

Do Public Fund Windfalls Increase Corruption? Evidence from a Natural Disaster

Elena Nikolova (CELSI and IOS-Regensburg) and Nikolay Marinov
(Mannheim)

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Research question

- How do (non-resource) financial windfalls affect governance?

The case of Bulgaria

- Riverbeds and dams neglected before and after 1989 throughout the country
- 2004-2005: torrential rain across Bulgaria results in severe flooding
- Central government awards money to flood-stricken municipalities (257/264)
- March 2006: two national audit agencies summoned to issue detailed reports on the uses of the money; audits were unexpected (227/264 municipalities)
- One agency independent (BNAA) and the other one part of the ministry of finance (PFIA)

Extent of the floods



One of the many corruption examples

- Belovo municipality: As of June 2006, an unreliable temporary bridge is the only way connecting different parts of the town
- BGN 400,000 (Euro 200,000) received from central government on 16 August 2005, 18 August firms already paid. BGN 54,000 paid for building an *existing* 12 km road
- Corruption allegations led to intense media discussions and political turmoil, including an (unsuccessful) vote of no-confidence for the incumbent government

Preview of results

- Municipalities that receive more funds also have more corruption (IV results stronger than OLS)
- Suggestive evidence: More corrupt mayors anticipated punishment by voters and dropped out of the next election race (2007)
- Link between funds and corruption is stronger in municipalities which are more developed economically and which have a weaker media

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Contribution

- Use a unique municipal-level data set on the amount and use of disaster aid following several waves of torrential rain and flooding in 2004-2005 in Bulgaria
- Exploit the quasi-random nature of rainfall shock (conditional on controls for ground flood risk) to isolate exogenous variation in the amount of funds received in each municipality
- Exploit unexpected and nearly universal fund use audit in 2006 to create an *objective* measure of corruption using information on the number and type of infringements recorded in each municipality

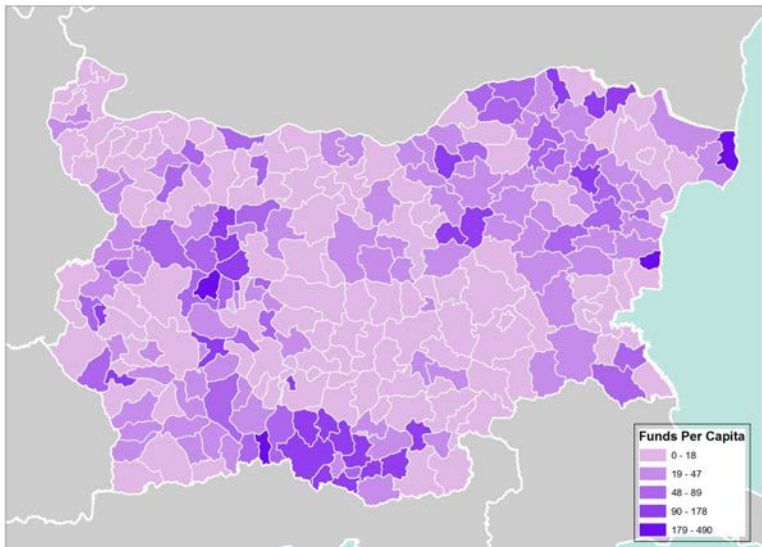
Identification challenges

- Unobserved characteristics may be driving both awarded funds and corruption
- Charismatic mayors may attract more funds *and* may be more likely to get away with corruption
- Exploit a new instrument for flood-related assistance: monthly rainfall deviations (relative to a historical average) in each municipality in 2004-2005

Data: 262/264 municipalities

- Funds received (log and per capita); mean of total funds received around 250,000 Euro per municipality
- Mean of funds to municipal income: 15.6%
- Ground flood risk: Number of settlements within 1 km of a water body; elevation; slope; latitude; longitude

