"Gone with the Storm: Rainfall Shocks and Household Wellbeing in Guatemala"

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This paper

- Exploits the occurrence of a natural shock, Tropical Storm Agatha (2010), which brought to Guatemala the largest rainfall since 1963, to identify its short- & medium-term impacts on
  - **Household well-being** (consumption, poverty indicators)
  - **Children's human capital** (school enrollment and health)
  - **Labor force supply responses** (adults and children)

- Carries out sub-group analysis to understand factors that raise resilience and attempts to disentangle some of the mechanisms

- Seeks to derive policy lessons to strengthen disaster and risk management strategies to protect vulnerable populations

How?

- It employs a standard double-difference analysis

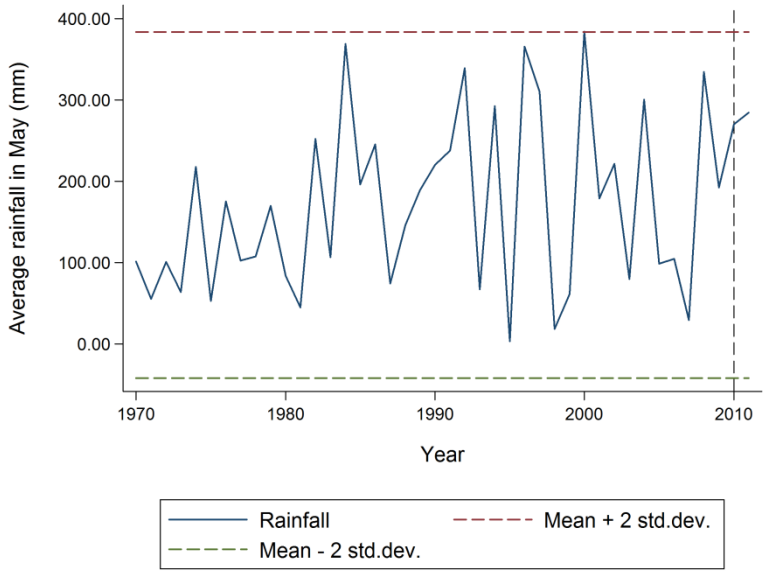
$$Y_{imt} = \alpha_m + 2011_t + \beta Storm_{mt} + X_{imt}{}'\gamma + \varepsilon_{imt}$$

- Using cross-sectional LSMS data from 2006 (pre-shock) and 2011 (post-shock)
- Exploits quasi-exogenous variation in the intensity of the shock (monthly and daily rainfall data from 73 weather stations
- And performs a number of placebo tests on two control groups

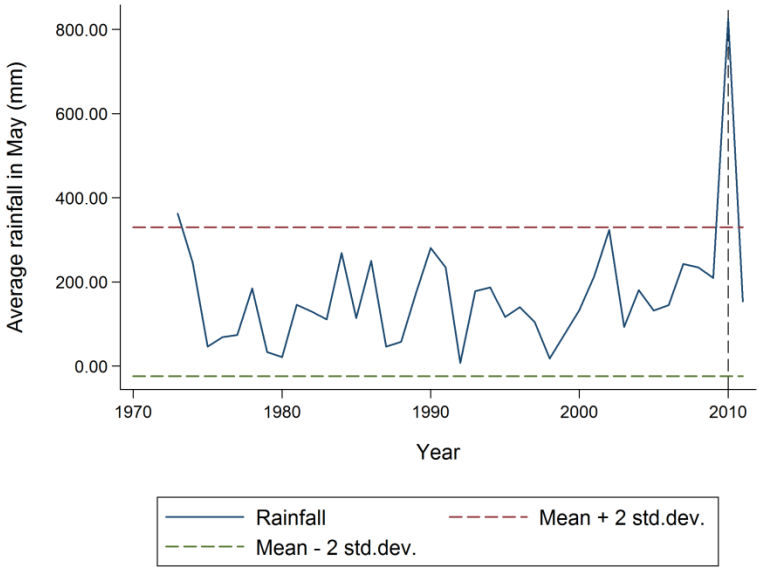
Defining rainfall shocks

- A station, i.e. matched municipality, heavily affected if rainfall recorded in May of 2010 is at least two standard deviations above its historical mean

