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Preferences, Behavior, and Welfare Outcomes against Disasters*

Yasuyuki Sawada

University of Tokyo and ADB Institute

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

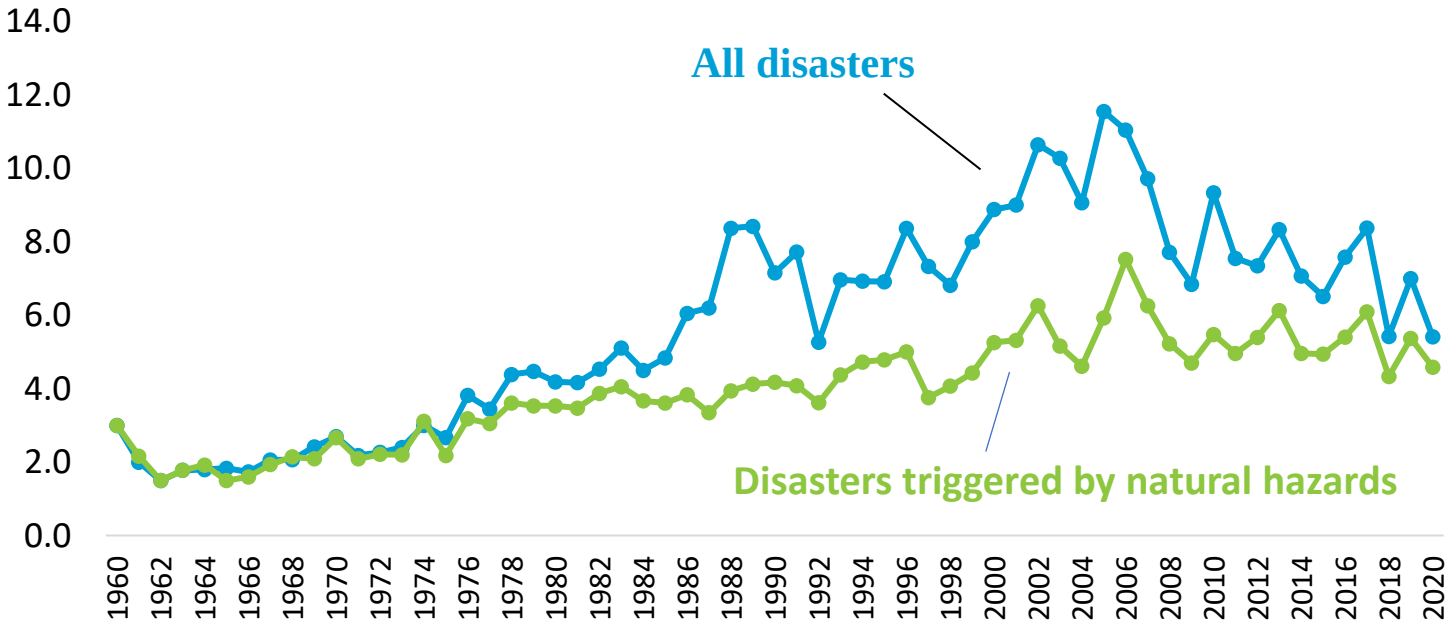
Outline

1. Introduction
2. Disaster exposure, preferences, and ex-post risk-coping
3. Welfare outcomes
4. Future challenges

Disasters Affect Asia Disproportionately

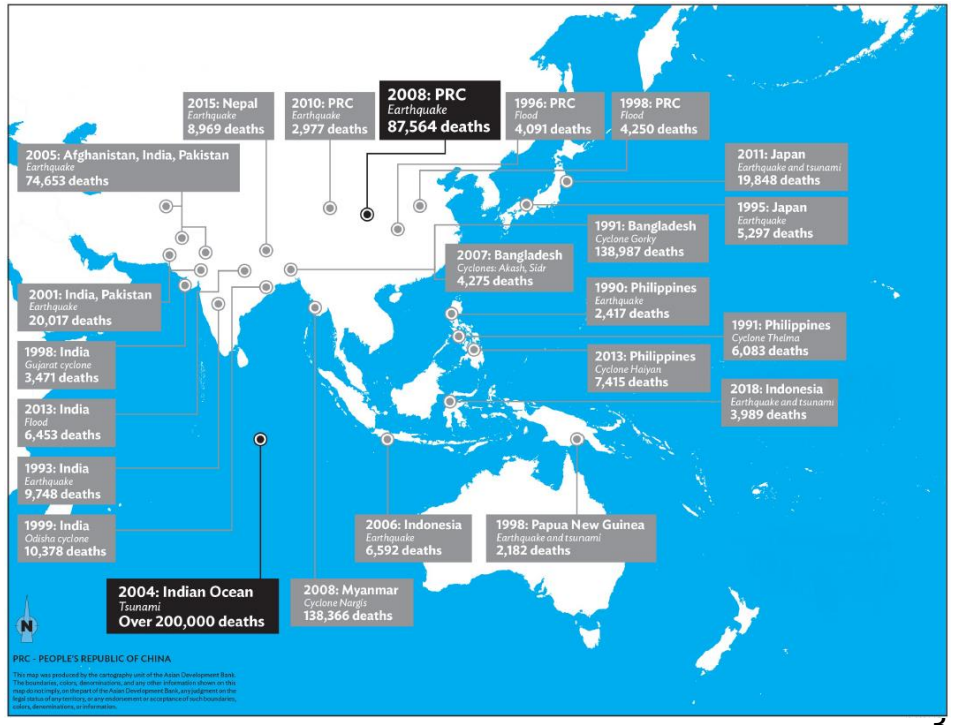
- Since the 1960s, about a third of all global disasters triggered by natural hazards has occurred in developing Asia

Disaster Occurrence, Natural and Technological, Developing Asia, 1960–2020



Notes: Disasters are either natural or manmade. Figures are simple averages of number of disasters in developing Asian economies with at least one disaster occurrence per year.
Source: ADB estimates using EM-DAT: The Emergency Events Database - Université Catholique de Louvain (UCL) - CRED, D. Guha-Sapir - www.emdat.be, Brussels, Belgium. Accessed on 25 January 2021.

