

DRAFT

Dec 2, 1999

TSUNAMI

The Uninsured Elements of Natural Catastrophic Losses

Phase 1 Research Report

Conclusions

1. Introduction

The text for the concluding chapter is not yet complete. However, most of the comparative analyses of the seven case studies have been carried out. This concluding chapter includes figures, tables and charts that compare the following aspects of the seven case studies:

- Total losses (Figure 1);
- Compensation of the losses from insurance and governmental aid (Figures 2 and 3);
- The institutional arrangements for flood and earthquake insurance programs (Tables 1 and 2);
- Factors affecting the insurability and the marketability of insurance (Charts 1-7); and,
- Factors favorable to the insurance industry in offering insurance (Table 3).

In addition, this document includes a short list of future research topics for consideration as continuation of the TSUNAMI contract.

2. Direct losses

Figure 1 shows the comparative (mainly direct) economic losses from the seven cases.

Note, especially, that the losses differ significantly. The relatively low-loss cases include the German floods of 1993 and 1995, the Polish flood of 1997, the UK floods in April of 1998 and the Italian Umbria earthquake of 1997. The relatively high-loss cases include the U.S. Mid-western floods of 1993, the California Northridge earthquake of 1994, and the Japanese Kobe Earthquake of 1995.

3. Compensation of the losses

Figures 2 and 3 show how these losses were compensated by the respective governments and insurance companies.

Note, especially, that, although the cases differ significantly in all but two cases (Easter floods and Umbria earthquake) the *total* compensation from private and public sources remains approximately between 40 and 60 per cent.

4. Institutional Arrangements for Flood and Earthquake Insurance

Tables 1 and 2 show selected features of the institutional arrangements for public and private insurance for flooding and earthquakes in the case study countries or states. Because of its interest in Europe, we have also included France.

Note, especially, the diversity of the institutional arrangements. In some countries, notably Italy and Poland, the governments have traditionally provided very generous compensation to natural disaster victims, and there is little private insurance. In other countries, notably the U.S (with respect to flood), the governments are very involved in insuring natural disaster risks. In still other countries and states, notably France, Japan and California, the governments actively organize a reinsurance system (however, only in Japan and France are the taxpayers eventually (partially) liable for very extreme catastrophic events). Finally, some countries, notably Germany and the U.K., rely heavily on the private insurance market for victim compensation.

5. Insurability of the risks and marketability of insurance

Charts 1-7 provide indicators of the insurability of the flood or earthquake risks and the marketability of flood or earthquake coverage in the respective countries or states. In this document, risks are insurable if it is possible to estimate the frequency and magnitude of potential losses to an acceptable degree. Insurance for these insurable risks is marketable if there is a premium for which insurers are willing to offer coverage and for which there is adequate demand to support the insurers' costs of marketing this insurance.

6. Conditions favourable to private insurance for natural disaster risks

Table 3 shows how each country rates with regard to a selected list of factors that reflect a "wish list" of private insurers. These factors have been selected from the authors' understanding of insurers concerns about the marketability of natural disaster insurance, as well as from published documents by Swiss Re and Munich Re. However, the list is very preliminary, and it will be revised after discussion with the TSUNAMI advisory committee.

7. Next steps: possible research topics

- Investigate conditions for governmental demand for public infrastructure insurance, e.g., what countries (after what disasters?) have faced difficulties in borrowing funds, or otherwise raising capital, for infrastructure repair?
- It is interesting that the private-public compensation stays in a range of about 40-60 per cent across a diverse set of disasters. This could be investigated across a larger set of cases.
- The cases could be expanded to include windstorm and other hazards, also to include more emerging-economy and developing countries
- The U.S (National Research Council) has prepared an interesting document recommending that the U.S. government collect better loss data. Could we prepare the foundations of a similar document for the EU? Possibly then apply for EU funding to explore the idea further
- A great deal more could be done on investigating the differences (advantages and disadvantages) of different national (state) schemes for public-private insurance systems.

Figure 1a

Estimated Total Economic Losses in USD millions (exchange rate at time of disaster)

