"Children's Vulnerability to Weather Shocks: A Natural Disaster as a Natural Experiment"

Javier E. Baez
Indhira Santos

Washington D.C.
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This paper

- Exploits the occurrence of a natural shock, Hurricane Mitch (1998) that severely hit Nicaragua to investigate:
  - the medium-term effects on investments in children: nutrition, health, school attendance and child labor
  - If children are disproportionately affected

How?

- It employs a standard double-difference analysis

$$Y_{imt} = \alpha_m + 2001_t + \beta Mitch_{mt} + X_{imt}{}'\gamma + \varepsilon_{imt}$$

- Using LSMS panel data from 1998 (pre-shock) and 2001 (post-shock)
- Exploits quasi-exogenous variation in the intensity of the shock

Raw DD shows that affected households cut back their investments in their children

D-D Reduced Form Estimates of the Impact of the Shock on Investments on Children

	School attendance		Child labor force participation	
	Total Sample	Rural	Total Sample	Rural
D-D	0.057 **	0.053 *	0.064 ***	0.056 **
	[0.025]	[0.031]	[0.024]	[0.029]
Observations	8,970	4,436	9,956	4,951
	Health care utilization (children between 0 and 6)		**Health care utilization (children between 6 and 15)**	
	Total Sample	Rural	Total Sample	Rural
D-D	-0.205 **	-0.292 **	-0.107 ***	-0.097 **
	[0.098]	[0.111]	[0.038]	[0.047]
Observations	1,118	684	3,203	1,679
	Z-score weight-for-height		**Children with severe undernutrition (<-2Z)**	
	Total Sample	Rural	Total Sample	Rural
D-D	-0.454 ***	-0.412 ***	0.075 ***	0.076 ***
	[0.114]	[0.136]	[0.025]	[0.028]
Observations	3,653	1,954	3,653	1,954

Results also hold in the extended D-D

D-D Models of the Impact of the Shock on Investments on Children
(Multivariate Reduced Form Estimates – Total Sample)

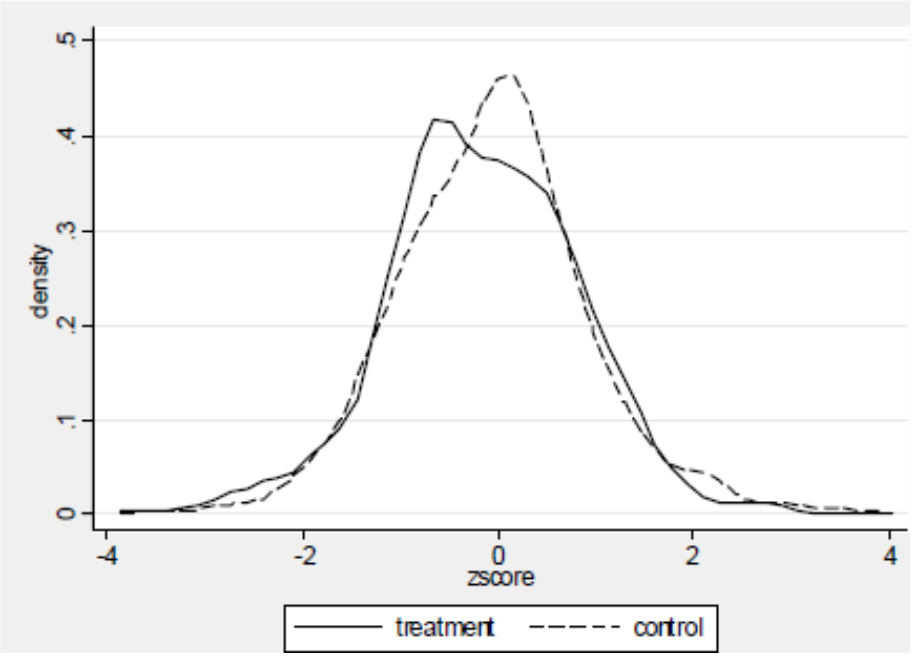
	Total Sample				
	LPM Pooled		Probit Pooled		
Outcome	(i)	(ii)	(i)	(ii)	N
School attendance (children between 6 and 15 years of age)	0.028 [0.025]	0.025 [0.026]	0.024 [0.021]	0.024 [0.021]	6,653
Child labor force participation (children between 6 and 15 years of age)	0.121 *** [0.020]	0.113 *** [0.028]	0.100 *** [0.034]	0.085 *** [0.031]	7,503
Joint school attendance and child labor force participation	0.104 *** [0.026]	0.107 *** [0.026]	0.084 *** [0.033]	0.086 *** [0.033]	6,653
Health care utilization, conditioned on being sick (children between 0 and 6 years)	-0.173 * [0.092]	-0.183 * [0.103]	-0.181 * [0.093]	-0.207 * [0.108]	1,035
Health care utilization, conditioned on being sick (children between 6 and 15)	-0.110 *** [0.038]	-0.086 ** [0.040]	-0.106 *** [0.036]	-0.087 * [0.042]	2,950
Z-score weight-for-height (children between 0 and 4 years of age)	-0.466 *** [0.179]	-0.501 *** [0.192]	----	----	2,020
Children with severe undernutrition (<-2 Z) (children between 0 and 4 years of age)	0.070 ** [0.033]	0.073 ** [0.037]	0.084 *** [0.040]	0.087 *** [0.049]	2,020
Household and individual demographics	yes	yes	yes	yes	
Controls for local public investment	no	yes	no	yes	
Controls for municipality effects	no	yes	no	yes	

