FROM CATASTROPHE RISK TO CAPITAL MARKETS. CONSIDERING THE CAT BONDS AS A SOLUTION FOR MANAGING FLOOD RISK IN ROMANIA

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There is multitude of factors that must be taken into consideration when trying to determine social and economic development. In recent years, one of these factors that had a growing impact was represented by natural catastrophes. Lately floods increased in intensity, frequency and were responsible for more losses than any other natural phenomena in Romania. At international level, managing the risk of floods became a top priority for insurance companies and governments alike. There are however a series of factors which make catastrophe risk unsuitable to be covered by traditional insurance. Within this article, we try to address a more suitable approach on the matter represented by catastrophe bonds.

Key words: catastrophe bonds, floods risk, securitization, financial innovation, ART

Catastrophe bonds – Rationale

In recent years, in Romania, the severity and frequency of floods have increased considerably due mainly to heavy precipitations and snowmelt during springtime. In 2005, as stated within the Guy Carpenter & Company Ltd's *European Flood Report 2005 –Central and Eastern Europe*, our country experienced the most terrible flooding in over 30 years with over 30 counties and 500 towns reported to have been affected, 69 people killed and over 13000 people constrained to abandon their homes. From a financial perspective, the Romanian government estimated that losses attained more than 1.5 billion euros, while only 10% of the households in the affected areas had flood coverage policies. In addition, as one can notice from the table-displayed bellow, for the period 1999 to 2008, the economic damage costs from the top ten natural disasters were determined mostly by the occurrence of floods.

Disaster	Date	Damage US Dollars (000's)
Flood	July-2005	800000
Drought	June-2000	500000
Flood	August-2005	313000
Flood	April-2005	200000
Flood	June-2001	120000
Flood	April-2000	100000
Flood	July-1999	50000
Flood	March-2001	15000
Flood	June-1999	10000
Flood	March-2000	500

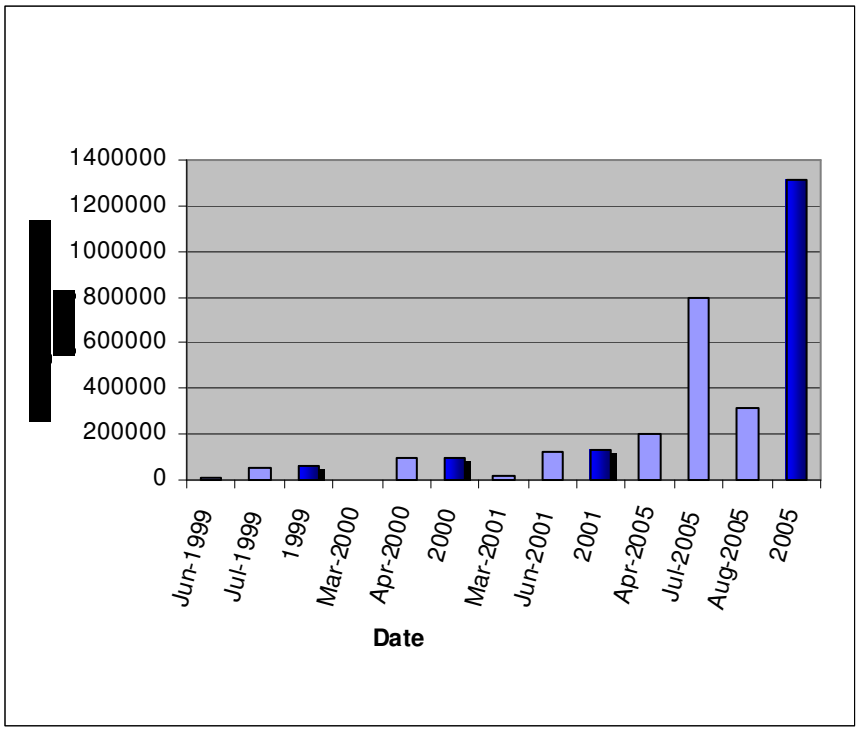
Natural disasters in Romania for the period 1999 to 2008

Source: "EM-DAT: The OFDA/CRED International Disaster Database

www.em-dat.net - Université Catholique de Louvain - Brussels - Belgium"

