

Optimal combination of international and intertemporal diversification of disaster risk: role of government

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There is a growing evidence that the coming years will see a rise in both the frequency and severity of natural disasters. The increased frequency of natural disasters coincides with the increasing concentration of population and assets in disaster prone areas which leads to growing economic losses. Though various kinds of financing instruments have been developed against catastrophes, governments are still facing possible resources gaps to fund catastrophe fully. There are evidences showing that major experience of catastrophes since 1990s has resulted in a widespread concern among insurance and reinsurance companies that there might not be enough allocated capital. Particularly, for those developing and economy emerging countries who have not established effective national catastrophe financing systems and are not or less covered by insurance, it would be very important to re-evaluate the function of existing financing instruments, and if necessary, to restructure and regroup those instruments to meet the needs of financing catastrophe risk.

In this paper, the authors try to develop a new financing instrument that combines international loan and reserve fund, which enlarge the pool of risk diversification to a wider spatial range and a longer temporal extent, respectively. In this study, a one-good, two-country and two-period overlapping generation

model is introduced to make comparative analysis on this combined instrument and traditional private insurance. Three scenarios are considered to evaluate the effectiveness of different risk financing instruments, they are respectively:

- I) Individuals of the hazardous country transfer their risk via the open capital market;
- II) Individuals of the hazardous country transfer their risk via private insurance contracts offered by the individuals of hazard-free country;
- III) The government of the hazardous country conduct reserve fund and use international loan to transfer risk to the hazard-free country.

In each scenario, individuals' optimal choices on their own investment behavior are analyzed. Then the utilities of the whole society of the hazardous country in different kinds of equilibriums are calculated to evaluate different risk diversification approaches. The result indicates that, the combined instruments could be a more effective way of risk financing, in terms of economic growth of the hazardous country in the long run. The result also gives some implications for governments on organizing catastrophe risk financing system.