Puerto Barrios station: Not affected



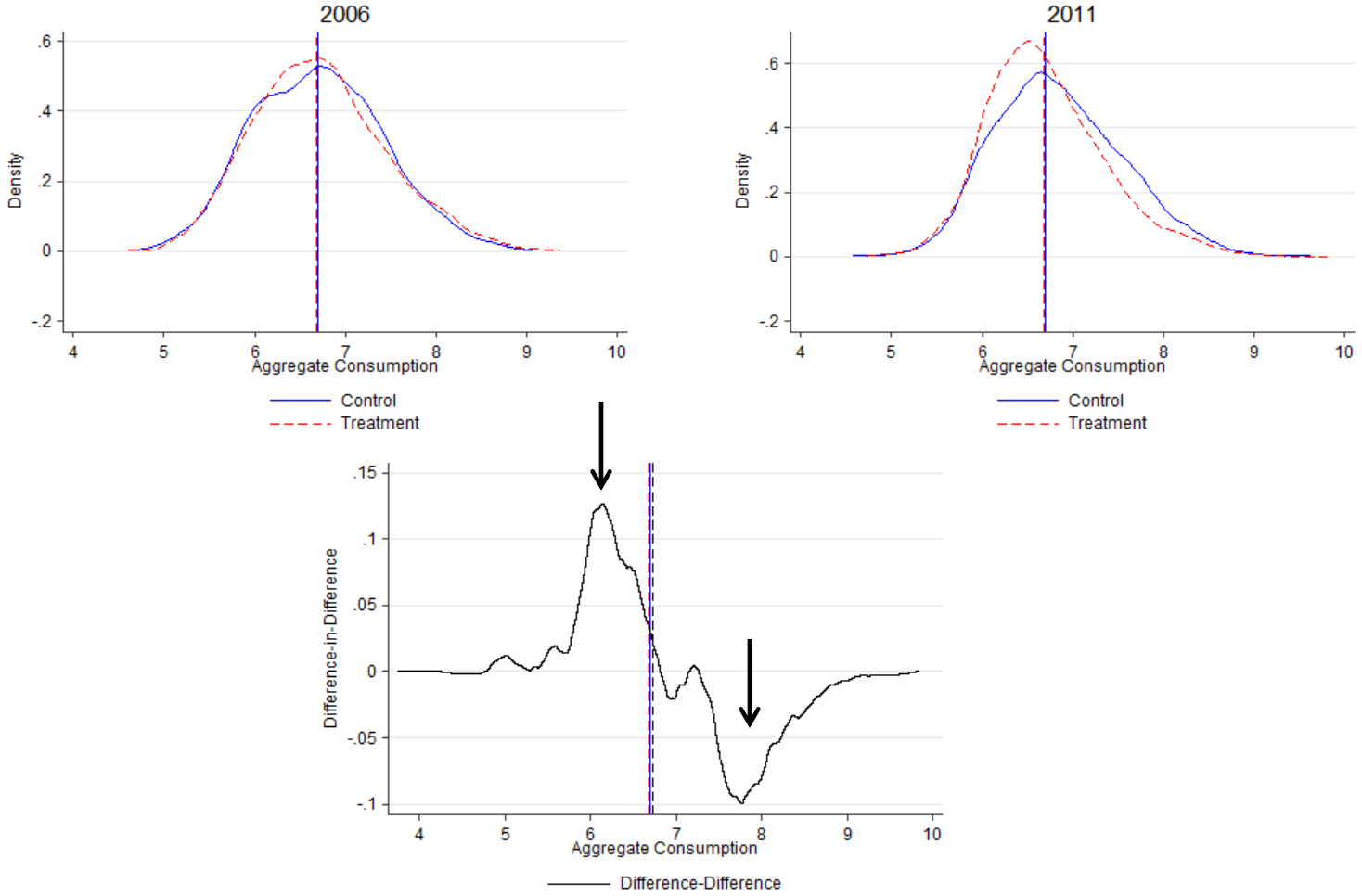
Montufar station: Affected



Source: INSIVUMEH and World Bank.

