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TSUNAMI

Project on

The Uninsured Elements of Natural Catastrophic Losses

Case Study Report

on

The 1993 and 1995 Rhine River floods in Germany

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1. EXECUTIVE SUMMARY

The floods in the Rhine River and its tributaries caused **economic losses** of over DEM 1,000 million (≈USD 575 million) in 1993 and DEM 550 million (≈USD 360 million) in 1995. Total **insured losses** amounted to DEM 300 million (≈USD 172 million) for the 1993 floods and DEM 220 million (≈USD 144 million) for the 1995 floods.[1] A total of 5 persons lost their lives in both the 1993 and 1995 floods.

Insurance against riverine flooding has not been widespread in Germany for a number of reasons. Demand is low, perhaps because the relatively wealthy public does not feel a need to insure. Also, there are problems of mutuality and adverse selection (anti-selection). The exception was Baden-Württemberg, where up until July 1994, there was mandatory flood insurance for buildings of all types. In that state, flood insurance has continued to be provided, although no longer mandatory. Insurance companies wishing to enter the market of Baden-Württemberg apparently should be willing to provide flood insurance in packages offered.

Due to problems of demand and anti-selection, proposals for mandatory insurance and more state involvement have been put forth. However, these proposals have failed to gain enough momentum to become legislated. The decentralised structure of the German federalist form of government complicates data gathering and subsequent searching of such information. Indeed, little information is available.

Any new insurance company wishing to enter this market should bear in mind that although risk exposure reduction efforts were present after the Rhine floods of 1993, this seems to have gradually died out since 1995. Therefore informing the public about possible hazard mitigation should also be a priority.

[1] MunichRe (1999a) Exchange rate is taken as 1.74 DEM/USD in Dec. 1993 and 1.53 DEM/USD in Jan 1995

2. INTRODUCTION AND DESCRIPTION OF DISASTER

In Germany, during the 1970-1998 period, winterstorm events, which caused the largest amount of damage, accounted for 65% of loss events, 75% of economic losses and 86% of insured losses. Floods came in second place, accounting for 20%, 19% and 8% respectively.[2]

The Federal Republic of Germany consists of 16 states known as 'Länder'. The floods of December 1993 and January 1995 affected 12 of these. Worst damage was experienced in (with state capitals in brackets) Baden- Württemberg (Stuttgart), Bavaria (Munich), North Rhine-Westphalia (Düsseldorf), Rhineland-Palatinate (Mainz), and Saarland (Saarbrücken). The cities most affected by the floods were Cologne (N. R.-W.) and Koblenz (R.-P.).

Loss of lives amounted to 5 in each flood. **Economic losses** from the floods amounted to over DEM 1,000 million (≈USD 575 million) in 1993 and DEM 550 million (≈USD 360 million) in 1995. Total **insured losses** amounted to DEM 300 million (≈USD 172 million) for the 1993 floods and DEM 220 million (≈USD 144 million) for the 1995 floods.[3] MunichRe estimates that 'the loss amounts incurred during the numerous flood catastrophes of recent years may be far exceeded by an extreme event in the catchment area of the Rhine with (potential) economic losses of DEM 20 billion (≈USD 11 billion).'[4] SwissRe indicates a loss potential from river floods of up to USD 30 billion in Germany (extreme flooding of the Rhine).[5] Flash floods could cause damage of several hundred million US dollars.[6]

In December 1993, 'the precipitation levels were more than 200% in excess of the mean recorded for that month between 1951 and 1980.'[7] A 10-day period of persistent rainfall 'paved the surface of the soil over large areas'.[8] In the first days of January 1995 temperatures were mainly below freezing point. The 9th and 10th January saw very heavy precipitation, 'especially in the north and west of Germany, as rain in the lowlands, as snow at higher altitudes.' The resulting saturation in some areas due to thawing and in

[2] MunichRe (1999a) p. 5 in the German language version

[3] MunichRe (1999a) pp. 85-86. Exchange rate is 1.74 DEM/USD in Dec. 1993 and 1.53 DEM/USD in Jan. 1995

[4] MunichRe (1999b) p. 2 taking the present exchange rate as 1.80 DEM/USD

[5] See SwissRe (1998b) p. 18.

