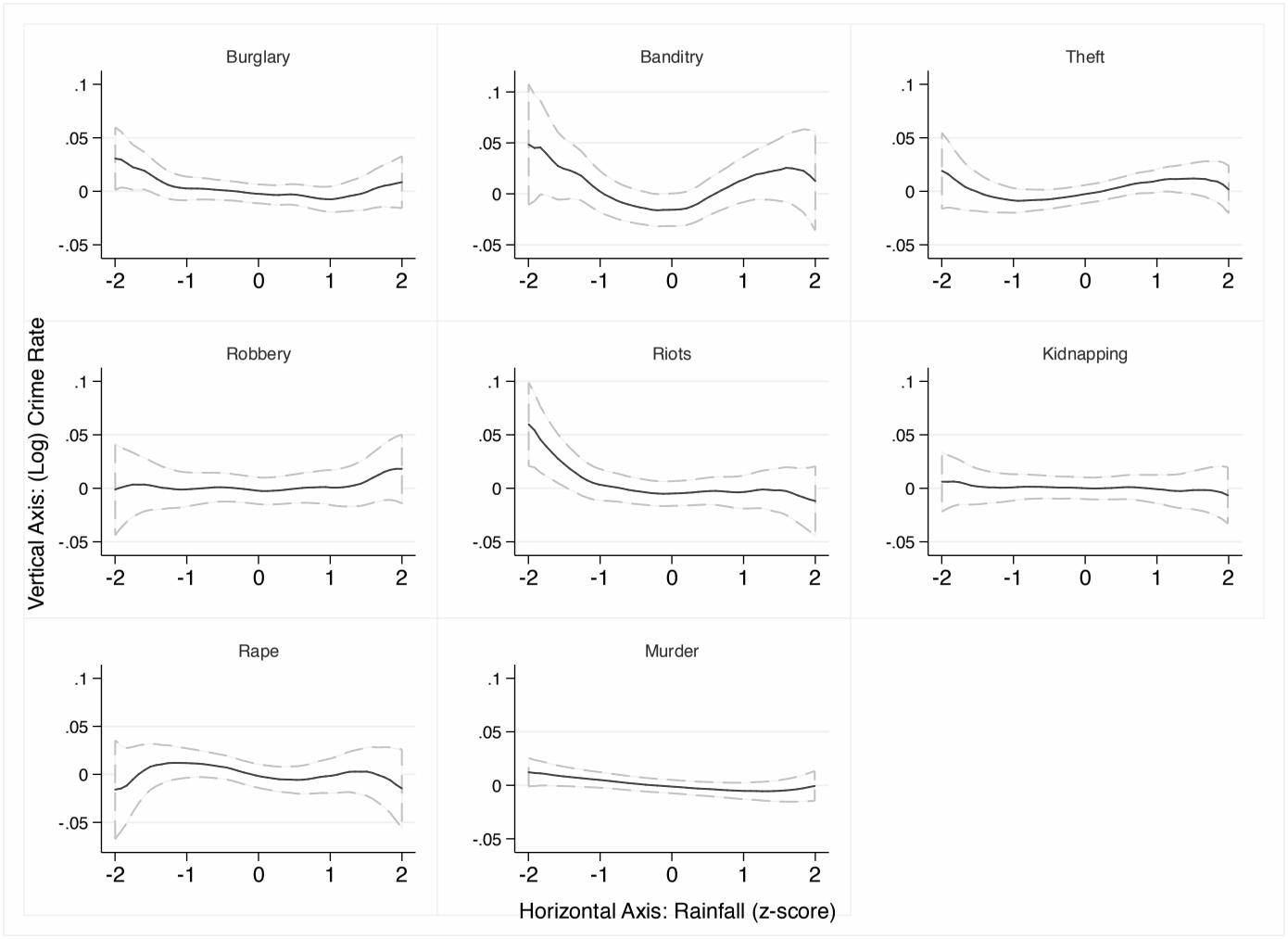

Figure A.5: Local regressions of individual crime category incidence on standardized (z-score) monsoon rainfall. To produce these plots, the pooled (logarithm of) crime rate and the weather deviation in question are both regressed on all other explanatory variables in equation (2). The residual term from the crime regression is then regressed on the residual from the weather deviation regression using a locally weighted polynomial regression with Epanechnikov kernel functions (using the STATA command lpolyci). Note: 95% confidence intervals are based on errors (dashed lines) that are not clustered as in our main specifications.

