



2nd GLOBAL CONFERENCE on BUSINESS, ECONOMICS, MANAGEMENT and
TOURISM, 30-31 October 2014, Prague, Czech Republic

The Poisson Regression Analysis for Occurrence of Floods

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Abstract

Currently, flood risk can be considered as the most serious threat, mainly in areas and countries where hardly any other natural risks occur. In order to analyze this kind of natural disaster, it is necessary to examine the long-term development of its occurrence around the world as well as its financial and other consequences. The main objective of the research was to apply Poisson regression on flood occurrence as the dependent variable. The set of explanatory variables under consideration was tested and subsequently the final model was determined. Poisson regression model, which is a generalized linear model, was chosen as a computing model. Using it guarantees consistent results when working with variables with non-normal data distribution (skewed and discrete). Thus OLS estimator cannot work and is replaced by MLE estimator. Consequently, confidence intervals of estimated parameters and all model results can be received. The research resulted in selecting the Poisson regression model with an estimated and significant parameter. Moreover, sample sets of selected countries were compared and evaluated in terms of overall intensity of flood occurrence.

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Selection and/ peer-review under responsibility of Academic World Research and Education Center

Keywords: Poisson regression, occurrence of floods, generalized linear model;

1. Introduction

Recent years have shown the need to deal with fluctuations in climate, whether these are floods, drought, sudden storms, hurricanes or others since they affect important aspects of people's lives, property and the protection of life. It is essential to find a way of predicting the development and potential impacts before a disaster occurs unexpectedly and in a strong intensity.

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The modeling of these important natural hazards usually uses a variety of data distribution, for example by regionalization of floods in El-Jabi (1998). The direct impact of flooding on the prices of property solves Ardielli (2011) based on Flood maps. So the flood occurrence (as a number of floods) has close relationship with real property prices and insurable values of property. Korytarova (2010) gives comparison between losses and investment costs for the flood protection by real property. Floods can be understood as a global issue of substantial importance.

2. Flood occurrence and data set

2.1. Flood occurrence development along with other variables

It can be said that volatility in hydrological and meteorological plane substantially affects the next level of the human world, such as the economy, the impact on assets and ultimately change people's thinking. Additionally, all of the basic characteristics of the climate at the time have significantly increased volatility, which can be seen in the following figure.

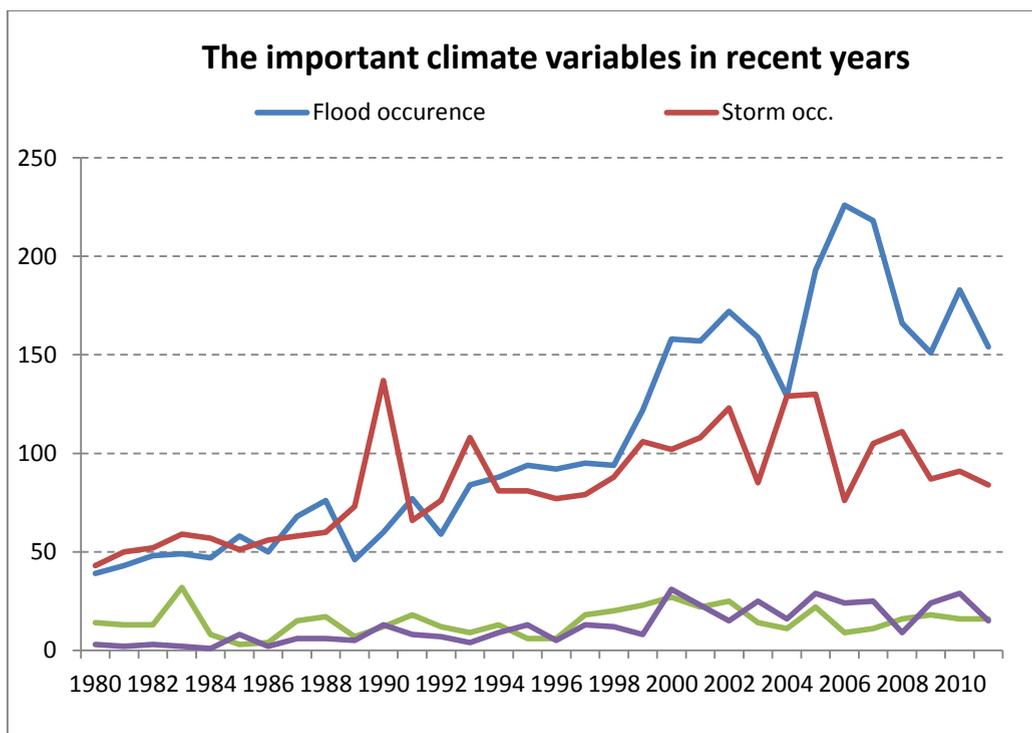


Figure 1. The aggregate climate variables depicting disasters around the world in the time series (1980-2011)

[<http://www.preventionweb.net/>]

There are the four important variables testifying to certain extreme climate expressions. Apparently it is rational to assume that among them it exists there a causal relationship across time horizon.

2.2. Data source and data set

As the main data source was used database called EM-DAT The international disaster database. There is possible to find required data as time series for all locations (continents, regions, countries) and also for many disaster groups. The figure 1 above shows selected key variables in total for the whole world. Their combination of time

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