High-profile disasters in Asia since 1990



Hazards, Exposure, & Vulnerability, Causing Disasters

Hazards

Exposure

Vulnerability

Direct

Mortality

Morbidity

Displacement

Asset damage

Indirect

Foregone economic activity

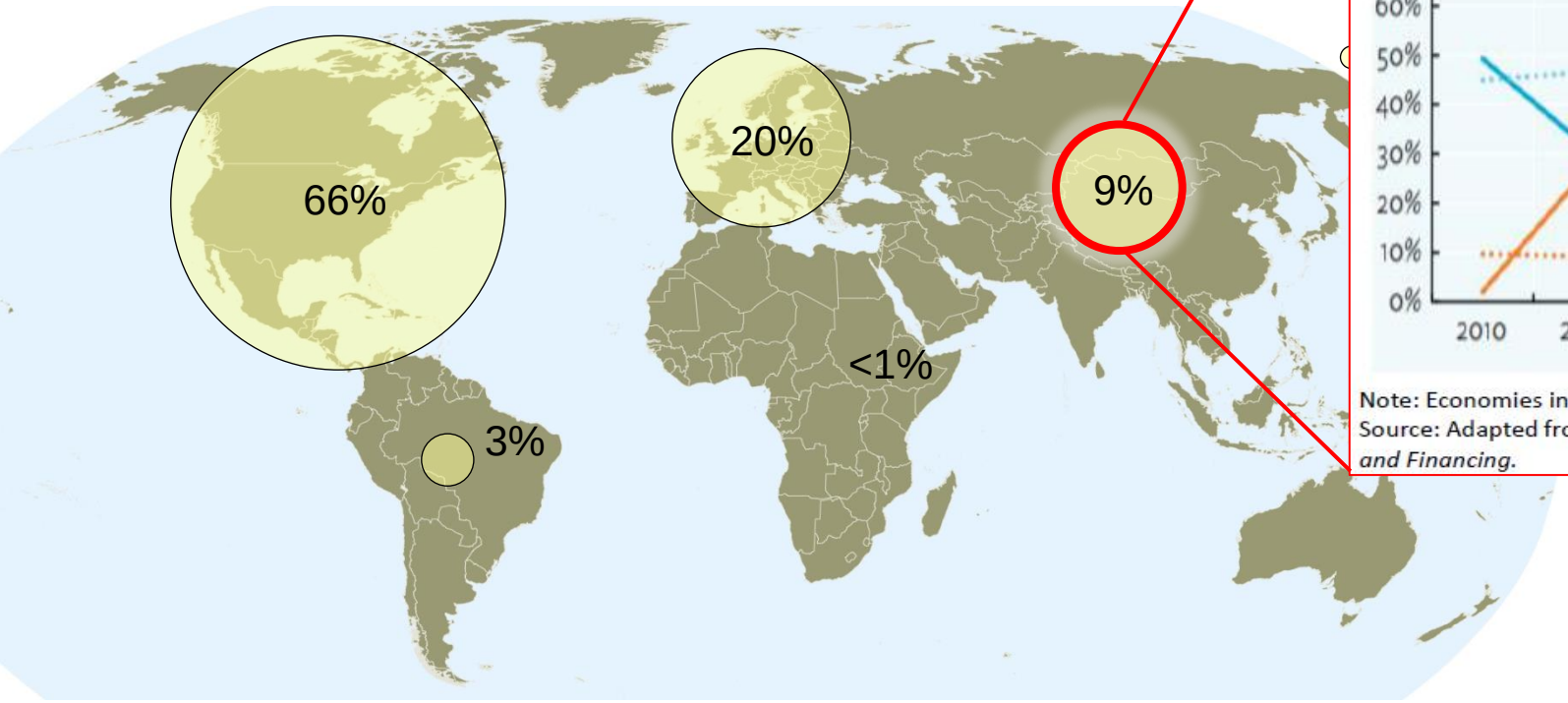
Spillover

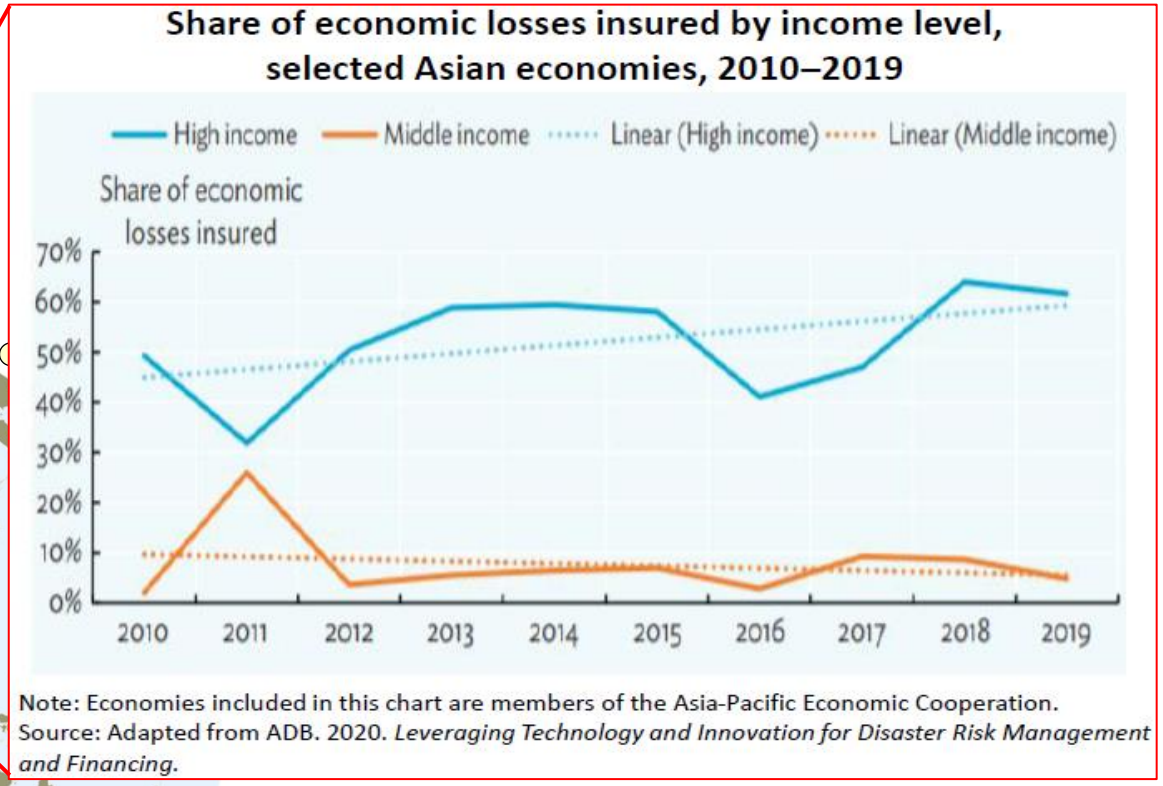
Time
- Industrial shifts
- Inter-generational

Space
- Supply chains
- Migration

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

Uninsured Disaster Losses

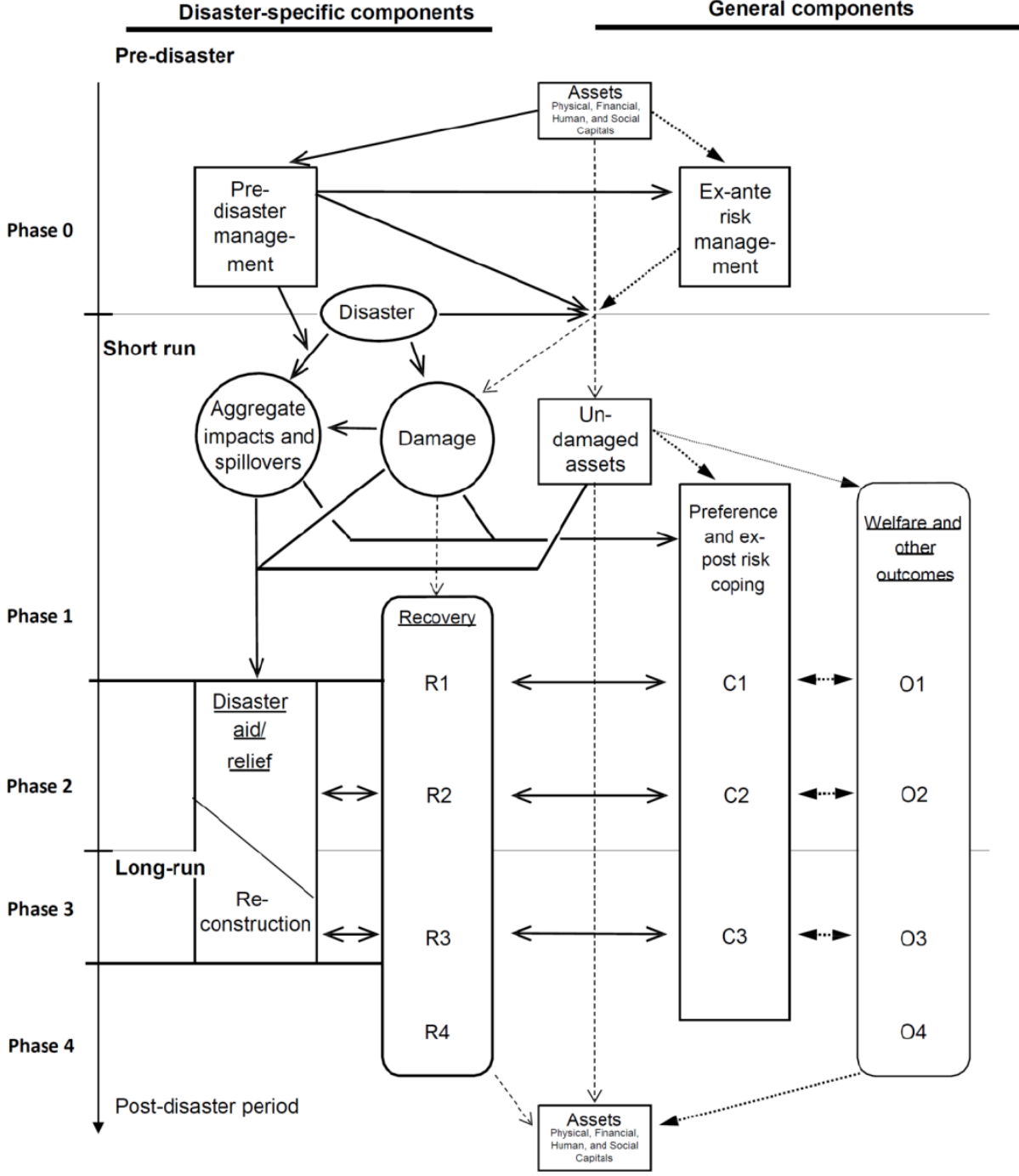




Note: Economies included in this chart are members of the Asia-Pacific Economic Cooperation.
Source: Adapted from ADB. 2020. *Leveraging Technology and Innovation for Disaster Risk Management and Financing.*

