

Financial and Fiscal Instruments for Catastrophe Risk Management

**Addressing Losses from Flood &
Climate Hazards in Central Europe**

TECHNICAL PRESENTATION

Macedonia, May 2011

Flood/Climate Damages are Increasing

- Large losses (\$3.2b in Poland, 2010)
- Need for efficient financial mechanisms to mitigate fiscal losses from disasters.
- EU funds available but extremely slow and very insufficient to close fiscal gaps.
- Governments need contingent and more sophisticated mechanisms to avoid fiscal disruptions and to provide immediate emergency cash for addressing damages.

Losses versus GDP & Revenue

<u>20 Year Event (5% prob.)</u>	PL	CZ	HU	SK
Euro amount				
Total Property (€ mn.)	2508	768	966	1191
Public Property (€ mn.)	904	245	248	412
% of Revenue				
Total Property	2.2%	1.4%	2.3%	10.7%
Public Property	0.8%	0.4%	0.6%	3.7%
% of GDP				
Total Property	0.8%	0.6%	1.0%	1.9%
Public Property	0.3%	0.2%	0.3%	0.6%
<u>100 Year Event (1% probability)</u>				
Euro amount				
Total Property (€ mn.)	9954	3405	4235	5452
Public Property (€ mn.)	3586	1086	1087	1887
% of Revenue				
Total Property	8.6%	6.2%	10.0%	48.8%
Public Property	3.1%	2.0%	2.6%	16.9%
% of GDP				
Total Property	3.2%	2.5%	4.6%	8.5%
Public Property	1.2%	0.8%	1.2%	2.9%

Private Insurance Coverage

- **Private sector insurance coverage is relatively high in CEE (50%-75% of households). Potential need for better private sector coverage in flood zones.**
- **Public infrastructure and assets, sub-national and municipal levels as well as underinsured housing, however, are at risk and reliant on fiscal outlays if damaged.**

A National Level Insurance Mechanism

- **Governments do not need commercial insurance, but rather a macro/fiscal instrument to hedge future losses.**
- **Large country portfolios of exposures allow governments to select target areas of loss and estimate chances of fiscal loss.**
- **An instrument that pays based on the physical event magnitude alone (flood, temperature level, etc.) is less costly.**

Water Flow Level/Discharge per River Catchment Correlated to a Euro 500 million per Country Loss

Czech Republic		Slovakia		Hungary		Poland	
Odra-CZ	m ³ /sec	Dunaj-SK	m ³ /sec	Ipel-HU	---	Odra-PL	m ³ /sec
	2,410		14,014		---		4,344
Morava-CZ	m ³ /sec	Vah-SK	m ³ /sec	Dunaj-HU	---	Wisla-PL	m ³ /sec
	785		2,037		---		8,486
Dyje-CZ	m ³ /sec	Hornad-SK	m ³ /sec	Salo-HU	m ³ /sec	Narew-PL	m ³ /sec
	918		1,278		758		1,805
Vltava-CZ	m ³ /sec	Bodrog-SK	m ³ /sec	Hornad-HU	---		
	2,997		2,032		---		
Labe-CZ	m ³ /sec			Tisza-HU	m ³ /sec		
	3,751				4,810		
				Leitha-HU	m ³ /sec		
					276		

Flood Threshold Payment Triggers

Flood Height (meters)	40 m	70 m	100 m
% insurance payment Inner grid	40	100	
% insurance payment Outer grid	20	60	100

