With the support of the Erasmus+ Programme of the European Union

Jean Monnet Module: Disaster Risk Management

DRM Cycle and financing strategies

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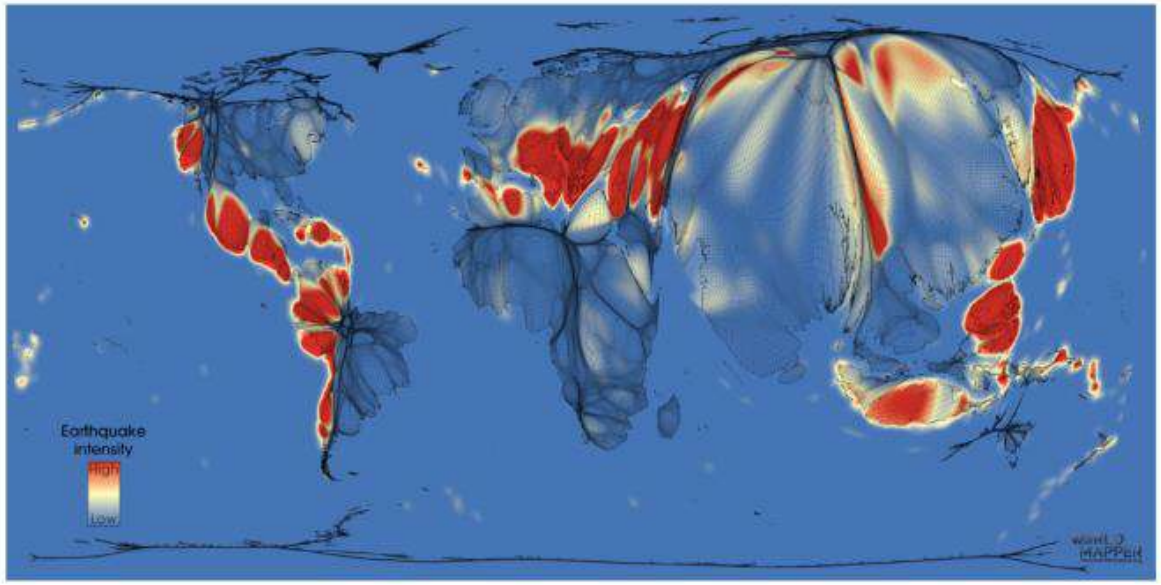
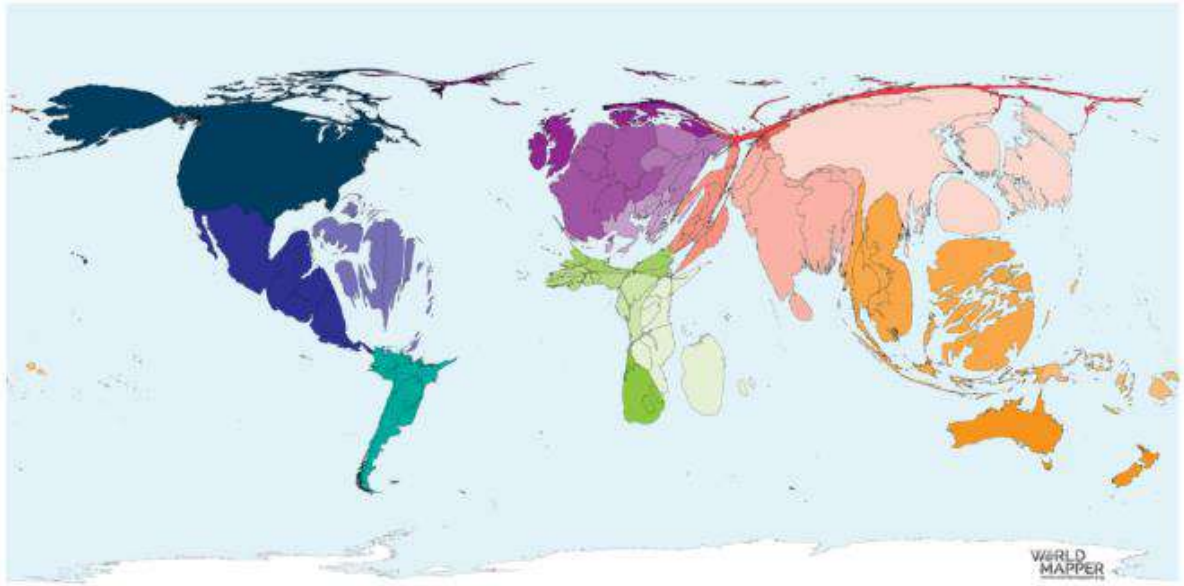
Disaster risk

- Development processes and experiences
- Human activities and decisions
- Climate change
- Globalization
- Urbanization
- Poverty
- Economic Meltdowns
- Technological developments

Disaster exposure does not depend on a country's level of development

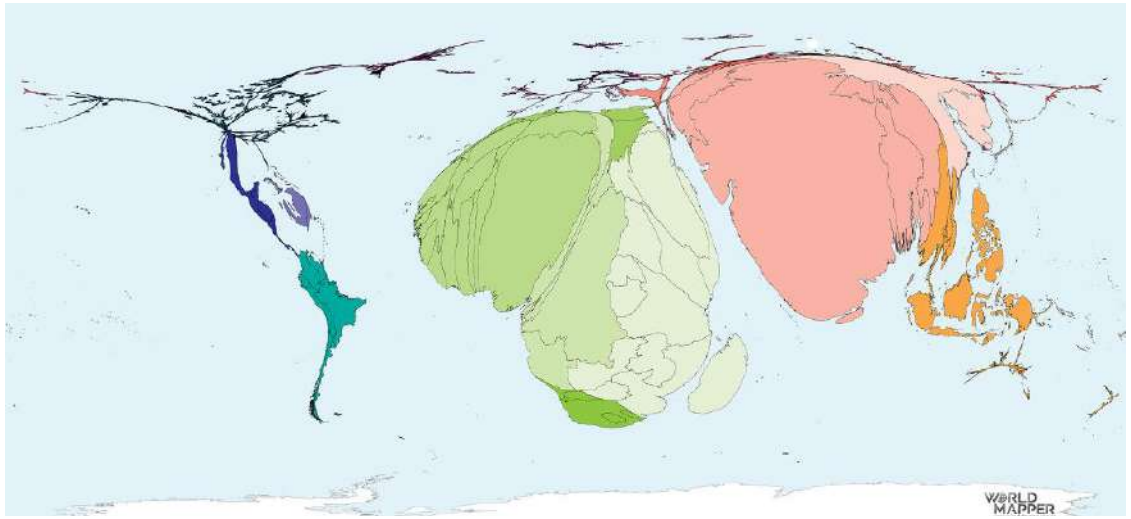


Seismic Risk

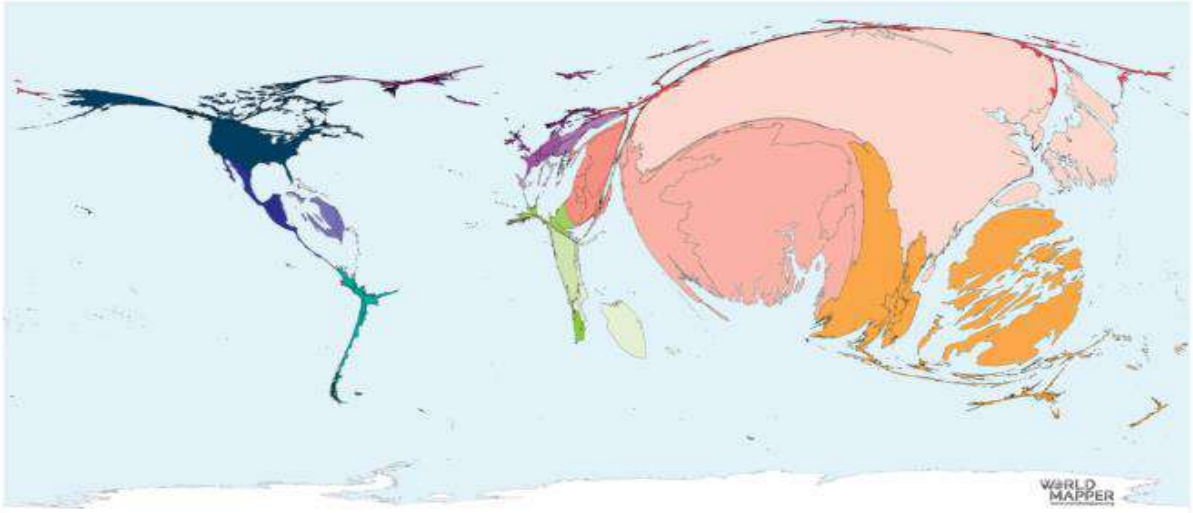


Storms 2000-2017

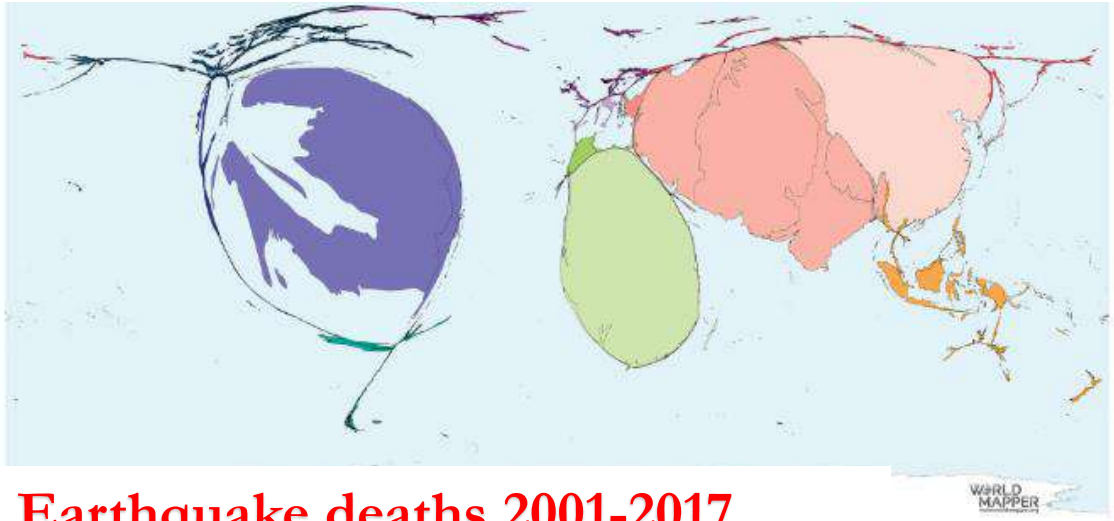
The consequences of disasters depend on the level of development of a country