Sawada and Takasaki (2017)

- Asset holdings
- Ex-ante management
- Preferences
- Ex-post risk-coping behaviors
- Overall welfare



Source: Sawada and Takasaki (2017)

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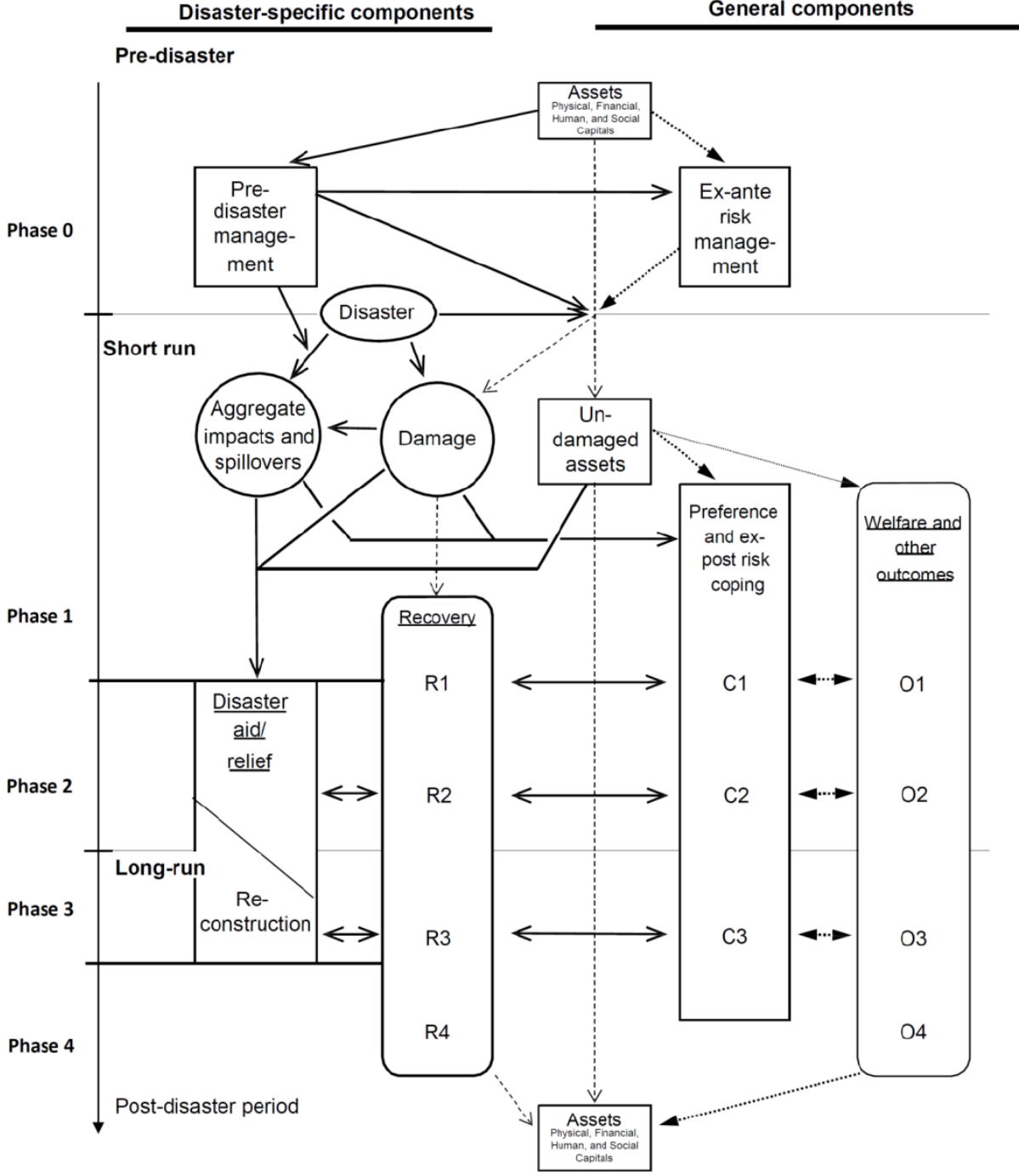
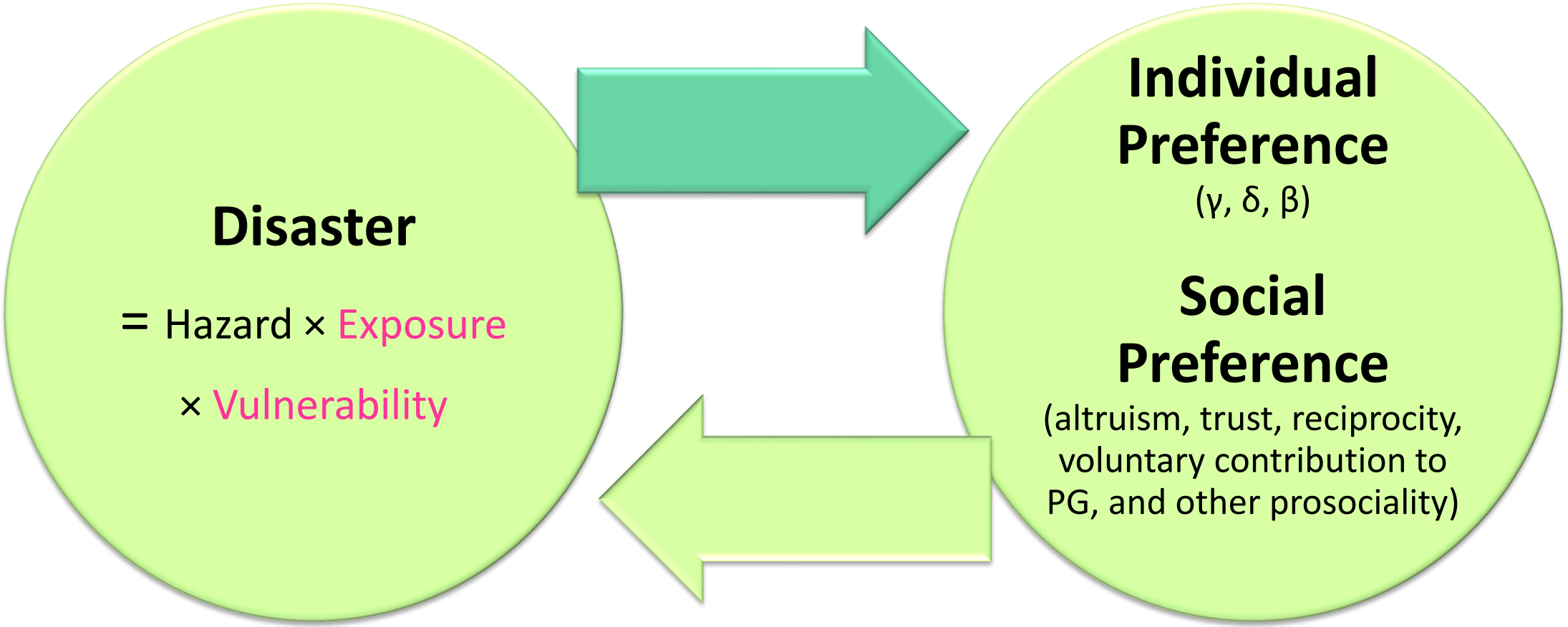