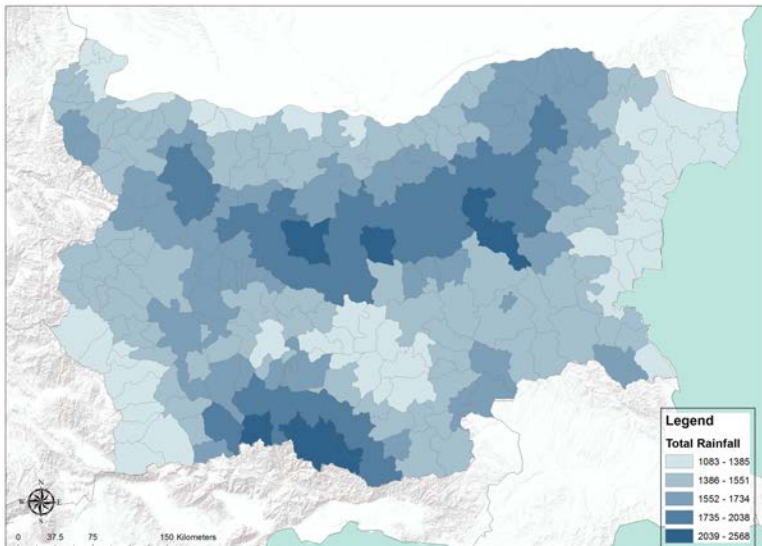
Distribution of relief funds (per capita)



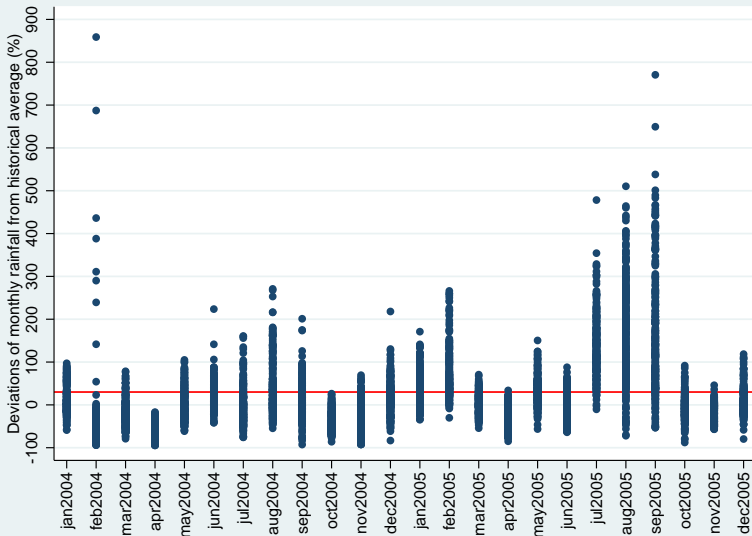
Flood data: rainfall

- From 126 ground stations, interpolated using a 45 km radius
- For each municipality, calculate monthly rainfall percentage change relative to a monthly historical average
- $$\frac{\text{Rainfall}_{\text{january}, 2004} - \text{Rainfall}_{\text{january}, 1931-1985}}{\text{Rainfall}_{\text{january}, 1931-1985}}$$
- For each municipality, take average value for all months for which change was at least 30%

Distribution of total rainfall



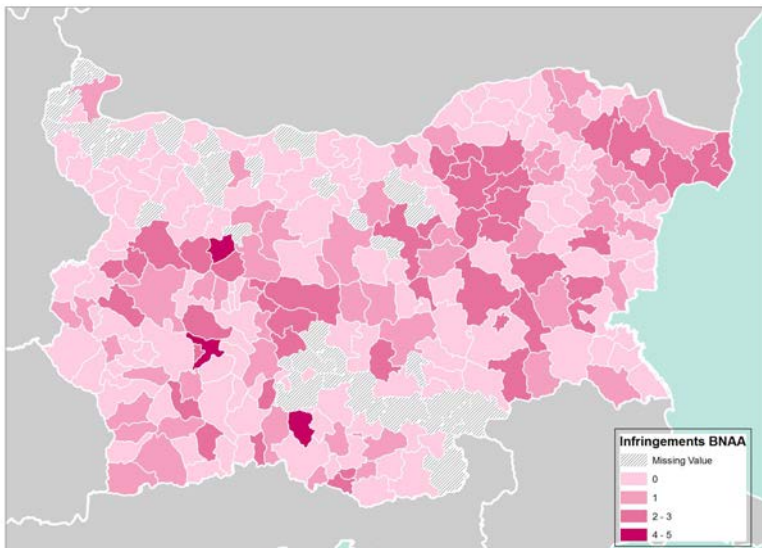
Rainfall measure used in the regressions