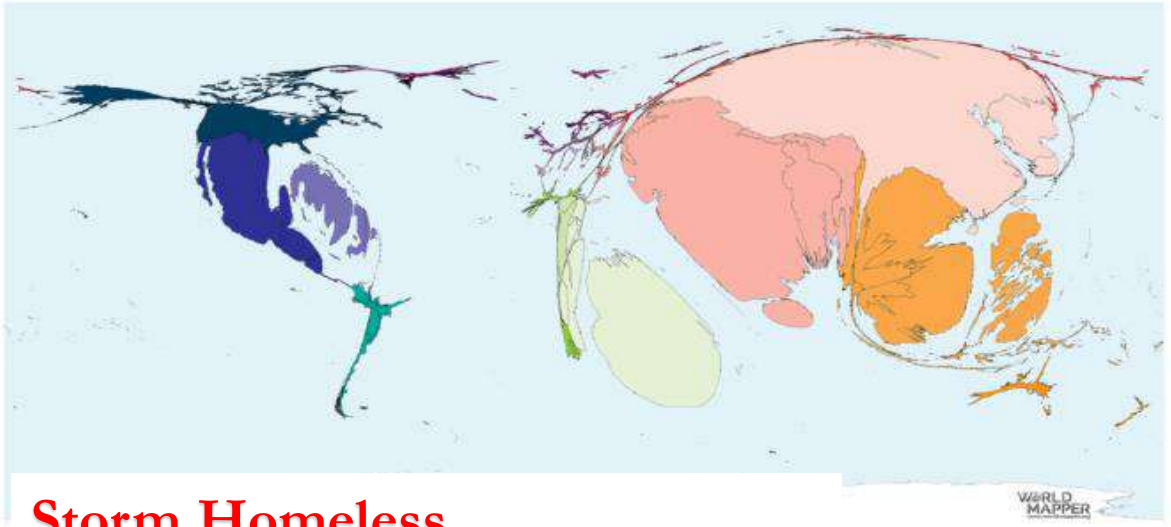
World map based on inequality, absolute poverty



Storm Injured 2000-2017



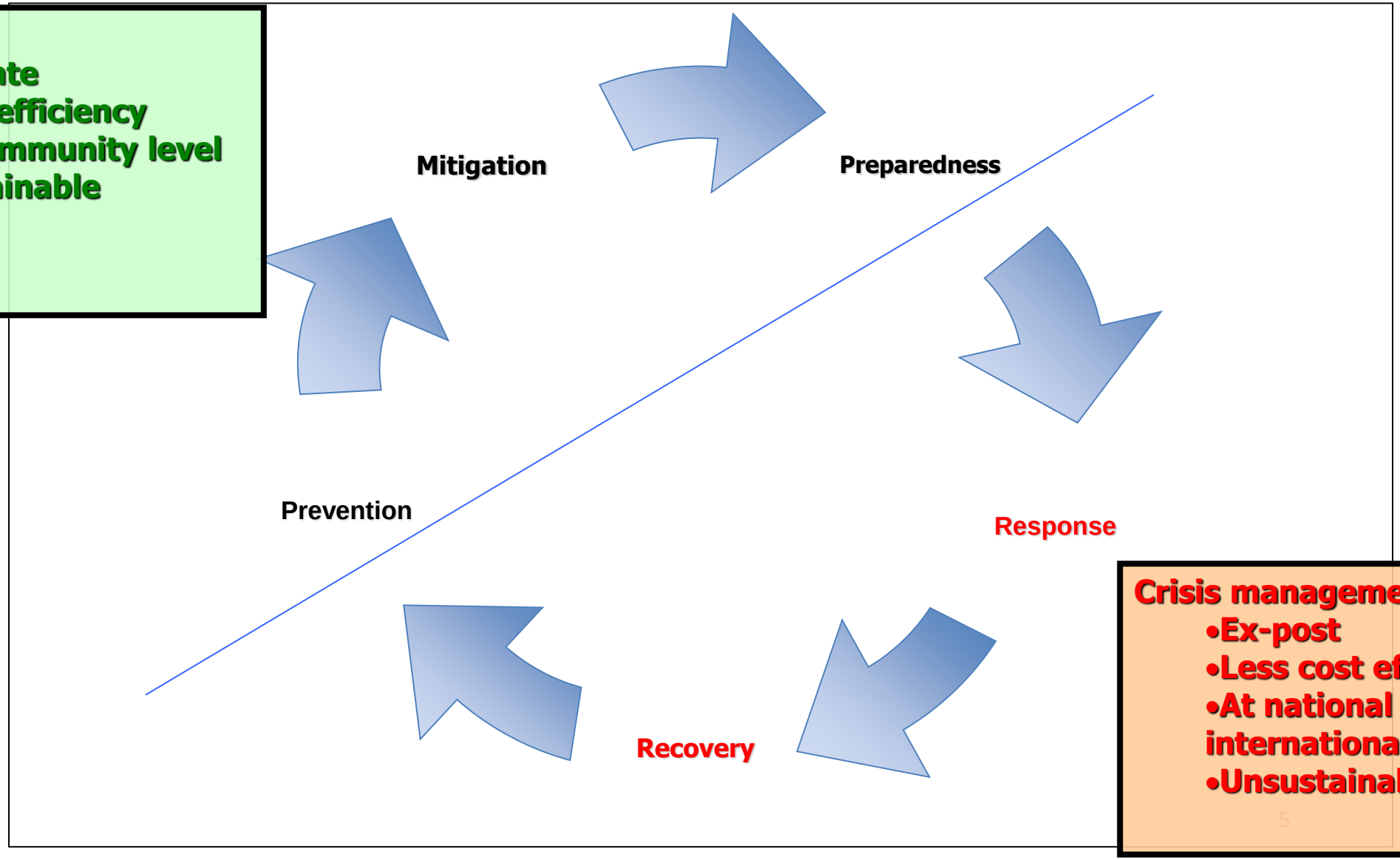
Earthquake deaths 2001-2017



Storm Homeless

DRM Cycle

Full cycle
- **Ex-ante**
- **Cost efficiency**
- **In community level**
- **Sustainable**



Crisis management:
- **Ex-post**
- **Less cost efficient**
- **At national and international level**
- **Unsustainable**

Prevention and mitigation

- Prevention and mitigation strategies should work towards reducing the financial and social costs to communities over time, improving the built environment, and reducing the impact on, and damage to, the environment.
- Investment in disaster risk prevention and reduction enhances the economic, social, health and cultural resilience of people, communities, countries and their assets, as well as the environment.
- The effective prevention of disaster events includes multiple strategies to reduce or remove the impact of hazards and increase the resilience of the community.

Prevention and mitigation

- Prevention and mitigation strategies should be based on the risk assessment and can be considered in relation to:
- land use planning and building codes
- essential infrastructure
- structural works
- landscape and environment.

Prevention and mitigation

- hazard specific control activities such as flood levees or bushfire mitigation strategies
- design improvements to infrastructure or services
- land use planning and design decisions that avoid developments and community infrastructure in areas prone to hazards
- community awareness campaigns to increase knowledge of how to prepare for disaster events
- community education programs to build knowledge of the appropriate actions to prepare for and respond to a disaster event
- capital works such as levee bank construction to reduce the impacts of flooding
- resilience activities including partnership building and engagement between sectors
- annual programs (e.g. vegetation management around essential services and essential infrastructure such as power lines).

Preparedness

Preparedness	*The knowledge and capacities developed by governments, professional response and recovery organizations, communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazard events or conditions.*

Preparedness elements

1. Risk assessment	2. Planning	3. Institutional & Legal System
4. Information management & communication systems	5. Early warning systems	6. Resource base (human, material & funds)
7. Response mechanisms & Coordination	8. Exercises	9. Education, Training, Risk awareness,