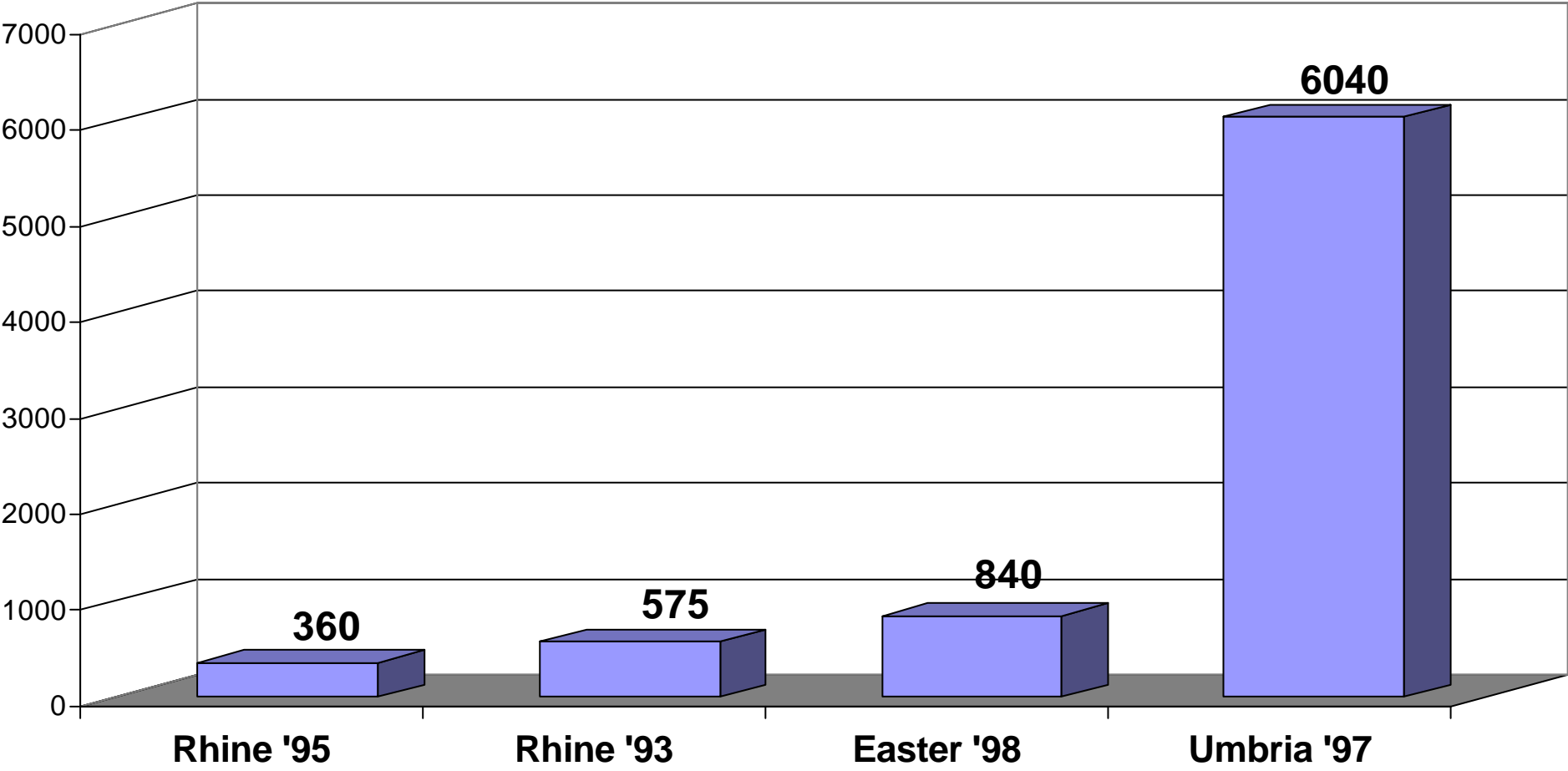


Figure 1b

Estimated Total Economic Losses in USD millions (exchange rate at time of disaster)