The raw DD shows a fall in consumption among affected households

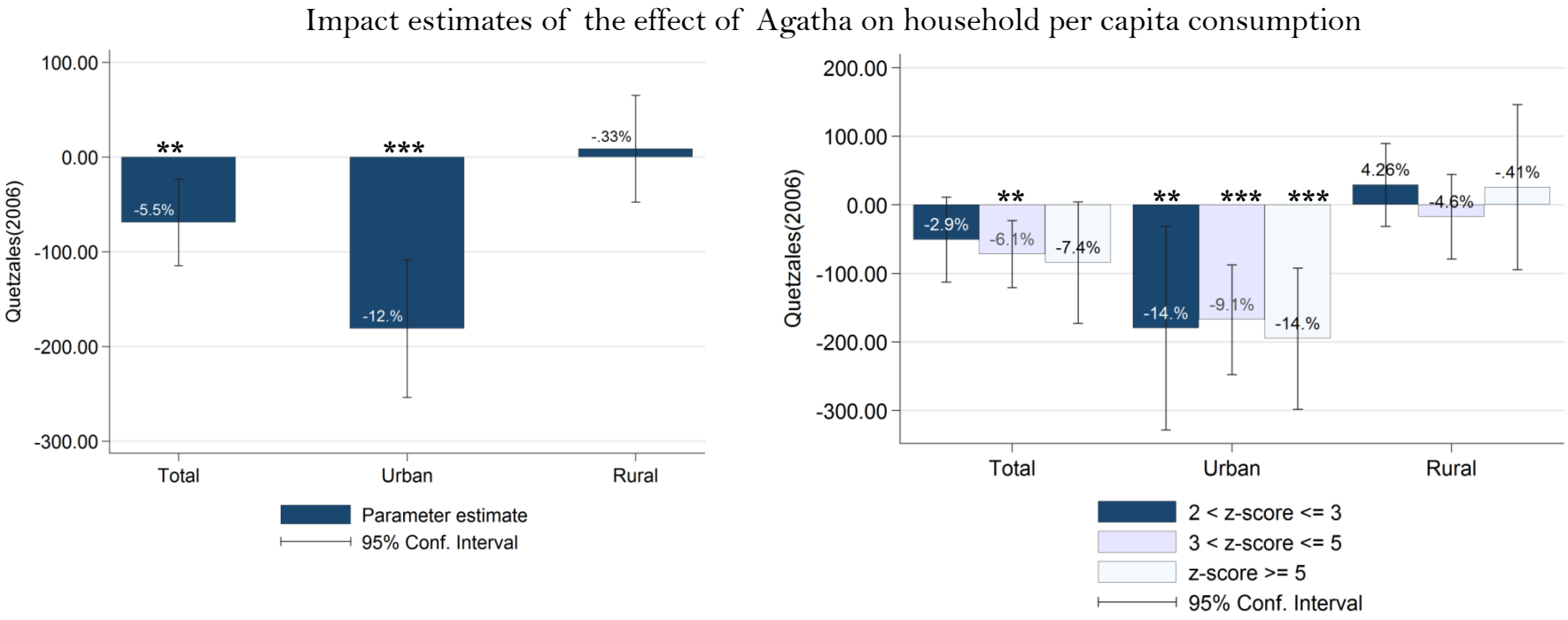
Consumption per-capita distribution and changes for control and treatment groups (2006 and 2011)