Source:
Abrahamsson, 2018

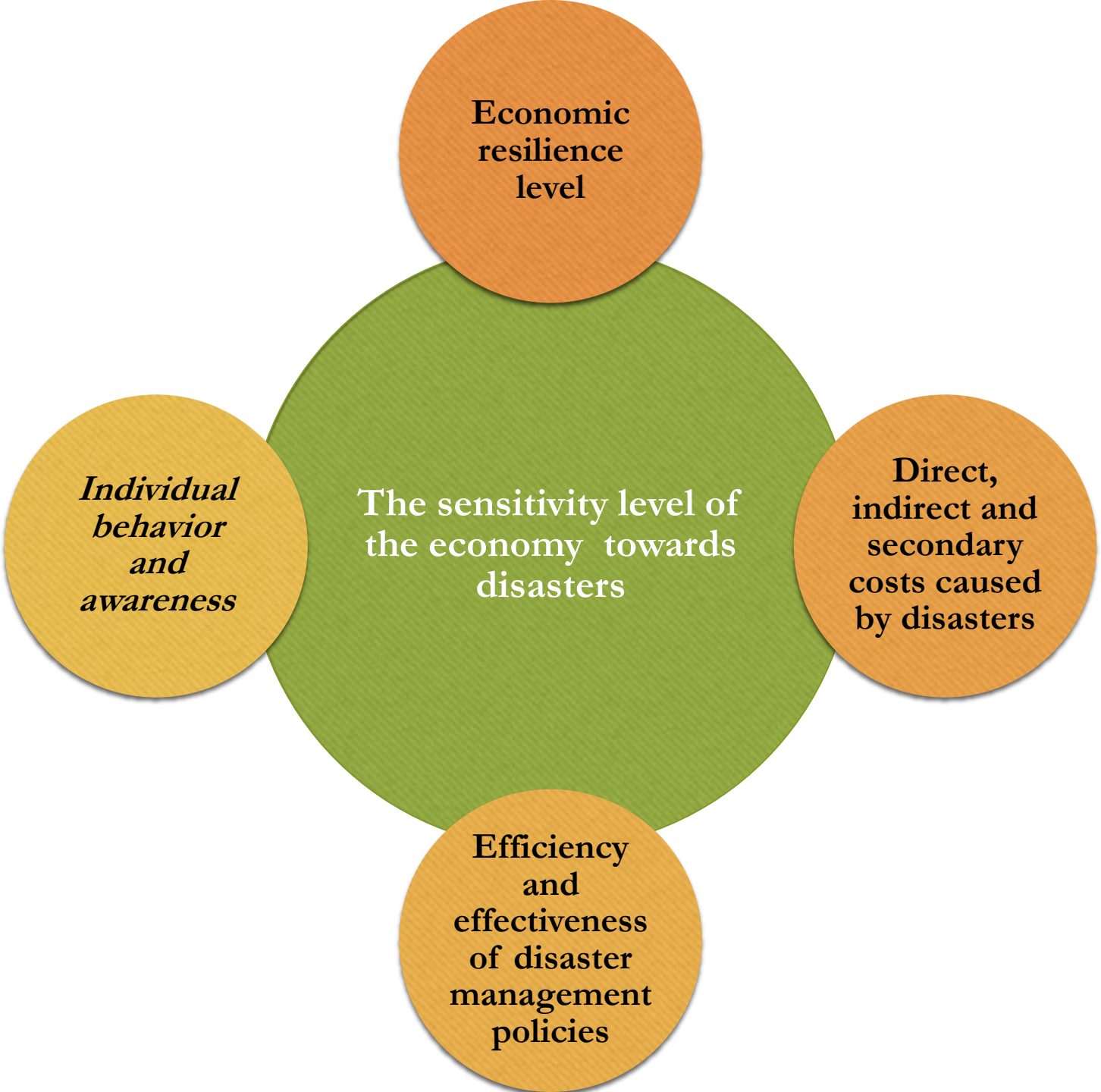
Plans are useless, but planning is indispensable.

Dwight D. Eisenhower

Response and recovery

- The aim of response operations is to save lives, protect property and make an affected area safe. Accordingly, response is the operationalisation and implementation of plans and processes, and the organisation of activities to respond to an event and its aftermath.
- The need for recovery may arise from a range of disaster events, including natural and non-natural disasters such as floods, cyclones, bushfires, acts of terrorism and major health emergencies, as well as animal and plant diseases.
  - human and social
  - economic
  - environment
  - building
  - roads and transport.

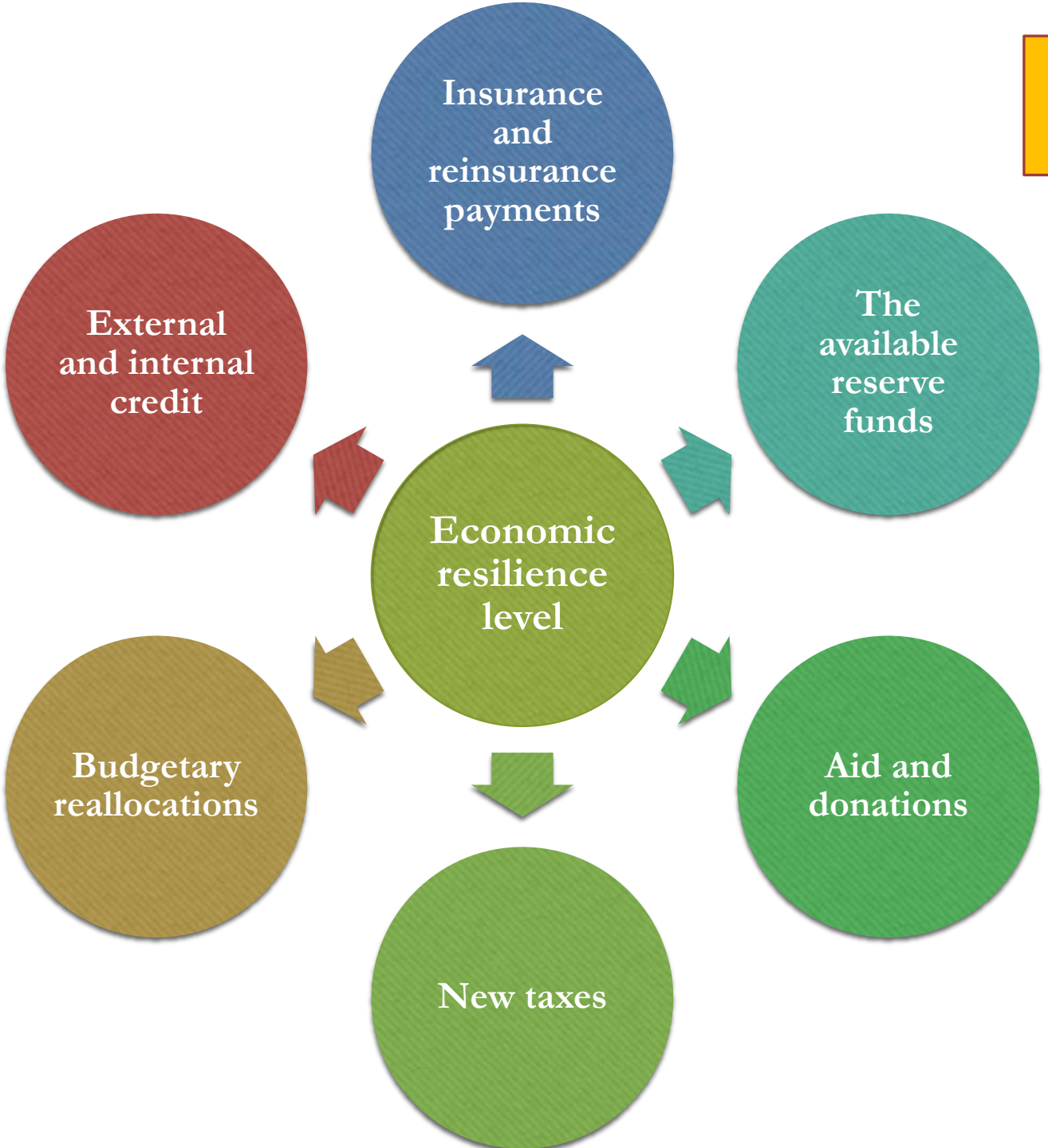
Financing a Disaster Risk Management Strategy


Economic resilience level
Individual behavior and awareness
The sensitivity level of the economy towards disasters
Direct, indirect and secondary costs caused by disasters
Efficiency and effectiveness of disaster management policies

Public Sector resilience toward hazards

- The ability of the public sector to respond to the event is determined by several factors.
- The economic resilience is conditioned by all the possible internal and external resources available to the government to respond to the event.
  - The insurance and reinsurance payments;
  - The reserve funds for disasters that the country has available;
  - The funds that may be received as aid and donations;
  - The value of new taxes that the country could issue in case of disasters;
  - The margin for budgetary reallocations of the country;
  - The feasible value of external credit;
  - The internal credit the country may obtain.

