ADAPTING NATIONAL RISK TRANSFER SYSTEMS:
How much regulation for the insurance markets?

Franz Prettenthaler, Nadja Vetters

OECD – WENGEN 2006 WORKSHOP

WENGEN, OCTOBER 4-6, 2006
JOANNEUM RESEARCH – Graz
Institute of Technology and Regional Policy (InTeReg)
Focus on Adaptive Capacity & Resilience

**ECONOMIC VULNERABILITY** (Nat. Hazards: 3 sectors & all)

<table>
<thead>
<tr>
<th>EXPOSURE</th>
<th>SENSITIVITY</th>
<th>ADAPTIVE CAPACITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Increase due to climate changes but also increase by different land use patterns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Methods to determine exposure get better</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Strong increase due to higher values invested in households &amp; firms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Global economic integration (Risk pooling)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Availability of Risk transfer mechanisms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Catastrophic Risk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Weather Risk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- ...</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Why are risk transfer mechanisms important for resilience?

- In General: Wealth is being created by exchange of goods and services to mutual advantage.
  - If markets are incomplete (e.g. risky goods cannot be traded) someone looses out
  - Answer: Risk Markets create Welfare

- To recover quickly after losses from extreme events
  - Role of insurers
  - What is the role of the State /Regulation?

- To deal with weather variability (smoothen revenues from weather sensitive businesses as increased uncertainty might frustrate investment)
  - Role of so called weather derivates
What are the key problems? The insurant

- risk aversion, fair insurance premiums → optimal to take out full insurance
- people often underinsured or not insured at all
  - underestimation of the risk (low probability high impact events)
  - government aid („charity hazard“)
  - little availability of insurance
Disaster Syndrome (Kunreuther, 2000)
What are the key problems? The insurer

- **adverse selection**
  - small risk pools
  - economies of scale
  - increasing premiums

- **catastrophic losses**
  - risks are correlated
  - large amounts of capital needed
  - role of the capital markets (Jaffee/Russel 2006)

- **moral hazard**
What are the key problems? The State

→ disadvantages of ad hoc ex post compensation
  • financed from the current budget -> political instability
  • damages often overestimated
  • cannot influence behaviour (moral hazard)
  • weakening insurance demand (charity hazard)

→ disadvantages of compensation funds
  • difficult to store necessary (large) reserves at times of budget scarcity

→ disadvantages of public reinsurance
  • moral hazard
Compensation Fund: Development of Reserves

Entwicklung der Reserven, Ein- und Auszahlungen

Mio. Euro per 31.12. bez. 1.1. des Folgejahres

-200 -100 0 100 200 300 400 500


ohne Abschöpfung
mit Abschöpfung
Einnahmen
Ausgaben
## Cross country comparison of RTM’s

<table>
<thead>
<tr>
<th></th>
<th>Germany</th>
<th>France</th>
<th>CH (CPI)</th>
<th>CH (Priv.)</th>
<th>Spain</th>
<th>Turkey</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Insurance Carrier</strong></td>
<td>private insurance companies</td>
<td>private insurance companies</td>
<td>Cantonal Property Insurance</td>
<td>Private insurance companies</td>
<td>public corporation</td>
<td>public corporation</td>
<td>National Flood Insurance Programm</td>
</tr>
<tr>
<td><strong>Monopoly</strong></td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Mandatory insurance</strong></td>
<td>No</td>
<td>mandatory extension of coverage</td>
<td>automatic extension of coverage</td>
<td>mandatory extension of coverage</td>
<td>compulsory insurance (subsidiary)</td>
<td>compulsory insurance</td>
<td></td>
</tr>
<tr>
<td><strong>Obligation to contract</strong></td>
<td>No</td>
<td>(Yes)</td>
<td>Yes</td>
<td>(Yes)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Bundle of natural hazards</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td><strong>Role of the state</strong></td>
<td>ad hoc relief</td>
<td>unlimited state guarantee for CCR</td>
<td>Keep monoploies</td>
<td>-</td>
<td>unlimited state guarantee</td>
<td>-</td>
<td>state guarantee (loan of up to 1,5 billion US$)</td>
</tr>
</tbody>
</table>
### Cross country comparison

<table>
<thead>
<tr>
<th></th>
<th>Germany</th>
<th>France</th>
<th>CH (CPI)</th>
<th>CH (Priv.)</th>
<th>Spain</th>
<th>Turkey</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Premium design</strong></td>
<td>risk-related</td>
<td>uniform</td>
<td>uniform plus risk loading</td>
<td>uniform</td>
<td>uniform plus risk loading</td>
<td>risk-related</td>
<td>risk-related, part. subsidised</td>
</tr>
<tr>
<td><strong>Coverage against catastrophic losses</strong></td>
<td>reinsurance</td>
<td>reinsurance (optionally with CCR), state guarantee</td>
<td>reinsuranc e plus insurance pool (IRV, IRG)</td>
<td>insurance pool plus reinsuranc e</td>
<td>reserve fund, unlimited state guarantee</td>
<td>insurance pool, intern. capital markets</td>
<td>state guarantee (loan of up to 1,5 billion US$)</td>
</tr>
<tr>
<td><strong>Further issues</strong></td>
<td>low insurance penetration</td>
<td>CCR confronted with adverse selection</td>
<td>CPI actively involved in prevention</td>
<td>compatibility with EU legislation</td>
<td>adverse selection is a big problem</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
RTM in Austria