Table A.1: The Effects of Weather Shocks on Individual Crops' Yield

	Monsoon Crops					Dry Season Crops				
	Rice	Jowar	Bajra	Maize	Arhar	Rice	Jowar	Bajra	Maize	Wheat
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Monsoon										
Neg Rain	-0.176***	-0.110***	-0.202***	-0.105***	-0.092***	-0.021	-0.109***	-0.146**	-0.025	-0.059***
	(0.023)	(0.028)	(0.044)	(0.032)	(0.021)	(0.016)	(0.033)	(0.064)	(0.027)	(0.014)
Pos Rain	0.010	-0.054***	-0.041	-0.076**	0.007	0.013	-0.008	-0.023	0.011	0.023**
	(0.012)	(0.019)	(0.036)	(0.032)	(0.017)	(0.018)	(0.022)	(0.035)	(0.017)	(0.010)
Neg Temp	0.024	0.011	0.163**	0.017	0.071***	0.001	-0.016	0.072	0.017	0.022*
	(0.018)	(0.025)	(0.066)	(0.040)	(0.027)	(0.019)	(0.042)	(0.076)	(0.026)	(0.012)
Pos Temp	0.001	-0.010	-0.075	-0.048	-0.024	0.027	0.043	-0.067	-0.047*	0.019
	(0.025)	(0.035)	(0.061)	(0.036)	(0.025)	(0.026)	(0.041)	(0.066)	(0.027)	(0.014)
Pre-Monsoon										
Neg Temp	0.028	0.073**	0.005	0.011	-0.035	-0.006	0.049	-0.039	0.001	-0.004
	(0.020)	(0.030)	(0.047)	(0.035)	(0.022)	(0.017)	(0.031)	(0.059)	(0.032)	(0.013)
Pos Temp	0.013	0.006	0.043	0.120***	0.027	-0.039**	-0.037	-0.004	0.013	-0.041***
	(0.017)	(0.025)	(0.041)	(0.033)	(0.022)	(0.016)	(0.027)	(0.058)	(0.023)	(0.016)
R-Squared	0.157	0.046	0.056	0.062	0.096	0.111	0.082	0.117	0.341	0.156
N	5784	4705	1295	2476	6737	2300	1966	386	1108	6985

Columns 1-10 report estimates of regression of the yields of individual crops on monsoon and Pre-monsoon weather shocks. Standard errors, clustered in time and space (see text), are reported in parentheses. Stars indicate statistical significance: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.2: The Effects of Weather Shocks on Individual Crime Categories (Multiple Bins)

	Property	Non-Property	Burglary	Banditry	Thefts	Robbery	Riots	Kidnapping	Rape	Murder
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Rainfall										
< -1.5 Sd	0.082***	0.035*	0.045	0.130***	0.053**	0.063	0.119***	0.030	0.010	0.045**
	(0.025)	(0.020)	(0.030)	(0.045)	(0.026)	(0.048)	(0.042)	(0.032)	(0.031)	(0.021)
-1.5 To -1.0	0.062***	0.033**	0.077***	0.083***	0.037*	0.054**	0.059*	0.048**	0.021	0.024**
	(0.015)	(0.013)	(0.019)	(0.027)	(0.022)	(0.026)	(0.033)	(0.019)	(0.024)	(0.012)
-0.5 To -1.0	0.014	0.017	-0.001	0.032	0.013	0.016	0.011	0.024	0.013	0.014
	(0.012)	(0.010)	(0.016)	(0.023)	(0.013)	(0.019)	(0.019)	(0.015)	(0.017)	(0.011)
05. To 1.0	0.024**	-0.013	-0.012	0.075***	0.018	0.046**	-0.003	0.004	-0.045**	-0.003
	(0.012)	(0.011)	(0.015)	(0.023)	(0.012)	(0.020)	(0.018)	(0.017)	(0.018)	(0.011)
1.0 To 1.5	0.008	-0.000	-0.012	0.029	-0.001	-0.006	0.018	0.009	-0.011	-0.009
	(0.014)	(0.013)	(0.017)	(0.028)	(0.015)	(0.023)	(0.019)	(0.021)	(0.021)	(0.013)
> 1.5 Sd	0.044***	0.028*	0.021	0.119***	0.056***	0.045*	-0.013	0.045*	0.017	0.020
	(0.016)	(0.014)	(0.017)	(0.030)	(0.018)	(0.027)	(0.028)	(0.024)	(0.024)	(0.014)
Temperature										
< -1.5 Sd	-0.007	-0.013	-0.019	-0.037	-0.004	0.028	-0.013	-0.004	-0.032	0.001
	(0.028)	(0.023)	(0.027)	(0.048)	(0.029)	(0.043)	(0.040)	(0.029)	(0.038)	(0.023)
-1.5 To -1.0	0.050***	0.019	0.048***	0.071**	0.026	0.097***	0.012	0.001	0.022	0.035**
	(0.016)	(0.015)	(0.017)	(0.036)	(0.016)	(0.028)	(0.028)	(0.024)	(0.025)	(0.015)
-0.5 To -1.0	0.027*	0.021*	0.034**	0.001	0.014	0.059**	0.027	0.013	0.011	0.033***
	(0.015)	(0.012)	(0.016)	(0.030)	(0.016)	(0.024)	(0.022)	(0.018)	(0.022)	(0.013)
05. To 1.0	-0.011	0.003	-0.021	-0.030	0.013	-0.002	-0.017	-0.028	0.012	0.022*
	(0.013)	(0.012)	(0.017)	(0.025)	(0.014)	(0.026)	(0.020)	(0.018)	(0.019)	(0.012)
1.0 To 1.5	0.052**	0.026	0.005	0.086**	0.045*	0.071*	0.067**	0.007	0.041	0.027
	(0.021)	(0.020)	(0.025)	(0.036)	(0.027)	(0.042)	(0.032)	(0.026)	(0.030)	(0.021)
> 1.5 Sd	0.015	0.026	-0.022	0.039	0.015	0.024	0.023	0.011	0.018	0.063***
	(0.026)	(0.023)	(0.032)	(0.046)	(0.031)	(0.046)	(0.038)	(0.032)	(0.038)	(0.020)
R-Squared	0.204	0.111	0.421	0.509	0.184	0.231	0.235	0.180	0.356	0.053
N	45725	27570	9171	9117	9117	9173	9147	9186	9191	9193