[6] Ibid. p. 18

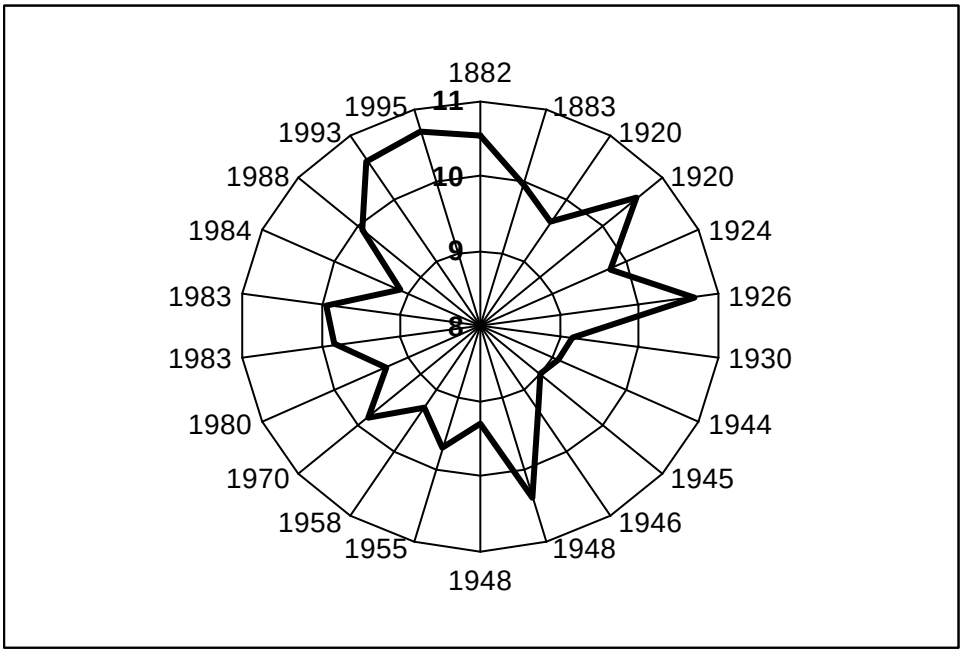
[7] Bayerische Rück (1994) p. 3

[8] Bayerische Rück (1995) p. 3

others due to further frost 'sealed the surface of the soil, giving the ground an extremely high runoff propensity.'[9]

In 1995 in Rhineland-Palatinate the water levels were lower than in 1993; therefore considerably fewer people were affected. This was also true for Baden-Württemberg. Further downstream, in North Rhine Westphalia, the 1995 floods were stronger than in 1993. A disaster would have occurred, had the 1995 water level reached over 11m in Cologne.[10] The diagram below shows the events (more than one event can take place in a single year) in which the water level surpassed 9 metres in the city of Cologne between 1863 and 1995.

Years (events) in which water level exceeded 9 metres in Cologne



Source: Köln (1995)

