What is the Potential for Catastrophe Risk Transfer Mechanism for Use by Governments in Taiwan?

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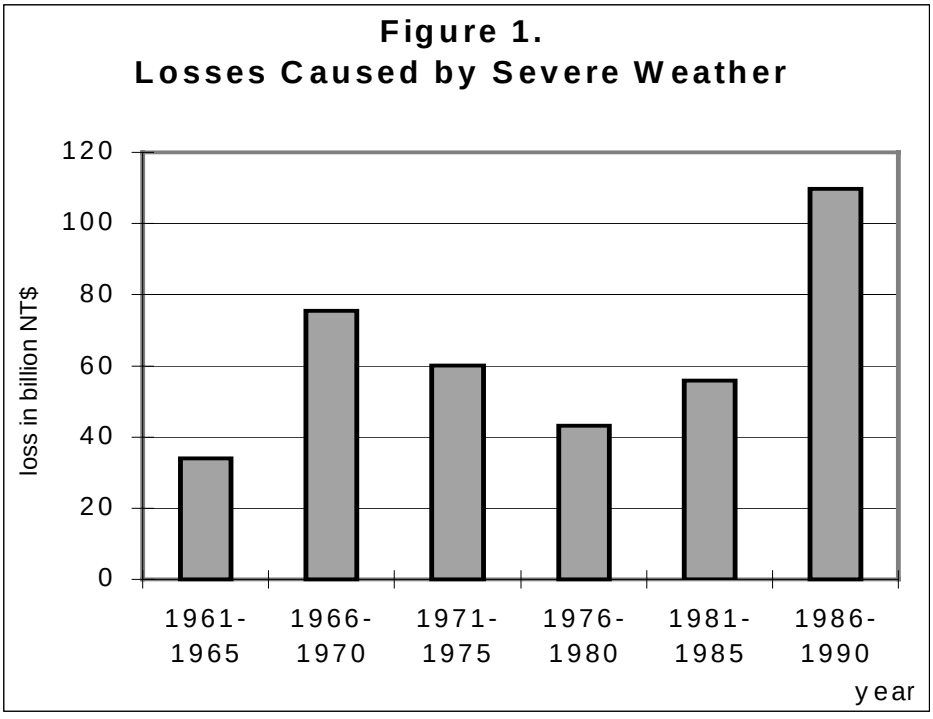
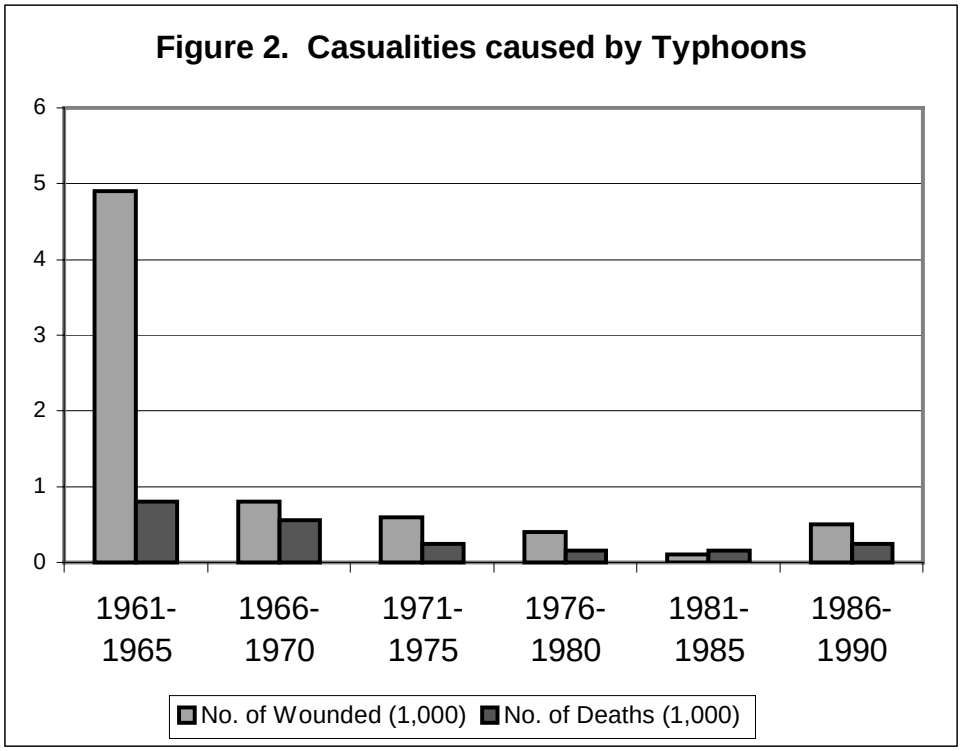
1. Catastrophe Risks in Taiwan