Columns 1-2 report estimates of regression (2) which includes weather shocks in the monsoon and Pre-monsoon seasons, restricted to property (column 1) and non-property (column 2) crimes. Columns 3-10 report estimates of regressions in which the outcome variables are the logarithms of the rates of individual crime categories. In all regressions, multiple bins for the value of standardized weather shocks in the monsoon and Pre-monsoon seasons are included. Standard errors, clustered in time and space (see text), are reported in parentheses. Stars indicate statistical significance: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.3: The Effects of Lagged Weather Shocks on Crime

	Entire Sample	Secondary Monsoon
	(1)	(2)
Same Year		
Monsoon		
Neg Rain	0.047***	0.051**
	(0.010)	(0.021)
Pos Temp	0.031**	0.005
	(0.015)	(0.038)
Post-Monsoon		
Neg Rain		0.067***
		(0.022)
Pos Temp		0.059**
		(0.029)
Previous Year		
Monsoon		
Neg Rain	0.012	0.020
	(0.010)	(0.019)
Pos Temp	-0.005	-0.001
	(0.012)	(0.025)
Post-Monsoon		
Neg Rain		0.067***
		(0.022)
Pos Temp		0.005
		(0.031)
R-Squared	0.131	0.153
No. of Observations	73295	15041

Columns 1 and 2 reports estimates of regression (2) which include weather shocks in the year of observation and the previous year. Regressions reported in column 1 include Monsoon season shocks, and those reported in column 2 also include Post-Monsoon season shocks. In columns 2, the sample is limited to those districts that receive the second monsoon (figure **??**). Standard errors, clustered in time and space (see text), are reported in parentheses. Stars indicate statistical significance: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.4: The Effects of Weather Shocks on Crime and Agriculture in Wet and Dry Areas, Multiple Rainfall Bins