Source: Sawada and Takasaki (2017)

Disaster and Preference Nexus



Disaster and Individual 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

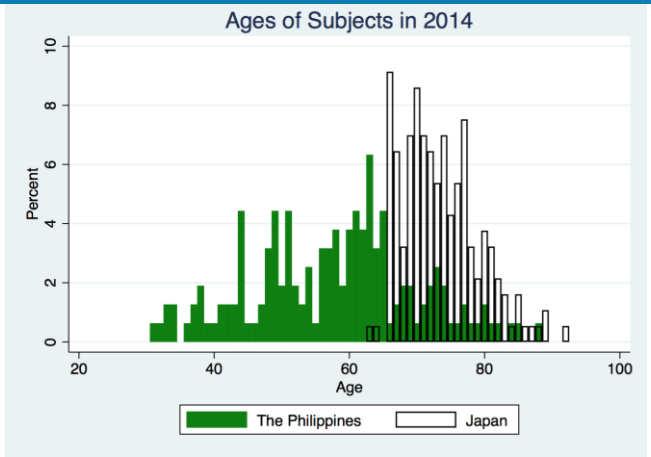
Why Mixed Evidence?

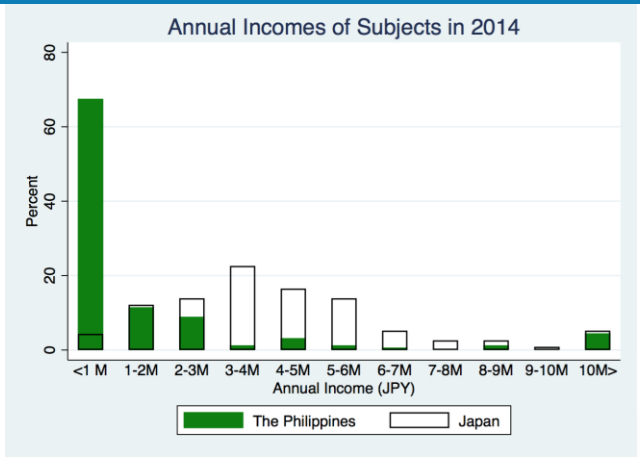
- Subject's **socioeconomic conditions, disaster types, and methods** of eliciting preference parameters may generate seemingly inconclusive results (Schildberg-Hörisch, 2018).

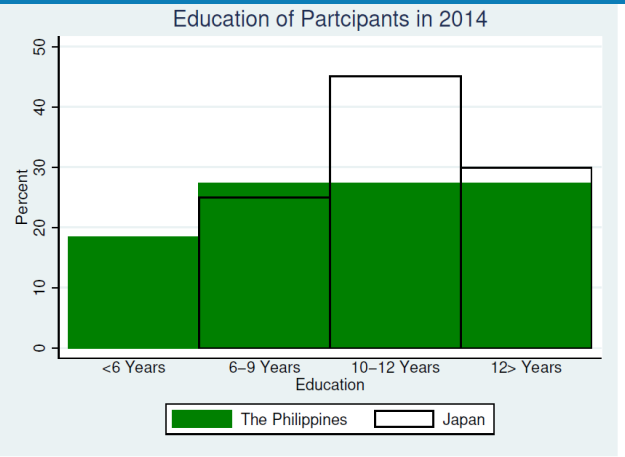
- There could be **specification errors** in estimation (Vieider, 2018; Andreoni and Sprenger, 2012; Andersen et al., 2008; Cheung, 2016; Carvalho et al., 2016; Dean and Sautmann, 2021).

- **Inaccurate data on disaster exposure and experimental results** can generate systematic biases in estimating the impact of disasters on preferences, making it difficult to identify the causal relationship precisely (Vieider, 2018; Schildberg-Hörisch, 2018; Imas, 2016)

A Comparison of Tsunami and Floods



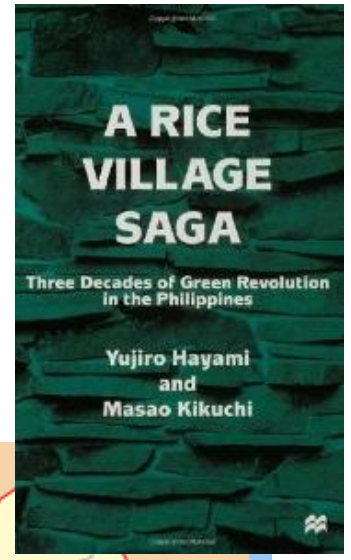




Iwanuma, Japan

Philippines

A Comparison of Tsunami and Floods

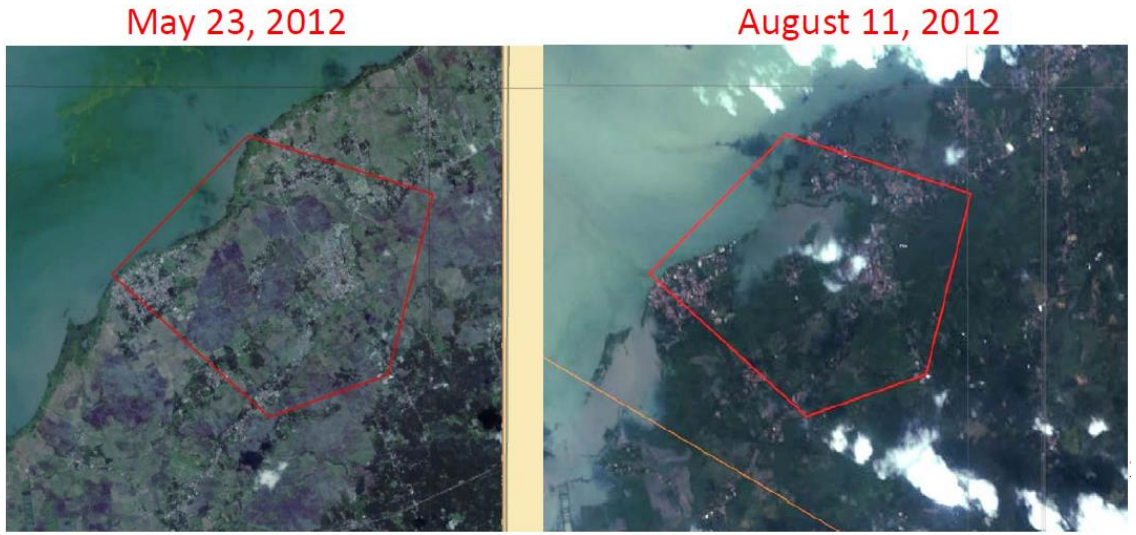


2 x 2 x 2 Hybrid Experiments

- **Two waves** of **two incentivized games** in **two disaster events**

- Combined with **precise data** on individual disaster exposure

	CTB experiments Andreoni and Sprenger (2012) (α, β, δ)	**MPL experiments Andersen et al. (2008)** (α̃, β, δ)
Japan (2014)	YES	No
Japan (2017)	YES	YES
Philippines (2014)	YES	YES
Philippines (2018)	YES	YES