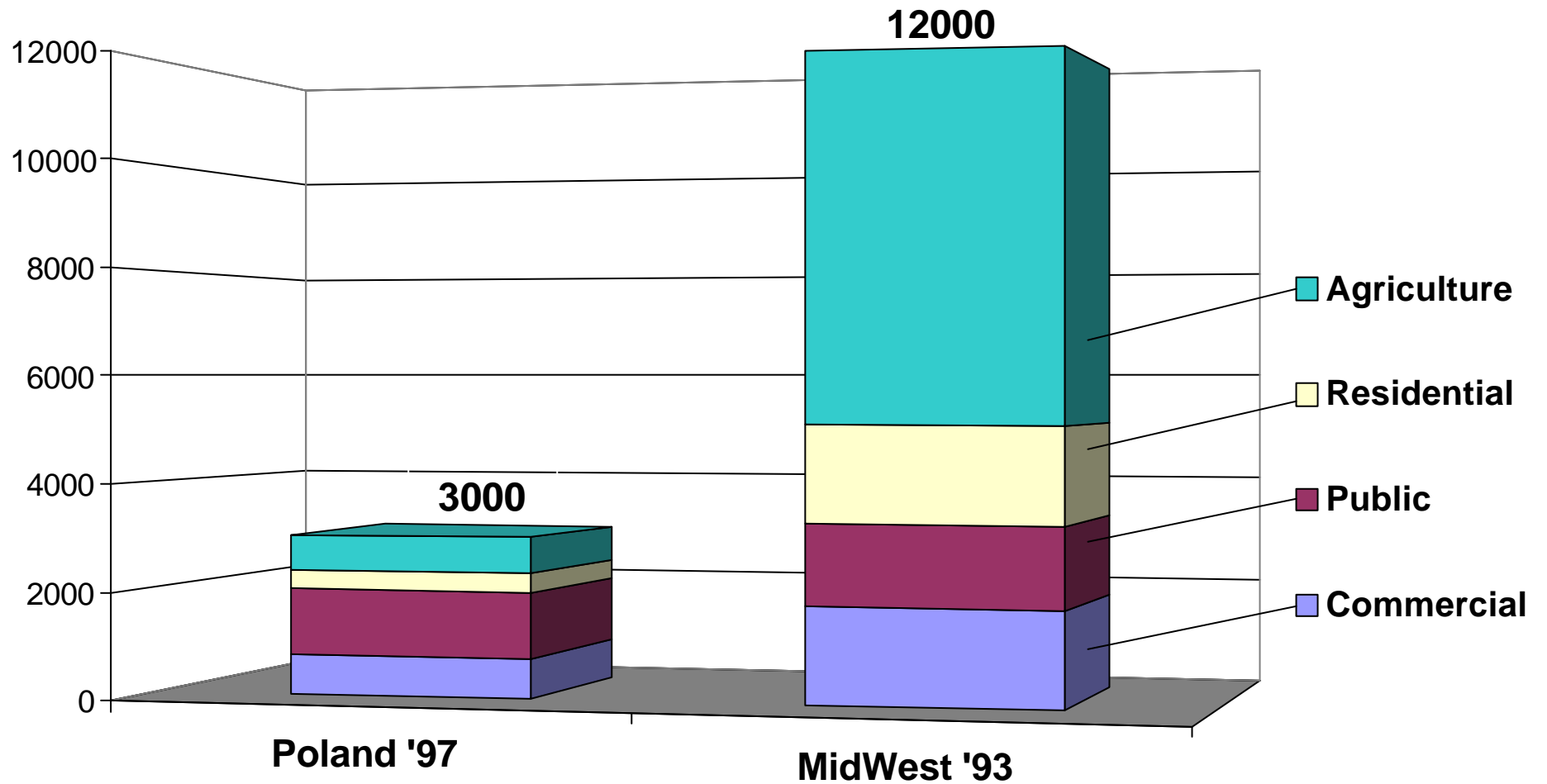


Figure 1c

Estimated Total Economic Losses in USD billions (exchange rate at time of disaster)