→ private insurance market + public compensation fund

→ private insurance market:
  • low insurance density
  • very limited coverage
  • extended coverage only outside flood risk areas

→ catastrophe fund:
  • tax financed
  • compensation and prevention
  • compensation is limited
2002 floods:
- Fund & Länder biggest insurer (in Mio. €):
  - compensation fund reserves not sufficient
  - Failing market gets further disturbed from State intervention by deductions for the insured
Concrete Example

Family Home 250.000 € (constr. 1994, income 35.000 € before taxes, 140.000 € debts, 2 children)

Damages to the building 15.000 € and 4.000 € to belongings, (of which 3000 resp. 1000 covered by insurance)

Compensation by local government (Land), 60% refund by Compensation Fund

So in fact 9 different RTM‘s in Austria
Regulation of the same case

<table>
<thead>
<tr>
<th>Region</th>
<th>Bundesanteil</th>
<th>Landesanteil</th>
</tr>
</thead>
<tbody>
<tr>
<td>WIEN</td>
<td>5.700</td>
<td>3.800</td>
</tr>
<tr>
<td>TIROL</td>
<td>4.200</td>
<td>2.800</td>
</tr>
<tr>
<td>STMK</td>
<td>3.540</td>
<td>2.360</td>
</tr>
<tr>
<td>SBG</td>
<td>6.077</td>
<td>4.052</td>
</tr>
<tr>
<td>OÖ</td>
<td>4.200</td>
<td>2.800</td>
</tr>
<tr>
<td>NÖ</td>
<td>3.600</td>
<td>2.400</td>
</tr>
<tr>
<td>KTN</td>
<td>2.700</td>
<td>1.800</td>
</tr>
</tbody>
</table>
RTM in Austria: concrete example

- Financed by taxes
- 80% by Households, 20% by enterprises
  - „Premium“: 12 € per HH, 50 Enterprise
- Leading to 23% - 53 % coverage
- Comparison:
  - Spain: 22,5 € full coverage
  - Switzerland: 105 € - 272 € full natural hazard package
Lessons for regulating the market in Austria

- Radical option: State could stay out completely allow for pooling
- private public partnership
- compulsory extension of coverage to include bundle of natural hazards
- risk-related premiums and deductibles
- proportional reinsurance offered by the compensation fund
- stop-loss reinsurance offered by the compensation fund + government as reinsurer of last resort
Reform Option – advantages (1)

→ compulsory extension of coverage
  • large risk pool
  • solves problem of adverse selection
  • affordable premiums
  • risk areas can be included

→ bundle of natural hazards
  • everybody is potentially affected
  • increased acceptance
  • cross-subsidizing is minimised

→ risk-related premiums and deductibles
  • signals and incentives for preventive measures
  • moral hazard is controlled
Reform Option – advantages (2)

→ proportional reinsurance offered by the compensation fund
  • insurance companies’ experience and expert knowledge
  • moral hazard is avoided

→ stop-loss reinsurance +

→ government as reinsurer of last resort
  • risks are bearable and insurable
  • diversified effectively over time
Weather Derivatives: Drought

→ Many weather sensitive risks not insurable

→ Agriculture, Energy and Tourism Sector sensitive to lack of rainfall

→ Weather Derivative: derivative financial instrument for which meteorological data serve as basis variables (underlyings). Those Variables (or indexes) are objectively measured by a third party.

→ Advantage to insurances: No moral Hazard, no individual loss claims & verification. Risk transfer to the capital market, coverage of so far not insurable risks.

→ Looking for inverse risks (hydropower & tourism)
The Market

No. of Contracts

Year

Europe
World

Searching for correlations

Peak Load/Temperature
Summer 1998 - Summer 2000

Durchschnittliche Tägliche Spitzenlast (MW)

Durchschnittliche Tagestemperatur (Fahrenheit)
Case Study Grassland

- Positive correlation between harvested quantity and monthly precipitation especially in June and July
- Negative correlation between harvested quantity and temperature especially in the warmest months from Mai to August

- Weather Index: by using the mean and standard deviation we constructed the following index:

\[
\text{Index}(P,T) = 0,5(P - \eta P)/\sigma P + 0,5(\eta T - T)/\sigma T
\]
Case Study Grassland

Harvest revenues vs. Index
Case Study Grassland

Erlös

- normale Ernteerträge bei schlechtem Wetter
- schlechte Ernteerträge bei normalem Wetter

- ohne Derivat
- Niederschlagsderivat 1 Funktion
- Niederschlagsderivat 2 Funktionen
- Wetterindexderivat 1 Funktion
- Wetterindexderivat 2 Funktionen
Conclusions

- Austrian Hail Insurance (Pool of private insurers) will use these results to come up with a new product 2007

- Allread now it is pathbreaking in drought insurance (economically viable?)

- Strength of weather derivatives is to reduce the range of possible profits, full elimination of risk is not possible

- Role of the State in weather derivatives limited: but European lacking behind might involve active measures to be overcome (availability of weather data for free)

- Role of the State in natural hazard insurance: give up intervention or do a thorough re-design of the mechanism allowing fruitful co-operation of the private sector and the state
Thank you for your attention!