2011 GEJE in Iwanuma, Japan

Figure 9: Summary of Raw Data Considering for House Damages (MPL) in Japan

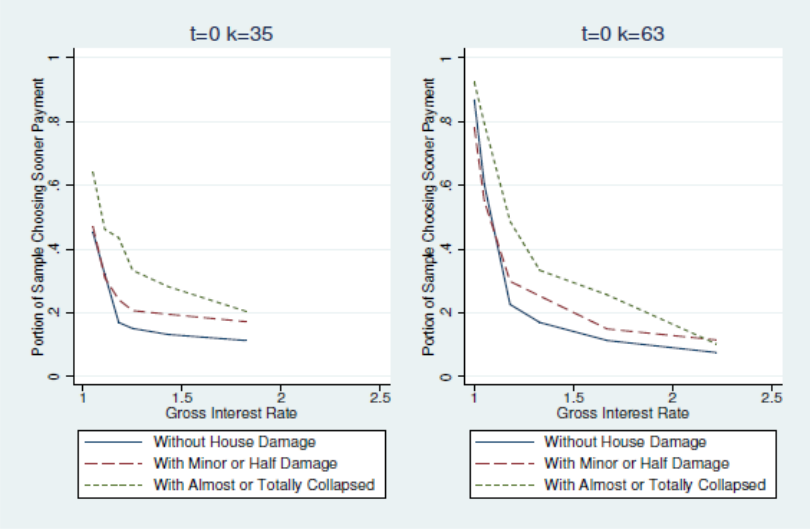


Figure 10: Summary of Raw Data Considering for House Damages (MPL) in Japan

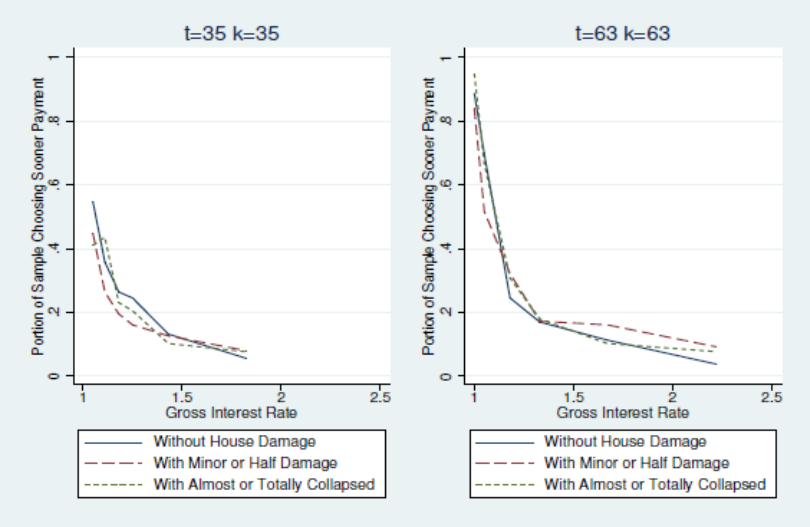
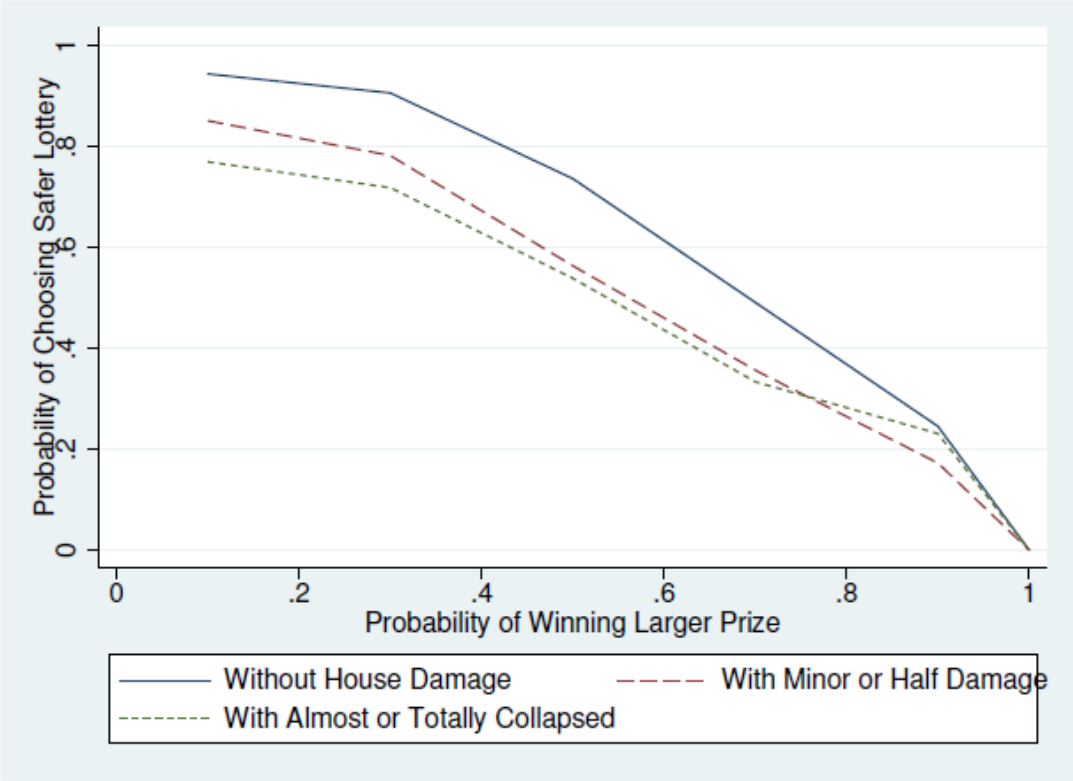


Figure 11: Summary of Raw Data Considering for House Damages (HL) in Japan



2012 Floods in Laguna, the Philippines

Figure A.17: Summary of Raw Data Considering for Our Defined Damage Combined With Satellite Farm Damage (MPL in 2014) in the Philippines

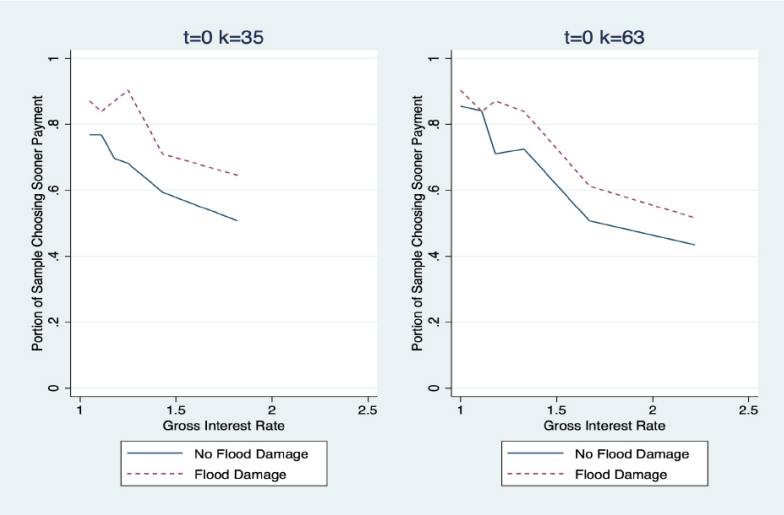


Figure A.18: Summary of Raw Data Considering for Our Defined Damage Combined With Satellite Farm Damage (MPL in 2014) in the Philippines