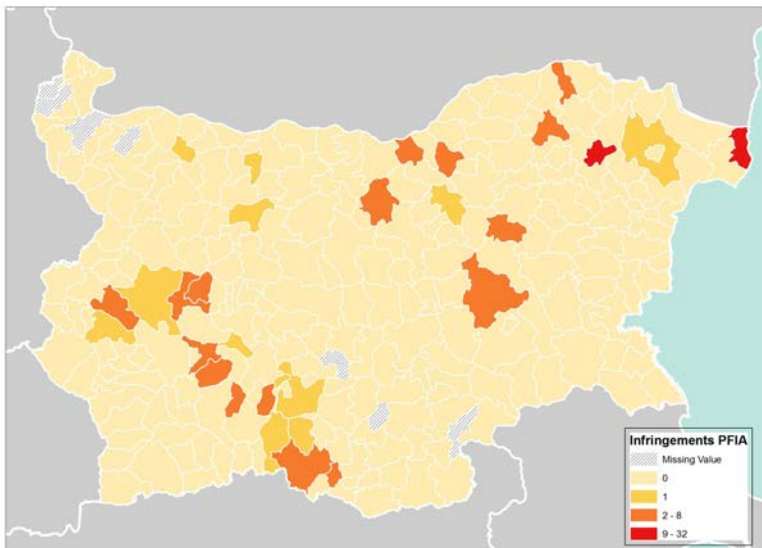
Data

- Corruption: number of infringements recorded by the two agencies: BNAA (independent but cannot impose sanctions) and PFIA (part of finance ministry, can impose sanctions)
- PFIA audited 257 municipalities; BNAA audited 227 municipalities
- Examples of infringements: (1) contracts not awarded to the highest bidder or no bidding; (2) money channeled for the repair of buildings experiencing no damage; (3) money given for no work
- Controls: economic conditions, media and civil society, composition of local government, mayor and council political affiliation, mayor characteristics, municipal budget top-ups (pre-flood)

Distribution of infringements: BNAA



Distribution of infringements: PFIA



Regressions

- For municipality i in region r
- First stage:

$$\text{Logfunds}_{ir} = \alpha_{ir}^F + \beta_1^F \text{Rainfall}_{ir} + \beta_2^F \text{FloodRisk}_{ir} + \mathbf{X}_{ir} \beta_3^F + \gamma_r^F + \epsilon_{ir}^F, \quad (1)$$

- Second stage:

$$\text{CorruptionIndex}_{ir} = \alpha_{ir} + \beta_1 \text{Logfunds}_{ir} + \beta_2 \text{FloodRisk}_{ir} + \mathbf{X}_{ir} \beta_3 + \gamma_r + \epsilon_{ir}, \quad (2)$$

- regional dummies (NUTS-2)

Results: BNAA measure of corruption

	OLS		IV		IV-Poisson
	(1) BNAA	(2) BNAA	(3) BNAA	(4) BNAA	(5)
log funds per cap	0.268*** (0.0913)	0.261*** (0.0903)	0.908*** (0.310)	0.793*** (0.280)	0.691*** (0.238)
Geography	✓	✓	✓	✓	✓
Economic conditions	✓	✓	✓	✓	✓
Civil society	✓	✓	✓	✓	✓
Composition of local gov.		✓		✓	✓
F-stat. rainfall % deviation, 30% cutoff			17.75 1.106 (0.263)	18.52 1.127 (0.262)	
R-sq	0.190	0.215			
Number of observations	225	225	225	225	225

Public funds and corruption: LiTS 2006 results

	(1) Corr. rel. to 1989	(2) Trust inst.	(3) trust in people today	(4) trust in people today
log funds per cap	-0.405*** (0.153)	0.339** (0.172)	0.660** (0.278)	0.900*** (0.303)
trust in people before 1989				0.154*** (0.0459)
Respondent characteristics	✓	✓	✓	✓
Geography	✓	✓	✓	✓
Economic conditions	✓	✓	✓	✓
Civil society	✓	✓	✓	✓
Composition of local gov.	✓	✓	✓	✓
F-stat.	138.0	188.5	171.8	145.6
rainfall % deviation, 30% cutoff	1.785 (0.152)	1.831 (0.133)	1.790 (0.137)	1.778 (0.147)
Number of observations	787	906	915	811