	Crime		Agricultural Product		Individual Agricultural Yields				
	Dry	Wet	Dry	Wet	Dryland Crops			Wet Crops	
					Jowar	Bajra	Maize	Rice	Arhar
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Rainfall									
< -1.5 Sd	0.062*	0.056**	-0.345***	-0.194***	-0.232***	-0.334***	-0.224***	-0.231***	-0.136***
	(0.033)	(0.022)	(0.078)	(0.036)	(0.053)	(0.059)	(0.071)	(0.042)	(0.043)
-1.5 To -1.0	0.069***	0.022	-0.110***	-0.083***	-0.106***	-0.209***	-0.083**	-0.174***	-0.076***
	(0.018)	(0.015)	(0.030)	(0.032)	(0.028)	(0.052)	(0.032)	(0.026)	(0.024)
-0.5 To -1.0	0.012	0.013	-0.045**	-0.036	-0.068***	-0.101***	-0.000	-0.065***	-0.033**
	(0.014)	(0.013)	(0.022)	(0.034)	(0.019)	(0.036)	(0.023)	(0.011)	(0.017)
05. To 1.0	0.003	0.020*	-0.034*	0.014	-0.035	0.056	-0.035	0.026**	0.033*
	(0.015)	(0.012)	(0.019)	(0.017)	(0.021)	(0.036)	(0.028)	(0.011)	(0.017)
1.0 To 1.5	0.021	-0.010	-0.024	-0.015	-0.050**	-0.000	-0.067*	0.011	-0.016
	(0.018)	(0.012)	(0.029)	(0.025)	(0.022)	(0.042)	(0.036)	(0.014)	(0.021)
> 1.5 Sd	0.058***	0.010	-0.093**	-0.001	-0.099***	-0.081*	-0.098*	-0.010	0.038
	(0.019)	(0.015)	(0.045)	(0.026)	(0.030)	(0.048)	(0.050)	(0.017)	(0.024)
R-Squared	0.146	0.111	0.106	0.111	0.052	0.077	0.058	0.170	0.100
N	38058	35395	3587	2928	4705	1295	2476	5784	6737

A comparison of the effects of rainfall shocks on crime and agriculture in the "wet" and "dry" sub-samples (see text for definitions) using multiple shock categories (or z-score bins). Columns 1-2 report estimates in which the outcome variable is the pooled crime rate. Columns 3-4 report estimates in which the outcome variable is the logarithm of annual agricultural product. Columns 5-9 report estimates in which the outcomes are the yields of the main "dryland crops" (columns 5-7) and "wet crops" (columns 8-9). Standard errors, clustered in time and space (see text), are reported in parentheses. Stars indicate statistical significance: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.5: The Effects of Weather Shocks in Irrigated Districts

	Crime	Product	Yield	Wage
	(1)	(2)	(3)	(4)
Neg Rain	0.051***	-0.046***	-0.024**	-0.016
	(0.016)	(0.017)	(0.012)	(0.011)
Pos Rain	0.024**	-0.033**	-0.005	-0.013
	(0.012)	(0.015)	(0.011)	(0.011)
Upstream Dam × Neg Rain	-0.037	0.093	0.111**	0.019
	(0.045)	(0.065)	(0.050)	(0.019)
Upstream Dam × Pos Rain	-0.018	0.028	0.002	-0.015
	(0.027)	(0.047)	(0.036)	(0.019)
R-Squared	0.911	0.917	0.906	0.876
No. of Observations	55322	6487	6486	3881

Column 1 reports estimates of regression (2) which includes monsoon rainfall shocks and their interaction with the presence of an irrigation dam upstream (the presence of dams within the district is also controlled for). Columns 2-4 report similar regressions in which the outcome variables are the logarithm of agricultural production (column 2), yield (column 3) and wages (column 4). Standard errors, clustered in time and space (see text), are reported in parentheses. Stars indicate statistical significance: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.6: The Effects of Monsoon Weather Shocks on Individual Crime Categories Across Decades

	Property	Non-Property	Burglary	Banditry	Thefts	Robbery	Riots	Kidnapping	Rape	Murder
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Negative Rainfall										
1970S	0.036	0.016	0.003	0.087**	-0.010	0.029	0.070**	0.032	0.006	0.007
	(0.022)	(0.022)	(0.037)	(0.040)	(0.039)	(0.035)	(0.033)	(0.027)	(0.044)	(0.021)
1980S	0.043**	0.014	0.090***	0.088**	0.032	-0.001	0.004	0.015	-0.001	0.029**
	(0.017)	(0.013)	(0.023)	(0.035)	(0.022)	(0.032)	(0.049)	(0.023)	(0.022)	(0.013)
1990S	0.039**	0.031**	0.044*	0.028	0.027*	0.055**	0.049	0.061**	0.006	0.027
	(0.018)	(0.016)	(0.025)	(0.031)	(0.016)	(0.027)	(0.032)	(0.024)	(0.028)	(0.019)
Positive Temperature										
1970S	0.079**	0.038	0.043	0.123*	0.080**	0.010	0.150***	0.020	0.073	0.026
	(0.031)	(0.026)	(0.032)	(0.064)	(0.039)	(0.047)	(0.051)	(0.035)	(0.046)	(0.025)
1980S	0.012	-0.006	0.019	-0.015	-0.044	0.116*	-0.018	-0.036	0.036	-0.018
	(0.028)	(0.023)	(0.035)	(0.047)	(0.043)	(0.066)	(0.047)	(0.041)	(0.035)	(0.021)
1990S	0.046***	0.038**	0.019	0.063*	0.030	0.097***	0.030	0.081***	-0.021	0.054***
	(0.018)	(0.015)	(0.022)	(0.034)	(0.018)	(0.027)	(0.023)	(0.021)	(0.023)	(0.019)