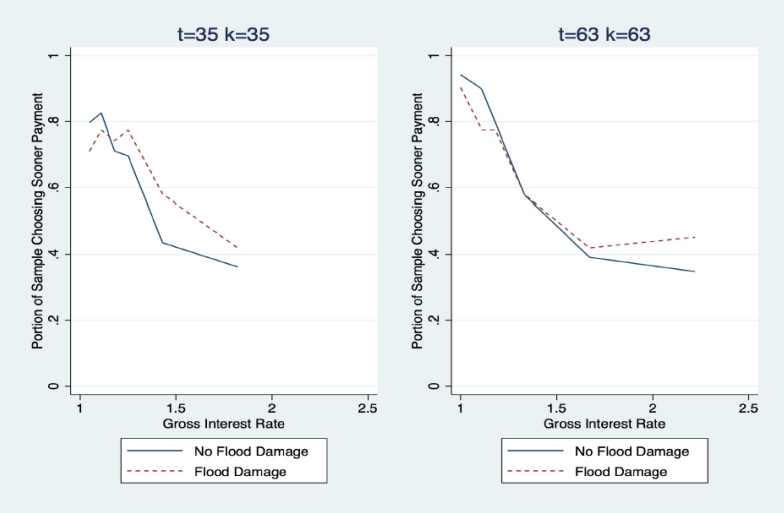
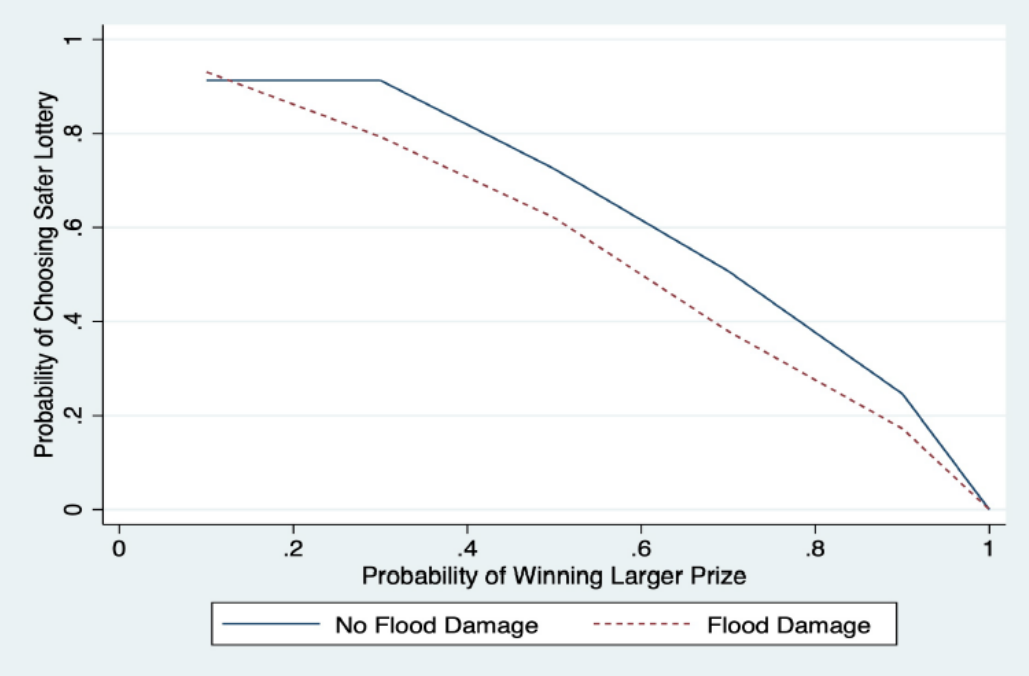


Figure A.19: Summary of Raw Data Considering for Our Defined Damage Combined With Satellite Farm Damage (HL in 2014) in the Philippines



A Comparison of Tsunami and Floods

- Disaster made people more present-biased and less risk-averse.
  - The same qualitative results found in 2x2x2 hybrid experiments
- **Socioeconomic conditions, disaster type, and method of measuring preferences** may not necessarily be drivers of the mixed findings reported in the literature
- Specification errors and inaccurate data on disaster exposure and experimental results?

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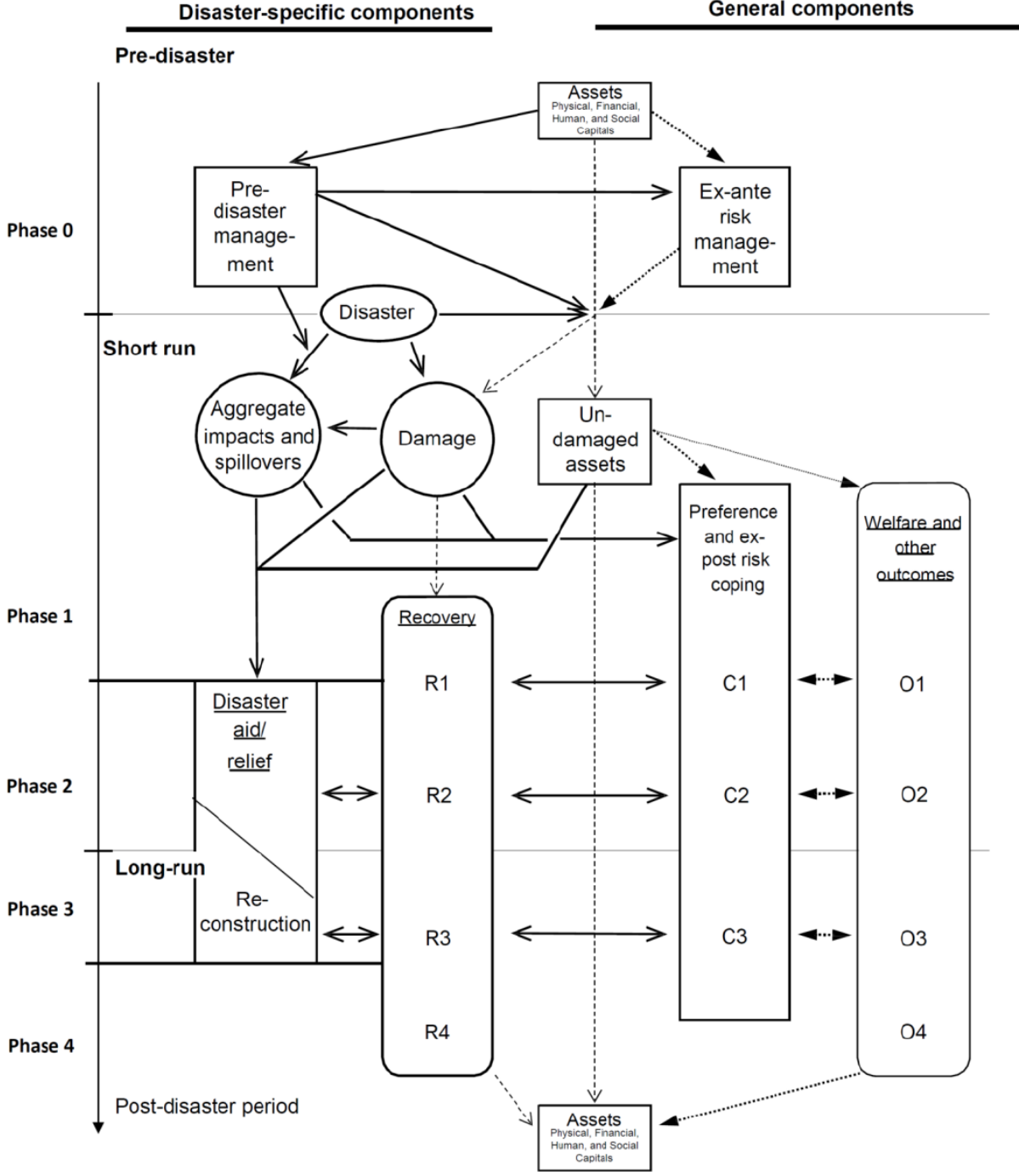
Why Mixed Evidence?

- Two possible determinants of prosocial behavior:
  - Pure or impure altruism (Andreoni, 1990)
  - Self-enforcing prosocial behavior in repeated interactions (Coate & Ravallion, 1993; Kandori, 2008).