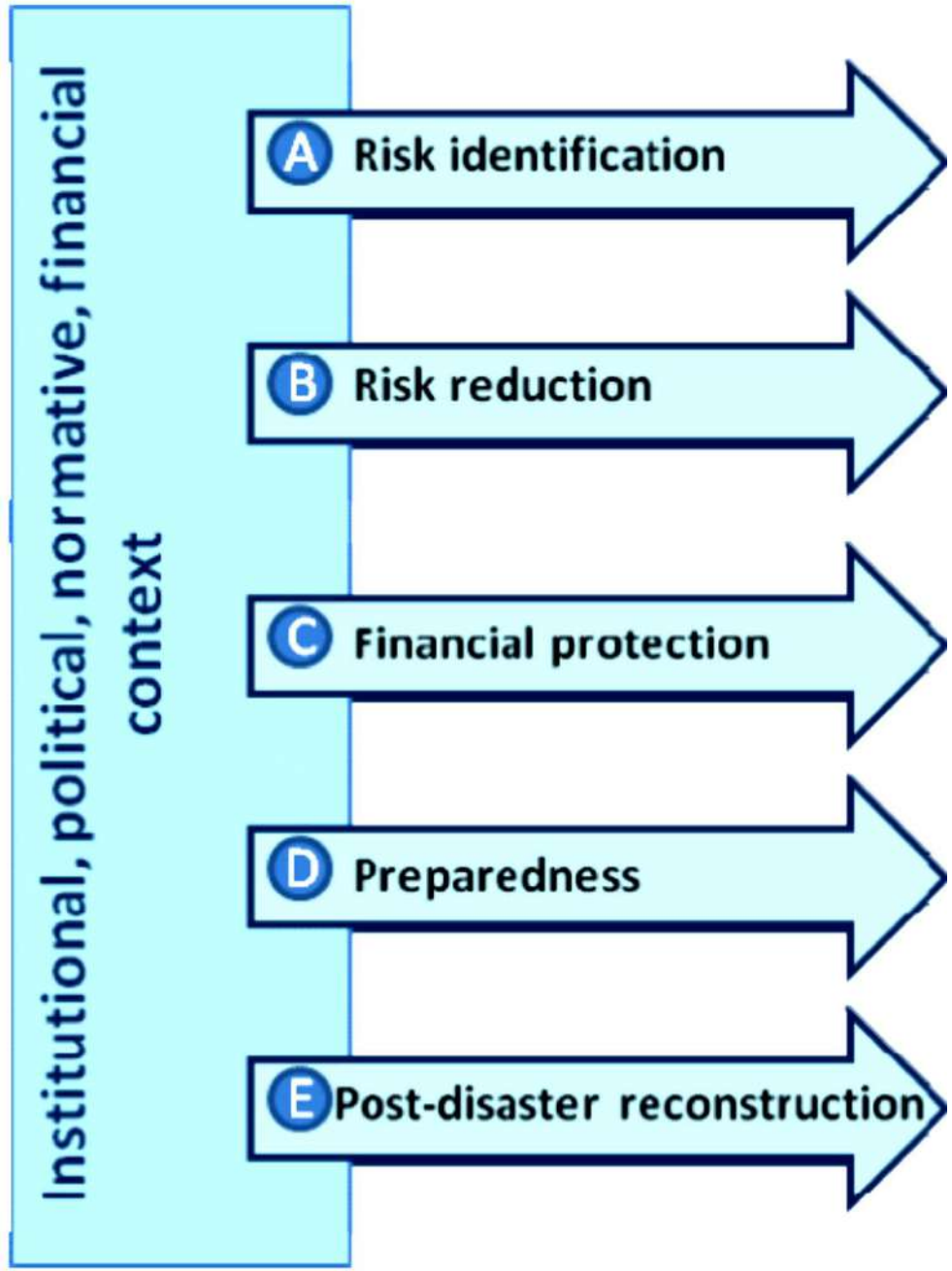
EX-ANTE

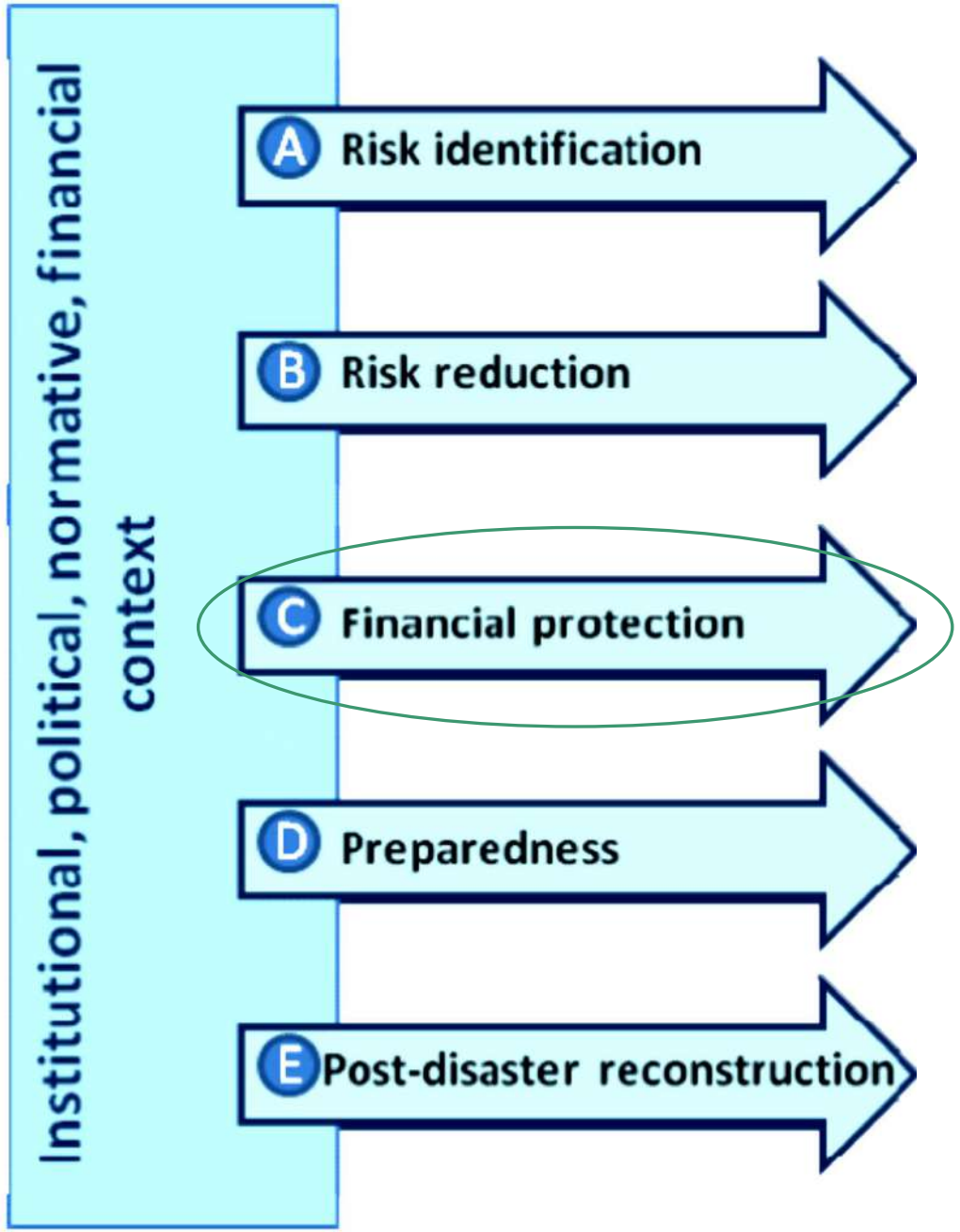


EX-POST

Overview

- Financial strategies for disaster risk management are intended to ensure that individuals, businesses and governments have the resources necessary to manage the adverse financial and economic consequences of disasters
- The analysis of financial exposure of a country to disasters is an important part of disaster risk management strategy.
- Financial protection will help governments mobilize resources in the immediate aftermath of a disaster, while buffering the long-term fiscal impact of disasters.