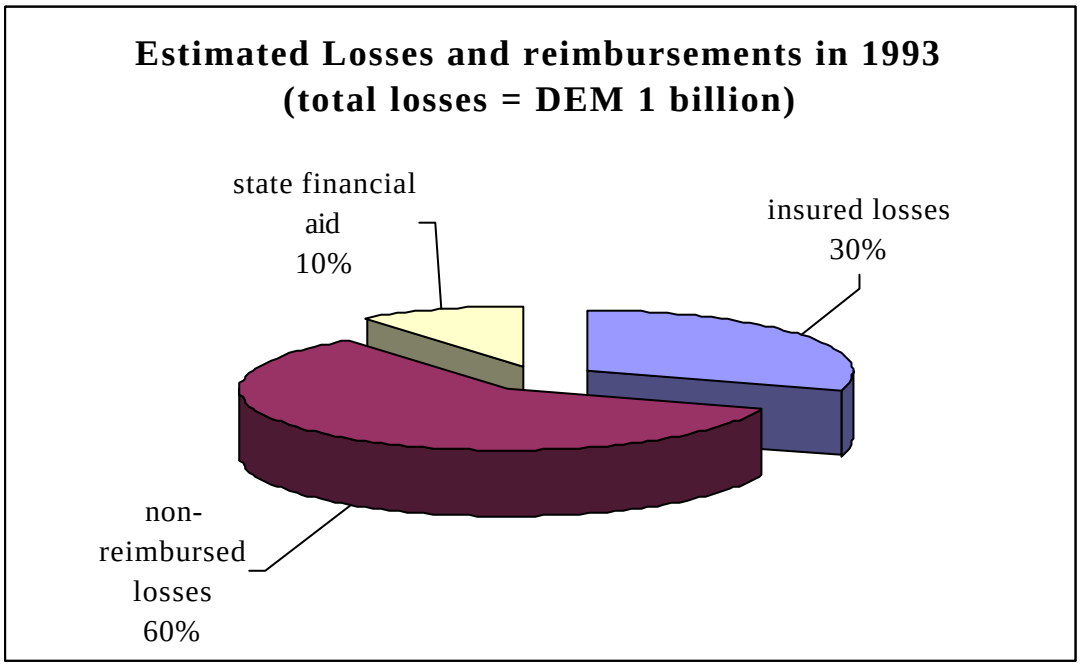
[9] Bayerische Rück (1995) p. 3

[10] See BfG (1996)

3. SUMMARY TABLES

Table 1 Estimated total economic losses in DEM & USD millions, due to floods[11]

	Share of losses			1993		1995	
	P.	C.	A.	DEM	USD	DEM	USD
Germany (all)	-	-	-	>1,000	>575	550	360
Baden-Württemberg[12]	-	-	-	>160	>92	>50	>33
Bavaria	-	-	-	35	20	-	-
North Rhine-Westphalia	-	-	-	200	115	-	-
Of which Cologne	-	-	-	110	63	65	43
Rhineland-Palatinate[13]	38%	54%	8%	325/650	187/374	-	-
Of which Koblenz	-	-	-	100/150-200	58/86-115	-	-
Saarland	25%	75%	-	100	58	-	-



For state financial aid, the figure is a rough estimate made by the authors.

[11] Exchange rate is 1.74 DEM/USD in Dec. 1993 and 1.53 DEM/USD in Jan 1995. 'Share of losses' figures are based on information from 'financial aid requested' from the state authorities for 1993. P.= Private households, C.= Commercial, A.= Agricultural. Figures are shown where available. Source: Bayerische Rück (1994, 1995).

[12] For Baden-Württemberg, 1993 losses are for insured buildings, so total losses were probably higher.

[13] For Rhineland-Palatinate, first figure is Bayerische Rück estimate and second figure is original official estimate.

Map of Germany

Source: http://www.lonelyplanet.com/dest/eur/graphics/map-ger.htm

4. GENERAL ECONOMIC AND DEMOGRAPHIC INDICATORS

Table 2	Popul./km^2 (1997)	Per capita income at current prices (1998)		Total population (millions, 1997)
		DEM	USD	
Germany	230	45,800	26,023	82.1
Baden-Württemberg	291	52,540	29,852	10.4
Bavaria	171	53,300	30,284	12.1
North Rhine-Westphalia	527	46,000	26,136	18.0
Rhineland-Palatinate	202	40,070	22,767	4.0
Saarland	421	42,280	24,023	1.1

Source: German Federal Statistical Office at **http://www.statistik-bund.de/jahrbuch/jahrueb.htm**
Population figures rounded to the nearest decimal point. Exchange rate is 1.76 DEM/USD and is the average for the whole of 1998 as indicated in the International Financial Statistics of the IMF.

