Annual BIDS Conference on Development (ABCD)
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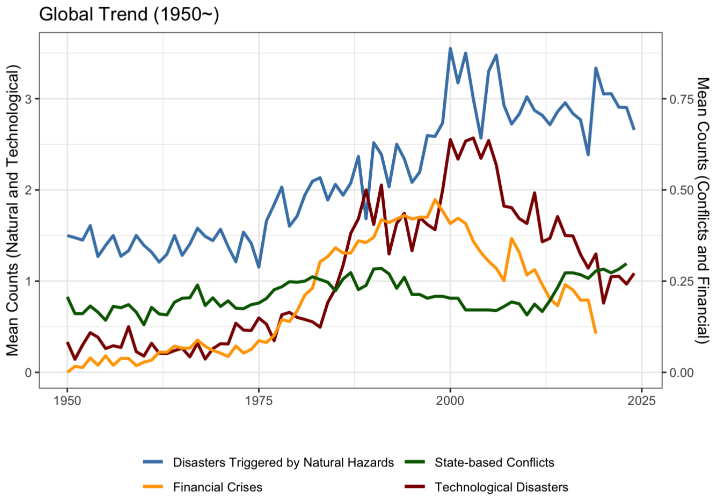
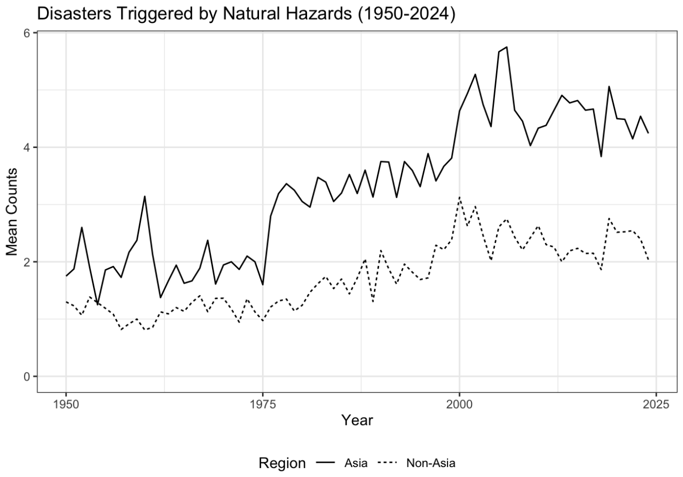
Building Resilience Among the Poor: Lessons from the Field

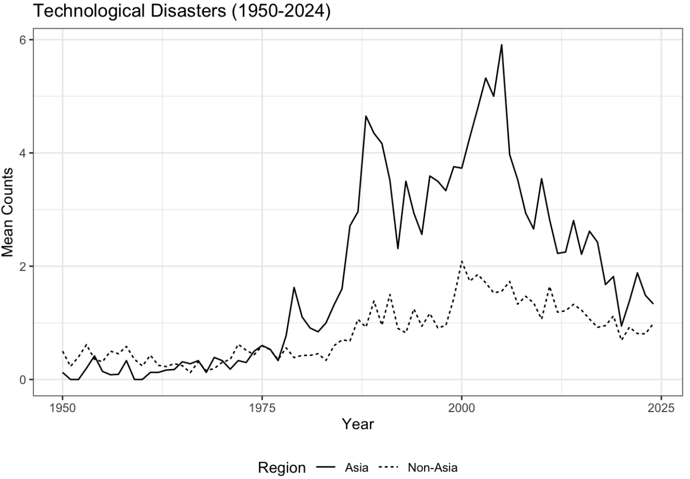
Yasuyuki Sawada

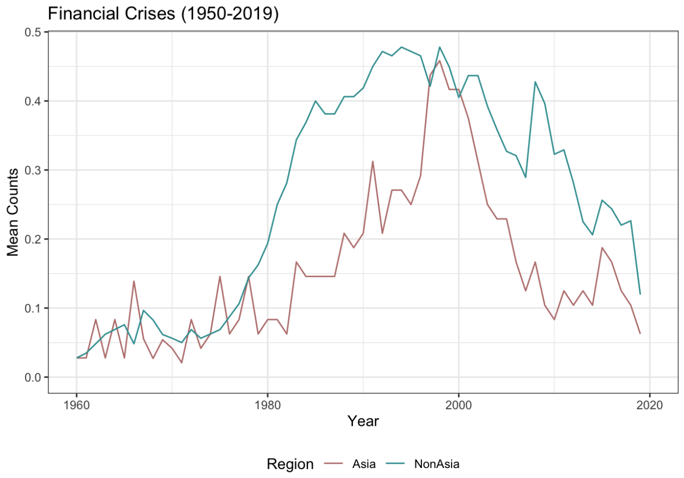
U of Tokyo

Disasters Trends



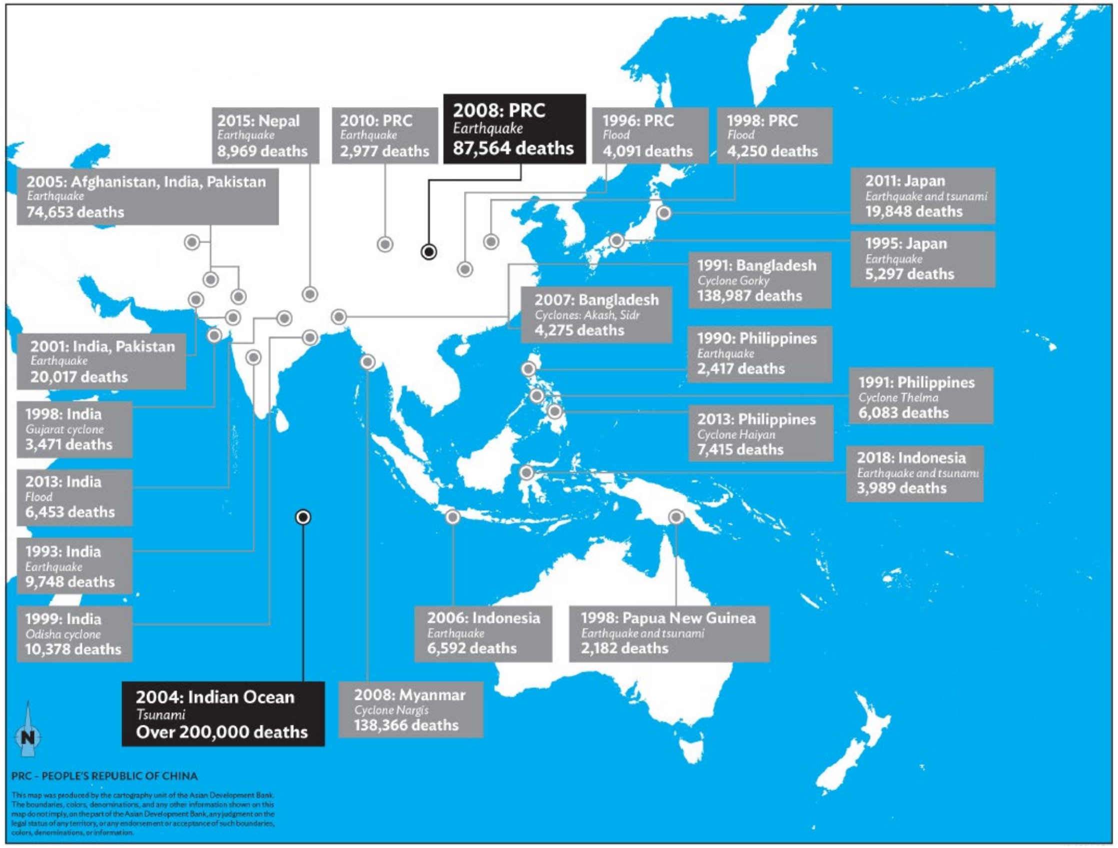






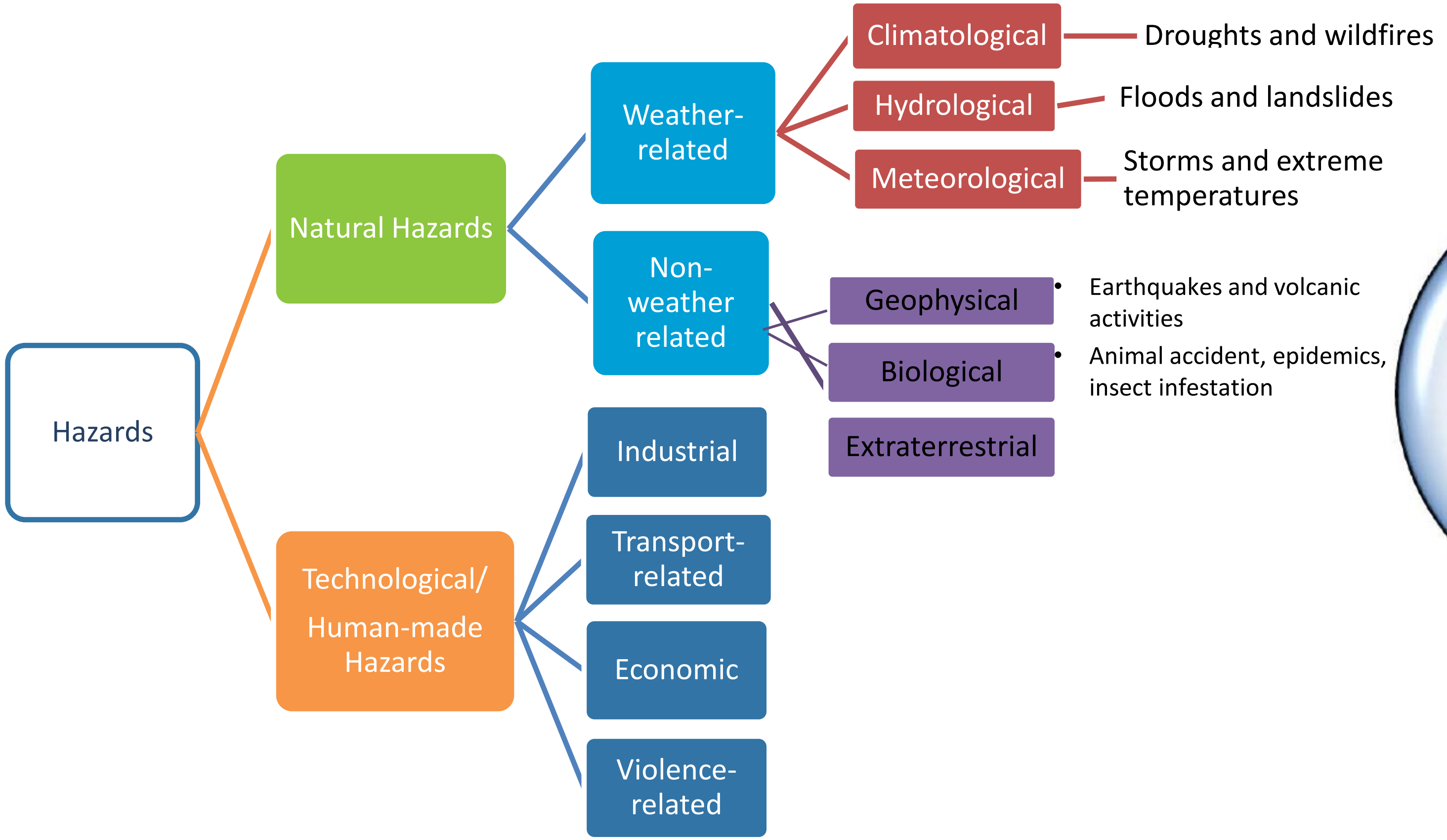
Note) These figures indicate the average occurrence of the four types of disaster per country per year.
Data sources) Natural and technological disasters are from CRED's EM-DAT database; wars are from the Correlates of War (COW) database; and economic crisis is from Reinhart and Rogoff (2010) and IFS.

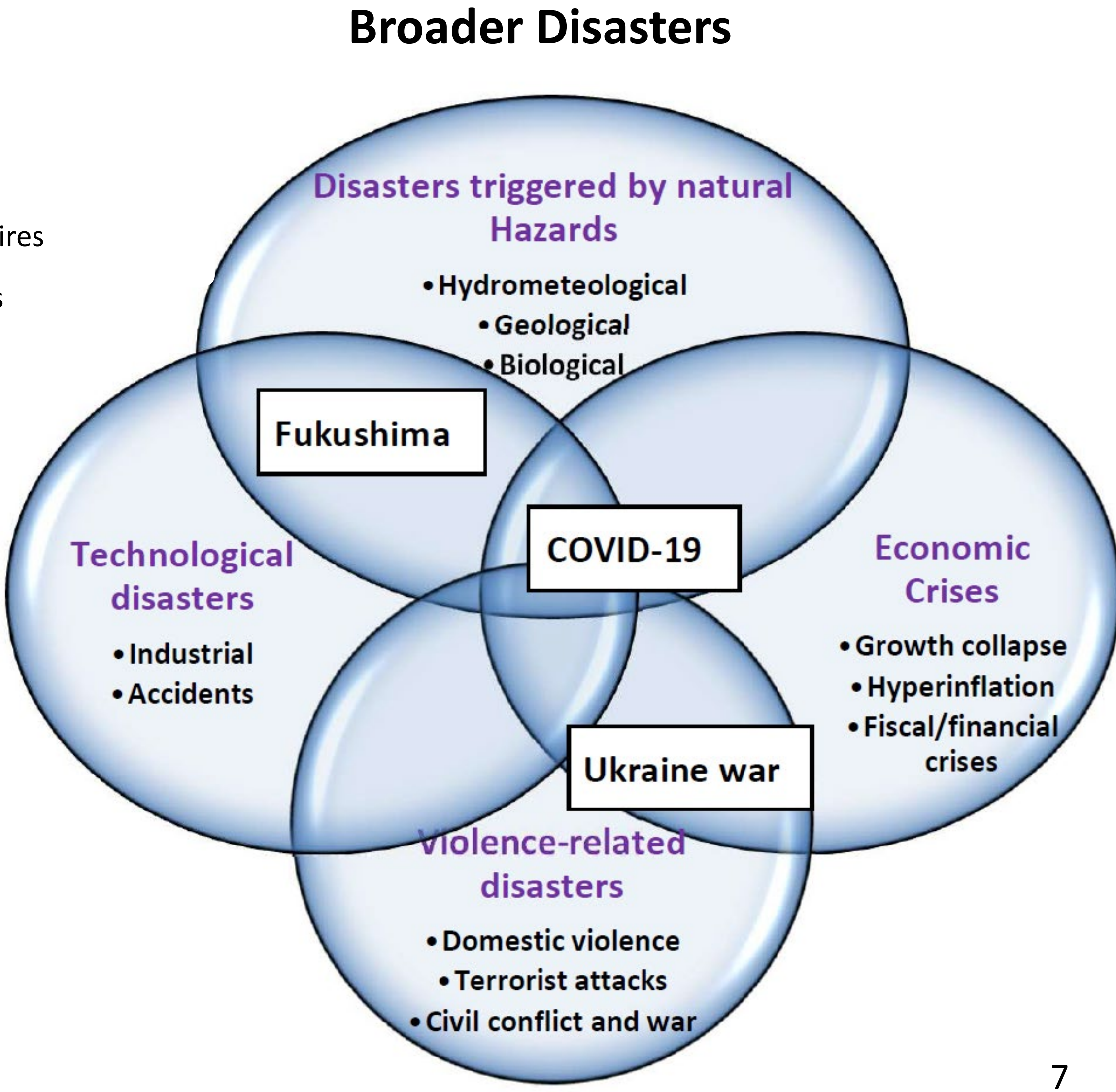
High-profile disasters in Asia since 1990