Institutional, political, normative, financial context
A Risk identification
B Risk reduction
C Financial protection
D Preparedness
E Post-disaster reconstruction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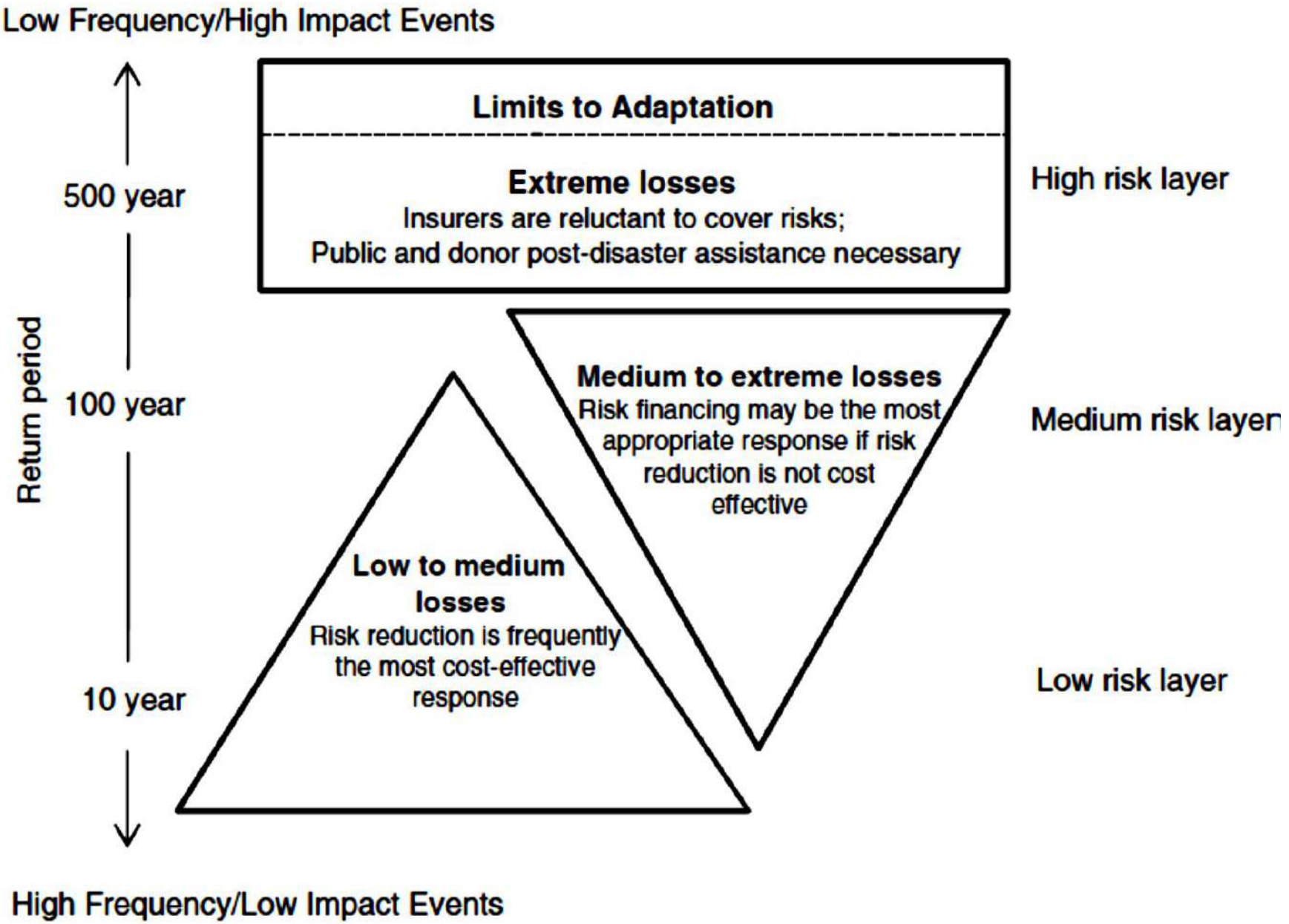
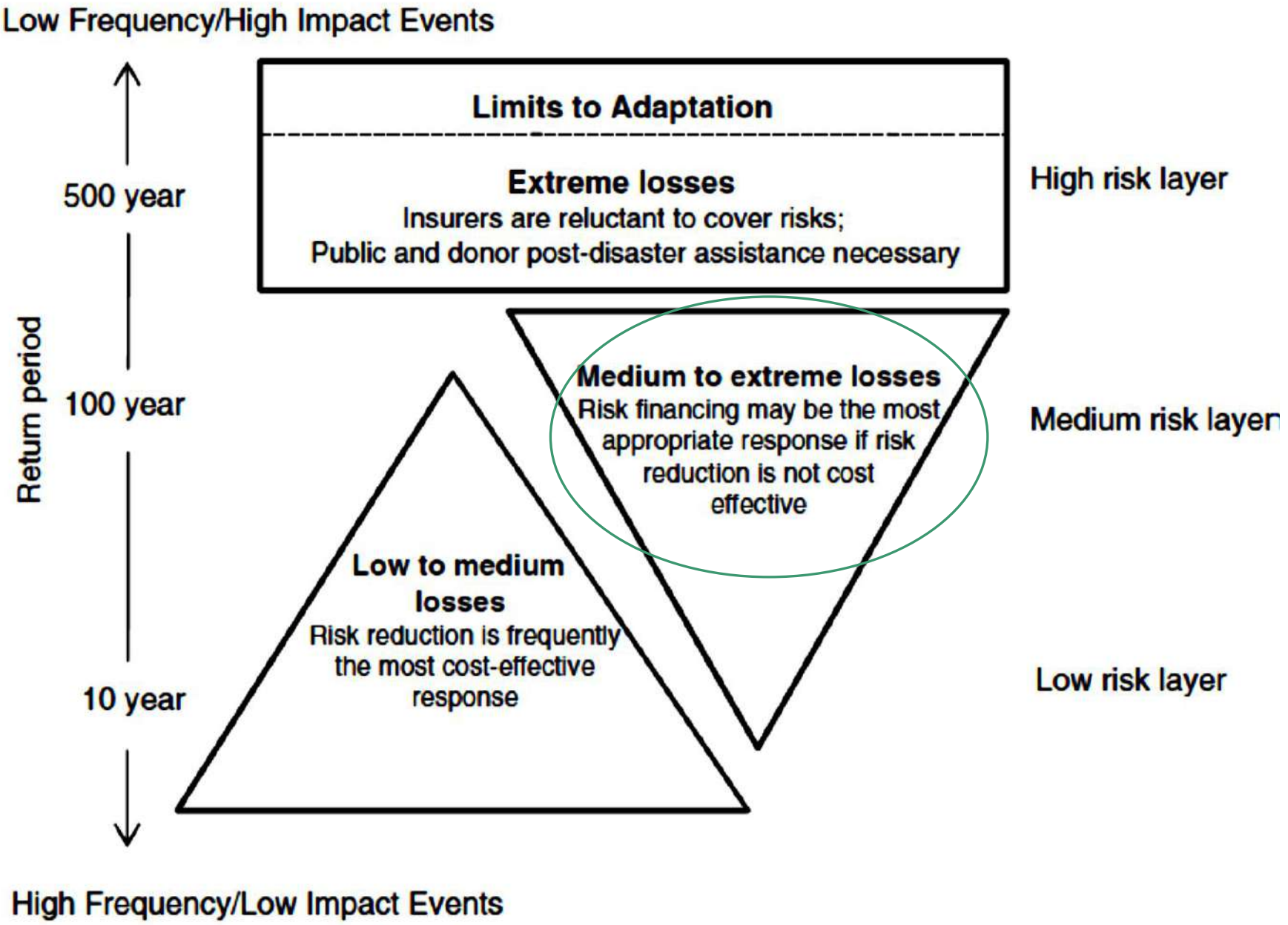
Disaster Risk Layers



Disaster Risk Layers



Approaches and instruments for financing the risk of natural disasters

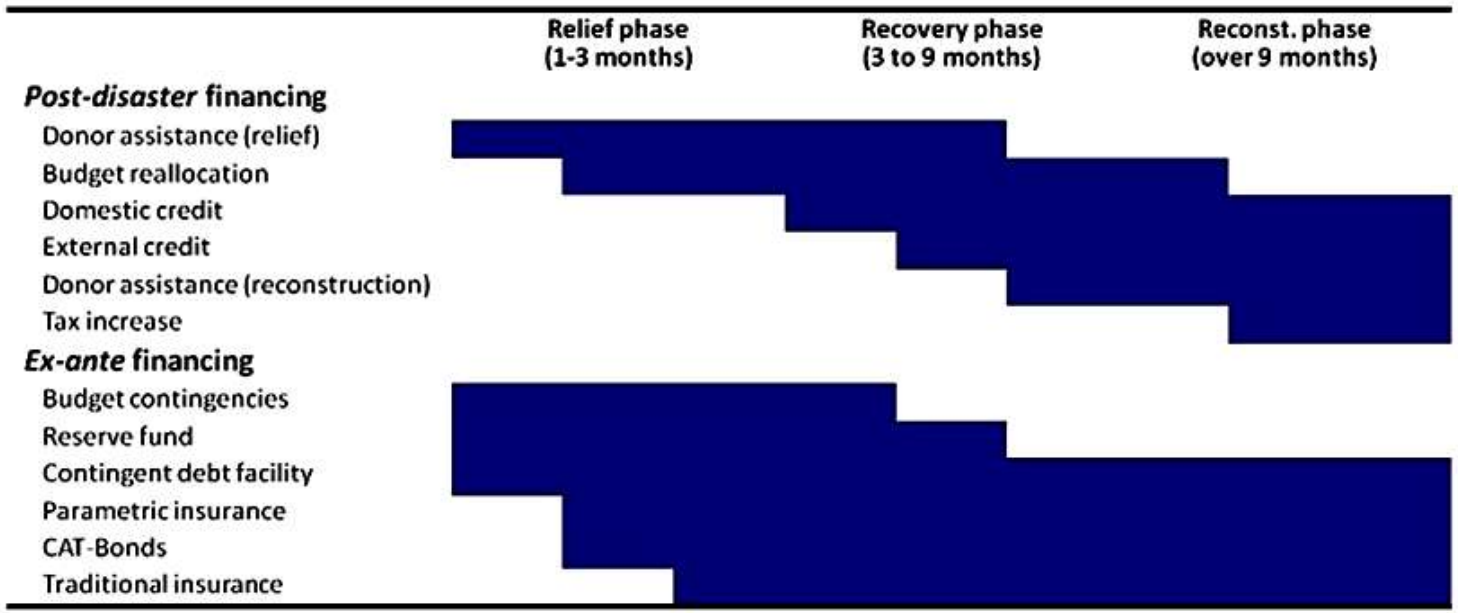
Approaches	Examples of Instruments
Non-market risk transfer	Government assistance (taxes) for private and public sector relief and reconstruction funding Kinship arrangements Some mutual insurance arrangements Donor Assistance
Market risk transfer	Insurance and reinsurance, Micro insurance, Financial market instruments: Catastrophe bonds, Weather derivatives
Inter-temporal risk spreading	Contingent credit (financial market instrument), Reserve fund, Microcredit and savings

Approaches and instruments for financing the risk of natural disasters

***Ex* ante Sources**[a)]		***Ex post* Sources**
Instruments without risk transfer Nonreimbursable resources ? Calamity funds ? Reserve funds or diversion of national budgetary resources ? Development and social funds Reimbursable resources ? Contingent credits ? Development and social funds	*Instruments with risk transfer* ? Insurance and reinsurance with damage coverage based on real losses ? Insurance and reinsurance with parametric activation of payments ? Catastrophe bonds with damage coverage based on real losses ? Catastrophe bonds with parametric activation of payments	Nonreimbursable resources ? Emergency donations ? Taxes Reimbursable resources ? Emergency credits (for example the IDB's Emergency Reconstruction Mechanism) ? Reconstruction loans ? Reformulation of existing loans

Approaches and instruments for financing the risk of natural disasters

Ghesquiere and Mahul (2010) provides an assessment of the time necessary to mobilize funds through these instruments.



Market risk transfer - Insurance

What insurance represents?

- A contractual agreement under which the insurance company, in consideration of the premium paid by the insured, promises to make payment to or on behalf of the insured, for losses caused by the perils covered under the contract
- The main purpose: to indemnify the insured, to restore his financial position prior to the occurrence of the loss

Market risk transfer
Insurance

Does insurance companies provide coverage to natural disaster losses?

An insurable risk would ideally fulfill certain requirements: large number of exposure units, loss must be unintentional, accidental, determinable, ***must not be catastrophic****, must be calculable and the premium must be economically feasible.*

The loss should not be catastrophic because*:*

- *The pooling technique (the essence of insurance) fails;*
- *The chance of loss is hardly predictable;*
- *The law of large numbers can hardly be applied.*

As the natural disaster risk does not satisfy all the above mentioned requirements, the insurance companies are not willing to cover all the natural disaster losses by their own.

Market risk transfer
Insurance

How the insurance companies provide coverage to natural disaster losses?

