

## **Economic impact of floods in the Indian States**

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### **ONLINE APPENDIX**

## Appendix B

**Table B1.** Flood magnitude, political alignment and flood fatalities: FE Poisson

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
lag of ln(per capita income)	-0.8444*** (0.1591)	-0.7093*** (0.1534)	-0.6104*** (0.1251)	-0.5610*** (0.2036)	-0.5768*** (0.0919)	-0.6263*** (0.0903)	-0.8343*** (0.1869)
ln(flood magnitude)		0.1780*** (0.0367)	0.0777*** (0.0166)	0.0453*** (0.0255)	0.0441** (0.0216)	0.0555*** (0.0200)	0.0574*** (0.0201)
ln(population affected by floods)			0.2903*** (0.0532)	0.1140*** (0.0232)	0.1175*** (0.0265)	0.1298*** (0.0201)	0.1347*** (0.0174)
ln(number of houses damaged)				0.2662** (0.0894)	0.2511*** (0.0844)	0.2376*** (0.0756)	0.2415*** (0.0821)
ln(population density)					0.3025 (0.2046)	0.3052* (0.1870)	0.2731 (0.1936)
State election dummy						-0.4924*** (0.1246)	-0.4745*** (0.1286)
Political alignment dummy						-0.4275*** (0.0963)	-0.3918*** (0.1016)
Literacy rate						-0.0025 (0.0044)	-0.0056 (0.0035)
lag of ln(expenditure of social security and welfare)							0.0728** (0.0325)
lag of ln(expenditure of irrigation and flood control)							-0.0258 (0.1472)
lag of ln(expenditure of natural calamity)							0.0363 (0.1002)
Observations	589	589	589	589	589	589	589
No of States	19	19	19	19	19	19	19

*Notes:* Clustered standard errors in parentheses. Significance: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. The dependent variable is flood-related fatalities. The state-wise flood fatalities data are taken from the Central Water Commission report. All models include time-invariant region and year fixed effects.

**Table B2.** PCI, political alignment and flood fatalities: IV Poisson

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
ln(per capita income)	-2.1844*** (0.4635)	-1.2688*** (0.3226)	-0.6460** (0.2634)	-0.7826*** (0.2657)	-0.7779*** (0.2657)	-0.8389*** (0.2501)	-1.6014*** (0.4381)
ln(area affected by floods)		0.1942*** (0.0266)	0.0413* (0.0245)	0.0164 (0.0233)	0.0160 (0.0235)	0.0193 (0.0236)	0.0283 (0.0242)
ln(number of house damage)			0.3570*** (0.0619)	0.2936*** (0.0660)	0.2909*** (0.0675)	0.2783*** (0.0660)	0.2622*** (0.0661)
ln(population affected by floods)				0.1092*** (0.0283)	0.1092*** (0.0277)	0.1117*** (0.0300)	0.1302*** (0.0309)
ln(flood duration)					0.0043 (0.0213)	0.0143 (0.0189)	0.0153 (0.0186)
State election dummy						-0.4781*** (0.1143)	-0.4372*** (0.1167)
Political alignment dummy						-0.3341** (0.1320)	-0.2676** (0.1330)
Literacy rate						0.0010 (0.0046)	-0.0070 (0.0052)
lag of ln(expenditure of social security and welfare)							0.0310 (0.0455)
lag of ln(expenditure of irrigation and flood control)							-0.5315** (0.1658)
lag of ln(expenditure of natural calamity)							-0.0032 (0.0560)
Hansen's J chi2(1)				0.9123 (0.3395)	0.8834 (0.3472)	1.484 (0.2839)	0.1411 (0.7071)
P-value							
Observations	608	608	608	608	608	608	589
No of States	19	19	19	19	19	19	19

Notes: Robust standard errors in parentheses. Significance: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. The dependent variable is flood-related fatalities. The state-wise flood fatalities data are taken from the Central Water Commission report. All models include time-invariant region and year fixed effects. **Instrument:** state-wise ln(*liable to flood-prone area*) and ln(*drought-prone area*) as an instrument for ln(per capita income). Hansen's J chi2(1) overidentifying restriction tests fail to reject the null hypothesis, which implies that the model is correctly specified. In other words, instruments satisfied the relevance and exogeneity conditions.

**Table B3.** PCI, flood magnitude and damages due to flood: FE Tobit

<b>Variables</b>	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>	<b>Model 4</b>
lag of ln(per capita income)	-1.2933** (0.6130)	-1.0776** (0.5066)	-0.9077** (0.3745)	-0.8006** (0.3665)
ln(flood magnitude)		0.3244*** (0.0844)	0.0424 (0.0526)	0.1035 (0.0565)
ln(population affected by floods)			0.7217*** (0.0199)	0.5360*** (0.08283)
ln(number of houses damaged)				0.2199*** (0.0612)
Literacy rate				-0.0008 (0.0097)
lag of ln(expenditure of social security and welfare)				0.1533 (0.1139)
lag of ln(expenditure of irrigation and flood control)				0.2609 (0.5193)
lag of ln(expenditure of natural calamity)				-0.0452 (0.1403)
Observations	589	589	589	589
No of states	19	19	19	19

*Notes:* Clustered standard errors in parentheses. Significance: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. The dependent variable is ln(damages/GSDP). The state-wise damages due to flood is taken from the Central Water Commission report. All models include time-invariant region and year fixed effects.

