

# Natural Disasters and Poverty Reduction: Do Remittances matter?

Linguère Mously Mbaye\* and Alassane Drabo<sup>+</sup>

\*AfDB, Abidjan and IZA, Bonn and <sup>+</sup> FERDI, Clermont-Ferrand

UNU-Wider and ARUA: Migration and Mobility-New Frontiers  
for Research and Policy  
5 October 2017, Accra

# Motivations

- ▶ Immediate consequences of disasters may be extremely harmful for developing countries
- ▶ Negative relationship between natural disasters and economic growth in these countries (Felbermayr and Groeschl, 2014; Noy, 2009; Dell et al., 2012)
- ▶ Natural disasters also have adverse effects on poverty (Carter et al., 2007; Rodriguez-Oreggia et al., 2013; Arouri et al., 2015)
- ▶ Little evidence on the role of private mechanisms, such as remittances, on poverty when natural disasters occur in developing countries (Mohapatra et al. 2012; Yang and Choi, 2007; Yang, 2008)

# Research question and Contributions

- ▶ Do private funds help mitigate poverty in the context of natural disasters?
- ▶ Mainly interested in the interaction term between natural disasters and remittances on poverty
- ▶ Generalize the role of remittances in terms of geographical situation: Use panel data from 52 low and lower-middle income countries over the period 1984-2010
  - ▶ Use of country level data as unit of analysis instead of household level data
- ▶ Use of different types of disasters as well as their physical intensity

# Objectives

- ▶ Investigate the role of remittances in mitigating poverty in the context of disasters, in a short-term perspective
- ▶ Use monetary poverty as main dependent variable
- ▶ Endogeneity issues: fixed effects model; alternative estimations and GMM

## Preview of the Results

- ▶ Reducing effect of remittances on poverty is more important when countries experience disasters
- ▶ Results mainly driven by storms, hurricanes and extreme temperature events

# Natural disasters and poverty

- ▶ Disasters can push people into poverty by destroying assets, eliminating the capacity to rebuild homes and securing basic needs (Carter et al., 2007)
- ▶ Since poor people generally live in unfavorable conditions, disasters exacerbate this vulnerability, which increase their poor economic status (Lal et al., 2009)
- ▶ Heterogeneity effects of natural disasters on poverty in the short-term and long-term:
  - ▶ Absence of long-term effects due to aid received by the communities (Gignoux and Menendez, 2016)

## Role of remittances

- ▶ Sending money back home reduces poverty through the accumulation of human and physical capital, reduced income inequalities and increased consumption (e.g Adams and Page, 2005; Acosta et al., 2008; Adams and Cuecuecha, 2013)
- ▶ Insurance mechanisms can explain the level of resilience in the aftermath of shocks (Silbert and Useche, 2012; Arouri et al., 2015)

# Data

- ▶ Estimates based on 52 developing countries from 1984 to 2010.
- ▶ Dependent variables: 2 measures of poverty from World Bank Databases:
  - ▶ Poverty headcount ratio at \$1.25 a day
  - ▶ Poverty gap at \$2 a day
- ▶ Natural disasters are from Game data (Felbermayr and Groeschl, 2014)
  - ▶ Physical intensity of disasters: disaster index aggregating disaster intensity measures
  - ▶ Disaggregated intensity measures: wind speed; difference in temperature; drought; flood; Richter scale; volcanic explosivity index



# Data

- ▶ Remittances variable is from the WDI and represents the transfers (USD) received in the countries over the period
- ▶ Controls for country characteristics: quality of the institutions; total population and population density; urbanization rate; logarithm of the growth rate of real GDP per capita (ppp) to capture economic factors such as unemployment or the quantity and quality of the infrastructures.

# Fixed Effects Model

We focus on the following fixed effects model where the unit of observation is the country  $i$  at year  $t$ :

$$Poverty_{i,t} = \alpha_1 disaster_{i,t} * remit_{i,t} + \alpha_2 disaster_{i,t} + \alpha_3 remit_{i,t} + \alpha_{k,i} X_{k,i,t-1} + \mu_i + \kappa_t + \epsilon_{i,t}$$

$Poverty_{i,t}$  reflects the different outcomes measuring poverty

- ▶  $disaster_{i,t}$  stands for natural disasters: aggregated and disaggregated disaster intensity measures
- ▶  $remit_{i,t}$  is the logarithm of the amount of remittances
- ▶  $X_{k,i,t-1}$  is the vector of control variables with one year lag
- ▶  $\mu_i$  stands for the country fixed effects controlling for the time-invariant country characteristics
- ▶  $\kappa_t$  is the time fixed effects and  $\epsilon_{i,t}$  is the unexplained residual

# Endogeneity of natural disasters

- ▶ Potential measurement error of the number or intensity of natural disasters due to misreporting
- ▶ Intensity of natural disasters may be influenced by the level of poverty
- ▶ Solutions : use an exogeneous measure through a disaster intensity index