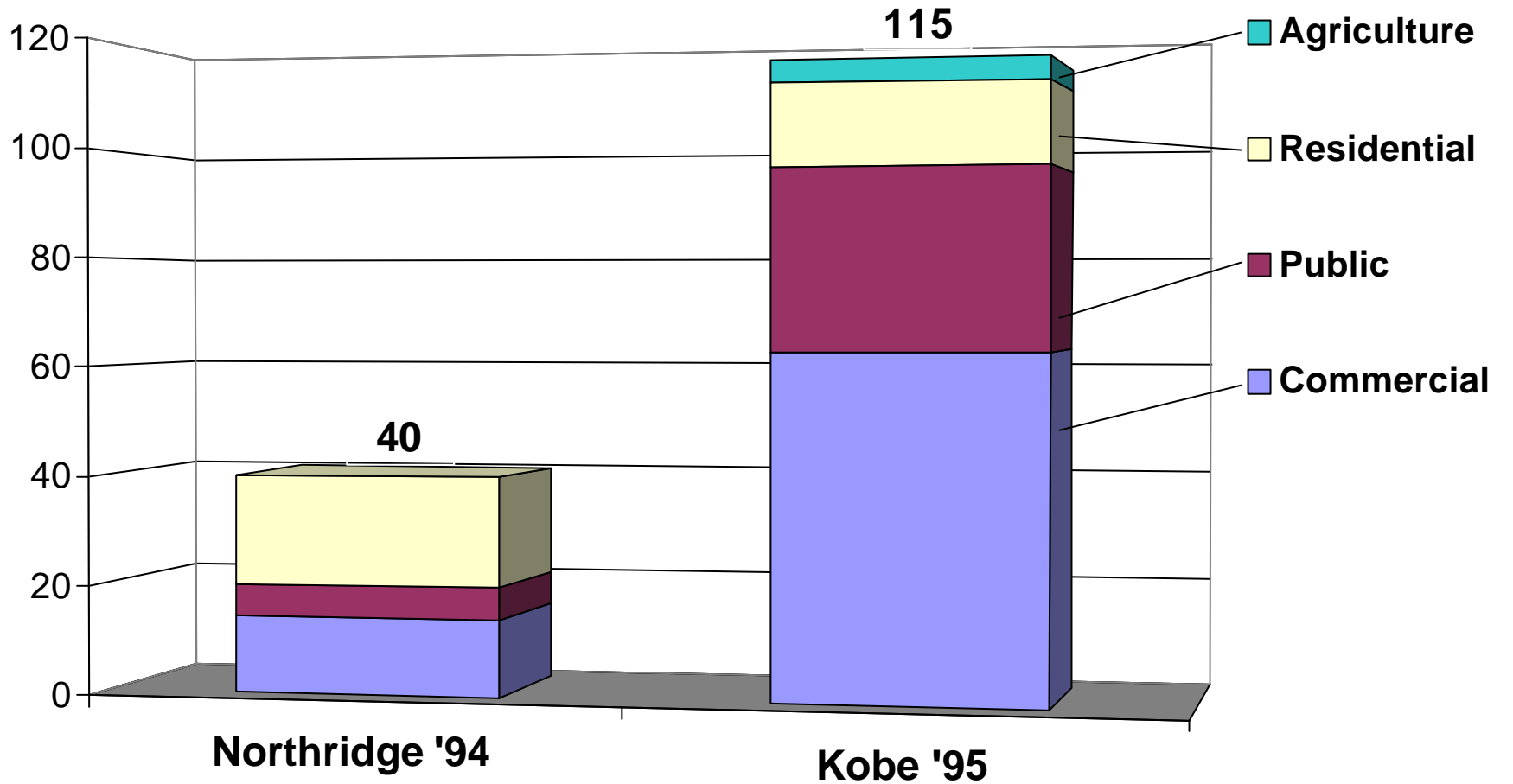


Figure 2

Percentage of Losses reimbursed and not reimbursed

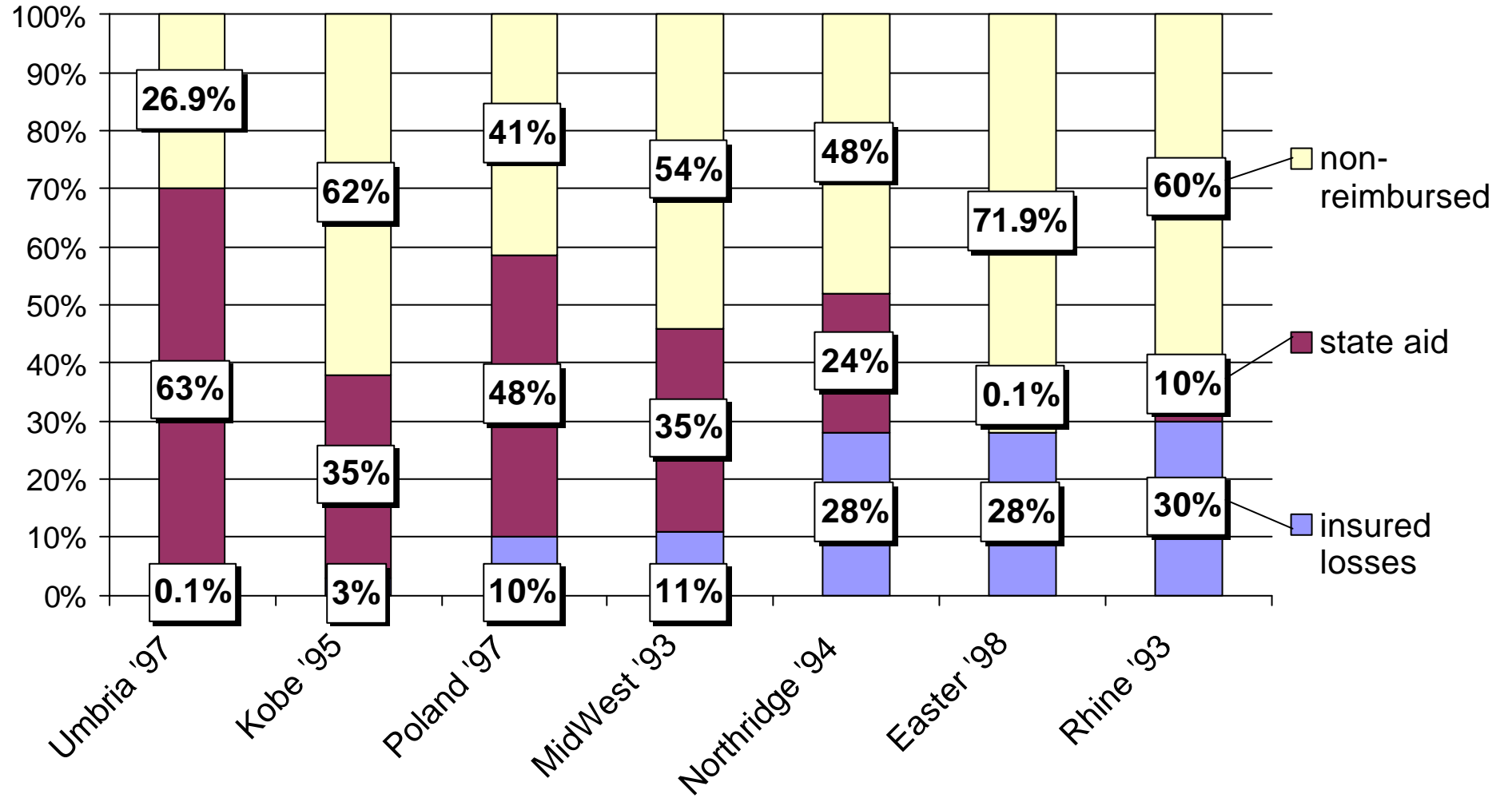


Figure 3

Percentage of Losses not reimbursed, in decreasing order by case

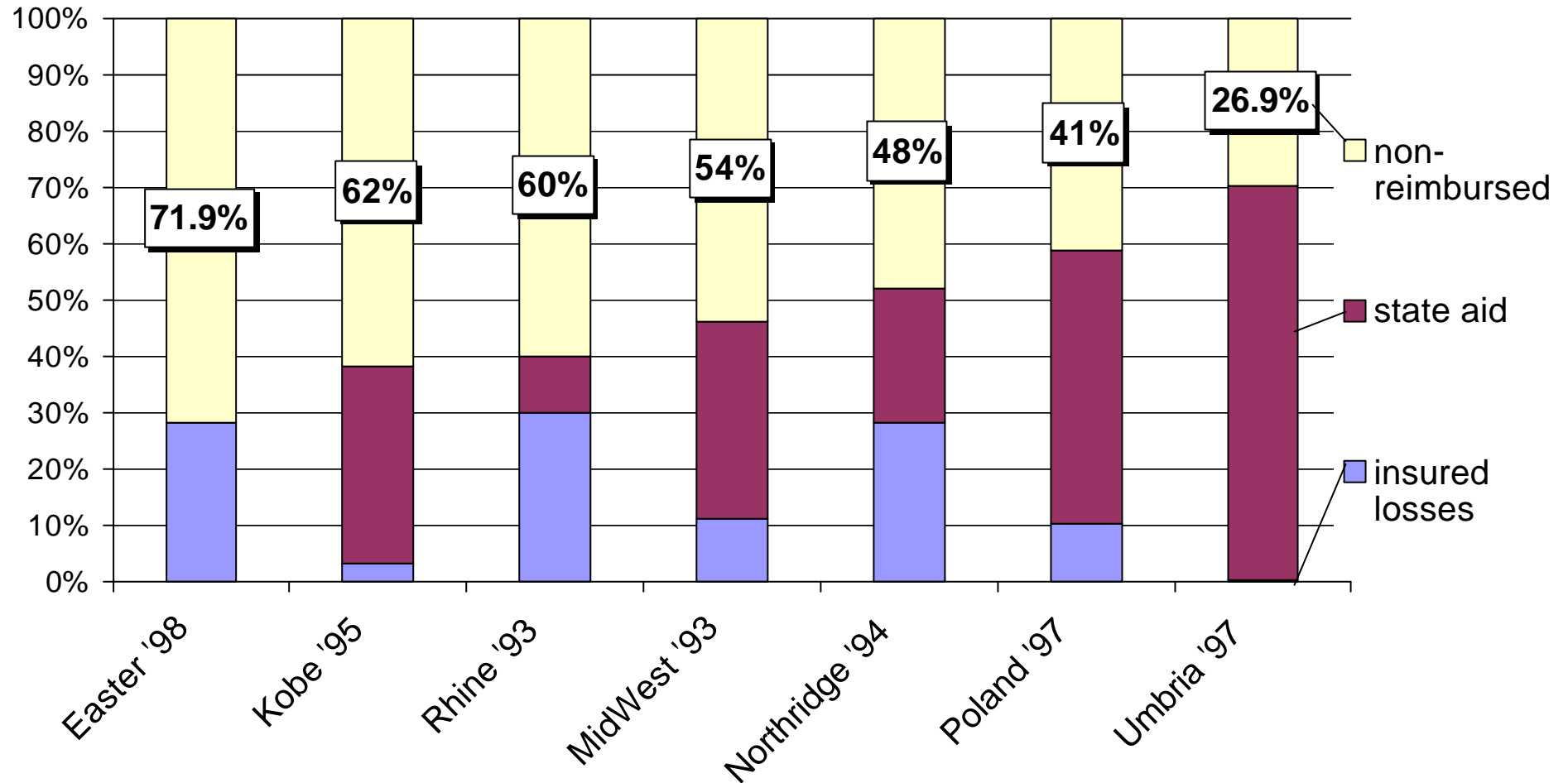


Table 1: National Institutional Arrangements for Flood Insurance

	United States <i>1993 Midwest floods</i>	Poland <i>1997 floods</i>	Germany <i>1993 & 1995 Rhine floods</i>	United Kingdom <i>1998 Easter floods</i>
Type of flood insurance available	Public; Addition to household policies; Private ins. mainly for additional cover for industrial	Private all hazards policy available as extension of fire policy: res., com. and ind.	Private insurance available as extension of household policy, for each hazard or as an extension of windstorm insurance in commercial sector. Was compulsory in Baden-Württ. until 7/94	Only private; risk considered insurable; All hazards insurance? Generally included in homeowner's policy, but does not cover certain risks*; commercial available either in fire or named risk policies
Cover	Max cover for res. \$250 t, Com. \$500 t. ; Public infrastructure little insured; Business interruption not covered; 96% is residential cover	Res., com., and ind. Agricultural buildings are compulsorily insured	Res., com. and ind.	Covers business disruption; Also covers dam bursts
Is ins. industry required to offer coverage?	Yes, to properties in qualifying communities	No	No	I think there are some industry-gov't agreements here??
Government supported?	Yes, but subsidies being phased out.	No	No	No?
Purpose of gov't support	Provide needed protection & force communities to mitigate	na	na	na

