# Modeling Hirmand River Flow Insurance

**Abstract**

Due to low annual rainfall and lack of underground water in Sistan region, agricultural activities are completely dependent on Hirmand river flow. Hirmand river flow has strict fluctuations in such a way that in last years people in this area always have suffered from continuous droughts and great floodways. Introduction and analysis of different patterns of river flow insurance, as one of methods to reduce the fluctuations of Sistanian farmers' gross margin, is the aim of this research. To this aim, a combination of modeling and simulation techniques was used. That is, using monthly data of Hirmand river flow from 1957 to 2009, stochastic river flow as a couple of 6 months accumulations were simulated by Copula method, first. Then, relationships between available water and gross margins of farmers were estimated by programming, econometrics, and simulation techniques. The effects of different patterns of river flow insurance in 80,75 and 70 percent coverage level, on decrease of gross margin risks of farmers were analyzed introducing these patterns to the model. At last, using stochastic efficiency with respect to a function, potential request of farmers to different patterns of river flow insurance were analyzed. Results showed that using different patterns of river flow insurance can be effective on decrease of fluctuations of farmers' gross margins which this effect is higher in Zahak in comparison to Zabol city do to higher risky water availability for Zahak farmers and therefore higher risk in their gross margins. Results also showed that at all levels of risk aversion, farmers' request to insurance patterns with higher cover level is higher. Premiume rates and Indemnities calculated show that financial efficiency of Sandooghe Bime is stronger performing river flow insurance in comparison to traditional insurance contracts which are currently performing in sistan region.

**Key Words:** River Flow Insurance, Hirmand River, Simulation, Copula, Stochastic Efficiency with Respect to a Function.

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