Performance and Climate Risk in Microfinance Institutions

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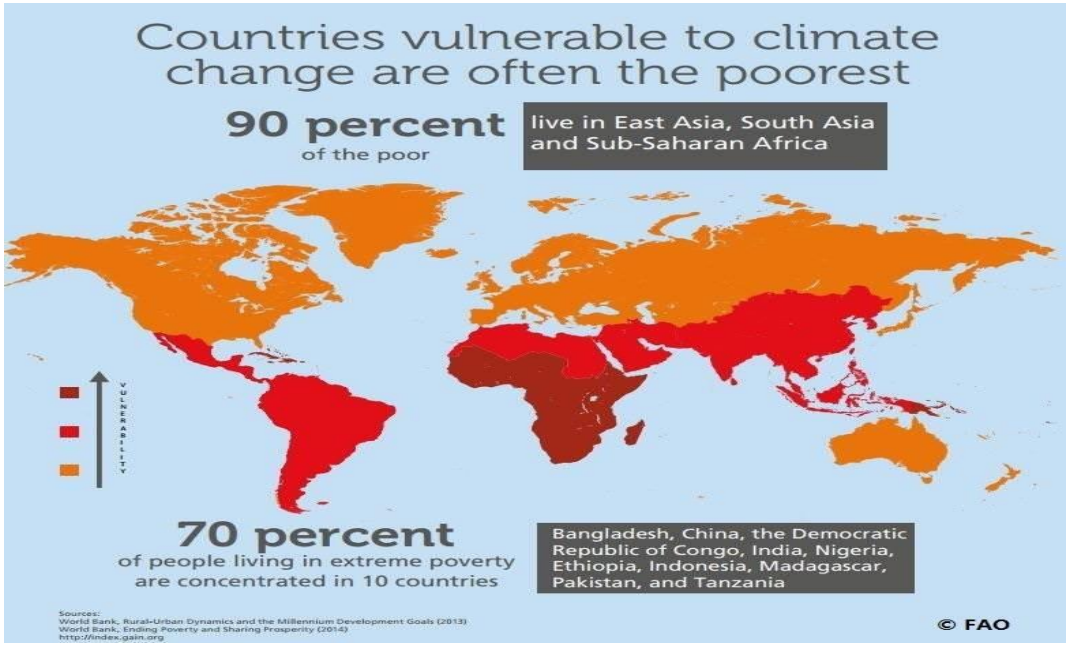
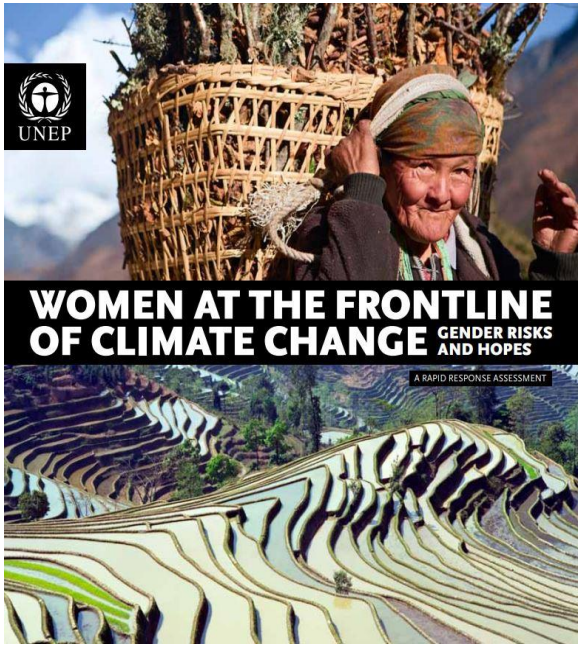
Frontiers of climate and nature in macroeconomics and finance
Banque de France, Paris
25/10/2022

Motivation

- The intensity and severity of climate hazards has been increasing, destroying physical assets, (micro)enterprises, crops and livestock, forcing people to flee their homes.
- Financial regulators warn that climate risk can harm the soundness of individual financial institutions as well as the stability of financial sectors.
- Extensive literature on microfinance institution's (MFI) role on creating climate adaptation and climate resilience.

Who are the Most Vulnerable?