	United States <i>1993 Midwest floods</i>	Poland <i>1997 floods</i>	Germany <i>1993 & 1995 Rhine floods</i>	United Kingdom <i>1998 Easter floods</i>
Cross-subsidies	Yes, across flood basins	Yes, across perils, but flood is main peril.	No, riks-based premiums	No, risk-based premiums
Who pays top layer?	If premium reserves exhausted, taxpayers pay	Primary insurers and private reinsurance	Private reinsurance	Private reinsurance, capacity considered sufficient
Premium basis	Partly on risk basis. Still, high risks heavily subsidized. Large adverse selection problem	Not on risk basis?? Risk assessments hardly available: Adverse selection problem	Premium on risk basis (except in Baden-Württ. before 7/94)	Premium rates often high, usually low deductibles; according to post code risks; risk-reflecting premiums
Penetration rate	About 25% (went up markedly after midwest floods)	Res. And com. Less than 25%; Ind about 50%; Agric. Bldgs. 100% (compulsory)	Very high in Baden-Württ. but low in other areas (perhaps 10%)	Simple risks: 95% Industrial: almost 100%
Trigger for payout	At least two properties affected			
Claims handled	Private insurers, who receive brokerage fee but take no risk	Private insurers	Private insurers	Private insurers
Gov't supported private mitigation?	Communities must mitigate to qualify	Yes	Yes	??

	United States 1993 Midwest floods	Poland 1997 floods	Germany 1993 & 1995 Rhine floods	United Kingdom 1998 Easter floods
Insurance industry-supported mitigation measures		??		Yes
Regulations on premiums	Not relevant for public insurance	No	Not apparent	??
Regulation on entry and exit	Not relevant for public insurance	No	No	no
Regulation on capital requirements	Not relevant for public insurance	??	??	??
Government compensation to insured and uninsured	Yes, statutory and significant	Traditionally yes, although not statutory	Yes, to uninsured, above certain thresholds, although small (about 10% in total)	Only to uninsured who are in great need
Central government compensation to local governments	Yes, up to 75% of infrastructure repair is statutory (Bills pending to change this)	Yes, but reorganization will put more responsibility on regional authorities	No, federal authorities only responsible for federal waterways	??

Res: residential, com: commercial, ind: industry

Industry will not cover if residents have refused to allow flood defences to be built, if property was purchased at a low price reflecting history of flooding, or planning consent given against advice of flood authorities.

Sources: TSUNAMI case studies; Green (forthcoming); Swiss Re (1998) Floods- an insurable risk?, Zurich.

Table 2: National Institutional Arrangements for Earthquake Insurance

	United States <i>1994 Northridge earthquake</i>	Japan <i>1995 Kobe earthquake</i>	France	Italy
Type of insurance available	Private; as an extension to household policies	Earthquake cover as a voluntary extension to fire policy	For natcats, private all-hazard program which is also reinsured by CCR	Private
Cover	Res. com. & ind. (California Earthquake Authority is all-residential)	Residential (govt. backed). Commercial and ind. also available.	Covers all natural hazards to an unlimited amount, although deductibles apply when state declares natcat	Com, res, ind
Is ins. industry required to offer coverage?	Yes in Cal. in combination with household policies	Yes, but premiums are high and thus limiting cover	Yes	No
Government supported?	Conceptually but not financially	Yes	Yes, over and above funds available in Caisse Centrale de Réassurance fund	No
Purpose of gov't support	To encourage insurance	To ensure that option of earthquake insurance is available	Solidarity, pressurize private companies to pay out quicker, cover large losses	Na
Cross-subsidies	Prior to CEA, across perils and states.	No	Yes, across insured parties	No, risk-based
Who pays top layer?	Reinsurers, capital markets, insurers and policyholders in CEA. Over this, pro-rata reimbursement	95% Govt. and 5%, Japan Earthquake Reinsurance Comp.	Government pays for losses above reinsurance funds	??
Premium basis	On risk basis, with deductibles of 15% in CEA. Change in 1999 to more flexible policy	On risk basis, with zones according to area and building type	Not risk based; fixed surcharge on base premiums; deductibles apply in event of natcat	Risk-based

	United States <i>1994 Northridge earthquake</i>	Japan <i>1995 Kobe earthquake</i>	France	Italy
Penetration rate	In '94, 30% of dwellings,	10% nationally	Same as fire policies, nearly 100%	Very low
Trigger for payout	Earthquake	Earthquake	Govt. declares a natural disaster	Earthquake
Claims handled	Private insurers	Private insurers	Private insurers	Private insurance
Gov't supported private mitigation?	Incentives and laws to build earthquake-safe buildings	Stringent building codes	Yes, through zoning	Questionable
Insurance industry-supported mitigation measures	Yes, and reflected in premium charged	None noted	No, few incentives for mitigation, since all pay same surcharge on base premium	No
Regulations on premiums	Yes, in order to ensure fairness for insurer and insured	?	Fixed surcharge on household or other policy base premium	??
Regulation on entry and exit	Yes, in CEA requirements	?	No	no
Regulation on capital requirements	Yes in CEA	Scheme is strictly regulated	??	?
Government compensation to insured and uninsured	Yes	Yes	Although almost all properties are insured, there is disbursement of emergency aid by government	Yes, and reforms directed at reducing compensation to uninsured victims
Central government compensation to local governments	Yes	?	Yes, but apparently not enough to restore public infrastructure to pre-disaster status quo	yes