Disaster Taxonomy, Complexity, and Ripple Effects

- Hazards are either natural or human-made.
- Compoundedness and complexity
- Ripple effects over time and space





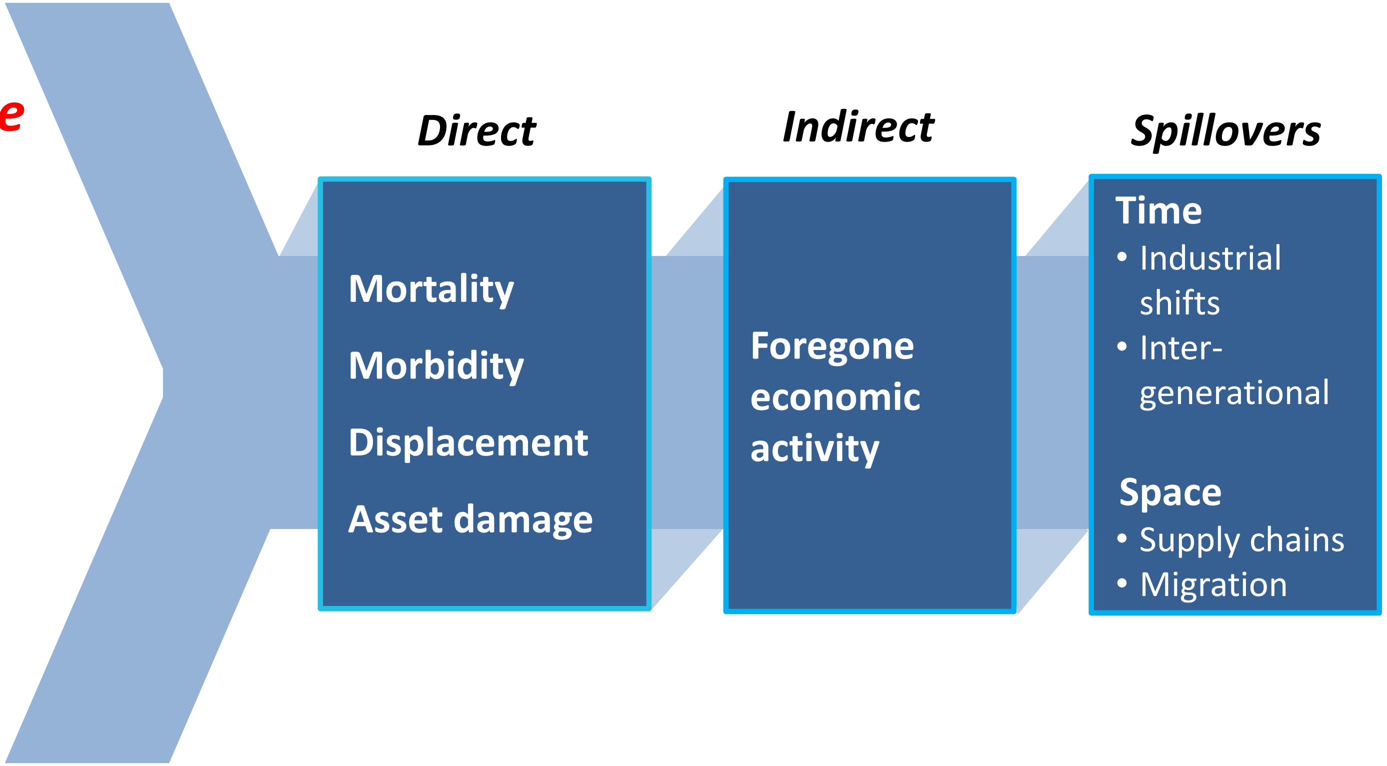
Note: We expanded the taxonomy of EM-DAT: The Emergency Events Database - Université Catholique de Louvain (UCL) - CRED, D. Guha-Sapir - www.emdat.be, Brussels, Belgium. Accessed 25 January 2021.

Hazards, Exposure, & Vulnerability, Causing Disasters

Hazards (due to climate change)

Exposure

Vulnerability



Source: *Asian Development Outlook 2019: Strengthening Disaster Resilience*, Asian Development Bank.
https://www.adb.org/publications/asian-development-outlook-2019-strengthening-disaster-resilience

Three Topics

- Market, state, and community mechanisms in resource allocation
- Disaster and preference nexus
- Field Studies and Policies?

Three Topics

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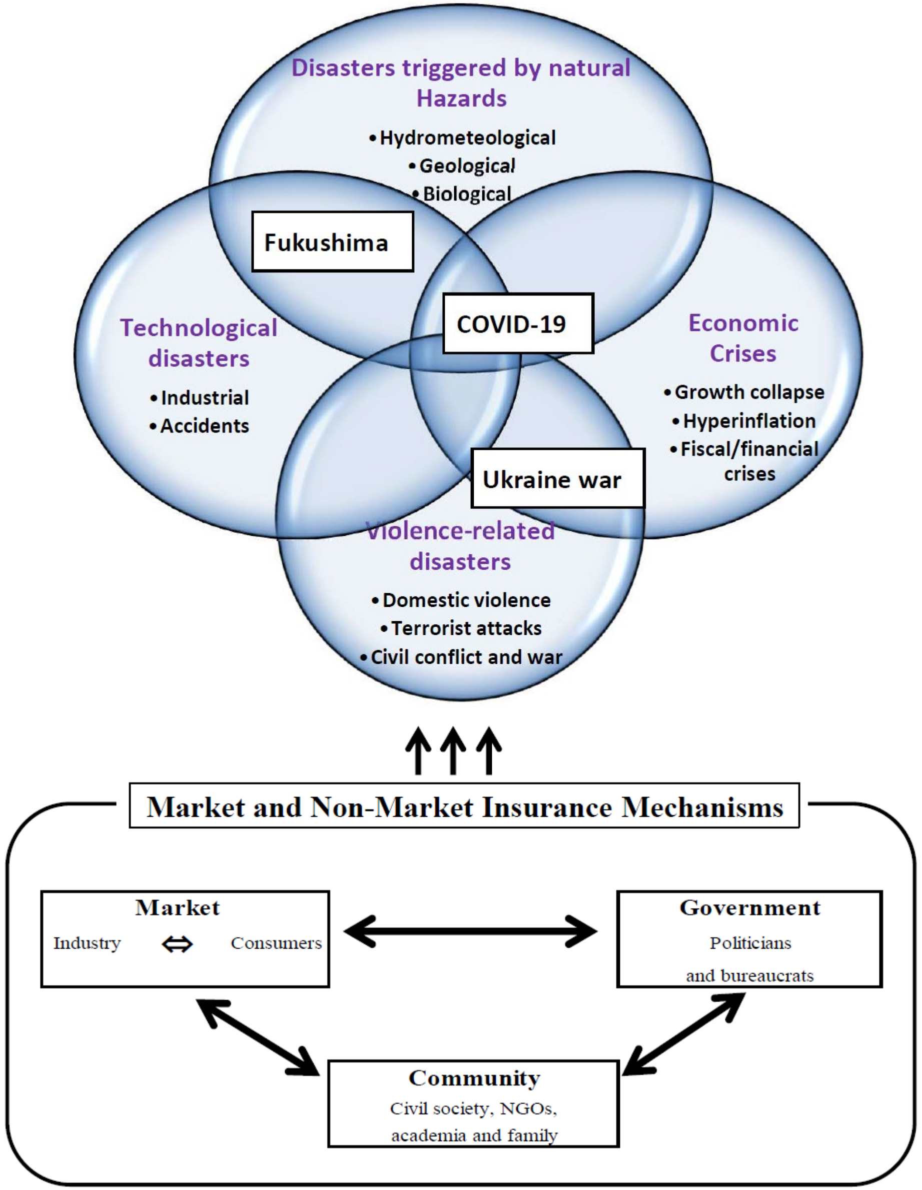
- Disaster and preference nexus
- Field Studies and Policies?

Market, State, and Community "Insurance" Mechanisms



Formidable Market Mechanism

- **John McMillan (2003) “Reinventing the Bazaar”**
  - Rwandan Refugee Camps in DRC
  - POW camps during WWII
  - Rice futures trading in Dojima, Osaka, in 17th century

- **1st welfare theorem**
  - Adam Smith's "Invisible Hand."
  - Laissez-faire achieves a Pareto-optimal allocation of resources.

Market and Government Failures

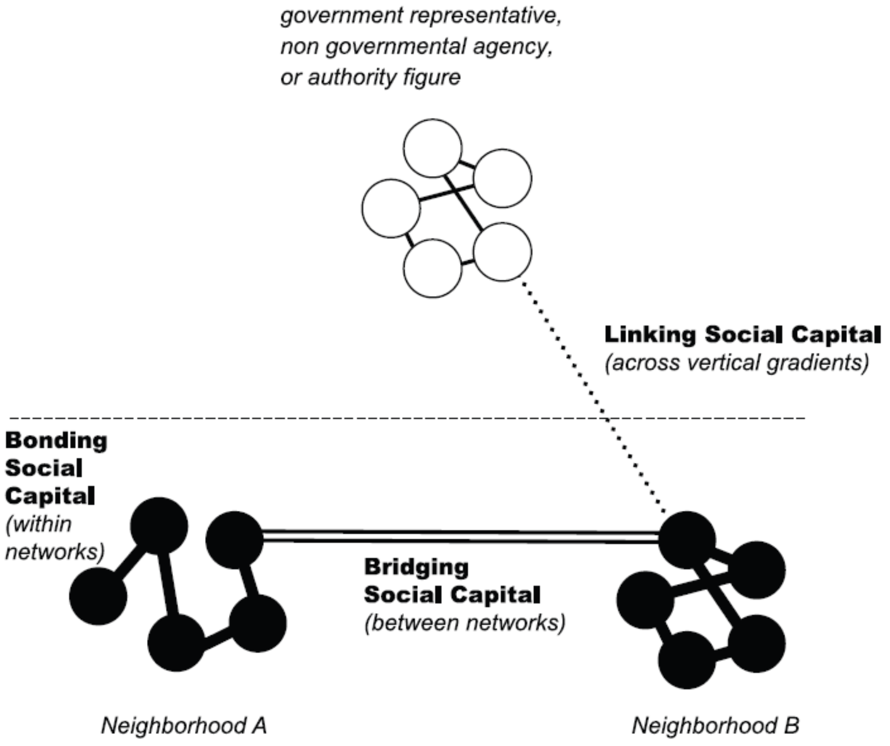
- **Yet, the 1st theorem remains neutral on poverty and income distribution**
- **Market failures**
  - Incomplete market (insurance, PG), imperfect information, imperfect competition, IRS,
  - "PD game" is a variant of market failures
  - Justify state inverventions
- **Government failures (Krueger, 1990)**
  - Lack of bureaucratic capacities, inappropriate governance, corruption, maximization of self-interests, etc.

Social Capital Built on Community Mechanisms

- **The informal forms of institutions and organizations** based on social relationships, networks and associations that create shared knowledge, mutual trust, social norms, and unwritten rules [Durlauf and Fafchamps (2004)]

- Network within/across rural communities and firms as well as SNS (FB etc)

- **Three modes:**
  - Bonding SC
  - Bridging SC
  - Linking SC



Source) Daniel Aldrich (2012) *Building Resilience*, University of Chicago press

Market, State, and Community Mechanisms

- **Ouchi, William G. (1980).** "Markets, Bureaucracies, and Clans," *Administrative Science Quarterly* 25(1), 129-141.
- **Hayami, Yujiro (1989).** "Community, Market, and State," in As. Maunder and A. Valdes, eds., *Agriculture and Governments in an Independent World*, Amherst, MA: Gower, pp. 3-14.
- **Bowles, Samuel and Herbert Gintis (2002)**. Social Capital and Community Governance. *Economic Journal* 112 (483), F419–F436.
- **Otsuka, Keijiro and Kaliappa Kalirajan, eds., (2011)** *Community, Market and state in Development*. Palgrave Macmillan.
- **Aldrich, Daniel P., Yasuyuki Sawada, and Sothea Oum (2015)** "Community, Market, and Government Responses to Disaster," in Daniel P. Aldrich, Sothea Oum, and Yasuyuki Sawada, eds., *Resilience and Recovery in Asian Disasters: Community Ties, Market Mechanisms, and Governance*, Springer, 1-16.
- **Rajan, Raguram. (2019),** *The Third Pillar: How Markets and the State Leave the Community Behind*, New York, Penguin Random House.
- **Ogaki, Masao (2022).** Economics of the Community Mechanism. *Japanese Economic Review* 73(3), 433–457.

The Trinity and (Field) Experiments

- **Public goods and trust games** are variants of **PD game**
  - Models of **market failure**
- **Deviation from the Nash equilibrium** observed (Cardenas and Carpenter, 2008)
  - Third party (government) **enforcement**
  - **Social capital or community mechanism** (Glaeser, 2000, Anderson et al., 2004; Camerer and Fehr, 2004; Karlan, 2005; Levitt and List, 2007)
    - **Other-regarding preferences**
    - **Repeated game**

Player B

Player A	C	D
C	4, 4	-1, 5
D	5, -1	0, 0

Social optimum: 4, 4

Nash equilibrium: 0, 0

Does Disaster Insurance Provide Peace of Mind?