Estimated coefficients of negative rain (top 6 rows) and positive temperature (bottom 6 rows) shocks on property (column 1), non-property (column 2) and individual crime categories (columns 3-10) in each of the three decades in the sample (each estimate is from a separate regression). Standard errors, clustered in time and space (see text), are reported in parentheses. Stars indicate statistical significance: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

7 Alternative Rainfall Specifications

In table B.1, we report results of estimates that use alternative specifications of rainfall deviations in the monsoon season. First, we replace binary indicators of rainfall totals exceeding one localized standard deviation above and below the local long-term mean, with similar indicators of rainfall totals falling in the 80th and 20th percentiles of the localized long-term distribution, following Jayachandran (2006)and Kaur (2014). The results (panel A) are similar, and indicate that both types of shocks increase crime in a statistically significant manner, but that the impact of negative rainfall shocks is larger. Second, we use a continuous measure of the fractional deviation of total rainfall from its long-term local mean, following Duflo and Pande (2007). We find a negative impact, as expected (panel B), but it is imprecisely estimated, possibly because of the non-monotonic effect of rainfall. We therefore repeat the estimation, but separately estimate slopes in the positive and negative shock domains; and find, once again, that both are positive and significant, but that the negative effect is larger. Third, we conduct a similar estimation, but now using the localized continuous z-score instead of the fractional deviation. Once again, we find negative and positive shocks to have significant impacts, with a stronger effect for negative shocks (panel C). Finally, we test the effect of an alternative measure of precipitation that replaces the total rainfall amount with the number of rainy days (days having at least 0.1 mm of precipitation). Such measures have been recently shown to perform well as predictors of agricultural productivity (Fishman, 2016). We divide the range of possible values of this variable into 7 intervals and include binary indicators of each of those in the regression. We find that small number of rainy days below 55 (out of a maximum possible 120) lead to increases in crimes. The lack of impacts of positive rainfall shocks in this specification is consistent with the nature of the variable. While excessive total rainfall can damage crops, large numbers of rainy days imply a smooth distribution of rainfall and can therefore have monotonic positive impacts on crop yields, as shown by Fishman (2016).

Table B.1: Alternative Rainfall Specifications

		(Logarithm) of Pooled Crime Rates				
		(1)	(2)	(3)	(4)	(5)
A	Bottom Quintile	0.035***				
		(0.009)				
	Top Quintile	0.014*				
		(0.008)				
B	Fractional Deviation		-0.020			
			(0.013)			
	Neg Fract Deviation			0.134***		
				(0.029)		
	Pos Fract Deviation			0.055***		
				(0.021)		
C	Neg Z-Score Deviation				0.034***	
					(0.008)	
	Pos Z-Score Deviation				0.016**	
					(0.006)	
D	0 To 45 Wet Days					0.057**
						(0.028)
	45 To 55 Wet Days					0.025*
						(0.013)
	55 To 65 Wet Days					0.020
						(0.012)
	65 To 75 Wet Days					-0.013
						(0.010)
	85 To 95 Wet Days					0.012
						(0.010)
	95 To 105 Wet Days					0.000
						(0.013)
	>105 Wet Days					-0.043
						(0.027)
	R-Squared	0.132	0.130	0.131	0.131	0.131
	N	73131	73295	73295	73295	73295

Estimated effects of rainfall shocks on crime in alternative specifications. **Panel A:** Explanatory variables are binary indicators for the top and bottom quintiles of the localized distribution of rainfall over time (Jayachandran, 2006; Kaur, 2014). **Panel B:** Explanatory variable is the continuous fractional deviation (Duflo and Pande, 2007)of rainfall in relation to its long-term localized mean (column 2), or the same deviation, estimated separately for negative and positive deviations (column 3). **Panel C:** The continuous z-score of rainfall in relation to its long-term localized mean and standard deviation, estimated separately for negative and positive deviations. **Panel D:** binary indicators for the number of rainy days (precipitation above 0.1 mm) occurring during the monsoon (Fishman, 2016). All regressions control for temperature shocks as in the main sepcification. Standard errors, clustered in time and space (see text), are reported in parentheses. Stars indicate statistical significance: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.