***Insurers cover catastrophic losses through**:*

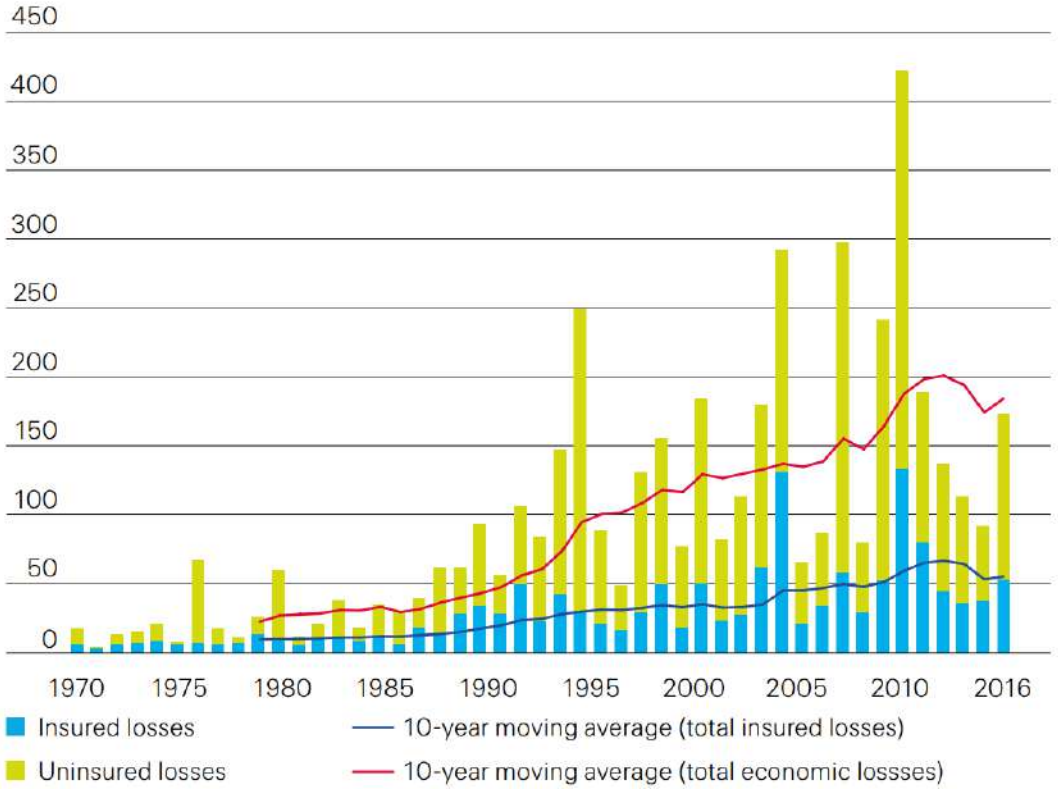
•Reinsuring their activity – shifting a part or the whole risk written from one insurer to another insurer (reinsurer).

•Dispersing their coverage over a large area – assuming different types of risk.

•Financial markets - issuing financial instruments, contingent surplus notes, catastrophe bonds and exchange traded options.

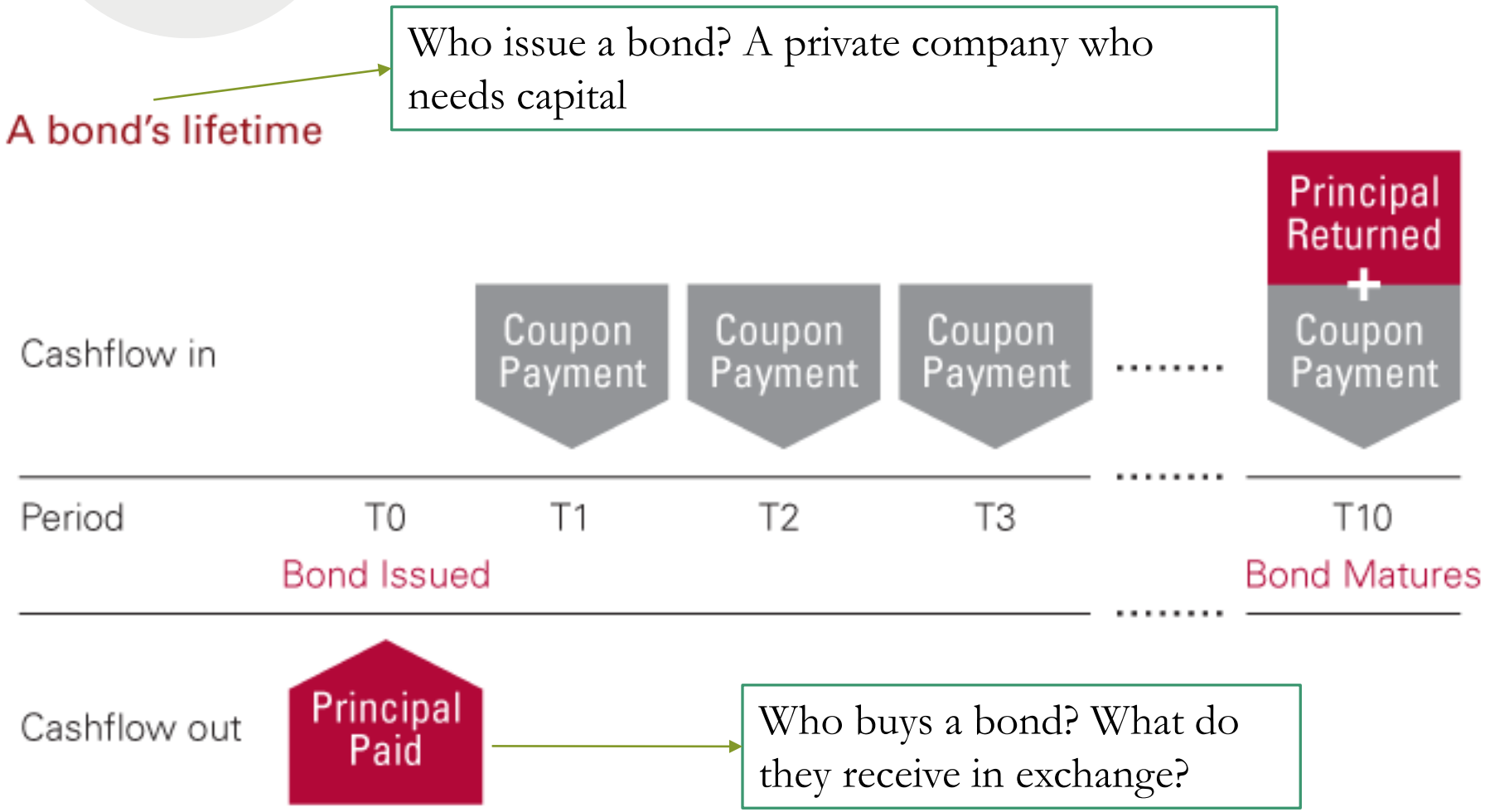
Market risk transfer
Insurance

What part of disaster losses is actually insured all over the world?

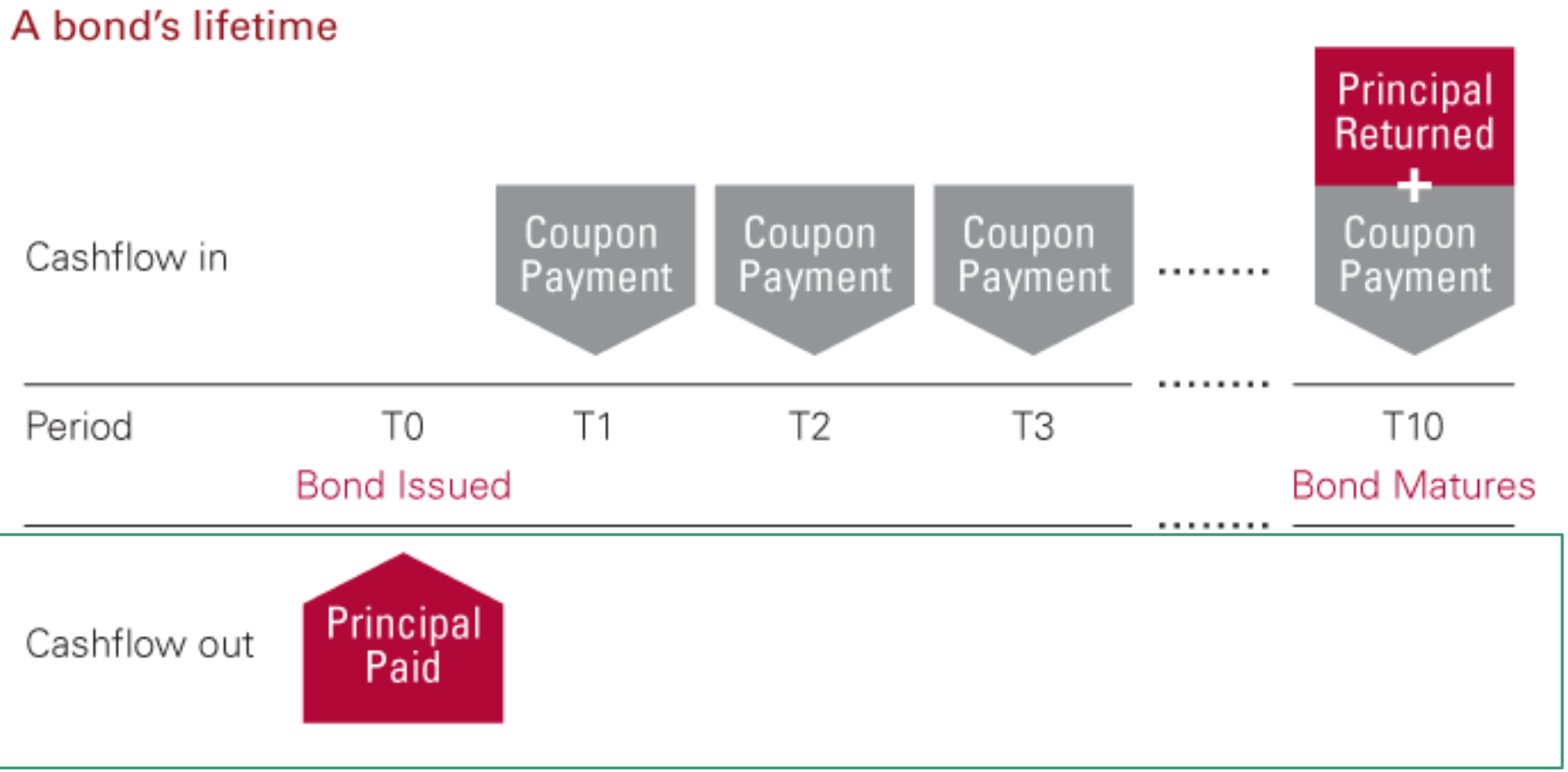


Insured losses versus uninsured losses
Source: "Sigma"