Evidence from the Great East Japan Earthquake

Toyo Ashida

University of Tokyo

Yasuyuki Sawada

University of Tokyo

What We do

- 'Peace of mind' effect of disaster insurance?
  - Insurance as a financial safety net
  - Disasters are traumatic (van Griensven et al. 2006; Kumar et al. 2007; Frankenberg et al. 2008; Fergusson et al. 2014; Tsuboya et al. 2016; Sawada et al., 2018)
- **Japan Gerontological Evaluation Study (JAGES) panel from Iwanuma City**
  - Severely affected by the **Great East Japan Earthquake of March 11, 2011.**
  - Covers before and after the earthquake (2010, 2013, 2016, & 2019)

- **Empirical models (ANCOVA) for *W*=GDS15:**

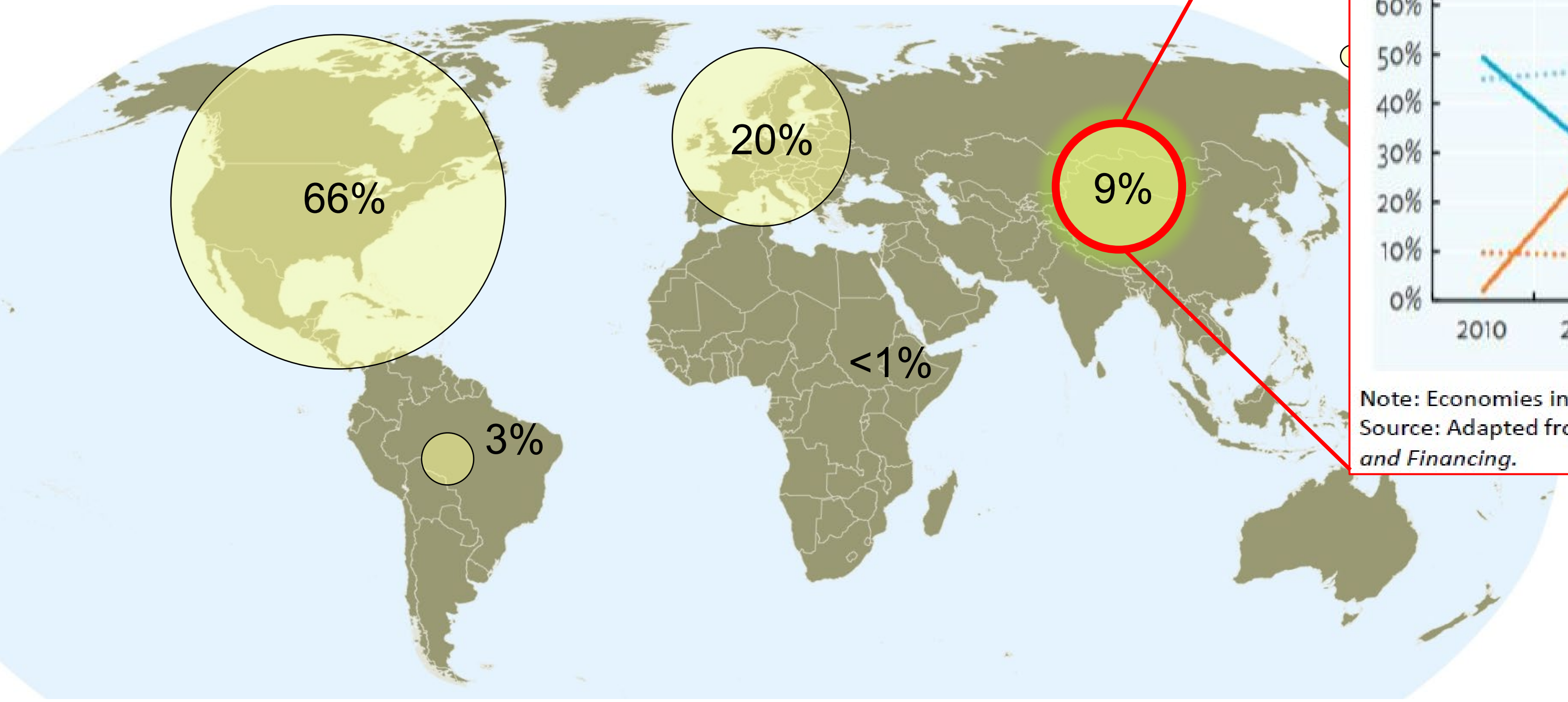
$$W_{it} = b_0 + b_W W_{it\text{-}1} + b_S S_{it} + X_{it}\beta + \varepsilon_{it}$$

$$W_{it} = b_0 + b_W W_{it\text{-}1} + b_S S_{it} + b_S^I S_{it} \times I_{it\text{-}1} + X_{it}\beta + \varepsilon_{it}$$

Table 3: Estimation Results of Depression Regression, 2010-2013

	(1)	(2)	(3)	(4)	(5)	(6)
Insurance subscription			-0.102	-0.0762	-0.0366	-0.0206
			(0.116)	(0.113)	(0.119)	(0.116)
Home damage	0.411	0.400	0.422#	0.408	0.935***	0.846**
	(0.290)	(0.285)	(0.291)	(0.287)	(0.345)	(0.355)
Insurance subscription×House damage					-0.808***	-0.688**
					(0.300)	(0.300)
Y_{t-1} (GDS-15 measure in 2010) (	0.636***	0.614***	0.635***	0.614***	0.634***	0.613***
	(0.0196)	(0.0210)	(0.0196)	(0.0210)	(0.0198)	(0.0211)
Age ≥75	0.604***	0.386***	0.603***	0.386***	0.600***	0.385***
	(0.0965)	(0.0909)	(0.0966)	(0.0910)	(0.0960)	(0.0899)
Women	0.00762	-0.254**	0.00572	-0.255**	0.00461	-0.252**
	(0.106)	(0.115)	(0.106)	(0.114)	(0.106)	(0.114)
Constant	0.872***	1.216***	0.962***	1.275***	0.917***	1.237***
	(0.112)	(0.299)	(0.150)	(0.317)	(0.151)	(0.314)
Control variables	No	Yes	No	Yes	No	Yes
N	2,762	2,762	2,762	2,762	2,762	2,762
Adjusted R-squared	0.415	0.424	0.415	0.424	0.416	0.425

Disaster Insurance Markets Fail



Share of economic losses insured by income level, selected Asian economies, 2010–2019

Note: Economies included in this chart are members of the Asia-Pacific Economic Cooperation.
Source: Adapted from ADB. 2020. *Leveraging Technology and Innovation for Disaster Risk Management and Financing*.

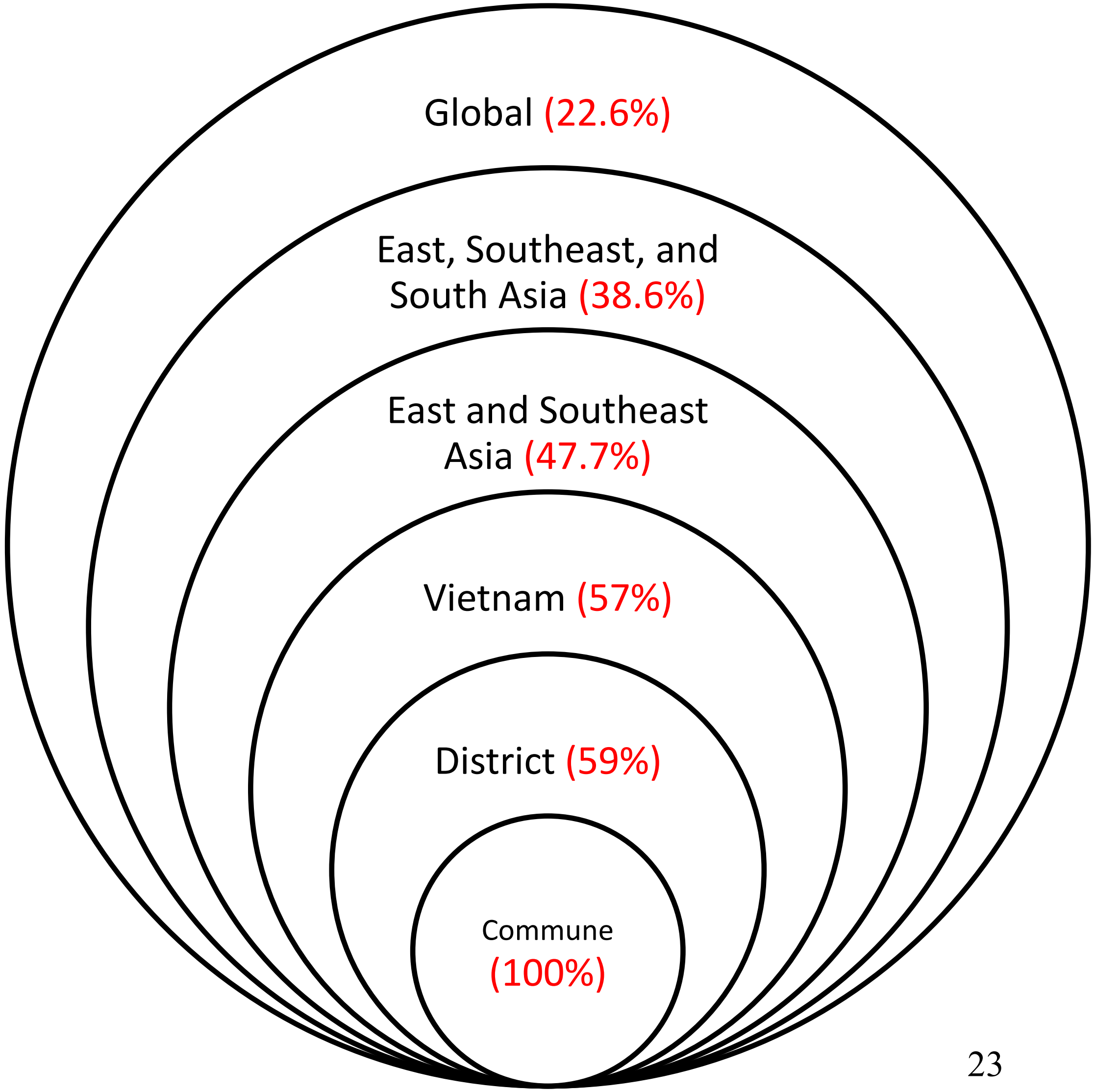
© 2010 Münchener Rückversicherungs-Gesellschaft, Geo Risks Research, NatCatSERVICE – As at August 2010

Overall Insurability at Different Layers

- **Consumption risk sharing or consumption insurance test**
  - Individual: Townsend (1994); Mace (1991); Cochrane (1991); Udry (1994); Kinnan (2022); Kinnan et al. (2024)
  - International: Obstfeld (1994); Lewis (1996); Kose, Prasad, and Terrones (2009); Flood, Marion, and Matsumoto (2012); Lustig and Verdelhan (2019); Kekre and Lenel (2024):

- **F.O.N.C.:** $\Delta \log c_{it} = \alpha_0 + a_1 S_{it} + u_{it}$

- **Tests by different layers: Sawada (2017) and Sawada, Nakata, and Kotera (2017)**
  - Globally, market and government mechanisms are weak
  - Locally, community insurance mechanisms for idiosyncratic shocks work



Why Disaster Insurance Markets Fail?

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Journal of Economic Behavior and Organization

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ELSEVIER

Adverse selection and moral hazard in corporate insurance markets: Evidence from the 2011 Thailand floods☆

Daisuke Adachi[a,*], Hiroyuki Nakata[b,c], Yasuyuki Sawada[d], Kunio Sekiguchi[e]

[a] *Department of Economics and Business Economics, Aarhus University*
[b] *Graduate School of Frontier Sciences, University of Tokyo*
[c] *Research Institute of Economy, Trade and Industry (RIETI)*
[d] *Faculty of Economics, University of Tokyo*
[e] *Ministry of Economy, Technology and Industry (METI)*

- **Adachi et al. (2023) Conventional indemnity-based insurance** arrangements fail:
  - Foreign firms under 2011 Thai floods
  - Property insurance and business interruption insurance revealed serious adverse selection and moral hazard problems.

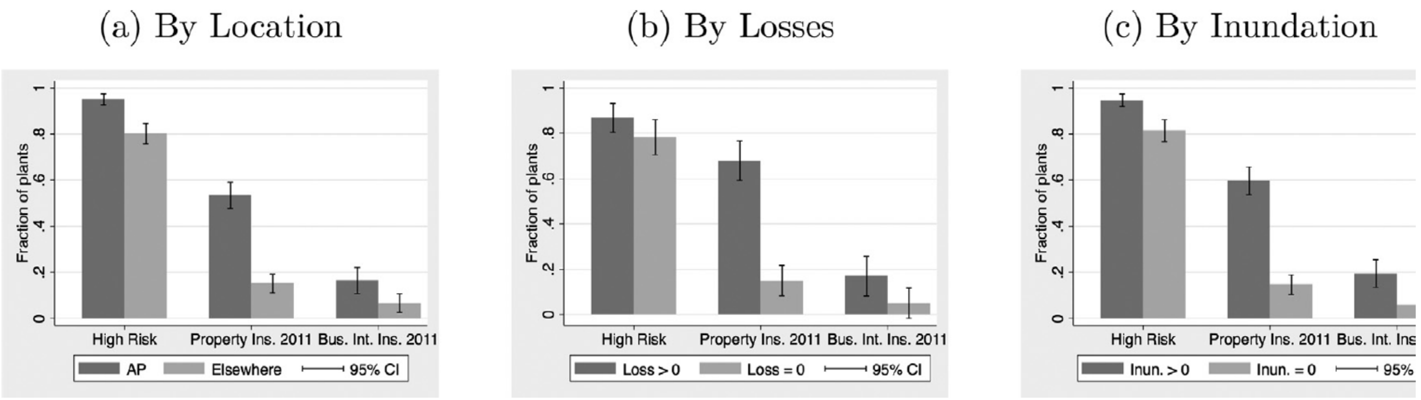


Fig. 1. Adverse Selection: Tests of Mean Differences. *Note*: The authors' calculation based on the RIETI survey dataset. Figures compare the fraction of firms that perceived high risk and are covered by property insurance ('Property Ins') and business interruption insurance ('Bus. Int. Ins') in 2011 before the floods. 'High risk' indicates that 'Because natural disasters occur infrequently' is not included as a reason for the plant's location choice. 'Covered 2011' refers to property insurance subscription in 2011 before the floods. The whiskers are the 95 percent confidence intervals. AP stands for Ayutthaya and Pathum Thani provinces. 'Loss > 0' indicates that the firm reported positive financial losses. 'Inun > 0' means that the firm experienced a water positive height on-site during the 2011 floods.

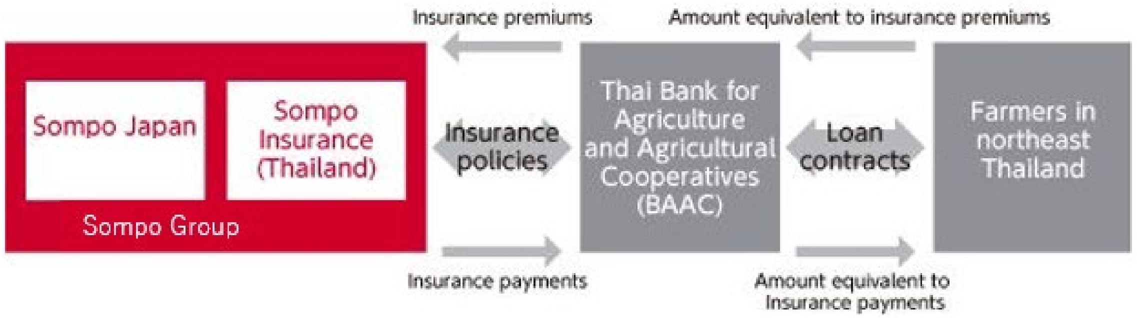
Table 4
Moral Hazard: Regressions of length of suspension (RT_i) on insurance payment.