5. INSTITUTIONAL ASPECTS

5.1 Public sector

In peacetime, disaster management is the responsibility of the states. The Oberste Katastrophenschutzbehörde in each state's Ministry of the Interior delegates disaster management to the Unterste Katastrophenschutzbehörde at the communal level.[14] Article 35 of the German Constitution (Grundgesetz) states that all federal and state authorities must render one another assistance in cases such as natural disasters. The states can also call upon the federal government for help from the armed forces if deemed necessary.[15] Basically, disaster response starts at communal and district level. If a 'disaster' is officially declared (which did not happen in 1993 or 1995), then neighbouring districts step in to help. In all cases, neighbouring districts did step in to help anyway, and there was a general demonstration of solidarity. In addition, the army 'fulfilled important support functions such as preparing sandbags, constructing temporary dikes, rescuing and evacuating people etc..'[16] Further substantive assistance was provided by US and French armed forces and a number of relevant federal agencies.

[14] See Dombrovsky and Ohlendieck (1998)

[15] See, for example www.uni-wuerzburg.de/law/gm00000_.html for an English translation of the German constitution

[16] D & O (1998), p. 169

‘Compensation is the responsibility of the individual State Ministry of Internal Affairs. The granting and approval of tax-deductible costs due to flood damage is the responsibility of the State Ministry of Finances. The granting of long-term credits for reconstruction in the private and business sector is the responsibility of the State Ministry of Economic Affairs.’[17] However the states are not legally bound to provide compensation.

The federal authorities are solely responsible for the navigability of the federal waterways and rivers such as the Rhine. The individual states are responsible for the surveillance and maintenance of the embankments, dikes and retention areas. They are also required to provide information on expected water levels and issue disaster warnings.[18]

5.2 Private Insurance sector

Generally speaking, wide-scale flood insurance was only present in the case of Baden-Württemberg where it was mandatory for all buildings up to July 1994. Mutuality was made possible by incorporating flood insurance premia in packages including fire risk for example.[19] The mandatory insurance was abolished since it was a monopolistic insurance scheme and thus not compatible with the EEC’s Third Council Directive 92/49/EEC of 18 June 1992 ‘on the coordination of laws, regulations and administrative provisions relating to direct insurance other than life assurance’.[20]

In the other states, private flood insurance is rare. Flood insurance can be taken as an addition to a basic package of household or building insurance. Most of the flood insurance outside Baden-Württemberg is taken by the commercial sector as part of a package including wind-storm insurance.[21] The lack of insurance is due to a number of reasons: Riverine flooding mostly affects those living along and not far from the river Rhine. This poses adverse selection (anti-selection) problems. Since risk identification is not widespread, insurance is offered on the basis of previous loss experience, the vertical and horizontal distance from bodies of water and the building class of the structure. This, along with the uncertainty involved, drives the cost of insurance up.[22] Movements in

[17] Ibid. p. 183

[18] Ibid. p. 158

[19] In talk with H. Engel and also in Korn (1995) p. 93

[20] See http://europa.eu.int/scadplus/leg/en/lvb/l24028b.htm

[21] See website of German insurance association www.gdv.de

[22] In talk with U. Ebel of Bayerische Rück.

population also could be a factor, with new dwellers not so aware of dangers. Already settled people probably find it better to take precautions themselves, living with the risk. People probably also feel that dikes and other safety measures provide enough protection.

6. TOTAL LOSSES

Estimates of economic losses are based on submissions for financial aid from the individual state authorities and the fact that only 10% of households affected, submitted applications for state aid in 1993.[23] Data on losses are very sparse (especially in 1995). Reasons for this lack of information: some people were reluctant to divulge their finances; also, 'people mostly relied on themselves and the help from family, friends or neighbours. They accepted damage without much complaint'[24].

Total economic losses for 1993 are generally estimated at over DEM 1,000 million, with insured losses of approximately DEM 300 million. For 1995, economic losses were estimated at DEM 550 million, and insured losses at DEM 220 million. It is not apparent where the insured losses were incurred outside Baden-Württemberg, which had mandatory building insurance up to 1994, with the largest insured loss there amounting to DEM 7 million in 1993. However, it can be said that outside B.-W. the insured losses came mainly from the commercial sector.