Taiwan, with a population close to 22 millions and an area of 36,000 square kilometers, is an island located between the temperate and tropical zones, and also in the circum-Pacific seismic belt. It often suffers from severe damage caused by typhoons (hurricanes), heavy rains, droughts, cold outbreaks, and earthquakes.

According to the Central Weather Bureau, the annual loss caused by severe weather is up to or over NT$14.2 billion (in 1991 real terms) on average from 1961-1990 (See Figure 1). 70% of the total loss is caused by the typhoons occurred between July and October and 26% by heavy rains occurred between May and June. It is found that the loss is on the increase, even though the casualty is on the decrease (See Figure 2).

On average, there are over 1,800 earthquakes in Taiwan each year from 1930-1990. Most of them are minor ones. 200 of them are noticeable and only one would cause damages. A 1935 earthquake has caused 3,276 deaths and 54,000 collapsed buildings. Another one in 1964 has caused 106 deaths and 36,000 collapsed buildings. Totally 81 earthquakes have caused 5,610 deaths, 18,879 injures, and 137,438 collapsed buildings from 1900-1992.





2. Catastrophe Insurance

In order to share the high risks of typhoons and earthquakes, Taiwan's insurance industry has provided typhoon and flood insurance policy and earthquake insurance policy. Both are available by attaching the relevant endorsements and payment of additional premiums to fire insurance, engineering insurance, automobile insurance and life insurance. Fire insurance and engineering insurance are the two most important ones among them. The typhoon and flood insurance policy and earthquake insurance policy attaching to engineering insurance and fire insurance are available since 1964 and 1972, respectively.

The rates of premiums of the typhoon and flood insurance and the earthquake insurance in the fire insurance are varied based on the degrees of risks. The variables used in the risk formulas are regions, and types and uses of buildings only. However, the rates of premiums are the same for every insurer since every insurance policy including the rates have to be approved by the government according to the Insurance Act. Thus the insurers can only compete with their quality of services. On the other hand, the rates for the engineering insurance are not fixed since the highly unique situations of every construction or installation case prevent the government from regulating its rates.

Demands for both insurance policies are quite low. Among 660,000 fire insurance policies bought in 1991, only 2,389 (0.36%) purchased the attached typhoon and flood insurance and 3,107 (0.47%) purchased the attached earthquake insurance. The written premiums of the typhoon and flood insurance and the earthquake insurance only account for 1.2% and 1.0% of that of the fir insurance in 1991, respectively. Most buyers are industries and businesses. The high loss ratio for the typhoon insurance indicates that insurers make a loss from the attached typhoon and

flood insurance (see Table 1). On the other hand, the very low loss ratio for the earthquake insurance indicates that there have not been very strong earthquakes in recent years (see Table 2).