Besides the immediate losses caused by floods, such as damage to buildings, motor vehicles, infrastructure and persons, costs of clearing up and disposal, one can identify several indirect losses like the damage from business interruption and power failure, costs of transportation, assistance, accommodation, communications and storage as well as intangible losses like parting of the area at risk psychological impairments or losses of intangible values.[57]

Furthermore, in the end, all these damages transpose themselves into losses for the entire economy in the form of a decline regarding the economic growth. As we can observe from the following table, in Romania, the financial costs regarding the floods exhibited a growing trend in the last years. Al these facts lead to the conclusion that flood stand for one of the most important catastrophe risk factors in our country with a huge impact on the determinants of social development and economic growth.



Economic damage costs from flood (1999-2005)

While insurance companies cover the pure risks using the law of large numbers by holding a large portfolio of independent risks, in the case of catastrophes, in general, and floods, in particular, one can consider the location an impediment as, at the same time, the entire insured pool could be affected. Therefore, the incidence of these events is characterized by high correlations among the losses within one insurance company's pool. Furthermore, one should mention the frequency of these events: they do not occur quite often with respect to other events (such as a fire), making almost impossible the design of scenarios based on historical statistic data. In addition to all these, the occurrence of one catastrophe can lead to the emergence of other unfavorable events, like epidemics or fires.

At international level, as a consequence of the reduced financial capacity of the insurance companies with regard to the losses from natural catastrophes, the financial innovation phenomenon induced the emergence of market – oriented contracts. These ones are meant to `transfer and scatter the catastrophe risk (from natural catastrophes like earthquakes, hurricanes or floods or man-made catastrophes) towards the investors within the capital markets through well-defined mechanisms – *alternative risk transfer (ART)* solutions. In addition to all said, from a financial perspective, one can notice within this contracts the solving of the

[57] Hausmann, P. (1998), *Floods – an insurable risk?*, Cat Perils, Reinsurance & Risk division, Swiss Reinsurance Company

issue regarding the incomplete market through accessing the capital market resources. Therefore, the limits of insurability can be mitigated by designing innovative financial contracts such as those represented by the catastrophe bonds (*CAT bonds; Insurance-linked bonds; Act of God bonds*).

Basically, the contracts mentioned above are characterized by the fact that both the coupons and the principal can be modified or no longer paid in the case of occurrence of a natural catastrophe within a well-specified area. One could say that these contracts are financially indexed to natural catastrophes. Another aspect that should be mentioned relates to the fact that, in order to issue these bonds, there is used a very popular financial process, known as *securitization*. Through this technique, financial assets characterized by a low degree of liquidity (such as mortgages, commercial loans, credit cards) are transformed into new financial contracts, traded on the international capital markets. More thoroughly, the securitization technique consists in packaging financial promises and transforming them into a form whereby they can be freely transferred among a multitude of investors.[58]

Several aspects regarding the securitization of catastrophe risk

As far as the catastrophe risks are concerned, the securitization technique involves the presence of several economic actors, among which the following three ones are the most important:

- **The sponsor –** is the company that selects, pools together the catastrophe risks and cedes them to the special purpose vehicle. The CAT bonds could be seen as options or supplements of the reinsurance. The sponsor can be an insurance or reinsurance company.
- **The special purpose vehicle (SPV) –** acts as a "reinsurance company" in relation with the ceding company and finances the operation by covering the risks through issuance of securities (bonds) towards the capital markets. The payment relative to the coupons and / or the principal will occur only if one or more conditions related to the catastrophe event will or not are fulfilled, mainly if there are not registered damages over a certain trigger point, established within the contract. Therefore, the cash flows due to the investors will be transferred to the ceding company to pay policy claims in the case of surfacing of a catastrophic event. In addition, the loan funds are invested in a collateral account with. The main role of the SPV is represented by the fact that it insulates the investors and the sponsor / ceding company.
- **The investors –** stand for the last important participant of this market. They are those who invest in the CAT bonds issued by the special purpose vehicle. One can notice the importance of the SPV for the latter ones – if they were to buy the bonds directly from the ceding company, they would have had to face a double risk: first, the catastrophe risk and second, the default risk of the ceding company. As far as the motivations are concerned, for the investors they consist in the fact that there is no correlation between the catastrophe events and the risks connected to the financial securities. Therefore, for investors there is the opportunity to diversify their portfolios and to invest exclusively in the catastrophe risk when the presence of the SPV. In addition, one can think at the possibility of investing in a new asset class with al the advantages resulting, such as diversification within a portfolio formed by correlated corporate bonds that could be characterized by losses while qualms within the fixed income markets are present. Furthermore, taking into account the fact that this is relatively a new asset, this type of bond could offer a significant premium of novelty.