VARIABLES	(1) Resumed Month	(2) Resumed Month	(3) Resumed Month	(4) Resumed Month	(5) Resumed Month
Property Paid	4.009***	2.224***			1.892**
	(1.027)	(0.818)			(0.740)
Property Delay	-0.0590	-0.0212			0.00712
	(0.0839)	(0.0767)			(0.0796)
Bus. Int. Paid			4.316***	2.283*	1.765*
			(1.373)	(1.328)	(1.024)
Bus. Int. Delay			-0.257***	-0.208**	-0.167*
			(0.0906)	(0.101)	(0.0869)
Losses		-0.160		0.0552	-0.181
		(0.105)		(0.0679)	(0.123)

Note: The coefficients of model (3) are reported. For each property insurance (label 'Property') and business-interruption insurance (label 'Bus. Int.'), variable Paid indicates a dummy variable with 1 when the insurance is paid to the firm after floods and 0 otherwise. Variable Delay is the number of months from July 2011 until insurance payment. Variable Damage indicates natural logarithm of (monetary value of losses due to the floods +1). Standard errors are clustered by industrial estates in Table A.1. R-squared is not reported because model (3) is estimated as an ordered probit model. As reported in Table 1, some firms do not report outcome variables, who are dropped from regressions. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

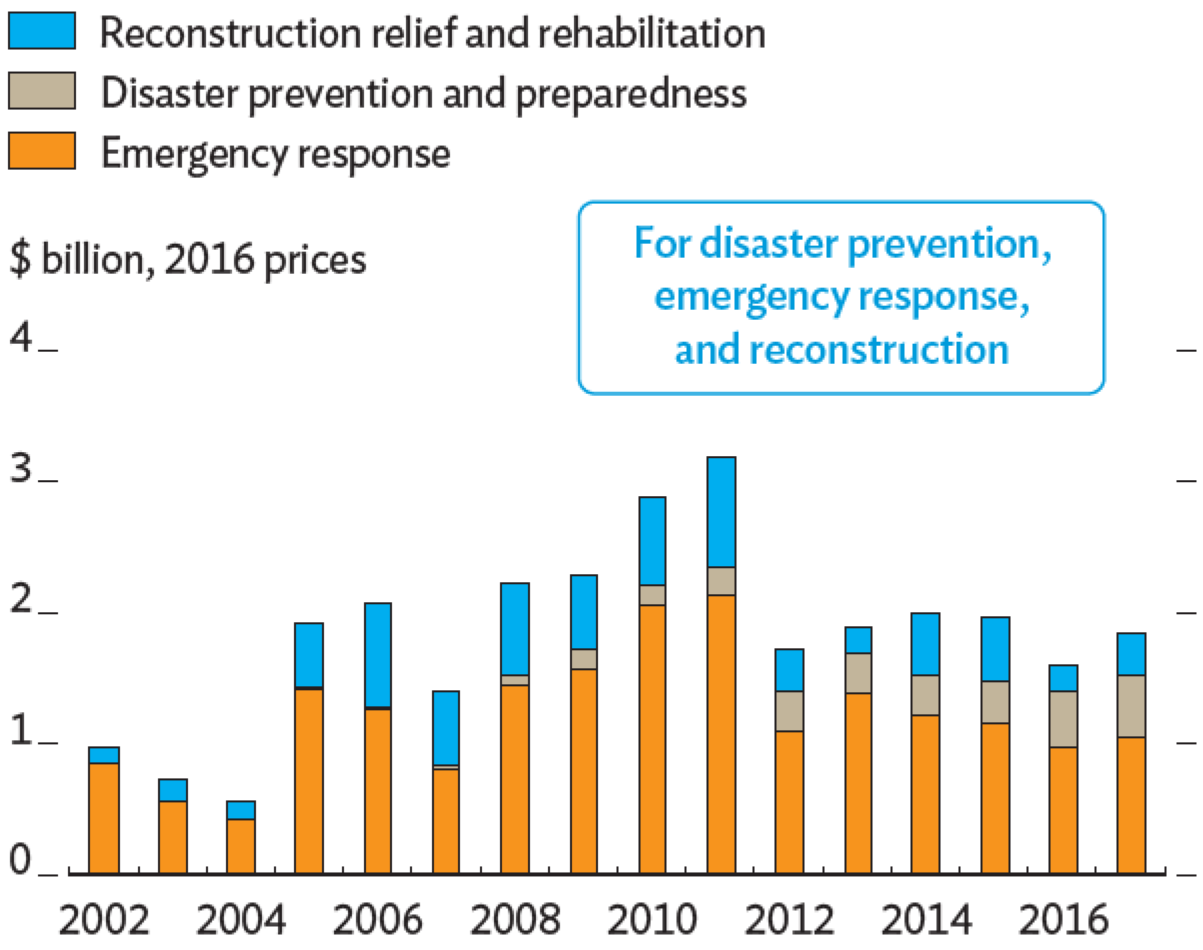
Innovative Insurance?

- **Innovative microinsurance programs** have been unpopular
  - Index-based risk transfer (rainfall, temperature, area outcomes, NDVI, etc.)
  - Free from adverse selection and moral hazard problems
- **Macro insurance**
  - Started from CRIFF and expanded to other rigions
  - CAT Bond
  - Markets remain small

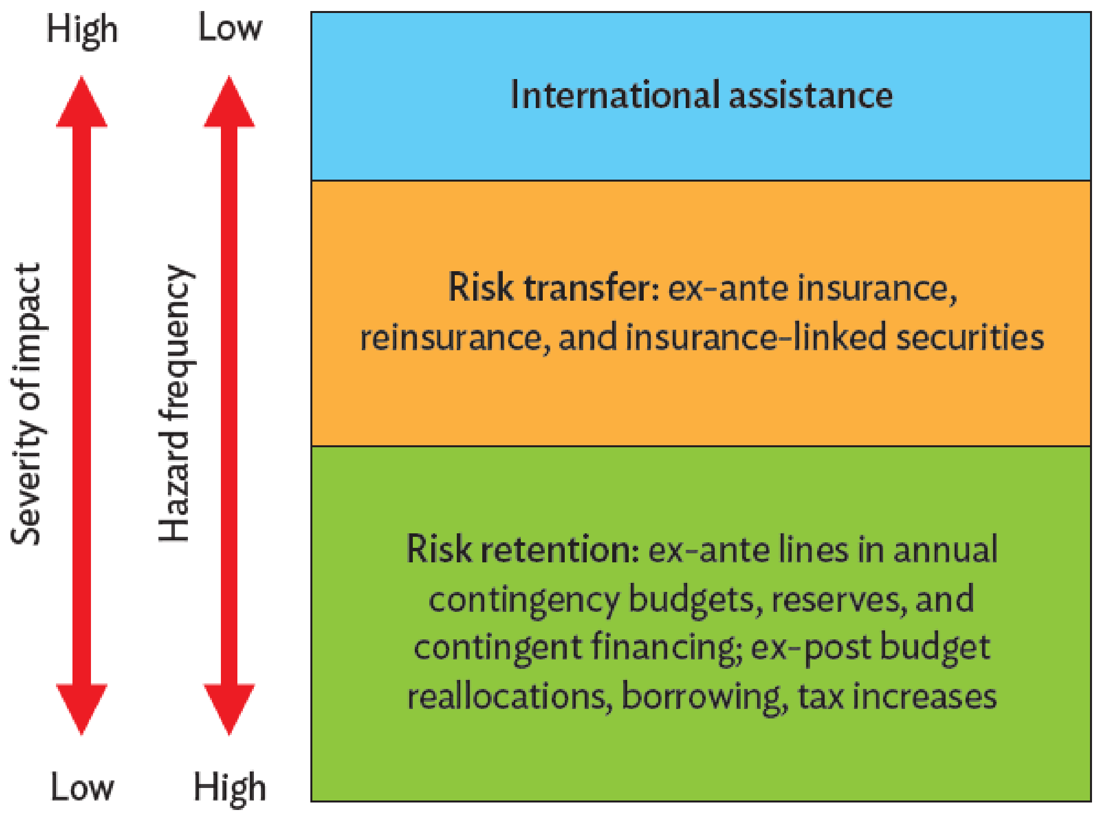


Government Failures

2.3.1 Humanitarian aid to developing Asia



2.3.4 Layered approach to disaster risk financing



Source: ADB calculations using data from DRM Database of the Sustainable Development and Climate Change Department, ADB.

Infrastructure for Building Resilient Social Capital

- **Ibasho House**
  - Ofunato, Iwate, affected by **March 2011 GEJE**
  - June 13, 2013 -
  - Infrastructure for better bonding social capital in a super-aging community
  - **Lee et al. (2022): "Ibasho participation effect"** is positive in subjective assessment of recovery from the disaster

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OPEN **Social capital building interventions and self-reported post-disaster recovery in Ofunato, Japan**

Juheon Lee[1]✉, Daniel P. Aldrich[2], Emi Kiyota[3], Tanaka Yasuhiro[3] & Yasuyuki Sawada[4]

- **What is Ibasho House?**
  - **Visitor-friendly infrastructure** which has been building social capital and resilience while changing people's attitudes about aging and the social role of elders.
  - It has expanded the scope of the operation **from a simple café to include a vegetable garden, a ramen noodle shop, a farmer's market, a children's day care, and other multi-generational programs.**
  - Its knowledge and experience was leveraged to help launch **Ibasho projects in Nepal and the Philippines.**

Infrastructure for Building Resilient Social Capital

- **Ibasho Philippines**
  - Super Tyhoon Yolanda 2013, Ormoc（Barangay Bagong Buhay）
  - 2015-
- **Ibasho Nepal**
  - Matatirtha village, 2016-, April 2015 Earthquake
- **Aida et al. (2023):** Ibasho *treatment* effects


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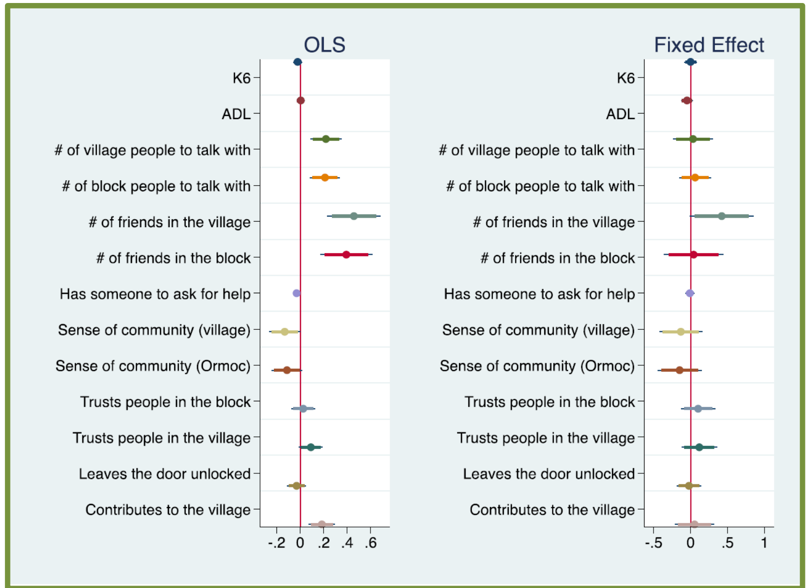
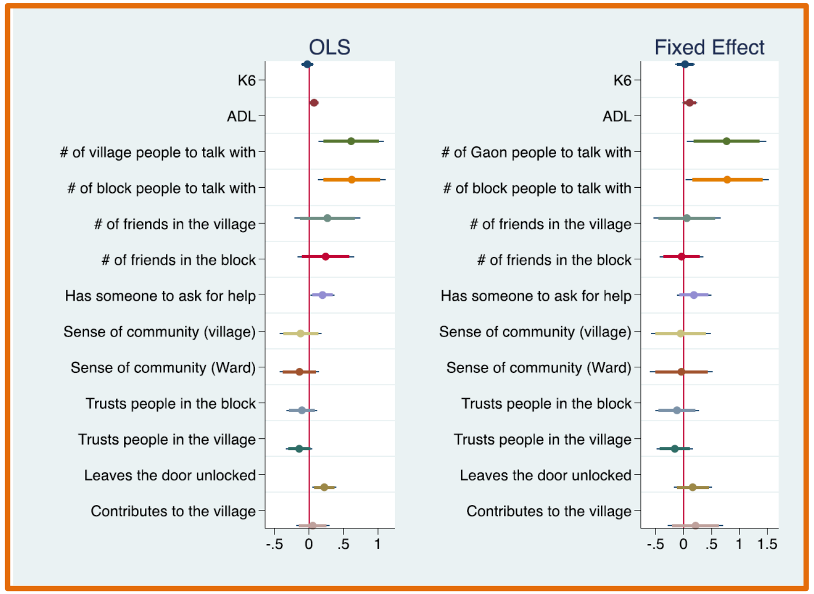
Building social capital with elders' leadership through a community hub "*Ibasho*" in the Philippines and Nepal

Takeshi Aida[1], Emi Kiyota[2], Yasuhiro Tanaka[3] & Yasuyuki Sawada[4]





Government to Promote Social Capital

- **JICA's irrigation project in Sri Lanka**
  - Southern Sri Lanka, Walawe left bank (WLB)
  - 1960～ A large-scale project to irrigate SAT area
  - 1995～2008, JICA supported irrigation in WLB
  - Land allocation has been done arguably by **lottery**
  - Aoyagi, et al.（2022): **Years of access to irrigation enhance social capital captured by trust games: Infrastructure for habit formation**

World Development 156 (2022) 105906

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Irrigation infrastructure and trust: Evidence from natural and lab-in-the-field experiments in rural communities ☆

Keitaro Aoyagi [a], Yasuyuki Sawada [b,*], Masahiro Shoji [c]

Table 4
Homogeneity of Irrigation Impact across Physical/Social Distance.

Receiver's Identity:	Anonymous + Identified				Anonymous			
Sample:	Full		Lottery		Full		Lottery	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Years of access to irrigation	0.95*		2.89*		0.88		3.36**	
	(0.54)		(1.68)		(0.55)		(1.59)	
× 1 if identified person	0.75	0.96	0.89	1.51				
	(0.55)	(0.61)	(1.98)	(1.85)				
× 1 if an anonymous	−0.15	−0.13	−1.20	−1.13	−0.16	−0.11	−1.22	−1.16
person in same D-canal	(0.62)	(0.68)	(1.73)	(1.62)	(0.64)	(0.75)	(1.82)	(1.69)
× 1 if an anonymous person	0.11	0.21	−1.10	−0.99	0.12	0.26	−1.08	−0.97
in different D-canal	(0.45)	(0.39)	(0.80)	(0.77)	(0.43)	(0.37)	(0.84)	(0.77)
1 if identified person	34.37***	43.71***	63.90***	68.42***				
	(7.39)	(7.26)	(23.15)	(23.20)				
1 if an anonymous person	4.64	11.37	27.41	35.66	4.13	19.01*	25.60	41.35*
in same D-canal	(10.81)	(11.04)	(21.97)	(22.53)	(11.42)	(10.99)	(22.80)	(22.74)
1 if an anonymous person	0.29	1.12	26.89*	31.05**	−0.62	3.40	24.79	34.55**
in different D-canal	(6.36)	(6.03)	(14.87)	(14.16)	(6.32)	(6.05)	(16.10)	(14.51)
Fixed Effects	Block	Indiv.	Block	Indiv.	Block	Indiv.	Block	Indiv.
Number of observations	1,532	1,532	366	366	773	773	188	188
Number of households	260	260	63	63	259	259	63	63
R-squared	0.43	0.42	0.54	0.50	0.36	0.24	0.48	0.35

D-canal-level cluster-adjusted robust standard errors are shown in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
The dependent variable is the amount sent in the trust game. All specifications control for the sender's socio-demographic characteristics, altruism, risk preference, income, assets, the proportion of lottery households in the D-canal, an indicator of canal tail, and the expected trustworthiness of the counterpart. Columns (1)–(4) include both identified and anonymous receivers, and columns (5)–(8) include only anonymous receivers.