Sources: TSUNAMI case studies; Green (forthcoming); Swiss Re (1998). Floods , an insurable risk? Zürich

Insurability and Marketability of Flood Risks

Charts 1-7

Chart 1

United States (floods)

Insurability

- Flood risk maps made available by FEMA greatly increases insurability of flood risks
- Consulting firms offer property vulnerability data and catastrophe modeling

Marketability

Demand for insurance

- Demand low, but more efforts being made to enforce requirements for flood insurance as condition of mortgage; otherwise insurance not compulsory;
- Demand low also as a result of generous federal government aid for national disasters, but legislation pending to reduce this aid;
- Demand low for public infrastructure insurance, partly because of generous federal support to repair public infrastructure damage;
- Legislation also pending to change this. Public authorities may also have good opportunities to borrow after the disaster, reducing demand for insurance.

Supply of private insurance

- Opportunities to provide private insurance as supplement to NFIP, particularly for industrial risks; Perhaps private insurers can compete with NFIP as rates become more risk based;
- Adverse selection is a problem;
- Moral hazard can be remedied with deductibles and co-insurance;
- Mutuality not a problem if geographic diversification?
- Government takes very pro-active stance on promoting community and private mitigation measures;
- Early warning systems are effective.

Chart 2

United Kingdom (floods)

Insurability

- Risks estimated by postal zones. Increasing availability of flood loss data, e.g., the Dundee tables;
- Still, loss and risk data incomplete
- Difficulties in assessing very extreme events, the main foreseeable risk in this category is the failure of the Thames Barrier, for which 1 million persons in London at risk.

Marketability

Demand

- Flood insurance not obligatory, but automatic inclusion of all-perils coverage into household policies;
- Open question: premiums relatively high, so why is demand so high compared, e.g., to U.S??

Supply

- Relatively low flood risk (6% of land area) relative to the capacity of the insurance industry (reducing insolvency risk and, therefore, reducing risk premiums);
- All-perils policy means cross subsidization of premium rates for flood-risk properties by those at risk from other hazards (reducing premiums for flood insurance if it is highest risk).
- The existence of highly developed system of land use zoning controls (reducing adverse selection and moral hazard)
- Risks estimated by postal zones, reducing adverse selection;
- Mitigation measures stipulated as condition of insurance??

Chart 3

Poland (floods)

Insurability

- Extensive loss data available from Central Statistical Office
- Flood risk mapping is high on the agenda, and supported by recent World Bank loan to Poland
- Good hydrological models and large community of hydrologists, etc.

Marketability

Demand for insurance

- Demand low mainly as a result of low incomes
- Demand low also as a result of generous central government aid for natural disaster victims, but government interested in reducing this aid
- Large public infrastructure losses from 1997 flood, combined with public borrowing constraints (Maastrich conditions) have increased interest in sovereign insurance;

Supply of private insurance

- Private market virtually unregulated, but World Bank loan is also intended to assess options for a natural disaster program in Poland
- Major problem is that capital reserves and reinsurance on the part of domestic insurers are insufficient; concerns about very costly flood in Warsaw
- Government has no statutory obligations to reinsure
- Adverse selection may be a problem;
- Government has traditionally devoted substantial resources to structural mitigation measures, but increasing tendency to support non-structural defences, government may become more involved in zoning and building regulations.
- Early warning systems need improving.

Chart 4

Germany (floods)

Insurability

- Flood risk maps made available?

Marketability

Demand for insurance

- Demand low, which appears to be related to *need*. At least for the relatively wealthy populations living in the Rhine basin, there appears to be an attitude that they can cover the losses without insurance
- Insurance no longer compulsory in Baden-Wurtemberg (conflict with EU requirements)
- Very little government post-disaster compensation, and only to needy
- Little need for local governments to purchase infrastructure insurance since they have easy access to funds after the floods, and not constrained on borrowing in state of emergency?

Supply of private insurance

- Major problems appear to be adverse selection and mutuality
- No regulations on premiums,
- Government does not act as reinsurer or reinsurer of last resort
- Public becoming increasingly against structural mitigation measures in favor of „letting the river flood“, which is a problem for urban areas. State governments responsible for community and private mitigation measures
- Early warning systems are effective.