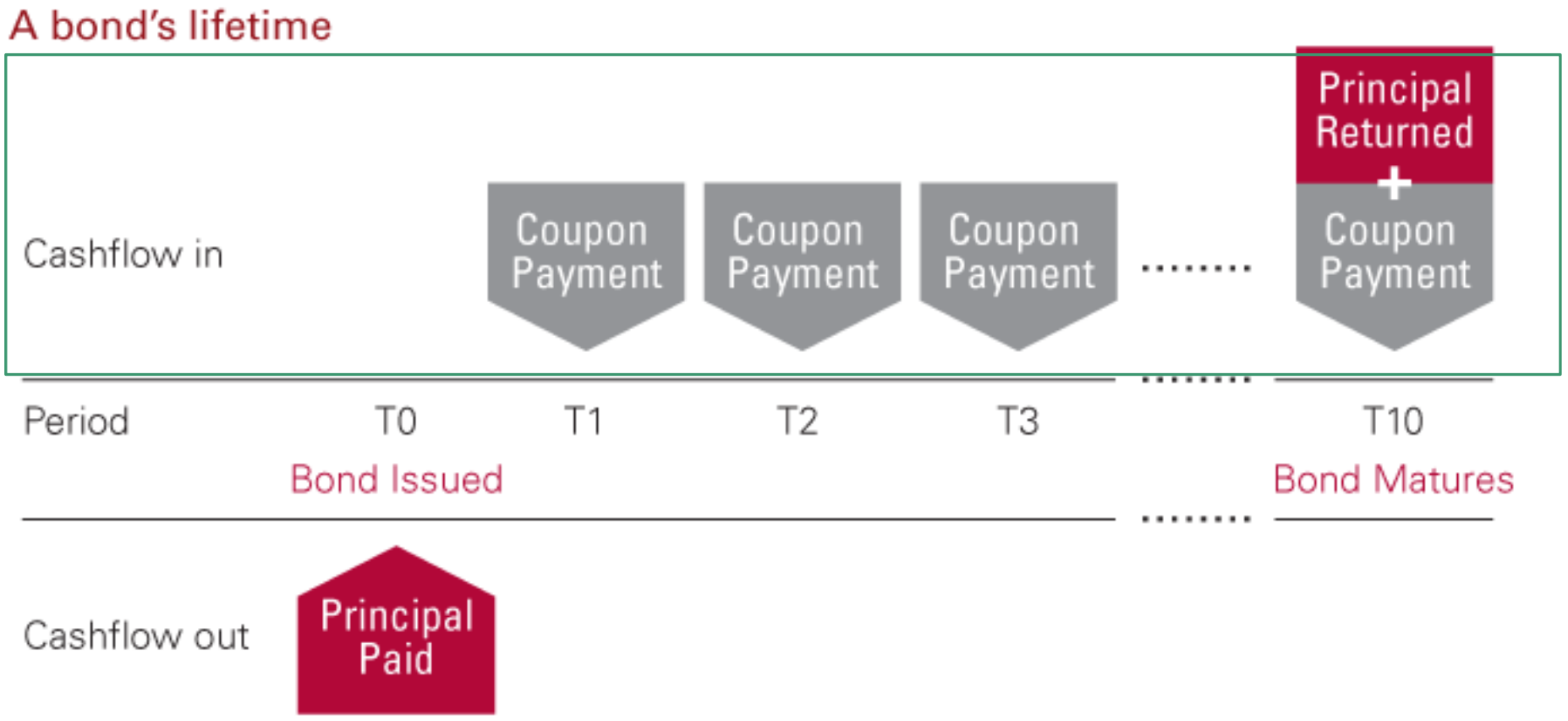
Market risk transfer
Financial Market Instruments – Cat Bonds



Market risk transfer
Financial Market Instruments – Cat Bonds



Market risk transfer
Financial Market Instruments – Cat Bonds



Market risk transfer
Financial Market Instruments – Cat Bonds

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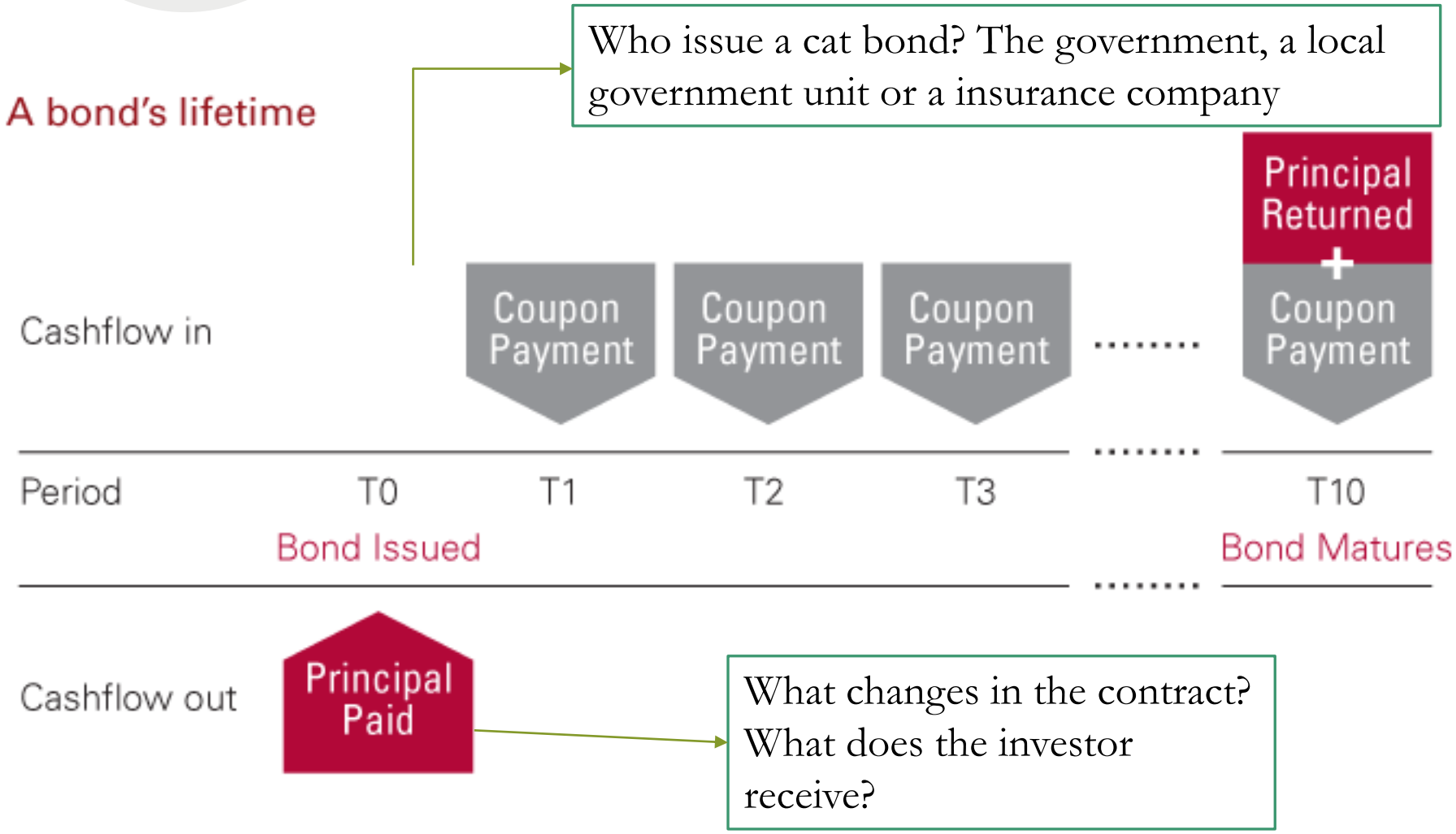