Source: LSMS 2006 and 2011 and World Bank calculations

Conditional DD models confirm that consumption fell, mostly in urban areas

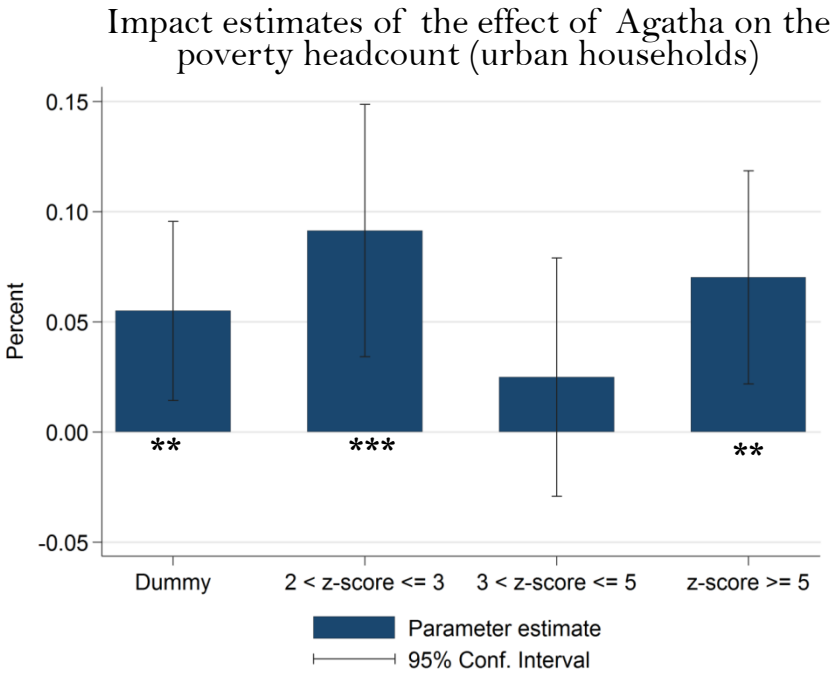
- Overall consumption fell by 5.5% among affected households, 12% among urban households

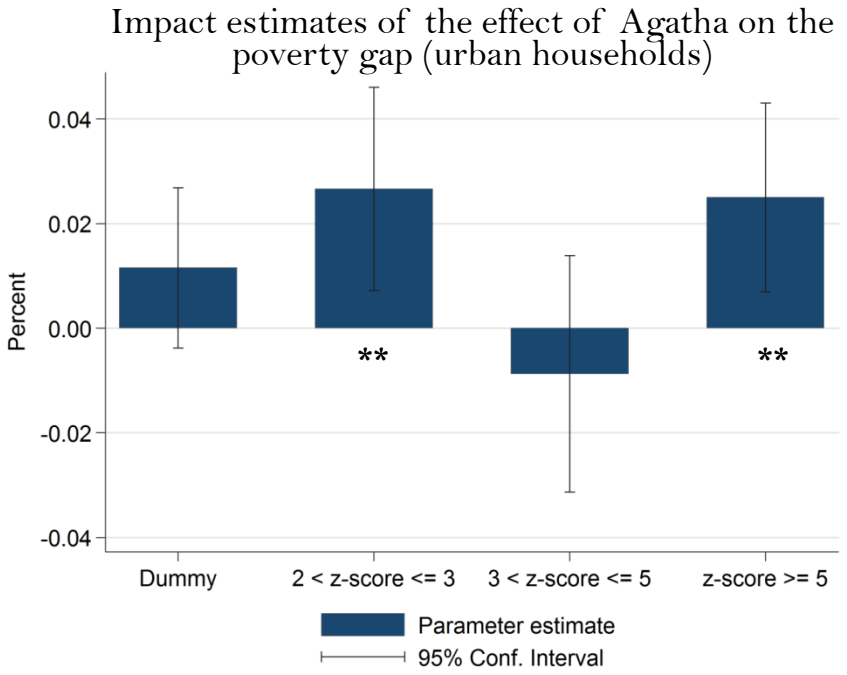


Note: Parameter estimates of the effect of the shock on household consumption per capita from diff-in-diff models. Results in Panel A derived from a binary definition of the treatment while results from Panel B use a treatment intensity specification. Robust standard errors clustered at the municipality level. Estimates significant at 90(*), 95(**), 99(***) percent confidence

The fall in consumption pushed some affected households back into poverty

- The shock increased poverty by 5.5 percentage points (18%) as well as the severity of poverty in urban areas





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Key dimensions of household welfare negatively affected

- One year after the shock: (i) food and education expenditures 10-13% lower, (ii) consumption of durable goods fell by 80%