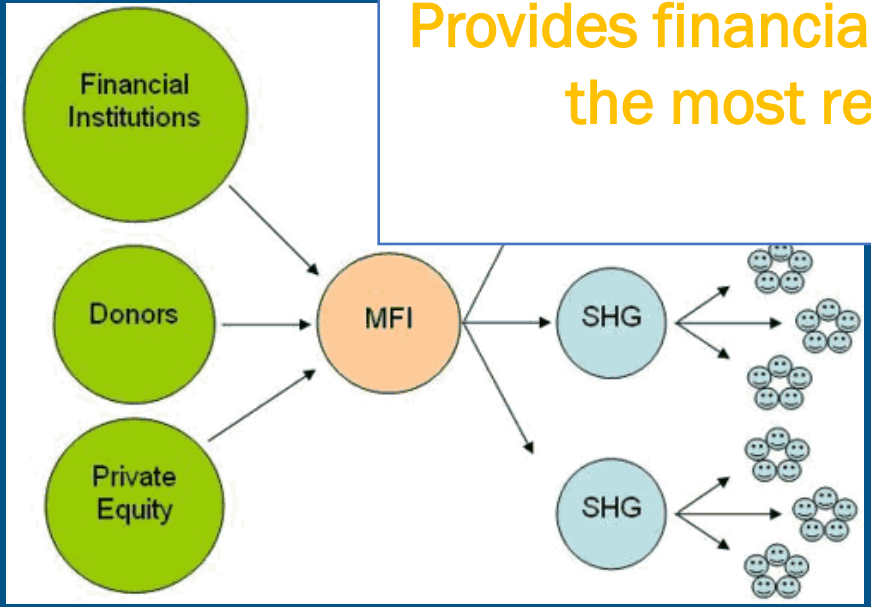
The damage is greater in the developing world, where MFIs are critically engaged with the financial ecosystem, socio-economic development and climate adaptation.

= ?

MFI is distinctive…

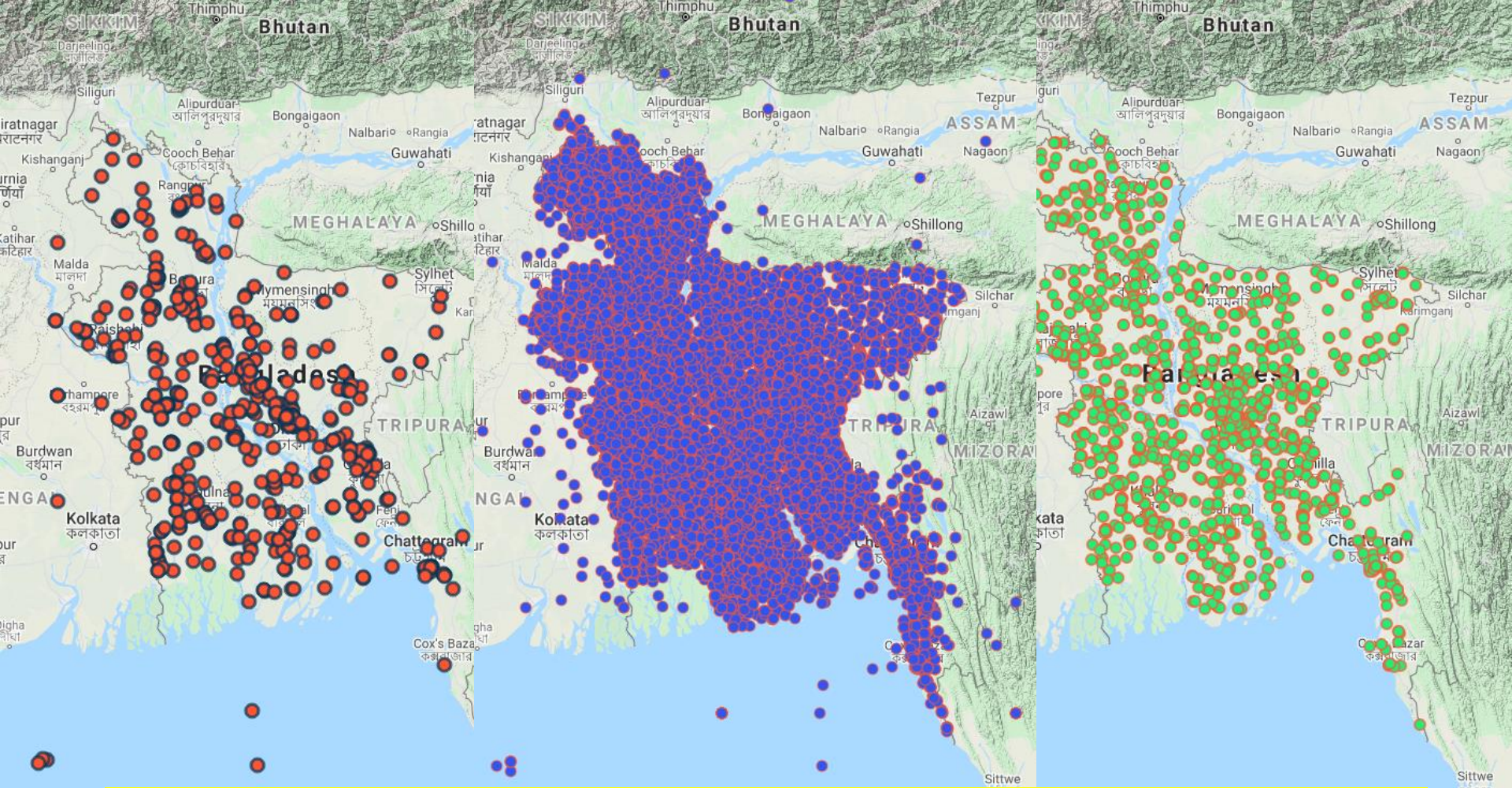
- Microfinance services low income groups, e.g. extreme poor, moderately poor- main clients), mostly unserved by traditional banks.
- edit facilities, transfers, urance.
- ith collateral free hat is deeply s exposed to
- Hybrid organizations.
- Social Enterprise.