Chart 5

California (earthquake)

Insurability

- Public availability of fault/risk data
- Property vulnerability and loss data available from private consulting firms
- Sophisticated catastrophe modeling offered by consulting firms

Marketability

Demand for insurance

- After Northridge, demand for insurance in California high;
- However, recent hefty premiums in high-risk areas, combined with high deductibles, have reduced demand significantly;
- Demand is also affected by generous federal government aid for uninsured victims of natural disasters, but legislation pending to reduce this aid;
- Demand low for public infrastructure coverage, partly because of generous federal support to repair public infrastructure damage. Legislation also pending to change this. Public authorities may also have good opportunities to borrow after the disaster, reducing demand for insurance;
- No discussion of compulsory insurance

Supply of private insurance

- Compulsory for insurers offering property insurance to offer earthquake coverage separately;
- Premium rates are risk-based, but regulated?
- Recent efforts by state government to reduce risk to insurers. Now a state-run insurance company (CEA) that is capitalized as follows:
 - Capital from insurers
 - Post-event assessment on insurers
 - Reinsurance
 - Policyholder assessment
 - Capital markets
 - Post-event assessment on insurers
- Moral hazard reduced with large deductibles
- Mutuality a problem, now spread over other states?
- Government takes very pro-active stance on promoting community and private mitigation measures;
- Insurance industry also assesses risks (and premiums) according to mitigation measures in place on property

Chart 6

Italy (earthquake)

Insurability

- Public availability of fault/risk data
- Little data on losses and insured losses

Marketability

Demand for insurance

- Very low, mainly because of generous public compensation to victims
- Proposed law would make public compensation conditional on insurance
- Proposed law would make an all-perils policy as supplement to fire insurance (but not compulsory)
- Demand low for public infrastructure coverage, including buildings of cultural value, partly because of generous federal support to repair public infrastructure damage. No legislation pending to change this.

Supply of private insurance

- Currently, government underwrites all private insurance?, and insurers receive a (generous) percent to cover brokerage fees
- Proposed legislation would make it compulsory for insurers offering fire insurance to offer all-perils package at fixed premiums (as percent of fire insurance).
- Fixed rates would present moral hazard problems from proposed program
- Proposed legislation would require insurers to reinsure, but government would act as insurer of last resort
- No information on deductibles
- Government promotes to some extent community and private mitigation measures

Chart 7
Japan (earthquake)

Insurability

- Estimates available on faults and risks by region

Marketability

Demand for insurance

- Demand for insurance in Japan is relatively high, but in high-risk areas premiums for earthquake insurance are prohibitive
- Discussion on making earthquake coverage compulsory or including it in fire policies
- Federal aid is not? Generous, which should lead to higher demand for private insurance
- Much of the „public“ infrastructure in Japan is privately owned, so little demand for public infrastructure insurance

Supply of private insurance

- Main concern is the extremely high potential losses at not-so-low probabilities of occurrence (fat tails)
- Regulatory conditions appear favourable: risk-based premiums, limits on coverage, and these limits decrease if insurers take large losses (i.e, the collective insurance compensation has a maximum, and if exceeded, insured receive average)
- Government and private reinsurer (TAO) play a large role in covering top layers (but government only reinsures residential losses)
- Moral hazard can be reduced with deductibles?;
- Mutuality may be a problem?
- Government takes very pro-active stance on promoting community and private mitigation measures;

Conditions favourable to private insurance for natural disaster risks

1. All-perils policies
2. Unregulated premiums, allowing risk-based pricing
3. Either conditionally or unconditionally compulsory insurance, perhaps with public subsidies for low-income persons
4. Insurance companies have right to refuse coverage (or apply very high premiums) for "bad risks"
5. Tax deductions for private insurance purchases, and no tax on insurer capital reserves
6. Limit on collective cover; government (and taxpayers) acts as reinsurer for the top layer - "insurer of last resort" - and reinsures itself in international market
7. Government invests in cost efficient, collective mitigation measures and regulates (and enforces) private mitigation measures, ie zoning, building codes
8. Government supplies risk data and analysis, eg., flood risk maps
9. Government collects direct and indirect loss data
10. Government does not engage in compensating uninsured victims (if there are any) nor in compensating local governments. The exception is that governments act as a safety net for those who are needy and underinsured
11. Local and central governments are required to have insurance to cover public infrastructure losses
12. Government takes a pro-active stand on global change phenomena to reduce disaster losses

Table 3: Conditions favourable to private insurance for natural disaster risk

	Italy	Pol	Fra	Italy Prop	Jap	US (f)	US (Eq)	Ger	UK
1. All-perils policy	no	yes	yes	yes	no	no	no	no	yes
2. Premiums not regulated	yes	yes	no	no	?	no	no	yes	?
3. Compulsory insurance	no	no	Yes-	yes	no	p	no	no	no
4. Insurers' right to refuse cover	yes	yes	Yes	no	yes	p	No	yes	yes
5. Tax advantages	no	no	no	no	pro	no	yes	no	?
6. Insurer of last resort	?	no	yes	yes	yes	yes	yes	no	no
7. Govt active in mitigation	P	yes	yes	p	yes	yes	yes	yes	yes
8. Public risk data	Yes	p	no	yes	?	yes	?	no	no
9. Public loss data	no	yes	?	no	?	no	no	no	no
10. gov't only conditionally compensates	no	no	yes	yes	?	no	no	yes	yes
11. Sovereign insurance	no	no	??	no	no	P?	P?	no	no
12. Gov't active in global change prevention	p	p	p	p	p	p	p	p	p

(Note: From left to right are countries with decreasing taxpayer involvement)