Particularly strong negative effects children's nutrition

Children hit by Hurricane Mitch (1998) in Nicaragua much more likely to be undernourished two years after the shock

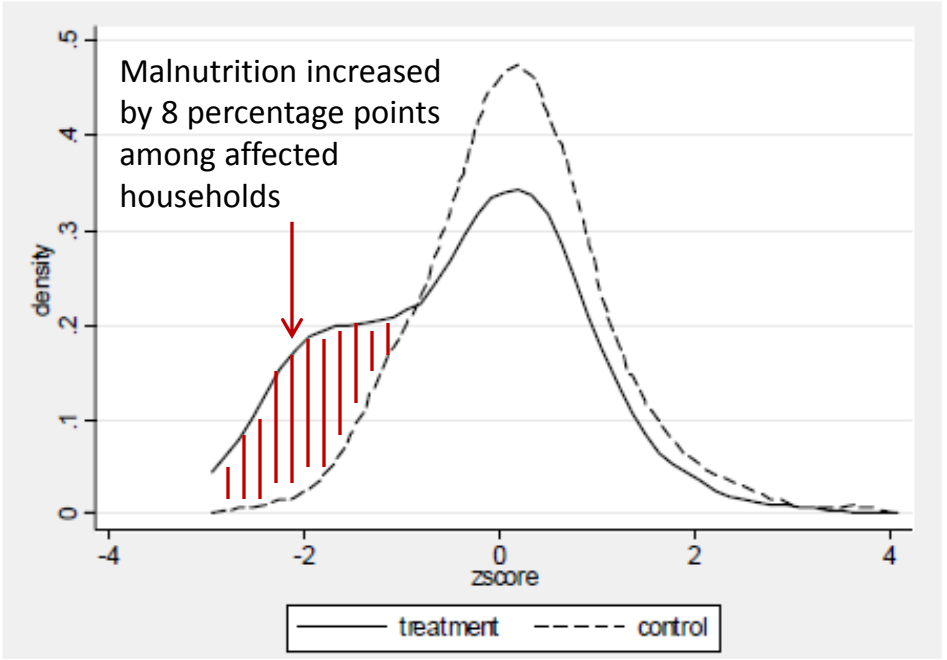
Nutritional status of children in affected and non-effected households very similar before the shock

(z-score weight-for-height distribution)



But children in affected households were four times more likely to be malnourished after the shock

(z-score weight-for-height distribution)



Source: Baez and Santos (2007)

And children appear to be disproportionally affected relative to older household members

D-D Estimates of Adult Consumption and Adult Nutritional Status in Rural Households

Outcome	Pre-shock mean		Raw D-D	OLS Pooled	Fixed Effects	Random Effects	*N*
	Treatment (Mitch=1)	Control (Mitch=0)					
Monthly Consumption Share: Alcohol	0.207	0.292	-0.099	-0.024	0.094	-0.067	2,097
	[0.072]	[0.056]	[0.163]	[0.160]	[0.180]	[0.166]	
Monthly Consumption Share: Tobacco	0.566	0.511	0.040	0.201	0.217	0.179	2,097
	[0.105]	[0.041]	[0.230]	[0.197]	[0.251]	[0.201]	
Body Mass Index	27.40	28.83	0.028	0.035	--	--	5,186
	[0.271]	[0.249]	[0.443]	[0.382]			
Weight/Height - Percentage of Reference Median WHO	161.99	176.63	0.876	1.220	--	--	5,186
	[3.091]	[2.848]	[3.678]	[3.499]			

Robustness

- Results hold for models run on rural households growing the same crops at the pre-shock time
- Non-parametric D-D analysis also yields similar results
- Base results robust to "fake" treatments in pre-shock period using, ruling out pre-treatment differential trends
- Results not sensitive to a D-D-D strategy

Conclusions

- Evidence of large adverse effects of several natural disasters on investments on children
- Furthermore, children seem to be disproportionably affected!
- Important to take into account that children could be at disadvantage in the household decision making process when designing policy responses to natural disasters

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