Market risk transfer
Financial Market Instruments – Cat Bonds

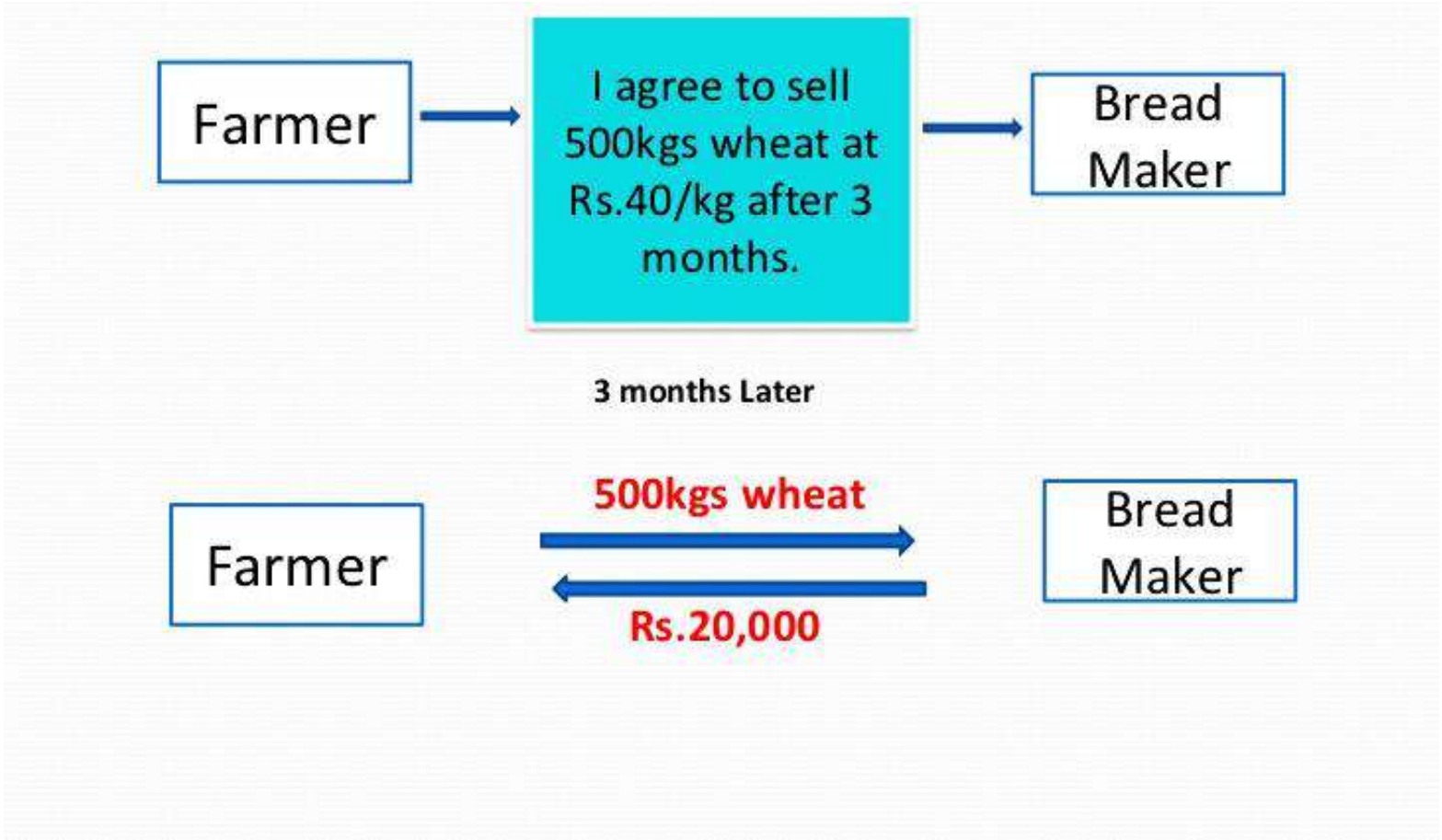
- Issued and trade mainly in the institutional investor marketplace
- Similarity with a corporate bond
- Maturity -from 1 year to 5 years
- Higher return from disaster bonds compared to corporate bonds with the same rating

Why to invest in catastrophe bonds?

- The returns are largely uncorrelated with macroeconomic factors
- risk exposure can be reduced by diversifying across many different catastrophe bonds
- the likelihood of incurring extreme losses is lower than the chance of benefitting from extreme returns

Financial Market Instruments – Disaster Derivatives

Forwards/futures

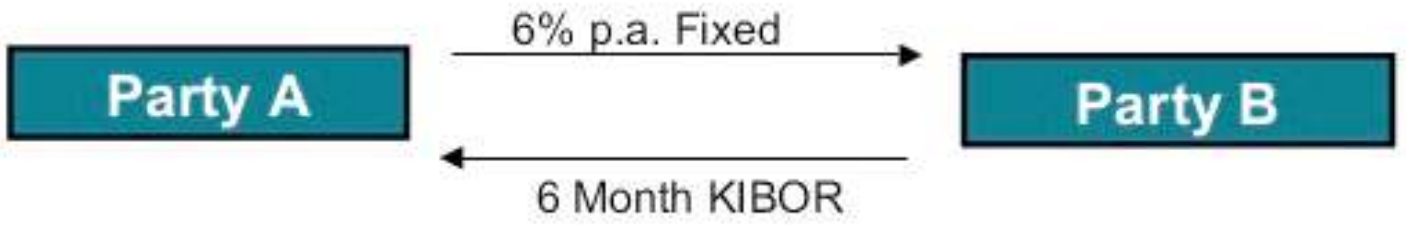


Options


CALL OPTION
Current Price = Rs.250
Premium = Rs.25/share
Right to buy 100 Reliance shares at a price of Rs.300 per share after 3 months
Strike Price
Expiry date
Amt to buy Call option = Rs.2500
Suppose after a month, Market price is Rs.400, then the option is exercised i.e. the shares are bought.
Net gain = 40,000-30,000-2500 = Rs.7500
Suppose after a month, market price is Rs.200, then the option is not exercised.
Net Loss = Premium amt
= Rs.2500

Swaps

Counter parties:: A and B
Maturity:: 5 years
A pays to B : 6% fixed p.a.
B pays to A : 6-month KIBOR
Payment terms : semi-annual
Notional Principal amount: PKR 10 million.



Financial Market Instruments – Disaster Derivatives

How these instruments are used to create a disaster derivative

Items Sold	Preferred Weather	Risk Factor	Weather Derivative
			Managing risk to prevent **rainy weather**
			Managing risk to prevent **sunny weather**

Financial Market Instruments – Disaster Derivatives

Problems related to this market:

- young age of the market
- regulatory market requirements of the insurance market and of banks
- liquidity not like most of the derivatives markets
- use of different indexes which influences the risk of the transaction
- moral hazard

Non-market risk transfer
Solidarity – government and donor assistance

Government assistance categories:

- funds allocated to cover the financial cost of the damages to public sector infrastructure;
- financing made available as a result of political pressures to private businesses who lacked sufficient insurance coverage;
- funds to meet the government's obligations to care for the poor.

Government financing possibilities:

- New taxes
- Budgetary reallocations
- Exploitation of reserve funds

Non-market risk transfer
Solidarity – government and donor assistance

Donors assistance categories:

- reimbursable or non-reimbursable financing
- the refinancing or forgiving of past debts

Shortcomings of donors assistance:

- not always immediately available
- frequently in-kind
- create bad incentives

Non-market risk transfer
Informal risk sharing - Kinship arrangements

- When savings, credit and government support are not forthcoming, at-risk individuals in developing countries traditionally rely on financial arrangements that involve reciprocal exchange, kinship ties and community self-help

- These arrangements might be inappropriate for high-layer, covariate risks, where whole families and regions may be affected, but could be very effective for low- and medium-layer risks.

Risk Pooling - National and regional insurance pools

National insurance pools

- public disaster programs
  - pooling of risks through a scheme similar to insurance, but with a focus on one coverage type and a specific area.
  - state insurance, at affordable prices, and often mandatory ones
  - social nature
  - Turkish Catastrophe Insurance Pool
- disaster funds
  - contingency fund, which is activated in cases of catastrophic nature.

Risk Pooling - National and regional insurance pools

Regional insurance pools

- A common mechanism, a regional disaster recovery fund
- Reduces the exposure of governments of any country to a disaster risk by dividing it with other countries
- Reduces the impact on the fiscal and macroeconomic parameters of each country part of the scheme
- Integrates insurance markets in the countries involved in the scheme
- Improves risk management techniques through its diversification
- Reduces the dependence of the participating countries on the scheme from international disaster relief.

Risk Pooling - National and regional insurance pools

Regional insurance pools, problems:

- more complex than national schemes that can apply to any country.
- The problem of moral risk is not avoided
- the countries concerned should have the same profile of disaster risk
- a need for political will and coordination which can be much more difficult and bureaucratic than in the case of a national scheme.

Examples:

- CCRIF in the Caribbean countries
- SEEC-CRIF applied in South East Europe and the Caucasus area.

Inter-temporal Risk Spreading Instruments

Contingent Credit

- In exchange for an annual fee, gives the right to take out a specific loan amount post-event that has to be repaid at contractually fixed conditions.

Reserve Funds

- Funds to be used in case of a disaster event should be accumulated, by making annual deposits of the funds.

Development funds

- Accumulating funds which aim at prevention and mitigation with the purpose to finance activities which lead to the reduction of vulnerability.

Microfinance and savings

- Provision of financial services to low-income individuals, including the self-employed

Climate finance

- Climate change is expected to increase risks to businesses, infrastructure, assets and economies.
- Strategies of disaster risk management should include climate change modeling.
- Apart from disaster risk financial means, there are further financial strategies targeting directly climate change.
- A combination of policies, regulations, and longer-term debt from DFIs can trigger private investments in climate resilience
- A decentralized approach to 'innovative financing', focusing on taxation, development-based charges, entry fees, small-scale enterprises and initiatives taken at the local level between the private sector, government authorities and NGOs.

Climate finance

Source of funding	Financing instruments	Field of action
International funds	Grants and Donations	Biodiversity; Forestry; Ecosystems; And/or any other areas of international importance
	Soft credits and loans	
	Swap contracts	
	IPA	
Domestic funds From the private sector:	Payment for Environmental Services (PES)	Tourism Agriculture Forestry
	Financial conditions for the approval of private activities	
	Compulsory insurance of property	
	Licensing fees for touristic operators	
Domestic funds: From households	Environmental taxes and charges for municipal services	Population and Settlements
	Compulsory insurance of property	
Domestic funds From the state sector:	Review of budgetary allocations	Infrastructure Hydrological Regime and Water Resources Forestry Agriculture Biodiversity
	Reserve and Development Funds	
	Environmental taxes	
	Insurance	
	Entry fees in protected areas and touristic locations	
	Subsidies	

Concluding remarks

- Disaster risk finance is a challenging issue, especially in developing countries
- Its implementation requires careful planning in terms of:
  - modeling and pricing uncertainties
  - institutional stability,
  - public confidence and trust;
  - moral hazard, adverse selection and basis risk
- Climate finance is becoming a further problem as climate change requires adopting new policies and strategies