Government to Promote Social Capital

- **JICA, "School for All" project in Burkina Faso**
  - COGES (community-based management) in elementary schools
  - Management committee members are selected by election.
  - **Sawada, et al.（2022): Rolling-out RCT of COGES, enhancing social capital captured by PG game contributions**


Journal of Economic Behavior and Organization 198 (2022) 267–279

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ELSEVIER

Democratic institutions and social capital: Experimental evidence on school-based management from a developing country☆

Yasuyuki Sawada[a], Takeshi Aida[b], Andrew S. Griffen[a,*], Eiji Kozuka[c], Haruko Noguchi[d], Yasuyuki Todo[d]

Table 3
COGES Election and Implementation Effects on PGG (ITT).

	Election Effect			Implementation Effect		
	(1)	(2)	(3)	(4)	(5)	(6)
D_s	10.77	3.65	4.65	28.91†	28.59†	22.54*
	(9.07)	(8.87)	(8.18)	(13.81)	(13.63)	(11.55)
Dictator game contribution			0.37‡			0.42‡
			(0.03)			(0.04)
2nd round	24.17‡	24.17‡	24.17‡	13.06‡	13.06‡	13.06‡
	(4.83)	(4.83)	(4.83)	(3.64)	(3.64)	(3.64)
Constant	294.9‡	296.8‡	199.6‡	360.7‡	354.3‡	232.1‡
	(16.15)	(22.74)	(23.65)	(20.75)	(34.50)	(34.43)
Controls	No	Yes	Yes	No	Yes	Yes
Strata FE	Yes	Yes	Yes	Yes	Yes	Yes
Estimation	OLS	OLS	OLS	OLS	OLS	OLS
Time period	Baseline	Baseline	Baseline	Endline	Endline	Endline
N	2822	2822	2822	1638	1638	1638
R^2	0.07	0.12	0.20	0.07	0.09	0.22

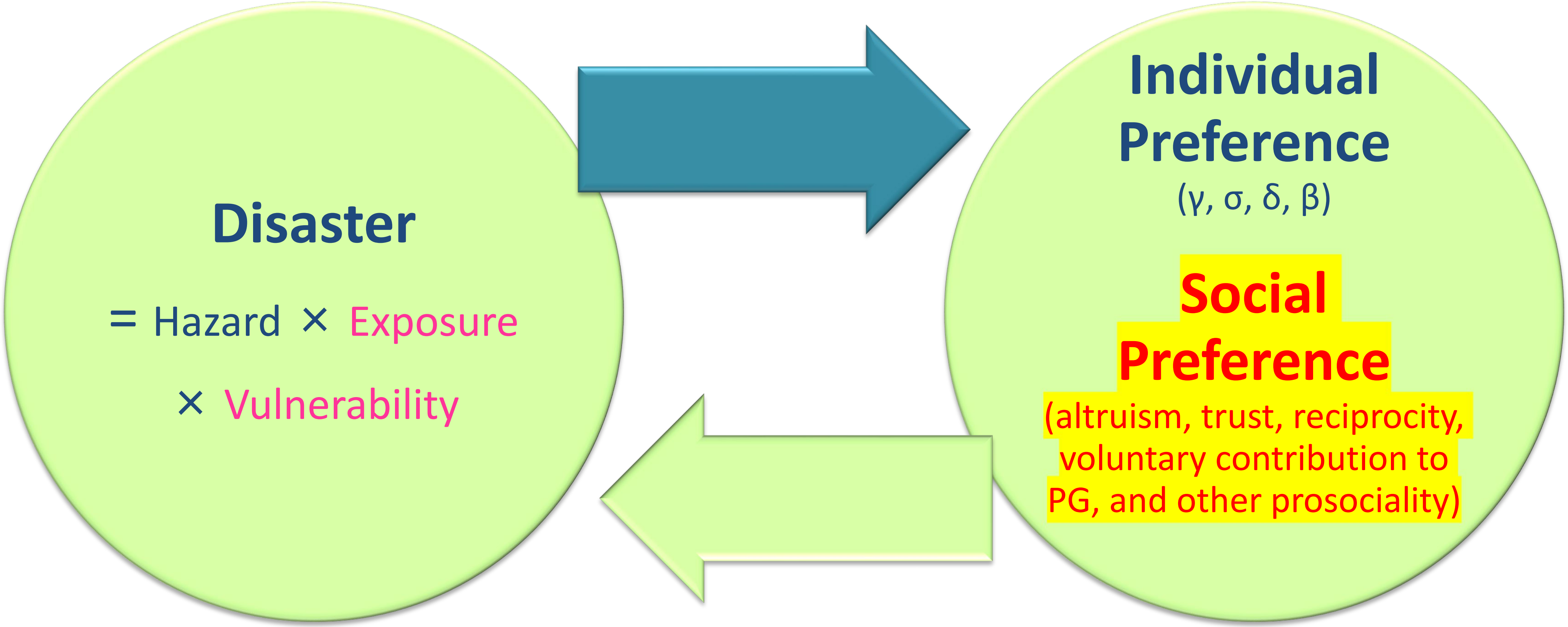
Notes: The dependent variable is the amount contributed in the public goods game from an initial stake of 500 FCFA. Robust standard errors clustered at the school x group level are reported in parentheses. Control variables are indicators for subgroup, age, years of schooling, and indicator variables for male, private school, Islamic school, school director, teacher, AME member, and APE member. ‡ $p<0.01$, † $p<0.05$, * $p<0.1$.

Three Topics

- Market, state, and community mechanisms in resource allocation
- Disaster and preference nexus
- Field Studies and Policies?

Disaster & Preference Nexus

- To enhance insurability, we need to understand the disaster and preference nexus
- The existing academic findings on the impacts of disasters on **risk and time preference domains as well as social preferences** have been mixed (Chuang & Schechter, 2015; Schildberg-Hörisch, 2018; Sawada, 2022).



Anarchy of Disaster & Preference Nexus

Study	Disaster Type	Risk Attitude	Time Discounting	Social Preference
Alesina and La Ferara (2002)	Traumatic event in the US			Less trust
Eckel et al. (2009)	Hurricane Katrina in the US	Less risk averse		
Castillo and Carter (2011)	Hurricane Mitch in Honduras			More trust on small shocks, less trust on large shocks
Voors et al. (2012)	Civil conflict in Burundi	Less risk averse		More altruistic
Callen et al. (2014)	Insurgent attacks in Afghanistan	No change		
Fleming-Muñoz et al. (2014)	Earthquake in Chile			Less reciprocity
Kim and Lee (2014)	Displacement in Korea	More risk averse		
Page et al. (2014)	Floods in Australia	Less risk averse		
Toya and Skipmor (2014)	Storms, floods, earthquakes, mass movements, and volcano eruptions, 131 to 146 countries			More trust
Callen (2015)	Tsunami in Sri Lanka		More patient	
Cameron and Shah (2015)	Earthquakes and floods in Indonesia	More risk averse		
Samphantharak and Chantarat (2015)	Floods in Thailand	More risk averse		Less altruistic
Sawada and Kuroishi (2015a)	Floods in the Philippines		More present-biased	
Sawada and Kuroishi (2015b)	Earthquake and tsunami in Japan		More present-biased	
Sawada and Kuroishi (2015c)	Earthquake and tsunami in Japan			More voluntary contribution to public goods
Andrabi and Das (2017)	Earthquake in Pakistan			Neutral on trust
Cassar et al. (2017)	Tsunami in Thailand	More risk averse	More impatient	More altruistic
Shupp et al. (2017a)	Tornado in Oklahoma City in the US	(Direct) More risk averse (Indirect) Less risk averse		
Shupp et al. (2017b)	Tornado in Oklahoma City in the US		Less patient	More trust
Chantarat et al. (2019)	Floods in Cambodia	More risk averse	More patient	More altruistic, less trust
Hanaoka et al. (2018)	Earthquake in Japan	Less risk averse		
Sawada et al. (2018)	Earthquake and tsunami in Japan		More present-biased	
Akesaka (2019)	Earthquake in Japan		More present-biased	
Kuroishi and Sawada (2019a)	Earthquake and tsunami in Japan and floods in the Philippines	Less risk averse	More present-biased	More altruistic
Kuroishi and Sawada (2019b)	Floods in the Philippines			More altruistic
Matsuyama et al. (2020)	Earthquake and tsunami in Japan		Less patient	
Sawada et al. (2021)	Earthquake and tsunami in Japan			Less prosocial among the elderly, more prosocial among the young laborer

Source) Sawada, Y. (2022) "Preferences, Behavior, and Welfare Outcomes against Disasters: A Review," in Mark Skidmore, ed., ***Handbook on the Economics of Disasters***, Edward Elgar.

Mechanisms Behind Seemingly-Prosocial Behavior

- Utility function with warm glow and pure altruism (Andreoni, 1989, 1990, and 2006):

$$u(\omega_s - g_s) + \phi_1 v_1(g_s) + \phi_2 v_2(\omega_r + g_s), \tag{1}$$

- F.O.C.:

$$u'(\omega_s - g_s) = \phi_1 v_1'(g_s) + \phi_2 v_2'(\omega_r + g_s). \tag{2}$$

- Effect of a recipient's exposure to the disaster:

$$\frac{dg_s}{d\omega_r} = \frac{-\phi_2 v_2''(\omega_r + g_s)}{u''(\omega_s - g_s) + \phi_1 v_1''(g_s) + \phi_2 v_2''(\omega_r + g_s)}. \tag{3}$$

$$\frac{dg_s}{d\omega_r} = 0 \quad if \quad \phi_2 = 0, \tag{4}$$

$$\frac{dg_s}{d\omega_r} < 0 \quad and \quad \frac{d^2 g_s}{d\phi_2 d\omega_r} < 0 \quad if \quad \phi_2 > 0. \tag{5}$$

- Effect of the sender's exposure to the disaster:

$$\frac{dg_s}{d\omega_s} = \frac{u''(\omega_s - g_s)}{u''(\omega_s - g_s) + \phi_1 v_1''(g_s) + \phi_2 v_2''(\omega_r + g_s)} > 0, \tag{6}$$

- An infinitely repeated PD game with a trigger strategy
- A necessary condition for self-enforcing cooperation:

$$\delta \geq \frac{u^D - u^C}{u^D - u^\omega} \tag{10}$$

- Disaster exposure would:
  - reduce u^ω, decreasing RHS, making the cooperative threshold of δ lower
  - change δ directly

- **A disaster provide us with clean variations in:**
  - ***ω_s*: own resource**
  - ***ω_r*: partner's resource**
  - ***u^ω*: utility from own resource**

Iwanuma City and Futaba Town

- **Iwanuma City, Miyagi, Japan**
  - Japan Gerontological Evaluation Study (JAGES) panel since 2010
  - Census of age 65 +
  - In 2011, Great East Japan Earthquake
  - **Nov 2016 data**: n=7,421; response rate = 74.5%

- **Futaba Town, Fukushima, Japan**
  - Survey of Nuclear Disaster Evacuees from Futaba, Fukushima
  - Original survey sent to all household heads by regular mail (with Koho Futaba)
  - Multiple rounds of survey : July 2013, December 2014, July 2016, December 2017年, July 2019, December 2020年, October 2022.
  - **July 2016 data**: n=499; response rate = 16.6%

Japan Gerontological Evaluation Study

Home Damage

- *d*: publicly-certified home damage level asked in our questionnaire.
  - **Iwanuma)** 1. No significant damage, 2. Partially damaged, 3. Half destroyed, 4. Almost collapsed, and 5. Totally collapsed.
  - **Futaba)** 1. No significant damage, 2. Partially damaged, 3. Half destroyed, 4. Destroyed.

Table A5: Iwanuma, Distribution by Home Damage Level

	Freq.	Percent
1. No significant damage	1,104	40.28
2. Partially damaged	1,217	44.4
3. Half destroyed	203	7.41
4. Almost collapsed	102	3.72
5. Totally collapsed	115	4.2
Total	2,741	100

Table A15: Futaba, Distribution by Home Damage Level

	Freq	Percent
1. No significant damage	157	31.46
2. Partially damaged	192	38.48
3. Half destroyed	86	17.23
4. Totally collapsed	34	6.81
Total	469	100

Ambiguous Disaster & Social Preference Nexus

scientific reports

OPEN

Heterogenous effects of the Great East Japan earthquake on prosociality of people depending on their age

Yasuyuki Sawada[1], Toyo Ashida[2] & Keiko Iwasaki[3]

Sawada, Ashida, and Iwasaki (2023)

- Prosociality captured by **(1) # of new year's greeting cards, (2) GSS Trust, or (3) (non-incentivized) dictator game with someone in your community**
- **Elders and GSS:** static framework
- **Younger and specific social preference:** dynamic framework

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Data:	Iwanuma	Iwanuma	Iwanuma	Futaba	Futaba	Futaba	Futaba	Futaba	Futaba
Dependent variable:	New Year's Cards	New Year's Cards	New Year's Cards	New Year's Cards	New Year's Cards	New Year's Cards	New Year's Cards	New Year's Cards	New Year's Cards
Sample:	All (Age > =65)	All (Age > =65)	All (Age > =65)	All	Age > =65	Age < 65	All	Age > =65	Age < 65
d (damage)	−5.279***	−4.852***	−6.247***	−2.923	−8.744***	6.945**	16.69	−11.22***	−1.322
	(1.291)	(1.298)	(1.642)	(2.721)	(2.300)	(3.451)	(13.69)	(2.919)	(4.391)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Data:	Iwanuma	Iwanuma	Iwanuma	Iwanuma	Futaba	Futaba	Futaba	Futaba	Futaba	Futaba	Futaba	Futaba
Dependent variable:	Trust	Trust	Dictator game	Dictator game	Trust	Trust	Trust	Trust	Trust	Trust	Trust	Trust
Sample:	All (Age > =65)	All (Age > =65)	All (Age > =65)	All (Age > =65)	All	Age > =65	Age < 65	All	All	Age > =65	Age < 65	All
d (damage)	−0.0330**	−0.0292*	−2.617***	−2.573***	−0.0954**	−0.0910*	−0.130**	−0.318	−0.0768**	−0.0751 +	−0.108**	−0.195
	(0.0152)	(0.0149)	(0.555)	(0.561)	(0.0415)	(0.0477)	(0.0583)	(0.225)	(0.0354)	(0.0496)	(0.0511)	(0.190)