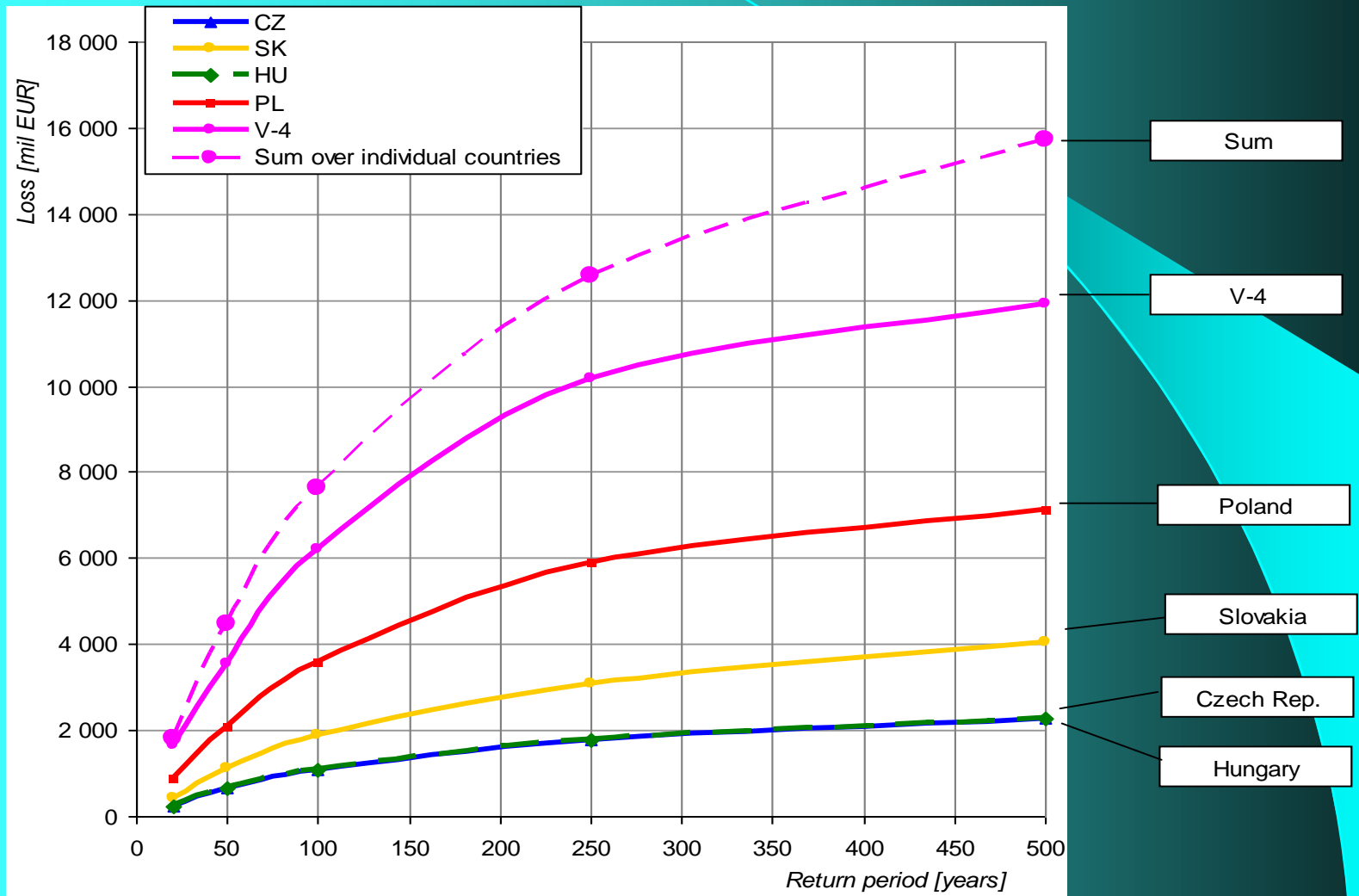
Outer Grid of City

Inner Grid
of City

Benefits of Multi-Country Approach

- **For insurance-like coverage, broader regions (multi-country) will yield lower costs and more benefits since the insurance provider or risk taker will have less uncertainty in loss predictability than with individual smaller portfolios.**
- **As well, larger portfolios and premiums require much less initial capital per unit of risk given diversification benefits.**

Benefits of Pooling Several Exposures



Types of Financial Instruments

- **Two essential types: (a) financing or (b) risk transfer. One has lower costs before, but higher after the event, the other, more before but nothing after.**
- **Financing can include contingent loans), budget reserves, guarantees, etc.**
- **Risk transfer may include standard insurance, parametric insurance (event triggered payout), insurance linked bonds (cat bonds) and others.**

Parametric/Index Contracts

- **Parametric (at times 'index') contracts pay out like a financial option: the physical measurement of the hazard event exceeds a threshold (e.g.: flood height, temperature level) to trigger a major payment in exchange for a prior premium.**
- **This mechanism avoids costly site-by-site evaluation of losses and admin. costs but relies on a large portfolios of risks.**

An instrument: Parametric SovereignPool

- Beyond budgetary reserves, contingent loans or other sources, countries can provide minimum capital to a joint insurance pool to save on financial costs.
- The pool would receive premiums for custom-made coverage levels specified by each country. The funds would contract w/reinsurance to receive payment in the event of a flood of specific strength (cc of water flow/sec. and/or flood height).

Risk Based Pricing per Country

- **Concern may exist of: “subsidizing the higher risks and payouts for my neighboring country”.**
- **This is not an issue as pricing can be solely risk based (a country with higher chance of disaster pays higher premium) while all benefit from the pooling effect which lowers overall cost (e.g.: 33%).**
- **If desired, a component of the pricing can be solidarity based (equal) and another fully risk based.**

Pooling Pricing Scenarios

(Based on a Combined Aggregate Loss of Euro 7.6 billion)

	Individual pricing <u>non-pooled</u>	Countries Pooled with <u>risk pricing</u>	Pooled with solidarity <u>risk pricing</u> ^{a/}
Poland	4.50%	3.02%	2.35%
Slovakia	2.40%	1.61%	1.64%
Czech Republic	1.50%	1.01%	1.34%
Hungary	1.60%	1.07%	1.37%
Average Expected Loss Probability	1.00%	0.67%	0.67%
Average Spread/Premium ^{b/}	2.50%	1.68%	1.68%

In Euros

Sum of Individual Premiums	190,000,000	
Sum of Pooled Country Premiums		127,300,000
Savings from Pooling		62,700,000

a/ Solidarity pricing means that half the pooling benefits are shared equally -- the other half are allocated by risk to each country (i.e.: those with lower risk getting the most remaining half benefits)

b/ Over Euribor, which is currently around 1.2%. The spread reflects the pure risk probability premium (expected loss probability) plus the variance uncertainty premium (risk load) around the mean of the risk probability.

Next Steps – What is Needed

- **Establish precise data on floods, temperatures, losses and exposures to derive strong correlations of hazard & losses as basis for financial contracts.**
- **Obtain market quotes for financial instruments (parametric insurance, catastrophe bond spreads).**
- **Set up institution for management of funds, verification of triggers, oversight.**