Corruption and mayor re-election, all elections

	(1) candidate in 2007	(2) candidate in 2007	(3) reelected in 2007	(4) reelected in 2007
predicted BNAA	-0.0267 (0.0247)	-0.0406* (0.0243)	0.0576 (0.0432)	0.0455 (0.0460)
voter turnout 07	0.00224 (0.00196)	0.00262 (0.00193)	0.00223 (0.00278)	0.00237 (0.00280)
margin elected 2003	-0.171 (0.252)	-0.154 (0.261)	0.460 (0.336)	0.496 (0.340)
in politics before 2003	0.190*** (0.0386)	0.209*** (0.0397)	0.692*** (0.0701)	0.710*** (0.0691)
Geography	✓	✓	✓	✓
Economic conditions	✓	✓	✓	✓
Civil society	✓	✓	✓	✓
Composition of local gov.		✓		✓
Number of observations	225	225	203	203

Corruption and mayor re-election, margin 2003 $\leq 10\%$

	(1) candidate in 2007	(2) candidate in 2007	(3) reelected in 2007	(4) reelected in 2007
predicted BNAA	-0.0855*** (0.0301)	-0.0734*** (0.0207)	0.158*** (0.0425)	0.170*** (0.0555)
voter turnout 07	0.00861*** (0.00267)	0.00898*** (0.00244)	0.00421 (0.00318)	0.00391 (0.00310)
margin elected 2003	-1.070* (0.567)	-0.705 (0.477)	2.411** (0.984)	2.715*** (0.970)
in politics before 2003	0.272*** (0.0491)	0.282*** (0.0445)	0.676*** (0.0631)	0.704*** (0.0739)
Geography	✓	✓	✓	✓
Economic conditions	✓	✓	✓	✓
Civil society	✓	✓	✓	✓
Composition of local gov.		✓		✓
Number of observations	162	162	145	145

Heterogeneous effects

	log mun.inc. per cap		unemployment		newspapers circ.	
	< median	>= median	< median	>= median	< median	>= median
	(1)	(2)	(3)	(4)	(5)	(6)
	BNAA	BNAA	BNAA	BNAA	BNAA	BNAA
log funds per cap	0.500 (0.506)	0.851*** (0.287)	1.003** (0.413)	-0.00386 (0.331)	0.898*** (0.296)	-0.129 (0.510)
Geography	✓	✓	✓	✓	✓	✓
Economic conditions	✓	✓	✓	✓	✓	✓
Civil society	✓	✓	✓	✓	✓	✓
Composition of local gov.	✓	✓	✓	✓	✓	✓
F-stat.	6.615	12.35	11.19	5.554	19.39	4.048
rainfall % deviation, 30% cutoff	0.881** (0.343)	1.350*** (0.384)	1.015** (0.303)	1.285** (0.545)	1.731*** (0.393)	0.699** (0.348)
Number of observations	113	112	117	108	118	107

IV validity/identification threats

- Direct link between funds and corruption unlikely (special procedure, difficult to appropriate existing resources, enforcement already poor)
- Heavy rains may make monitoring reconstruction harder? Monitoring happens locally (pictures and other materials required to be sent to Ministry of Disasters)
- More corrupt municipalities had poorer drainage systems? (drainage universally poor, correlated with other characteristics, controls for ground flood risk included)
- Audits unexpected; little evidence of political bias in auditing process or that municipalities which received more funds were audited more intensely; weather stations not endogenously located

Conclusion

- Exploit a unique policy experiment to demonstrate that financial windfalls lead to corruption in local government
- Suggestive evidence: More corrupt mayors anticipated punishment by voters and dropped out of the next election race (2007)
- Effects stronger in municipalities that are more developed and with weaker media
- Welfare-enhancing transfers may have unintended consequences; continuing such transfers without strengthening mechanisms of control is costly
- Even broader consequences: embezzled money could have been used to buy votes thus deteriorating governance even further

Additional slides

Central government

- 2001- August 2005: coalition of NDSV (leader, party of former king Simeon Saksoburgotski) + Socialists + Movements for Rights and Freedoms (MRF)
- August 2005-July 2009: 'triple' coalition: Socialists (leader); NDSV and Movement for Rights and Freedoms (MRF)
- before August 2005: flood-related assistance handled by Ministry for Agriculture and Forestry and a minister 'without portfolio' (MRF controlled)
- August 2005: MRF also controls newly formed Ministry for Disasters and Ministry for Environment and Water