- Sawada et al. (2021) disentangle these two effects with the age gradient using data from the 2011 GEJE:
  - Among the older groups, disaster damages undermine prosociality
  - The younger groups show reinforced prosocial behaviors

Sawada and Takasaki (2017)

- Asset holdings
- Ex-ante management
- Preferences
- Ex-post risk-coping behaviors
- Overall welfare



Source: Sawada and Takasaki (2017)

Theoretical Framework

- F.O.C. of **LC-PIH and RSH** (Jappelli & Pisterferri, 2017; Ambrus & Elliott, 2021; Townsend, 1994):

$$\Delta \log\left(c_{it}\right) = a_0 + a_1 S_{it} + u_{it},$$

- Intertemporal budget constraint:

$$c = y + b$$

- The **financing side of consumption or risk-coping decisions** equation (Fafchamps & Lund, 2003):

$$k_{it} = a_0 + a_1 S_{it} + u_{it}, \quad k \equiv \Delta \log(y) + \Delta(b/y)$$

- Preferences as intervening variables: (γ, δ, β)

Risk-Coping Behavior

Study	Disaster Type	Damages	Risk coping strategies					
			Consumption Adjustments	Borrowing	Dissaving	Labor Adjustments	Income Transfers	Other
Horioka et al. (2002)	Overall unexpected events in Japan	Sickness, accidents, disasters, unemployment, bankruptcy	–	Limited	Effective	–	Private transfers effective	Insurance
Sawada and Shimizutani (2008, 2011)	Hanshin Awaji Earthquake in Japan	Houses	Effective	Effective	Ineffective	–	Limited	–
		Assets	Effective	Ineffective	Effective	–	Ineffective	–
Tamura and Sawada (2009)	Avian influenza in Vietnam	Livestock and health	Effective	Effective	Ineffective	Ineffective	Effective	–
Yang (2008)	Hurricanes (global level)	Hurricane damages	–	Ineffective	–	–	Effective (private, Official Development Assistance)	–
Shoji (2010)	Floods in Bangladesh	Assets	Effective	Effective	–	–	–	–
Gray and Mueller (2012)	Floods and crop failures in Bangladesh	Floods and crop failures	–	–	–	–	–	Migration
Cameron and Shah (2015)	Earthquakes and floods in Indonesia	Risk tolerance	–	Effective (Rotating Savings & Credit Associations)	Effective (ROSCA)	Effective	Effective	Less new business or technology
Heltberg et al. (2015)	Natural and manmade disasters in Afghanistan, China, Lao PDR, Tajikistan, Uzbekistan, and Vietnam	Disasters, employment and health shock, asset and crop loss, household breakup, crime	Effective	Effective	Effective	Effective	Effective	
Gignoux and Menendez (2016)	Earthquakes in Indonesia	Assets and income	Effective	–	Effective	–	Effective	–
Chantarat et al. (2017)	Droughts in Kenya	Livestock	–	–	–	–	–	Index-based insurance
Kurosaki (2017)	Floods in Pakistan	Assets	–	–	–	–	Public transfers effective	–
Park and Wang (2017)	Sichuan earthquake in China	Assets and income	–	Weak	–	Weak	Public transfers effective	–
Sakai et al. (2017)	Typhoon in the Philippines	Crop losses and price changes	Effective	Effective	Ineffective	Effective	Effective	–
Sawada (2017)	Avian influenza and other epidemics, flood, typhoon, drought, hail, and landslide in Vietnam	House, livestock and other assets; harvest; and health	Effective	Effective	Weak	Weak	Ineffective	–
Sawada et al. (2017)	Landslide, typhoon, flood, drought, and epidemics in Vietnam	Income	Effective	Effective	Possibly effective	–	Effective	Self-production
Takasaki (2017)	Cyclone in Fiji	Housing	–	–	–	Effective	Effective	–

Case Studies from Vietnam and China

- Sawada et al. (2017) on disasters in Vietnam
  - Supports full consumption risk-sharing at the community level
  - Self-production
  - Precautionary savings
  - Access to credit arrangements

- Park and Wang (2017) on the 2008 Great Sichuan Earthquake in China
  - The substantial government emergency relief aid
  - Weak private coping responses in private transfers, labor supply, and borrowing
  - Crowding out effect of large public transfers on private transfers

Sawada and Takasaki (2017)

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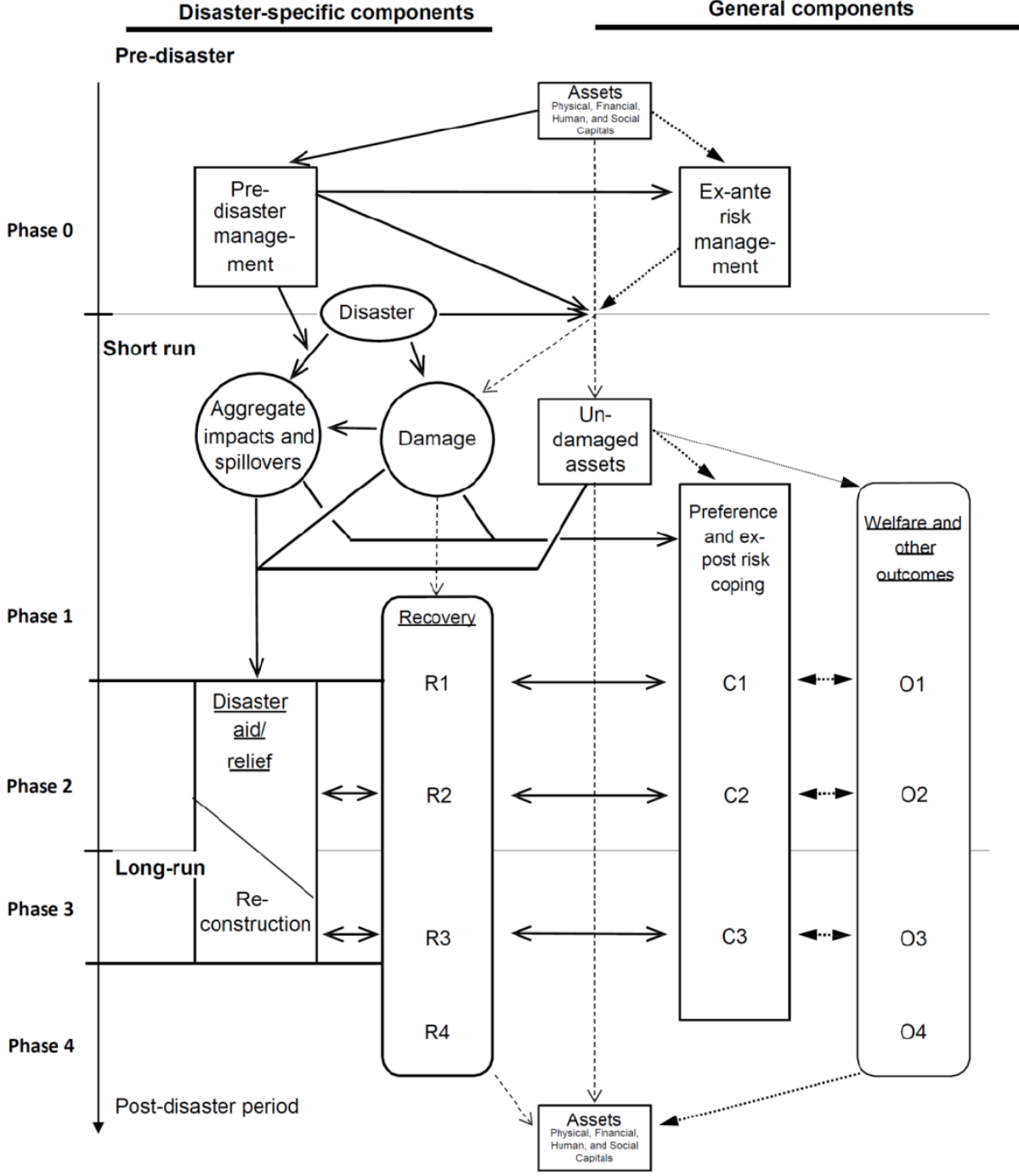


Source: Sawada and Takasaki (2017)

Welfare Outcomes

- Welfare outcomes used in psychology or public health
  - Life satisfaction
  - Happiness measures
  - Clinically validated measures of mental health
- Psychological poverty trap (Ridley et al., 2020).
- Disaster research in public health (Kawachi, et al, 2020; Fergusson et al., 2014; Iwasaki et al., 2017; Tsuboya et al., 2016; Van Griensven, et al., 2006).
  - Japan Gerontological Evaluation Study (JAGES): The GEJE disaster exposure has caused enormous welfare deterioration in the form of depression, trauma, and other psychiatric disorders (Hikichi et al., 2016).
  - Social connections or general social capital of the community play a key role in protecting people from such welfare losses (Hikichi et al., 2017).
  - Lee et al. (2022) indicate the importance of informal insurance mechanisms or mutual supports based on social capital as a critical element in disaster resilience

Welfare Outcomes (Chetty & Looney, 2006)