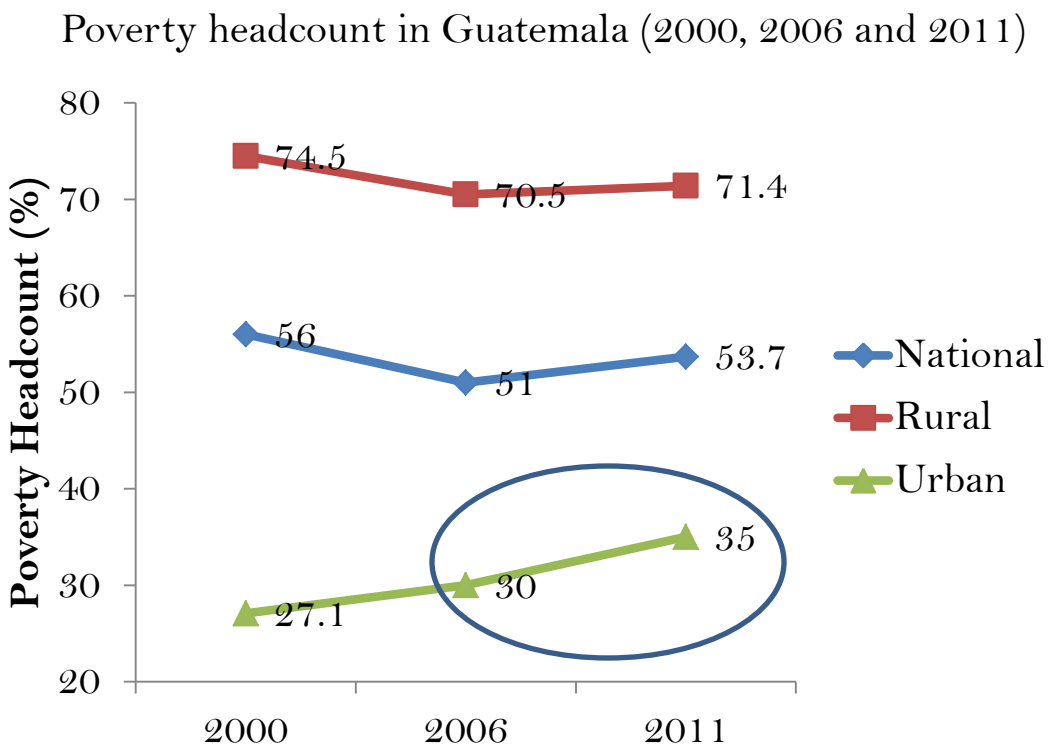
Impact estimates of the effect of Agatha on per capita consumption by components

	Food	***Health***	***Education***	***Durables***
National	(1)	(2)	(3)	(4)
t * (rainfall z-score> 2)	-16.054	0.828	-5.821**	-16.554*
	[10.956]	[2.683]	[2.559]	[9.231]
Observations	26,587	26,587	26,587	26,587
Baseline Mean	348.3	20.99	38.73	45.97
Urban				
t * (rainfall z-score> 2)	-40.622**	-5.967	-8.830*	-51.447***
	[16.306]	[4.775]	[5.094]	[16.087]
Observations	11,225	11,225	11,225	11,225
Baseline Mean	410.4	25.77	60.25	66.85
Rural				
t * (rainfall z-score> 2)	7.954	5.190*	-2.860	-3.366
	[14.200]	[2.986]	[2.292]	[8.135]
Observations	15,362	15,362	15,362	15,362
Baseline Mean	302.4	17.46	22.87	30.58

Conclusions

- Robust evidence suggests that Agatha led to a sizable –and possibly persistent– deterioration of human welfare among affected households
- Similar impacts widely documented in the literature but those triggered by excessive rainfall often concentrated in rural areas
- This paper shows that urban areas are as vulnerable
- Agatha could be responsible for up to 20% of the increase in poverty between 2006 and 2011 –often attributed solely to the effects of the global and food price crises.

Poverty headcount in Guatemala



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