Table 3 Estimated total economic losses in DEM & USD millions, due to floods[25]

	1993		1995	
	DEM	**USD**	**DEM**	**USD**
Germany (all)	>1,000	575	550	360
Baden-Württemberg	160	92	50	33
Bavaria	35	20	-	-
North Rhine-Westphalia	200	115	-	-
Of which Cologne	110	63	65	43
Rhineland-Palatinate	325/650	187/374	-	-
Of which Koblenz	100/150-200	58/86-115	-	-
Saarland	100	58	-	-

[23] Bayerische Rück (1994) p. 11

[24] D & O (1998), p. 185

[25] Exchange rate is 1.74 DEM/USD in Dec. 1993 and 1.53 DEM/USD in Jan 1995*For Rhineland-Palatinate, first figure is Bayer. Rück estimate and second figure is original official estimate. For Baden-Württemberg, 1993 losses are for insured buildings, and total losses are most probably higher.

6.1 Direct Losses

There are no data available referring specifically to direct losses except for the losses for Baden-Württemberg in Table 3, which are insured losses for buildings. Furthermore, beside the data as shown in Table 5, there is no readily available information of losses broken down according to residential, commercial, public and agricultural sectors.

6.2 Indirect losses

There are even fewer data on indirect losses suffered from the two floods. For example, 'the cleaning of the public streets and places in Cologne cost about DM 1 million' in 1993.[26] Cleaning must be done while the water recedes, otherwise the sediment left behind will harden and become even more difficult and costly to remove. Due to measures taken to protect heating-oil reserves, the amount of water-oil mix which had to be disposed of was reduced to almost nothing in 1995 from almost 2,000 tons in 1993 in Cologne.

Further indirect costs include the removal of sediment and erosion from waterways and loss from vessels not being able to navigate the waterways. The costs for cleaning the waterways are covered by the Federal authorities and amounted to DEM 12 million in 1993 and DEM 9 million in 1995 (including other rivers besides the Rhine). That part of the river Rhine affected worst was not navigable for 7 days in 1993 and for up to 11 days in 1995. The loss in income from non-navigability amounted to between DEM 40 million and DEM 50 million in both 1993 and 1995. [27]

7. COMPENSATION

7.1 Government compensation

'Flood victims in desperate financial straits could apply for aid from their relevant state government. In order to prove their needs, the victims must disclose their finances to the authorities.'[28] If a household or commercial undertaking wished to apply for

[26] D & O (1998) p. 185.

[27] D & O (1998) p. 185 for the 1993 figures and BfG (1996) for the 1995 figures

[28] Bayerische Rück (1994) p. 11

compensation from their respective state, the damage they suffered would have to be at least the amount stated in Table 4.

Table 4 Compensation thresholds during 1993 & 1995 floods in DEM

	Residential	Commercial
Baden-Württemberg*	2,000 / 10,000	10,000 / 20,000
Bavaria	3,000	3,000
North Rhine-Westphalia	No thresholds and no rules	
Rhineland-Palatinate	3,000	5,000
Saarland	1,000	1,000

Source: Korn (1995) and Bayer. Rück(1994) *For B.-W. the first 'residential' figure is for household goods; the second, for real estate. For commercial, the first figure applies only in especially needy cases.

Data on applications for financial aid in 1993 are only readily available for those states mentioned in Table 5.

Table 5 * 1993/94 Applications for financial aid from state authorities

	Residential		Commercial		All	
In DEM®	Total (mn.)	Avg.	Total (mn.)	Avg.	Total (mn.)	Avg.
Bavaria	-	-	-	-	4.5	21,739
Rhineland-Palatinate	19.9	8,653	28.1	46,444	52.2	14,995
Saarland	9.8	10,103	29.3	73,990	39.1	28,624

* The 'All' column includes agriculture. The figures for Saarland include granted (17%), rejected (43%) and pending (40%) applications. (Avg.= average; mn.= millions)