TABLE 1

Typhoon and Flood Insurance attached to the Fire Insurance

Years	Written Premium (NT$)	Growth Rates (%)	Loss Ratio (%)
1987	73,533,942		
1988	92,359,528	0.26	147.38
1989	99,014,930	0.07	49.82
1990	118,644,658	0.20	98.94
1991	113,250,464	- 0.05	80.6
1992	151,168,783	0.33	32.68
1993	198,750,685	0.31	1.9
1994	222,388,207	0.12	146.24
1995	350,489,272	0.58	3.2
1996	383,509,623	0.09	114.81
1997	328,419,438	- 0.14	40.68

TABLE 2

Earthquake Insurance attached to the Fire Insurance

Years	Written Premium (NT$)	Growth Rates (%)	Loss Ratio (%)
1987	43,753,762		
1988	47,145,172	0.08	0.54
1989	53,397,861	0.13	0.94
1990	79,829,944	0.50	0.25
1991	89,014,533	0.12	4.08
1992	31,849,467	0.48	0.29
1993	145,197,832	0.10	0
1994	184,387,466	0.27	0.9
1995	287,012,350	0.56	1.1
1996	290,055,876	0.01	0.13
1997	218,971,858	- 0.25	0

Four reasons can be easily identified for the low demands:

(1) Adverse selection: For example, in Taipei which is a flood plain and protected by dikes, no households would like to purchase both insurance. When households located in a suburban area of Taipei which are not protected by dikes would like to purchase the flood insurance after a major flood in 1998, insurance companies would not sell.
(2) Low probabilities: Even though it is well-known that Taiwan is a high-risk area and it is expected that one major damaging earthquake will occur every fifty years, people still think they will be lucky enough to escape the catastrophes.
(3) Regulated high rates of premium: The premium rates are much higher than that of the fire insurance by a factor of five. This clearly would cause lower demands.
(4) Reluctance of insurers to promote the insurance: The current risk formulas and rates approved by the government are very crude. They are not based on detailed risk analyses. It makes insurers and foreign re-insurers reluctant to promote and underwrite the catastrophe insurance.

3. What is the Potential for Catastrophe Risk Transfer Mechanism for Use by Governments in Taiwan?

(1) Catastrophe Insurance: Catastrophe Insurance is clearly needed to reduce the burdens of those unlucky people in the high-risk area such as Taiwan. However, due to those reasons mentioned above, insurers, re-insurers and consumers are reluctant to promote or to buy the insurance. Thus, it may be necessary to make the catastrophe insurance mandatory. All private and public properties, capitals and life are required to purchase the catastrophe insurance. The benefits of a mandatory catastrophe insurance include:
   (a) Adverse selection problem can be avoided.
   (b) The lower rates of premiums will be affordable.
   (c) Insurers and governments have to work together to conduct detailed risk analysis and make it transparent.
   (d) Efficiency: Differential rates based on the degrees of risks analyzed would provide right price signals to consumers about the risks they face,
   (e) Equity: Since those protected by dikes are clearly subsidized by those who are not protected by dikes, it would be fair to have a mandatory catastrophe insurance that transfers incomes from those protected to those unprotected.
   (f) It may include public buildings and infrastructures in the mandatory insurance. Then, governments that build and operate public buildings and infrastructures will be subject to the scrutiny of insurers and re-insurers. This will make them behave more efficiently. In addition, other government regulations such as land use planning and zoning and building codes that are usually the equilibrium of political games would also behave more efficiently.
(2) Governments don’t have to issue catastrophe bonds if the above mandatory catastrophe insurance is in place. Insurers can issue their own cat bonds as they wish.
(3) It is necessary to have an institution that can integrate land use regulation and flood control in a river basin for purposes including flood prevention. We have recently adopted a policy to deal with this issue in Taiwan. First, the government will divide areas in a river basin into one of two zones: developable and un-developable. Most of the reasons for un-developable areas are to provide external

benefits for the developable areas such as proof against natural hazards, cleaner water quality, etc. Second, a mechanism is clearly needed to share the benefits and to give incentives to those land owners in the un-developable areas to provide better external benefits. The mechanism based on the beneficiary-pays-principle is to collect fees from the land owners in the developable areas and to distribute the revenue to the land owners in the un-developable areas according to their performance in benefits-generating, such as the quality of forest. In order to run the system efficiently, an integrated, democratic and professionally operated management institution like the Dutch water boards which are composed of all stakeholders in water and land uses is preferable.