# Endogeneity of remittances

- ▶ Reverse causality: the amount of remittances received can also be explained by the level of poverty
- ▶ Poverty determines the location or migration choice and thus the future receipt of remittances
- ▶ Solutions:
  - ▶ Consider the logarithm of remittances received in  $t - 1$  instead of the contemporaneous measure of remittances
  - ▶ GMM model to account for dynamics
- ▶ Also control for time fixed effects and use disasters and remittances at  $t$  but also at  $t - 1$

Dependent variable: Poverty headcount ratio at \$1.25 a day (ppp)

EXPLANATORY VARIABLES	Random effects		Country fixed effects		
	(1)	(2)	(3)	(4)	(5)
Log remittances*Disaster Index	-1.102*** (0.42)	-0.965*** (0.31)	-1.226*** (0.44)	-1.295*** (0.35)	-1.301*** (0.40)
Disaster Index	21.452** (8.41)	18.218*** (6.10)	23.894*** (8.71)	24.606*** (6.97)	24.667*** (8.14)
Log remittances	-4.256*** (0.75)	-3.270*** (0.84)	-4.121*** (0.78)	-2.813*** (0.82)	-1.308 (0.97)
Polity Index (lag)		1.183 (6.07)		1.994 (7.27)	-1.865 (7.09)
Log population (lag)		2.105 (2.31)		-7.966 (15.98)	-1.601 (16.55)
Population density (lag)		-0.017 (0.02)		-0.050 (0.03)	-0.047 (0.03)
Urban population (lag)		-0.737*** (0.16)		-0.414 (0.41)	-0.142 (0.45)
GDP growth per capita (lag)		5.986 (8.23)		4.004 (8.46)	0.541 (9.52)
Time fixed effects	No	No	No	No	Yes
Observations	313	312	313	312	312
R-squared	0.17	0.5	0.33	0.41	0.52
Number of countries	51	51	51	51	51
Hausman test				chi2 (7)=22.23 Prob>chi2=0.0045	

## Interpretation of the results

For countries experiencing an increase in the disaster index by 1% and receiving the average logarithm of remittances, the poverty headcount ratio at \$1.25 a day is expected to decrease by 1.145 percentage points ( $24.667 - 1.301 * 19.384 = -1.145$ ).

Dependent variable: Poverty headcount ratio at \$1.25 a day (ppp)

EXPLANATORY VARIABLES	Country fixed effects					
	(1)	(2)	(3)	(4)	(5)	(6)
Log remittances*Wind speed	-1.254*					
Wind speed	(0.73) 24.524* (14.61)					
Log remittances*dif temperature		-0.308***				
dif temperature		(0.07) 5.515*** (1.38)				
Log remittances*drought			-0.579**			
Drought			(0.27) 11.823** (5.66)			
Log remittances*flood				-0.330		
Flood				(0.29) 5.596 (5.63)		
Log remittances*Richter scale					-0.591	
Richter scale					(0.44) 9.041 (8.69)	
Log remittances*Volcanic explosivity						-0.384
Volcanic explosivity						(0.45) 7.690 (9.32)
Log remittances	-1.685	-0.596	-1.128	-0.963	-0.626	-0.888
Controls	(1.23)	(1.01)	(1.12)	(1.10)	(1.02)	(1.10)
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	312	312	312	312	312	312
R-squared	0.50	0.50	0.49	0.49	0.50	0.49
Number of countries	51	51	51	51	51	51

Dependent variable: Poverty headcount ratio at \$ 1.25 a day (ppp)

EXPLANATORY VARIABLES	Country Fixed effects						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log remittances*Disaster Index	-1.398*** (0.41)						
Disaster Index	26.589*** (8.34)						
Disaster Index (lag)	0.118 (0.82)						
Log remittances*Wind speed		-1.431* (0.74)					
Wind speed		28.088* (14.95)					
Wind speed (lag)		0.100 (0.83)					
Log remittances*dif temperature			-0.317*** (0.08)				
dif temperature			5.651*** (1.60)				
dif temperature (lag)			0.047 (0.31)				
Log remittances *drought				-0.594** (0.26)			
Drought				12.154** (5.47)			
Drought (lag)				0.019 (0.63)			
Log remittances *flood					-0.301 (0.31)		
Flood					5.101 (6.13)		
Flood (lag)					-0.157 (0.66)		
Log remittances *Richter scale						-0.684 (0.41)	
Richter scale						10.990 (8.10)	
Richter scale (lag)						-2.294* (1.29)	
Log remittances*Volcanic explosivity							-0.376 (0.46)
Volcanic explosivity							7.497 (9.38)
Volcanic explosivity (lag)							-0.059 (0.72)
Log remittances	-2.393** (1.13)	-2.714** (1.33)	-1.462 (1.15)	-2.016 (1.44)	-1.340 (1.34)	-1.232 (1.11)	-1.425 (1.14)
Log remittances (lag)	1.316 (0.93)	1.146 (1.04)	1.073 (1.11)	1.061 (1.44)	0.469 (1.33)	0.927 (1.08)	0.693 (1.15)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	308	308	308	308	308	308	308
R-squared	0.53	0.51	0.51	0.5	0.52	0.52	0.49
Number of countries	50	50	50	50	50	50	50