A very important aspect regarding the catastrophe bond contracts resides from the determination of the losses and the specific mechanism of trigger (mainly, when the coupons and / or the principal of the bonds should be paid partially or at all to the investors). Among the most known mechanisms are the following ones:

- **Indemnity trigger –** in this case, the trigger point is a function of the actual suffered losses of the ceding company and resembles a lot the reinsurance principle. The coverage offered by the CAT bonds is triggered when the sponsor company suffers losses above a certain level, known as *trigger point* and the latter one is indemnified for the registered damages due to the catastrophic events specified within the contract. For this type of mechanism, the financial

[58] Davidson, A., Sanders, A., Wolff, L-L., Ching A.; (2003); *Securitization Structuring and Investment Analysis*, John Wiley&Sons, Inc., Hoboken, New Jersey

literature has identified the presence of information asymmetry, through adverse selection and moral hazard phenomena. The former one can be detected when the insurance or reinsurance company (the sponsor within the securitization process) holds within his portfolio the appealing positions and cedes the risky ones. The latter one consists mainly in a reduction of policies regarding the indemnities, since the risks have been transferred to the investors.

- **Industry index trigger –** the trigger mechanism consists in the fact that the ceding company retrieves only a part of the total industry losses, above a level previously established. One can notice that the investment operation has a more transparent character as far as the investors are concerned as there is a third party to measure the trigger parameters of the industry losses. Through this mechanism, the sponsor faces the basis risk defined by the difference between the actual suffered losses and the indemnity received from the CAT bonds. Therefore, if the discrepancy is positive (and large) the sponsor finds itself in the position of being exposed to the catastrophe events. Contrary, if the difference is negative, the sponsor benefits from the transaction.
- **Pure parametric trigger –** while the last mechanism presented some transparency characteristics, this one, as the name says, is based only on the parameters of the catastrophe event, such as location or magnitude in case of an earthquake or flood depths in case of the floods. The main disadvantage is represented, as in the case of the industry index trigger, by the basis risk.
- **Modeled loss trigger –** for this trigger mechanism, after the occurrence of a catastrophe event, the values of its parameters are introduced within a well-defined model in order to generate the expected losses for the ceding company's portfolio. The result of the model will be compared with a certain level in order to determine the triggering of the bond.
- **Parametric index trigger –** this one differs from the pure parametric one through the employment of different categories and through the weighting of each category in order to reflect the exposure of the ceding company within a certain area.

With respect to the market of catastrophe bonds, this one has grown rapidly since its inception in 1997 regarding both the number of contracts, the perils covered and regarding the contracts designed. As far as the flood risk is concerned, the first catastrophe bond ever to be known was introduced with reference to river flood in Great Britain, by Allianz Global Corporate & Specialty through a Cayman Island-based company (Blue Wings Ltd.), fronted by Swiss Re. Besides the flood risk, the catastrophe bond is designed to cover earthquakes in Canada and the US excluding California. It is interesting to notice the fact that the mechanism used is a parametric index trigger, while the index is determined using the flood levels registered at over fifty locations from Great Britain As far as the earthquake risk is concerned, the bond uses a modeled loss trigger.

Further research

As one can notice the challenge of catastrophe events represent a significant part of the research studies and pragmatic solutions. Furthermore, for our country, the study of these events and their implications from a financial perspective, with reference to their management by shifting towards the capital markets through alternative risk transfer instruments (such as CAT bonds) could stand for an important field of research.

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