1995 Applications for financial aid from state authorities

No figures are available here. 'On the one hand, official sources are very reticent about giving information (having learned from their experience with the Christmas 1993 floods, when estimates were issued too early and subsequently turned out to be incorrect), and on the other the figures for state financial assistance (if available) are not comparable with the figures for the Christmas 1993 floods. In the state of Rhineland-Palatinate, for instance, changes in administrative procedures (applications for aid by private claimants are now processed by the social welfare authorities; means testing is stricter) cut the number of claims by more than a factor of ten.'[29]

[29] Bayerische Rück (1995) p. 7

Further compensation was provided by the authorities in a number of forms: 'The different states generally granted depreciation provisions to the victims to write off the costs of the flood damage. But there are no tax-deductible expenditures for private flood protection measures. In addition, credits for reconstruction were granted at low interest rates with repayments spread over several years.'[30]

7.2 Private insurance compensation

As mentioned above, figures are only available for building insurance compensation in Baden-Württemberg which amounted to DEM 160 million in 1993 and DEM 50 million in 1995 (as a result of flood damage). An aggregate sum of approximately DEM 300 million of insured losses is available for the whole of Germany in 1993 and DEM 300 million in 1995. Outside of Baden-Württemberg, most of the insurance compensation went to the commercial sector.

8. EX-POST MEASURES

8.1 Public Policy

The state authorities often initially aim at introducing new legislation after a major flooding occurrence. However, the willingness apparently dies out after a year or so. Nevertheless, although tax deductions for example are not provided for private initiatives, hazard mitigation has been a main concern of the authorities.

8.2 Private insurance sector

No apparent measures seem to have been taken here.

8.3 Hazard mitigation

Although the dikes which have been constructed along the river Rhine proved to be essential, they have also provided a perhaps too-large sense of security to the people living in the area. 'Where floods become rare owing to the construction of protective measures, tremendous property values accumulate in the course of time without any parallel adjustment of the protective measures. If an extreme event occurs and the flood

[30] D & O (1998) p. 186

protection fails, the resulting losses are many times more serious than would previously have been the case.'[31] The Rhine region provides no exception to this rule.

There seemed to be a learning effect from the 1993 floods as was seen in the private initiatives undertaken to minimize risk in the 1995 floods (addressing the moral hazard problem). Considerable improvements were made to infrastructure in the 12-month period after December 1993. For example, heating-oil tanks were better secured, and heating and electrical installations were placed at higher levels in buildings. Events related to oil spillage were thus reduced from 100 (in 1993) to only 6 (in 1995) in the Cologne area and there were hardly any short-circuits in 1995.[32] Many people in the Rhine and Moselle areas moved all their household goods up to levels above the 1993 floods, and people listened carefully to reports of water levels and flooding dangers. The learning effect shows that the people are responsible and would thus perhaps represent a more insurable opportunity, although it cannot be excluded that with insurance the moral hazard problem would increase.

However, this learning effect appears to have withered since 1995: a) because it is already quite a few years back and b) because there is a degree of population fluctuation in the region with new dwellers not having the same experience as the old inhabitants, often contenting themselves with the low prices of living quarters.[33] This implies an informational deficit which the authorities and indeed any insurance companies venturing to enter the market should take into account.

9. CONCLUSION

Insurance against riverine flooding has not been widespread in Germany, mainly for adverse selection (anti-selection) reasons. The exception was Baden-Württemberg where up until July 1994 there was mandatory flood insurance for buildings. In that state, such insurance has continued to be provided, although no longer mandatory. New insurance companies wishing to enter the market of this state apparently have to be willing to provide flood insurance in packages offered.

Due to problems of demand and anti-selection, proposals for mandatory insurance and more state involvement have been put forth. However, these proposals have failed to gain enough momentum to become legislated. The decentralised structure of the German

[31] SwissRe (1998a) p.25

[32] BfG (1995) p.39

[33] Re: talk with H. Engel of the BfG.

federalist form of government complicates data gathering and subsequent searching of such information. Indeed, little information is available.

Any new insurance company wishing to enter this market should bear in mind that although moral hazard reduction efforts were present after the Rhine floods of 1993, this seems to have died out since 1995. Therefore informing the public about possible hazard mitigation should be a priority.

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