Dependent variable: Poverty headcount ratio at \$1.25 a day (ppp)

EXPLANATORY VARIABLES	Country fixed effects						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log remittances (lag)*Disaster Index	-1.145*** (0.39)						
Disaster Index	21.350*** (7.80)						
Log remittances (lag)*Wind speed		-1.130* (0.61)					
Wind speed		22.021* (12.29)					
Log remittances (lag)*dif temperature			-0.265*** (0.06)				
dif temperature			4.475*** (1.17)				
Log remittances (lag)*drought				-0.432 (0.30)			
Drought				8.707 (6.38)			
Log remittances (lag)*flood					-0.123 (0.29)		
Flood					1.786 (5.51)		
Log remittances (lag)*Richter scale						-0.696* (0.40)	
Richter scale						10.958 (7.71)	
Log remittances (lag)*Volcanic explosivity							-0.347 (0.42)
Volcanic explosivity							6.881 (8.49)
Log remittances (lag)	-0.744 (0.96)	-1.137 (1.12)	-0.249 (1.04)	-0.719 (1.16)	-0.691 (1.13)	-0.220 (1.04)	-0.628 (1.12)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	308	308	308	308	308	308	308
R-squared	0.51	0.50	0.50	0.49	0.49	0.50	0.49
Number of countries	50	50	50	50	50	50	50

Dependent variable: Poverty headcount ratio at \$1.25 a day (ppp)

EXPLANATORY VARIABLES	GMM						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log remittances*Disaster Index	-1.202** (0.59)						
Disaster Index	25.721** (12.21)						
Log remittances*Wind speed		-1.554* (0.94)					
Wind speed		34.967* (19.62)					
Log remittances*dif temperature			-0.208** (0.09)				
dif temperature			3.449* (1.91)				
Log remittances *drought				-0.428 (0.51)			
Drought				4.955 (10.22)			
Log remittances*flood					0.924 (0.80)		
Flood					-17.604 (14.52)		
Log remittances*Richter scale						1.124 (1.35)	
Richter scale						-24.008 (26.72)	
Log remittances*Volcanic explosivity							1.055 (0.76)
Volcanic explosivity							-18.241 (15.32)
Log remittances	-3.010 (1.85)	-2.726 (1.77)	-1.486 (1.35)	-1.472 (1.33)	0.219 (1.50)	-2.149 (1.70)	-1.486 (1.53)
Poverty headcount ratio at \$1.25 a day (lag)	0.834*** (0.13)	0.838*** (0.11)	0.811*** (0.10)	0.840*** (0.11)	0.811*** (0.12)	0.752*** (0.12)	0.724*** (0.13)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	114	114	114	114	114	114	114
Number of countries	42	42	42	42	42	42	42
Hansen test for overidentification : chi2(19)	22.91	23.32	17.71	20.25	15.45	18.20	16.89
Prob > chi2	0.241	0.223	0.542	0.380	0.694	0.509	0.597
Arellano-Bond test for AR(2): z	-1.17	-1.21	-1.65	-1.52	-1.61	-1.51	-1.24
Pr > z	0.242	0.227	0.100	0.128	0.107	0.132	0.214

Dependent variable: Poverty gap at \$2 a day (ppp)

EXPLANATORY VARIABLES	Country fixed effects						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log remittances*Disaster Index	-0.993*** (0.29)						
Disaster Index	19.063*** (5.93)						
Log remittances*Wind speed		-1.117** (0.50)					
Wind speed		22.157** (10.17)					
Log remittances*dif temperature			-0.207*** (0.05)				
dif temperature			3.713*** (0.97)				
Log remittances*drought				-0.355* (0.19)			
Drought				7.296* (4.04)			
Log remittances*flood					-0.183 (0.21)		
Flood					2.852 (4.10)		
Log remittances*Richter scale						-0.205 (0.36)	
Richter scale						1.878 (7.13)	
Log remittances*Volcanic explosivity							-0.290 (0.31)
Volcanic explosivity							5.822 (6.22)
Log remittances	-1.017* (0.63)	-1.404* (0.81)	-0.495 (0.64)	-0.814 (0.71)	-0.742 (0.70)	-0.634 (0.68)	-0.655 (0.68)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	317	317	317	317	317	317	317
R-squared	0.521	0.51	0.50	0.49	0.49	0.50	0.49
Number of countries	52	52	52	52	52	52	52

## Conclusion and Recommendations

- ▶ Private funds such as remittances significantly reduce poverty in the context of natural disasters, but also before, showing their ex-ante role in resilience to shocks
- ▶ Social networks and migrants, in particular, are important channels that countries can use to deal with the adverse effects of shocks
- ▶ Private funds can have immediate mitigating effects on disasters victims compared to public funds which can take longer to reach population
  - ▶ Combine private and public mechanisms while dealing with shocks
  - ▶ Reduce cost of sending remittances...
    - ▶ ...can also be done through the use of ICT