East Laguna Village, Philippines

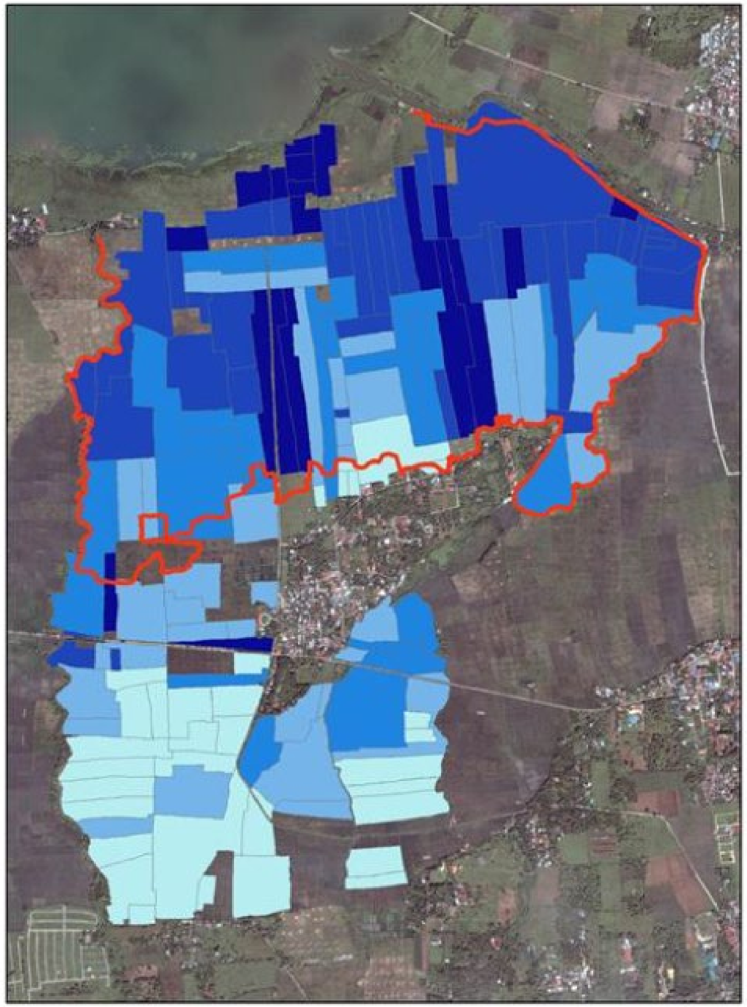
21 Surveys from 1966 to 2014

Year	Principal Reseacher in Charge	N
1966	H. Umehara	66
1974	Y. Hayami	95
1975-1976	Y. Hayami	12 selected only
1976	Y. Hayami and M. Kikuchi	111
1980	M. Kikuchi	126
1980-1982	M. Kikuchi	15 selected only
1983	M. Kikuchi	125
1987	Y. Hayami	155
1993	M. Hossain	190
1997	M. Hossain	244
1995	Y. Hayami and M. Kikuchi	242
1996	Y. Hayami and M. Kikuchi	51 farmers only
1997	Y. Hayami and M. Kikuchi	43 farmers only
1997	Y. Hayami and M. Kikuchi	266
2001	K. Kajisa	297
2003	N. Fuwa	376
2007	J. Estudillo	405
2007	Y. Sawada	433
2012	N. Fuwa, K. Kajisa, Y. Sawada	199 farmers only
2013	N. Fuwa, K. Kajisa, Y. Sawada	199 farmers only
2014	N. Fuwa, K. Kajisa, Y. Sawada	161 farmers only

Flood Damage

- **Heavy monsoon rain (*Habagat*) from Aug 1-8, 2012** & overflow of the lake, the first of this sort in the village data (Aug 8 2012, declared under the State of Calamity)
- **Damages to paddy fields**
  - Very bad timing for rice growth but discontinuous damages
  - The flood border unknown beforehand

May 23, 2012 August 11, 2012



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Motivations behind prosocial behavior: Evidence from the Philippines

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ABSTRACT

What are the motivations behind seemingly prosocial behavior? Does altruism play a key role especially after a disaster? We address these questions by combining two datasets from a Philippine village affected by strong floods in 2012: Satellite-based natural experimental data on damage caused by a natural hazard; and lab-in-the-field experimental data collected by incentivized dictator games. Lab experiments were conducted twice in 2014 and 2018, enabling us to explore temporal as well as medium-term impacts of a disaster. We build a simple theory that allows us to interpret empirical findings using data from a dictator game. Three main findings emerge from our analysis. First, on average, senders in our dictator game transfer more money to a person affected by disaster losses than do those who face no loss. This finding empirically supports the model of pure altruism, especially in the aftermath of a disaster. However, this pattern decays over time, reflecting erosion of altruism in non-disaster environments. Second, the results on own damages are consistent with the theoretical prediction of pure altruism as well as warm-glow giving. Comparisons of the results using data from two waves in 2014 and 2018, show overall erosion of altruism and warm-glow. Finally, as a byproduct, our estimation result is consistent with the prior literature, specifically the zero prudence coefficient or the negligible third derivative (NTD) in utility function under the additive separability assumption.

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Damage and Prosocial Behavior

Kuroishi & Sawada (2019)

- **Setting:**
  - Dictator game in 2018, 6 years after the disaster
  - Reference partner: A randomly selected person the same village (barangay).
  - **1[Subjective Life Expectancy Declined]** takes 1 if a subject perceived a decline in their longevity after
- **Results:**
  - ω_r Yolanda & GEJE (+), i.e., partner damage (+): Synpathy & altruism
  - ω_r Yolanda & GEJE for severity (+): Empathy but insigificant
  - ω_s Own damage (-): Not a repeated game
  - Life expectancy decline (-): Repeated game
  - u^{ω} (1-Life expectancy decline) × Severity (+): Repeated game but insignificant

Table 1: Dictator Game Analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				g_{ij}				
Yolanda	144.7***			144.7***	144.7***	120.5***	118.0***	110.1***
	(27.30)			(27.33)	(27.33)	(34.81)	(26.11)	(35.48)
Great East Japan Earthquake	122.0***			122.0***	122.0***	97.26***	95.90***	87.05***
	(24.59)			(24.62)	(24.62)	(31.42)	(24.64)	(32.23)
Someone in the Philippines	2.128			2.128	2.128	-28.77	-9.836	-32.61
	(20.50)			(20.51)	(20.51)	(26.51)	(20.82)	(27.10)
Severity		-65.06*		-65.06*		-106.4***		-107.0
		(33.70)		(33.79)		(37.44)		(95.31)
Yolanda × Severity						50.04		18.33
						(54.72)		(50.31)
Great East Japan Earthquake × Severity						51.27		20.38
						(49.29)		(46.88)
Someone in the Philippines × Severity						64.06		52.43
						(40.87)		(38.86)
Life Expectancy Declined			-89.81*		-89.81*		-209.8***	-157.0
			(47.41)		(47.53)		(61.84)	(96.53)
Yolanda × Life Expectancy Declined							197.8**	191.2**
							(88.40)	(85.40)
Great East Japan Earthquake × Life Expectancy Declined							193.6**	186.3**
							(76.96)	(76.03)
Someone in the Philippines × Life Expectancy Declined							88.78	70.17
							(74.75)	(73.93)
(1-Life Expectancy Declined) × Severity								34.11
								(97.48)
Observations	564	564	564	564	564	564	564	564
R-squared	0.056	0.013	0.011	0.069	0.067	0.066	0.073	0.075

"δ" Mechanisms Behind Seemingly-Prosocial Behavior

- Utility function with warm glow and pure altruism (Andreoni, 1989, 1990, and 2006):

$$u(\omega_s - g_s) + \phi_1 v_1(g_s) + \phi_2 v_2(\omega_r + g_s), \tag{1}$$

- F.O.C.:

$$u'(\omega_s - g_s) = \phi_1 v_1'(g_s) + \phi_2 v_2'(\omega_r + g_s). \tag{2}$$

- Effect of a recipient's exposure to the disaster:

$$\frac{dg_s}{d\omega_r} = \frac{-\phi_2 v_2''(\omega_r + g_s)}{u''(\omega_s - g_s) + \phi_1 v_1''(g_s) + \phi_2 v_2''(\omega_r + g_s)}. \tag{3}$$

$$\frac{dg_s}{d\omega_r} = 0 \quad if \quad \phi_2 = 0, \tag{4}$$

$$\frac{dg_s}{d\omega_r} < 0 \quad and \quad \frac{d^2 g_s}{d\phi_2 d\omega_r} < 0 \quad if \quad \phi_2 > 0. \tag{5}$$

- Effect of the sender's exposure to the disaster:

$$\frac{dg_s}{d\omega_s} = \frac{u''(\omega_s - g_s)}{u''(\omega_s - g_s) + \phi_1 v_1''(g_s) + \phi_2 v_2''(\omega_r + g_s)} > 0, \tag{6}$$

- An infinitely repeated PD game with a trigger strategy
- A necessary condition for self-enforcing cooperation:

$$\delta \geq \frac{u^D - u^C}{u^D - u^\omega} \tag{10}$$

- Disaster exposure would:
  - reduce u^ω, decreasing RHS, making the cooperative threshold of δ lower
  - change δ directly

- **A disaster provide us with clean variations in:**
  - ***ω_s*: own resource**
  - ***ω_r*: partner's resource**
  - ***u^ω*: utility from own resource**

“δ” Anarchy of Disaster & Preference Nexus

- **Possible reasons:**
  1. **Subject’s socioeconomic conditions, disaster types, timings, and methods of eliciting preference parameters** may generate seemingly inconclusive results (Schildberg-Hörisch, 2018).
  2. **Specification errors** may exist in estimation (Vieider, 2018; Andreoni and Sprenger, 2012, Andersen et al., 2008, and Cheung, 2016)
  3. **Inaccurate data on disaster and experimental results** can generate systematic biases in estimating the impact of disasters on preferences, making it difficult to precisely identify causal relationships (Vieider, 2018, Schildberg-Hörisch, 2018).

- **Kuroishi and Sawada (2024):**
  1. Different socioeconomic conditions, disaster types, and timings but the same methods
  2. Best specifications
  3. Accurate data on disasters and experiments

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On the stability of preferences: Experimental evidence from two disasters☆

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ABSTRACT

We investigate the impacts of two disasters in Japan and the Philippines on preferences using the convex time budget experiments and multiple price list experiments with monetary rewards. By exploiting natural experiments which are combined with lab-in-the-field experiments, we aim to investigate whether and how long preferences are affected by extreme events. We find evidence supporting preference instability caused by exposure to natural hazards: in both our study sites, disaster exposure seems to make individuals more present-biased even though they differ in socioeconomic conditions and disaster types. The estimated impacts are persistent over the short and long time intervals in both disaster-affected areas and are robust to the method of measuring preferences.

Iwanuma City and East Laguna Village

- **Iwanuma City, Miyagi, Japan**
  - Japan Gerontological Evaluation Study (JAGES) panel since 2010
  - **In 2011, Great East Japan Earthquake**

- **East Laguna Village, Philippines**
  - Based on Int'l Rice Research Inst (IRRI), panel studies since 1966
  - **In 2012, large-scale floods, *Habagat***