Provides financial services in some of the most remote markets.



MFI's Geographic Expansion in Bangladesh

Source: Microcredit Regulatory Authority (2020)



Head office: 709 Branch office: 20,459 Regional office: 1,725

Research Questions

- There are well established empirical evidences that explain the direct impacts of disasters on economies, and its impacts on financial markets and institutions.

- Are MFI's financial and social performance affected by the types of climate hazard?
  - Empirical approach.

Brief Findings

CAMELS	Acute	Chronic
Capital adequacy		Droughts and Extreme Temperature
Asset quality	Floods and storms	
Management quality	Storms	
Earnings	No	No
Liquidity	Floods, landslides and storms	
Social mission		Droughts

Contributions

This study makes several important contributions in the context of MFI.

- This paper distinguishes between climate-induced hazards (anthropogenic hazards) and other hazards (i.e., natural disasters).
- The study also explores the impacts of climate hazard types on MFI performance.
- The study uses the International Monetary Fund (IMF) core set of Financial Soundness Indicators (also known as CAMEL indicators) i.e., capital adequacy, asset quality, management quality, earnings and profitability, and liquidity and add S to CAMEL become CAMELS to capture the social impact.

Data and Sample

The initial sample was 2,591 MFIs from 119 countries; after cleaning, our final sample stands at 717 MFIs for the period of 1999 to 2019.

MFI-related data –**Microfinance Information eXchange (MixMarket)**.
Institutional quality index –**Kaufmann et al. (2010)**.
Macroeconomic data –**World Development Indicators**.

Climate hazard data—

Emergency Events Database (EM-DAT), Centre for Research on the Epidemiology of Disasters (CRED), Université Catholique de Louvain.

Data and Sample (cont.): EM-DAT

Disaster Group	Disaster Subgroup	Definition	Disaster Main Type
Natural	Geophysical	A hazard originating from solid earth. This term is used interchangeably with the term geological hazard.	Earthquake
			Mass Movement (dry)
			Volcanic activity
Anthropogenic	Meteorological	A hazard caused by short-lived, micro- to meso-scale extreme weather and atmospheric conditions that last from minutes to days.	Extreme Temperature
			Fog
			Storm
	Hydrological	A hazard caused by the occurrence, movement, and distribution of surface and subsurface freshwater and saltwater.	Flood
			Landslide
			Wave action
	Climatological	A hazard caused by long-lived, meso- to macro-scale atmospheric processes ranging from intra-seasonal to multi-decadal climate variability.	Drought
			Glacial Lake Outburst / Sea level rise
			Wildfire