Local government

- Local elections: conducted in 2003 and 2007; voters vote for a mayor (majority) and councilors (proportional system)
- Council: highest authority in local self-government; adopts municipal budget and exercises control over it; implements various policies
- Mayor: heads executive activities of the municipality; has organizational and supportive functions

Regressing rainfall on municipal observable characteristics

	(1) rainfall % deviation, 30% cutoff
audited	-0.0284 (0.0512)
distance to BNAA regional center	0.00274*** (0.000541)
elevation	-0.000265*** (0.0000799)
relief slope	0.0201*** (0.00558)
longitude	0.0939* (0.0556)
latitude	0.103*** (0.0259)
settlements near water	-0.00157 (0.00205)
log municipal income per capita	0.000571 (0.0662)
unemployment	0.00303 (0.00197)
net privatization income	-0.000165 (0.00187)
newspaper circ. per capita	-0.0000261 (0.0000500)
university degree	0.630 (0.701)
share urban population	0.0601 (0.0529)
voter turnout 2003	-0.120 (0.0955)
mayor triple coal.	0.0561 (0.0427)
council majority triple coal.	0.0151 (0.0643)
mayor & council triple coal.	-0.0959 (0.0738)
margin elected 2003	-0.320 (0.233)
in politics before 2003	-0.0239 (0.0324)
Budget topup per capita, 2003	0.678 (1.530)
Region dummies	✓
R-sq	0.378
Number of observations	260

Robustness 1

	IV				OLS
	(1) BNAA through pca	(2) PFIA	(3) BNAA	(4) BNAA	(5) BNAA
log funds per cap	0.478* (0.264)	2.575 (1.792)	0.755*** (0.268)	0.827** (0.339)	0.261*** (0.0903)
margin elected 2003			-1.584 (1.011)		
in politics before 2003			0.0258 (0.176)		
Geography	✓	✓	✓	✓	✓
Economic conditions	✓	✓	✓	✓	✓
Civil society	✓	✓	✓	✓	✓
Composition of local gov.	✓	✓	✓	✓	✓
F-stat.	18.52	12.58	19.09	20.34	
rainfall % deviation, 30% cutoff	1.127 (0.262)	0.922 (0.260)	1.158 (0.265)		
rainfall % deviation, 50% cutoff				0.641 (0.142)	
Number of observations					0.215
N	225	254	225	225	225

Robustness 2

	(1) BNAA	(2) BNAA	(3) BNAA
log funds per cap	0.852*** (0.279)	0.732*** (0.272)	0.802*** (0.285)
newspapers per cap. * mayor triple coal.	0.00208** (0.000946)		
newspapers per cap. * council majority triple coal.	-0.00385 (0.00243)		
newspapers per cap. * mayor & council triple coal.	0.00161 (0.00267)		
distance to province center		0.00481 (0.00385)	
Budget topup per capita, 2003			-3.778 (7.175)
Constant	4.570 (11.87)	4.413 (11.49)	3.585 (12.13)
Geography	✓	✓	✓
Economic conditions	✓	✓	✓
Civil society	✓	✓	✓
Composition of local gov.	✓	✓	✓
F-stat.	19.70	18.70	17.79
rainfall % deviation, 30% cutoff	1.153 (0.260)	1.154 (0.267)	1.125 (0.267)
Number of observations	225	225	224

Robustness: BNAA, no interpolation of rainfall

	OLS		IV		IV-Poisson
	(1) BNAA	(2) BNAA	(3) BNAA	(4) BNAA	(5)
log funds per cap	0.420** (0.162)	0.435** (0.166)	1.161** (0.481)	1.205** (0.476)	0.947*** (0.330)
Geography	✓	✓	✓	✓	✓
Economic conditions	✓	✓	✓	✓	✓
Civil society	✓	✓	✓	✓	✓
Composition of local gov.		✓		✓	✓
F-stat. rainfall % deviation, 30% cutoff			7.222 1.087 (0.405)	7.617 1.083 (0.392)	
R-sq	0.238	0.304			
Number of observations	88	88	88	88	88

Histogram of BNAA corruption index