Iwanuma City and East Laguna Village

Iwanuma City and East Laguna Village

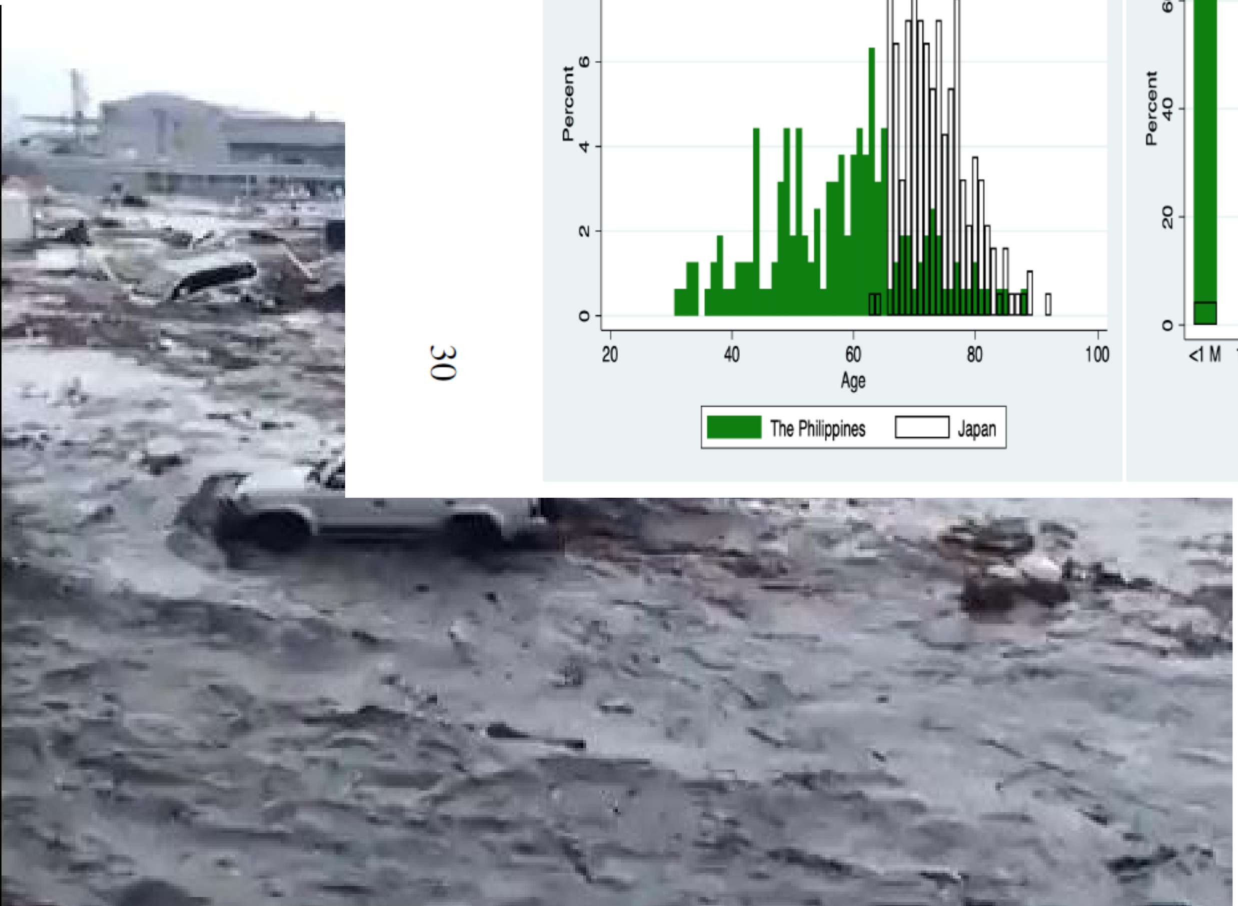
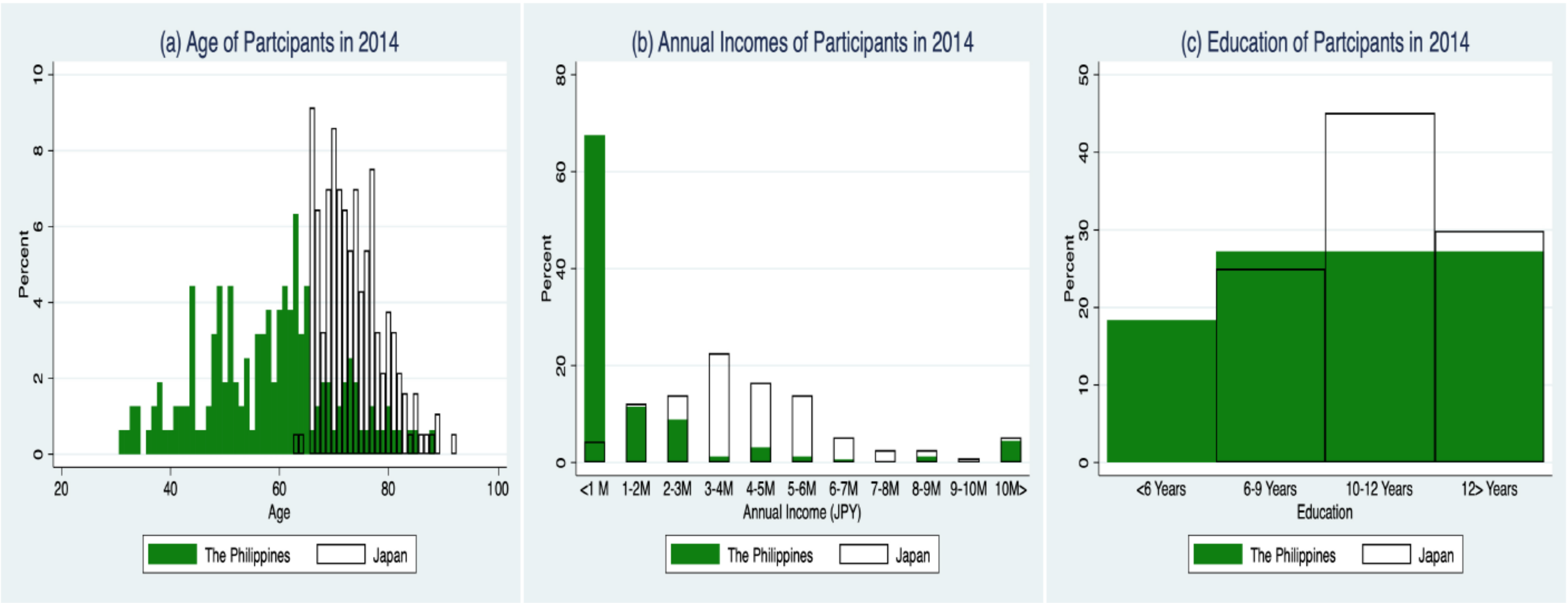
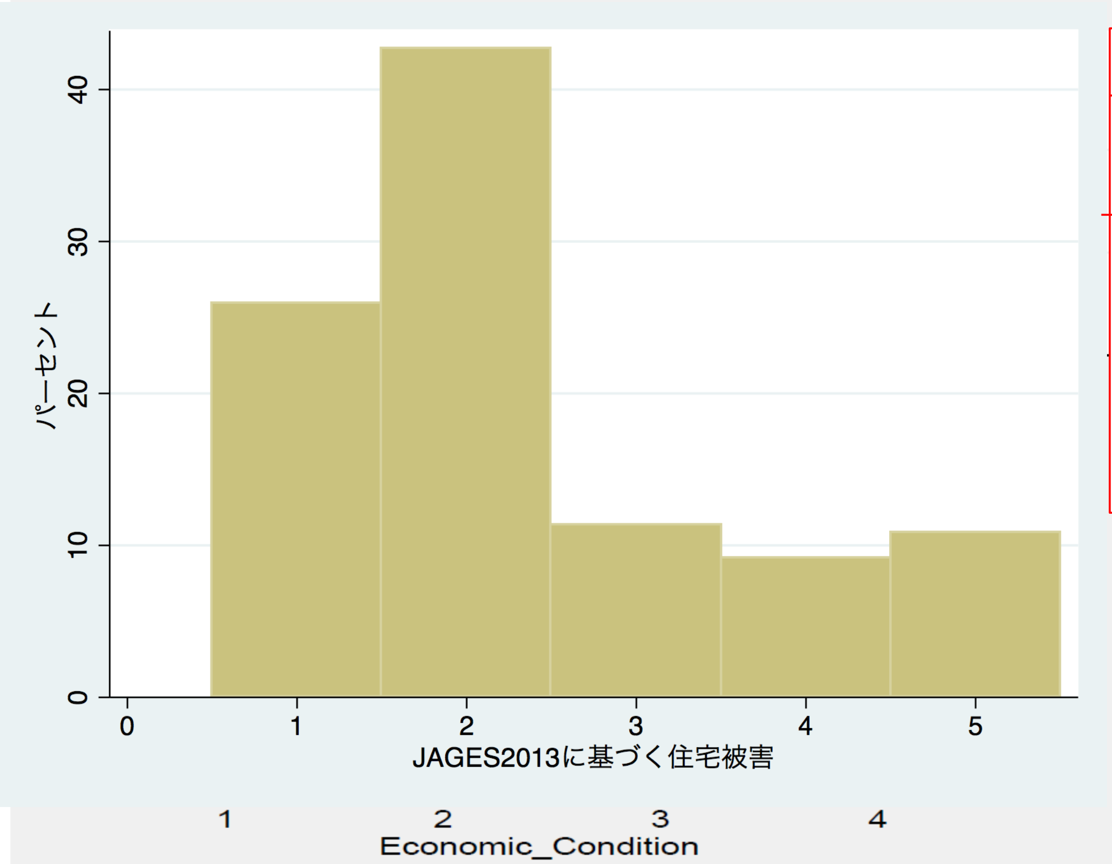


Figure 1: Comparison of Age, Income and Education levels



Iwanuma City and East Laguna Village

Figure 1: The histogram of the damage



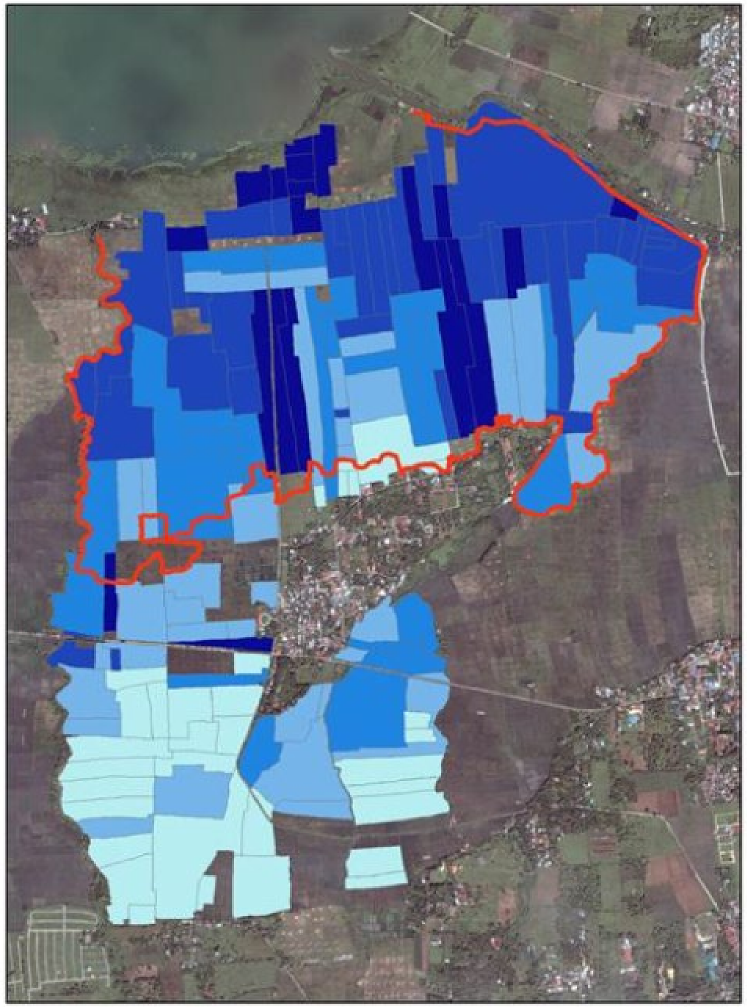
1. No damage
2. Minor damage
3. Half collapsed
4. Almost collapsed
5. Collapsed

Iwanuma City and East Laguna Village

- **Heavy monsoon rain (*Habagat*) from Aug 1-8, 2012** & overflow of the lake, the first of this sort in the village data (Aug 8 2012, declared under the State of Calamity)
- **Damages to paddy fields**
  - Very bad timing for rice growth but discontinuous damages
  - The flood border unknown beforehand

May 23, 2012

August 11, 2012



Iwanuma City and East Laguna Village

- **Iwanuma**
  - Lab experiments in 2014, 17, &23
  - Subjects: 187, 179, ongoing
- **Laguna**
  - Lab experiments in 2014 & 18
  - Subjects: 158 & 141

Iwanuma City and East Laguna Village

- **Iwanuma**
  - Lab experiments in 2014, 17, &23
  - Subjects: 187, 179, ongoing
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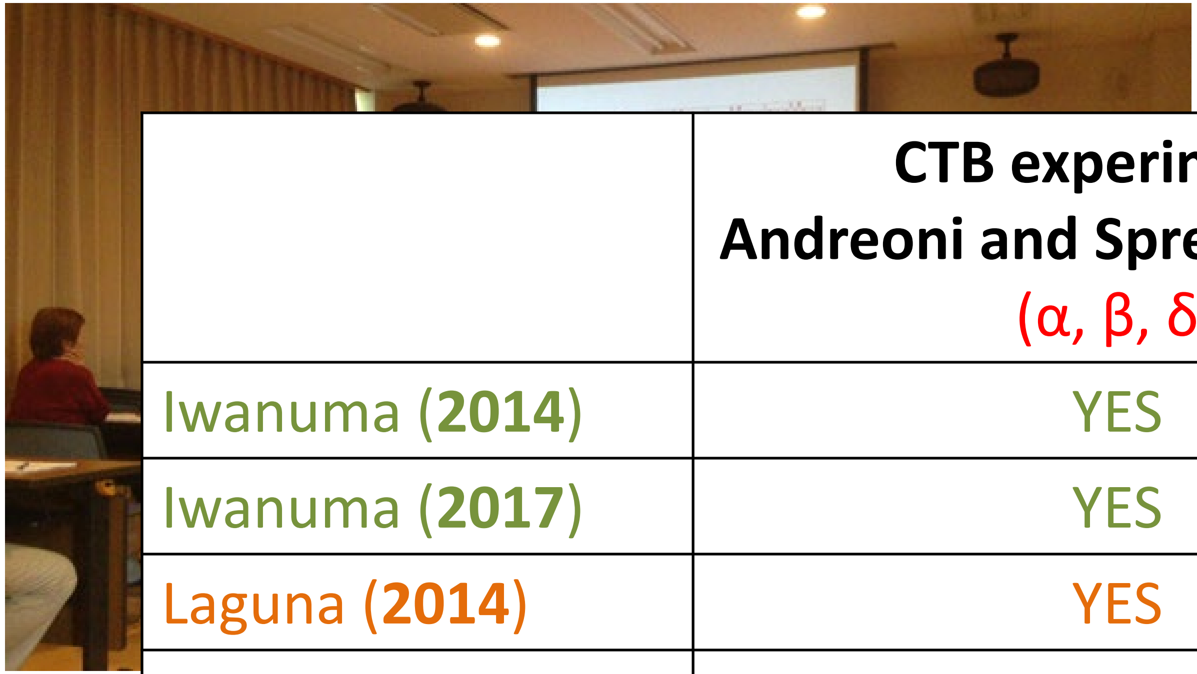
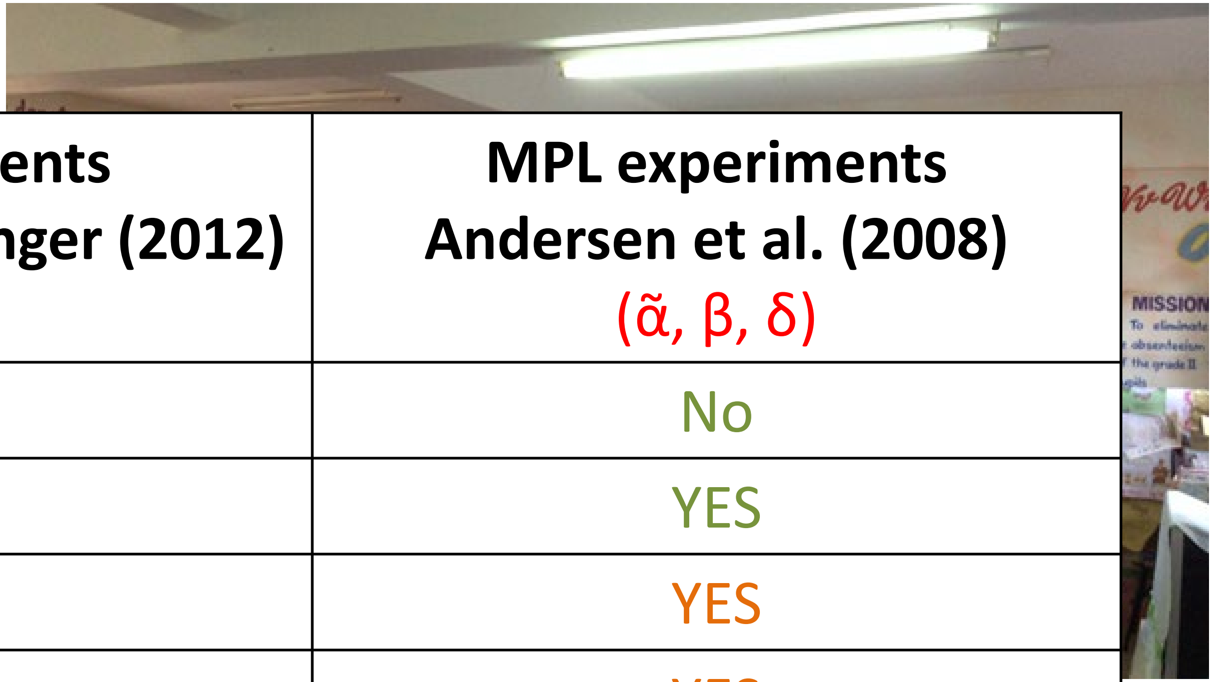
  - Lab experiments in 2014 & 18
  - Subjects: 158 & 141