Estimation

Dynamic Panel Model

$$P_{ijt} = \gamma_i + \delta_t + \mu P_{ijt-1} + \beta_k MFI^k_{ijt} + \beta_m ME^m_{jt} + \emptyset CH_{j;t,t-1} + \varepsilon_{ijt} \quad \dots (1)$$

- **System-GMM estimator to deal with:**
  - Presence of fixed effect (γ_i) and lagged dependent variable (P_{ijt-1}).
  - Endogenous variables (simultaneity with P_{ijt-1}): MFI^k_{ijt} ; e.g., GEX.

    *Durbin- Wu- Hausman (DWH) test for endogeneity.

- **Validity tests:**
  - AR(2) test for the second-order autocorrelation.
  - Hansen J-statistics test the over-identification test and instruments validity.
  - Difference-in-Hansen tests validity of each subset of instruments.

Results

VARIABLES	(1) CAR	(2) PaR90	(3) CPB	(4) PY	(5) DLR	(6) ALS
Drought	-0.1622**	0.1909	0.0828	0.0065*	-0.0142	0.1197**
	(0.0669)	(0.2463)	(0.0667)	(0.0034)	(0.0318)	(0.0521)
Extreme Temperature	-0.1944*	0.0432	0.0054	-0.0172	-0.0091	0.1169
	(0.1079)	(0.0884)	(0.0189)	(0.0208)	(0.0160)	(0.0755)
Flood	-0.0786	0.4560*	0.0167	-0.0072	-0.0487***	-0.0413
	(0.0758)	(0.2724)	(0.0177)	(0.0131)	(0.0159)	(0.0709)
Landslide	-0.0172	0.2715	0.0354	0.0078	-0.2568*	-0.0023
	(0.0708)	(0.3000)	(0.0536)	(0.0049)	(0.1504)	(0.0543)
Storm	0.1287	0.1337*	0.2049**	-0.0037	-0.2126*	0.0322
	(0.1344)	(0.0772)	(0.0969)	(0.0057)	(0.1234)	(0.0737)
Wildfire	-0.0031	-0.0942	0.1103	0.0065	-0.0319	0.0472
	(0.1644)	(0.1272)	(0.1009)	(0.0067)	(0.1744)	(0.0757)
Controls	Y	Y	Y	Y	Y	Y
MFI FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Region FE	Y	Y	Y	Y	Y	Y
AR(2) test (*p*-value)	> 0.05	> 0.05	> 0.05	> 0.05	> 0.05	> 0.05
Hansen test (*p*-value)	> 0.05	> 0.05	> 0.05	> 0.05	> 0.05	> 0.05
Difference-in-Hansen (*p*-value)	> 0.05	> 0.05	> 0.05	> 0.05	> 0.05	> 0.05

What is next?

- Data and/or additional measure:
  - Use additional climate hazard measure or different set of data for robustness.

- MORE analysis:
  - Developing countries vs least developed countries.
  - Country's dependency on weather-related sectors, e.g., agriculture and livestock.
  - Interaction between the types of climate hazards and geographic expansion.

Conclusion

- Droughts and extreme temperature (chronic) reduce MFI capital adequacy.
- Floods and storms (acute) are associated with lower asset quality.
- Storms (acute) increase costs per borrower suggesting poorer management quality.
- Floods, landslides and storms (acute) decrease MFI liquidity.
- Droughts (chronic) are associated with reductions in social performance.

- No evidence of MFI portfolio yield affected by the types of climate hazard.

Policy Implications

(i) MFI regulators and supervisors need to set adequate capital reserves to protect MFIs from adverse climate financial risk.

(ii) Microfinance practitioners need to monitor MFI asset allocations with respect to acute hazards.

(iii) The results also suggest that regulators need to exercise caution when formulating and implementing climate financial risks strategies. New MFI regulation actioned around vulnerability to weather-related catastrophes needs to manage the trade-off between high MFI performance and the need to build resilience against climate risks.

Thank You!

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Comments, suggestions or critique

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