**Table B4.** PCI, flood magnitude and damages due to flood: IV Tobit

<b>Variables</b>	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>	<b>Model 4</b>
ln(per capita income)	-2.2852** (0.9945)	-1.4820 (1.0529)	-1.6778** (0.7048)	-1.9109** (1.0284)
ln(flood magnitude)		0.2759*** (0.0654)	0.0495 (0.0526)	0.0516 (0.0507)
ln(population affected by floods)			0.6155*** (0.0229)	0.5990*** (0.0209)
Literacy rate				0.0091 (0.0076)
lag of ln(expenditure of social security and welfare)				0.1427 (0.1483)
lag of ln(expenditure of irrigation and flood control)				-0.0471 (0.4449)
lag of ln(expenditure of natural calamity)				0.0908 (0.1318)
Observations	608	608	608	589
No of states	19	19	19	19

*Notes:* Clustered standard errors in parentheses. Significance: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. The dependent variable is ln(damages/GSDP). The state-wise damages due to flood is taken from the Central Water Commission report. All models include time-invariant region and year fixed effects. **Instrument:** state-wise ln(*liable to flood-prone area*) and ln(*drought-prone area*) as an instrument for ln(per capita income). First stage regression of IV Tobit estimate confirms that ln(*liable to flood-prone area*) and ln(*drought-prone area*) is negatively related with ln(per capita income), which implies that states with higher *liable to flood-prone area* and *drought-prone area* experienced lower per capita income.

## Appendix C

**Table C1.** PCI, political alignment and flood fatalities: FE Poisson (clustered at the state level)

<b>Variables</b>	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>	<b>Model 4</b>	<b>Model 5</b>	<b>Model 6</b>
lag of ln(per capita income)	-0.0721 (0.5205)	-0.4836 (0.4659)	-0.2638 (0.4230)	-0.2062 (0.4541)	-0.1973 (0.4729)	-0.1704 (0.3923)
ln(flood magnitude)	0.1320*** (0.0230)	0.0573*** (0.0162)	0.0408** (0.0191)	0.0426** (0.0204)	0.0527** (0.0232)	0.0512** (0.0238)
ln(population affected by floods)		0.3033*** (0.0415)	0.1175*** (0.0268)	0.1200*** (0.0269)	0.1200*** (0.0233)	0.1223*** (0.0232)
ln(number of houses damaged)			0.2363*** (0.0653)	0.2370*** (0.0644)	0.2280*** (0.0619)	0.2304*** (0.049)
ln(population density)				1.0869 (1.0488)	0.6821 (1.0103)	0.6880 (0.9367)
State election dummy					-0.4730*** (0.1112)	-0.4454*** (0.1157)
Political alignment dummy					-0.3491*** (0.1344)	-0.3176** (0.1274)
Literacy rate					0.0014 (0.0064)	0.0057 (0.0060)
lag of ln(expenditure of irrigation and flood control)						-0.2203 (0.1678)
lag of ln(expenditure of natural calamity)						0.0161 (0.0924)
Observations	589	589	589	589	589	589
No of States	19	19	19	19	19	19

*Notes:* Clustered standard errors in parentheses. Significance: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. The dependent variable is flood-related fatalities. The state-wise flood fatalities data are taken from the Central Water Commission report. All models include time-invariant state and year fixed effects.

**Table C2.** PCI and damages: FE Tobit (clustered at the state level)

<b>Variables</b>	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>
lag of ln(per capita income)	-0.1828 (1.3632)	-1.1828 (1.3632)	-0.2500 (1.2276)
ln(flood magnitude)	0.0591** (0.0231)	0.0591** (0.0231)	0.0621 (0.0227)
ln(population affected by floods)	0.3363*** (0.0614)	0.3363*** (0.0614)	0.3296*** (0.0574)
ln(number of houses damaged)	0.3118*** (0.1153)	0.3118*** (0.1153)	0.3072*** (0.1143)
Literacy rate		0.0114 (0.0076)	0.0120 (0.0074)
lag of ln(expenditure of social security and welfare)			0.1126 (0.1435)
lag of ln(expenditure of irrigation and flood control)			0.2710 (0.1602)
lag of ln(expenditure of natural calamity)			0.1044 (0.0881)
Observations	589	589	589
No of states	19	19	19

*Notes:* Clustered standard errors in parentheses. Significance: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. The dependent variable is ln(damages/GSDP). The state-wise damages due to flood is taken from the Central Water Commission report. All models include time-invariant state and year fixed effects.