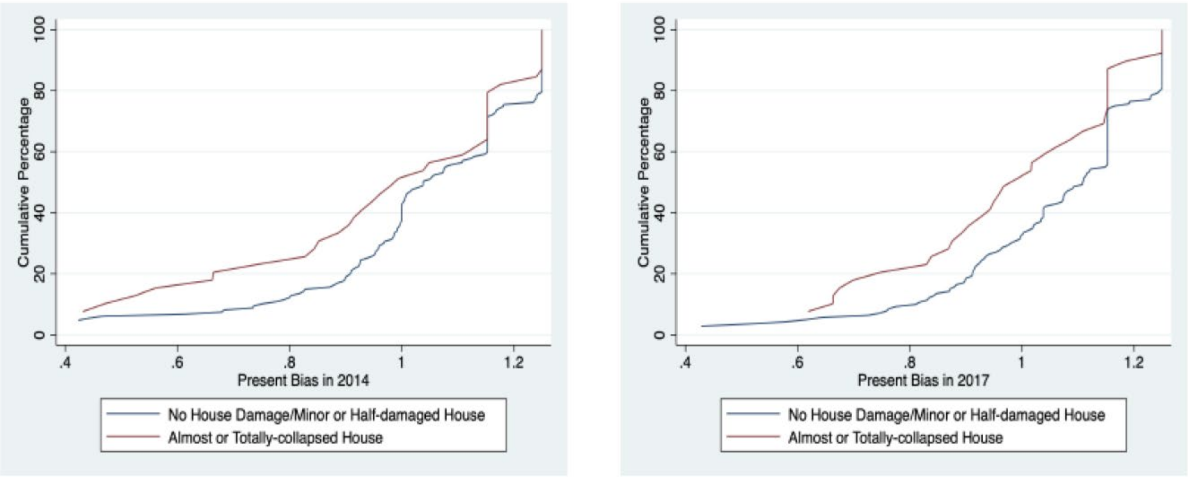


	CTB experiments Andreoni and Sprenger (2012) (α, β, δ)	**MPL experiments Andersen et al. (2008)** ($\tilde{\alpha}$, β, δ)
Iwanuma (**2014**)	YES	No
Iwanuma (**2017**)	YES	YES
Laguna (**2014**)	YES	YES
Laguna (**2018**)	YES	YES

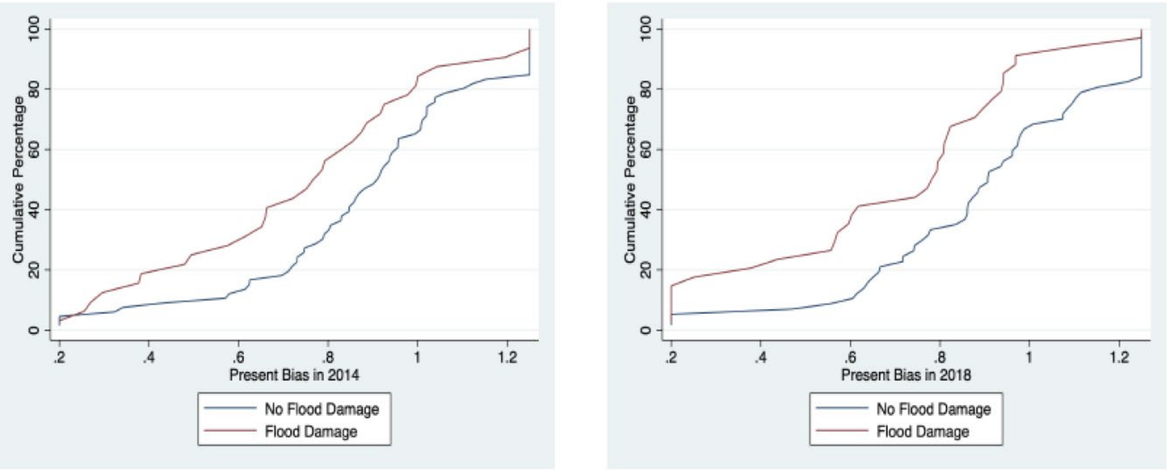
Exposure → β → Unhealthy behavior

- **Iwanuma**
  - Lab experiments in 2014, 17, &23
  - Subjects: 187, 179, ongoing
- **Laguna**
  - Lab experiments in 2014 & 18
  - Subjects: 158 & 141

Japan



Philippines



Time Trajectory of Disaster Impact on "δ"

- **Sawada and Kuroishi (2023) : δ↑** after 2-3 years; **δ↓** after 6 years
- **Callen (2015): δ↑** after 3 years
- **Chantarat et al. (2019) δ↑**after 3 years
- **Cassar et al. (2017) δ↓** after 4.5 years

- **"Disaster Utopia" after 2-3 years; then it deteriorates?**
  - Rebecca Solnit (2009). *A Paradise Built in Hell: The Extraordinary Communities That Arise in Disaster*, Viking Press.

Three Topics

- Market, state, and community mechanisms in resource allocation
- Disaster and preference nexus
- Field Studies and Policies?

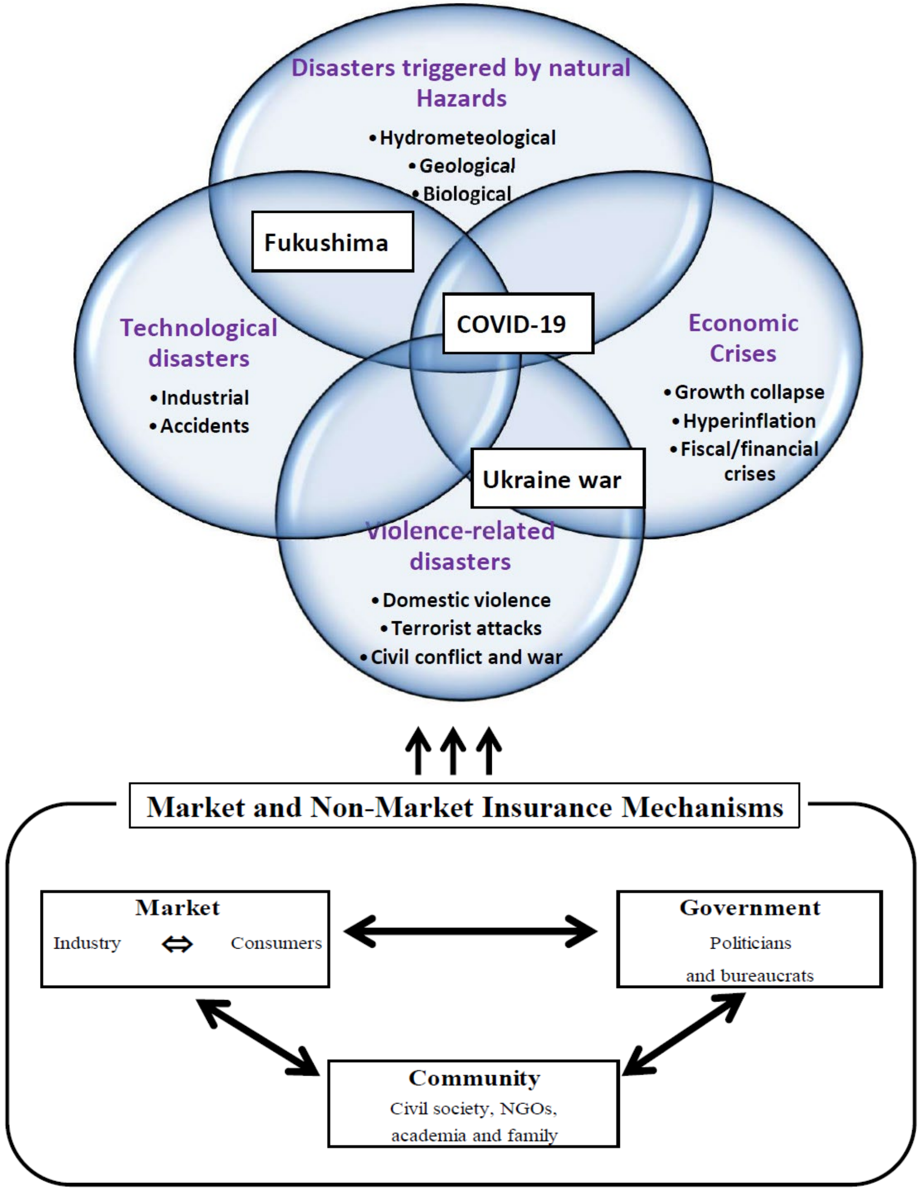
Remarks

- Disaster made **δ↑** after 2-3 years; **δ↓** after 4.5-6 years?
  - **"Disaster Utopia"?**
- People became more **present-biased; and less risk-averse.**
- **Real-world harmful (health) behaviors? Yes**
- **Importance of commitment devices and nudging**
  - Cash transfers combined with **commitment savings** to facilitate desirable behavior change (Dupas and Robinson, 2015; Dupas, 2011)
  - Use of **in-kind transfers** rather than cash compensation to nudge recipients toward desirable behaviors (Currier and Gahvari, 2008)
  - **Commitment contracts** for smoking cessation combined with savings deposits (which the smokers stand to lose if they fail to quit) (Gine et al., 2010)

Remarks

- The market, state, and community **trinity as a useful benchmark**
- **Disasters provide useful exogenous variations** for natural experimental study, uncovering important mechanisms
- **Theories as guides** to design empirical & experimental research
- **Multifaceted role** of disaster insurance
  - Disaster insurance participation mitigates negative mental health impacts
  - A direct financial safety net and overall “peace of mind”
  - Persistence over a span of 3 years but not 5 years
- **Government supports** imperative
  - Disaster insurance is welfare-enhancing
  - Baseline subscription of 54% **Innovative disaster policies** imperative:
  - To support formidable **market mechanisms** further
  - To make **infrastructure social capital-oriented**
  - To tackle **poly crises**

Innovative Insurance Needed for "Poly Crises"



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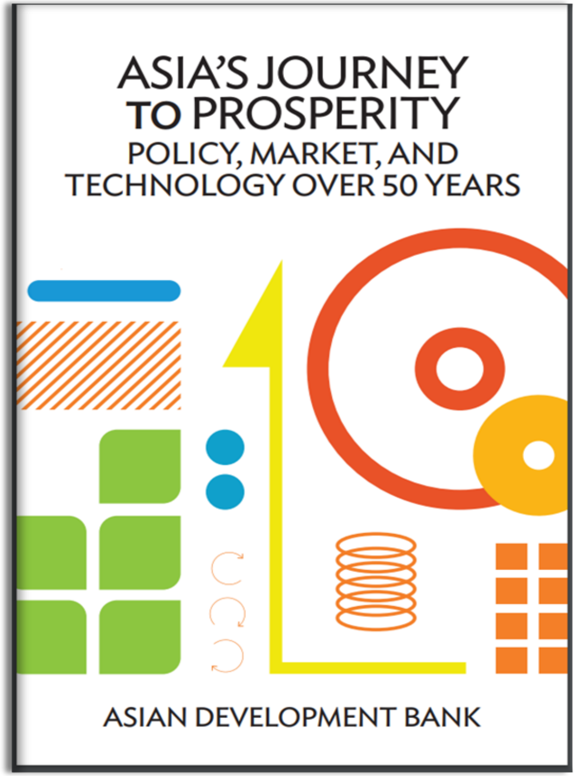

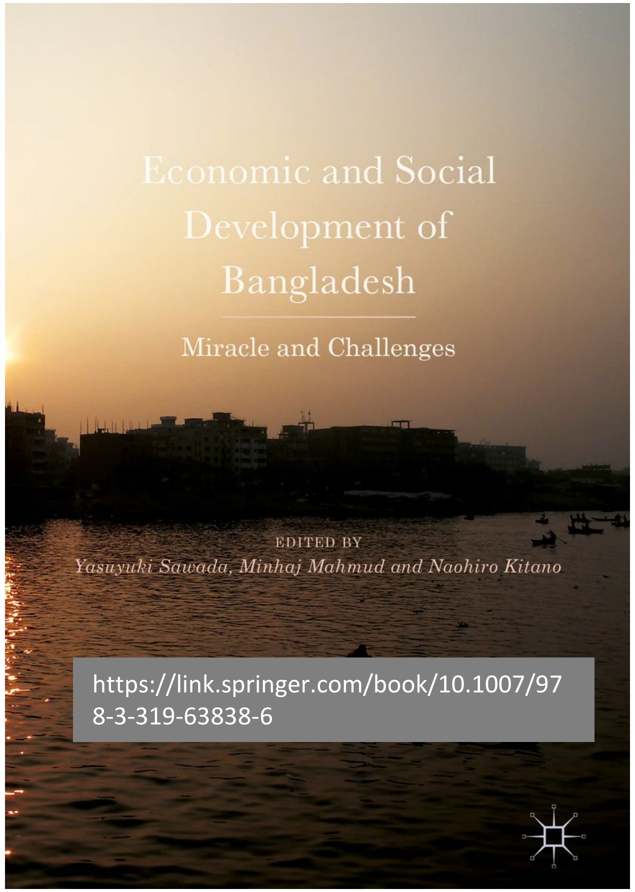

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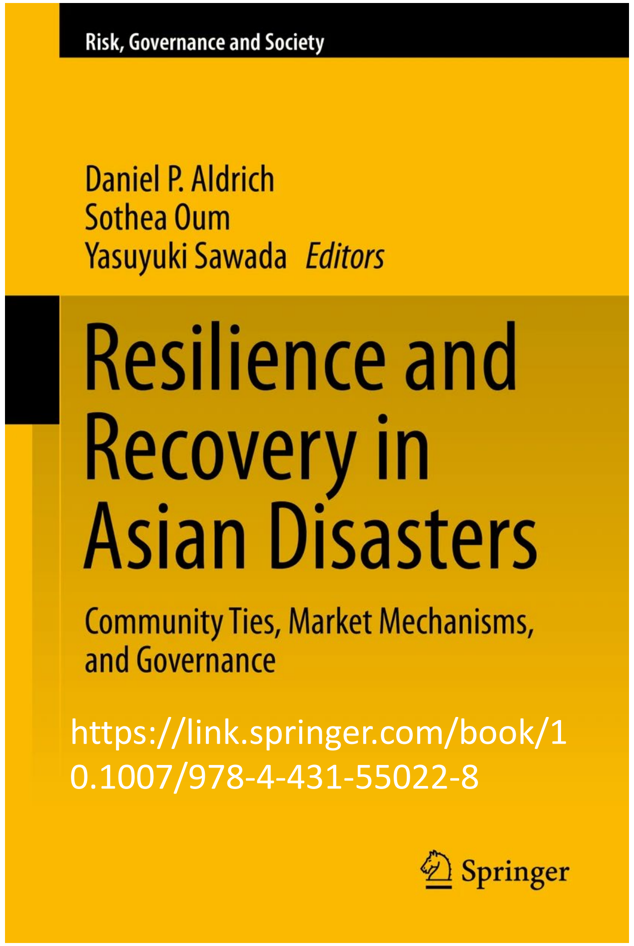

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