- The overall welfare:

$$W_{it} = u(c_{it}) - d\left[k\left(c\left(S_{it}\right)\right)\right],$$

- Welfare gain from social insurance:

$$\Delta W_{it} = \gamma \Delta c/c,\ (\Delta c/c)^{*} = 1-(1/\theta)^{1/\gamma}$$

$$\Delta W_{it} = \gamma\left[1-\left(1/\theta_{it}\right)^{1/\gamma}\right], \quad \theta \equiv \partial d/\partial k$$

Welfare costs of dissaving and borrowing
Fang and Sawada (2021)
using CHARLS 2011, 2013, 2015, 2018

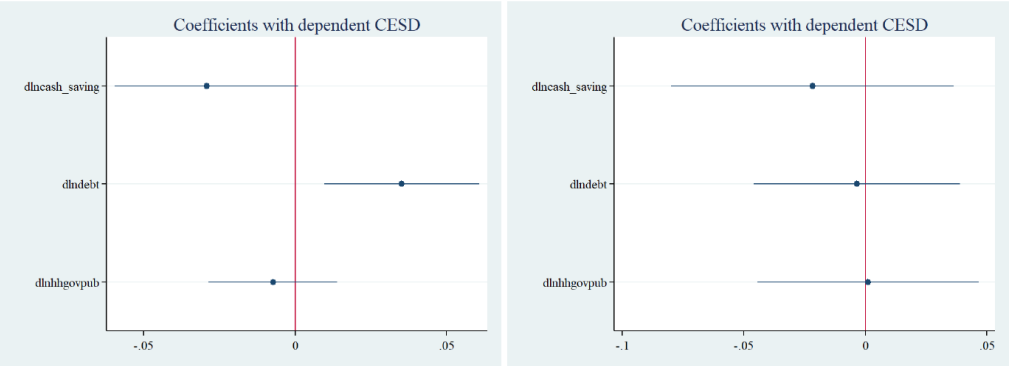


Figure 6: Rural (left) vs. urban (right) negative shocks on CESD (savings)

Cost of Risk Coping and Coefficient of Relative Risk Aversion in Deciding Consumption Growth and Welfare Changes,

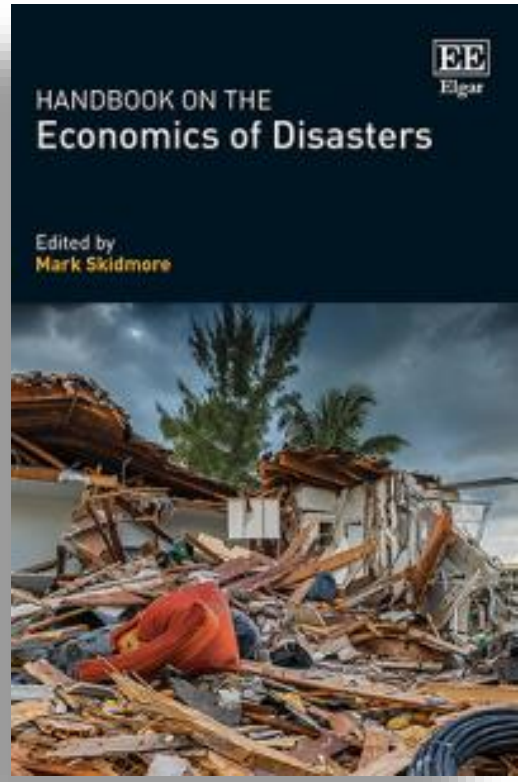
θ	Coefficient of Relative Risk Aversion (γ)				
	1	**2**	**3**	**4**	**5**
1	(0.00) [0.00]	(0.00) [0.00]	(0.00) [0.00]	(0.00) [0.00]	(0.00) [0.00]
1.25	(0.20) [0.20]	(0.11) [0.21]	(0.07) [0.22]	(0.05) [0.22]	(0.04) [0.22]
1.7	(0.33) [0.33]	(0.18) [0.37]	(0.13) [0.38]	(0.10) [0.39]	(0.08) [0.39]
1.75	(0.43) [0.43]	(0.24) [0.49]	(0.17) [0.51]	(0.13) [0.52]	(0.11) [0.53]
2	(0.50) [0.50]	(0.29) [0.59]	(0.21) [0.62]	(0.16) [0.64]	(0.13) [0.65]

Source: Table 1, Chetty and Looney (2006).
Note: Numbers in parentheses and brackets show consumption change rates ($\Delta c/c$) and marginal welfare gains ($\gamma\Delta c/c$), respectively.

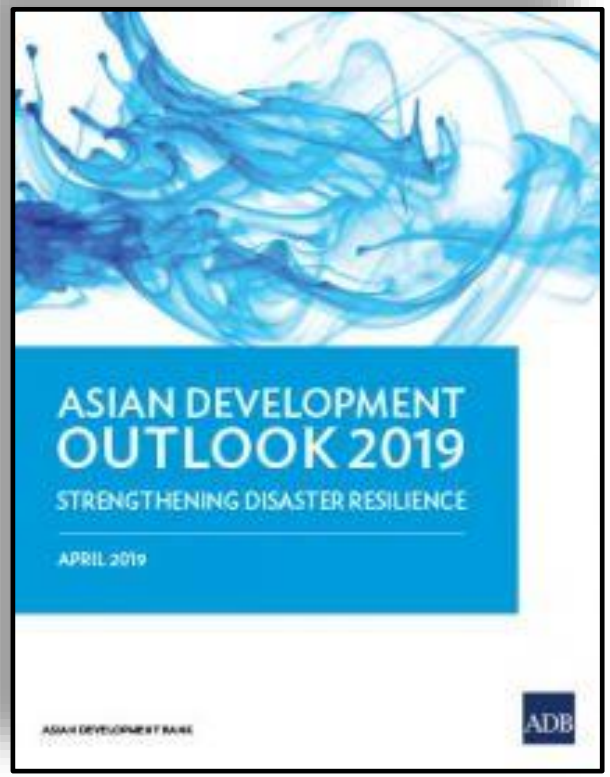
Future Challenges

- On the academic side:
  - The literature is already rich but the findings are inconclusive
  - More studies and systematic reviews needed
  - Theories and tests to reconcile mixed evidence
- On the policy side:
  - To increase the availability and accessibility of formal insurance mechanisms, especially in developing countries
  - To strengthen disaster prevention and preparedness under the multiple development dividends approach
  - To engage the community in addition to the governments and markets

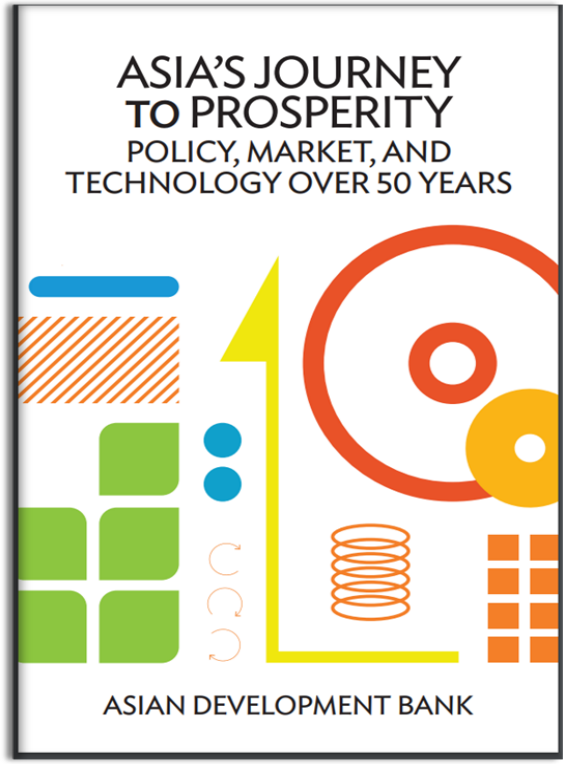
References



Forthcoming, https://www.e-elgar.com/shop/gbp/handbook-on-the-economics-of-disasters-9781839103728.html



https://www.adb.org/publications/asian-development-outlook-2019-strengthening-disaster-resilience



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