

# MAPFRE RE's economic capital model

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**"The model developed by the MAPFRE RE and Ernst & Young team for meeting future regulatory requirements goes much further than this and has become a powerful management tool."**

The new regulatory framework through the European Union's Solvency II project and regulatory initiatives of various countries such as the United States, the United Kingdom and Switzerland reveal the need within the insurance and reinsurance sector to be able to determine the risk profile of companies based on advanced quantification methods which include the various sources of risk to which they are subject, enabling the necessary level of economic capital to be determined for the whole company and separately for each of the said sources and to integrate the said models into the management of the company.

This need to quantify the economic capital and to include these models within the management of the company is seen within the sector as an innovation which goes well beyond mere regulatory compliance, enabling the company's management and strategic decision taking to be measured from a new perspective which combines both profitability and the risk assumed.

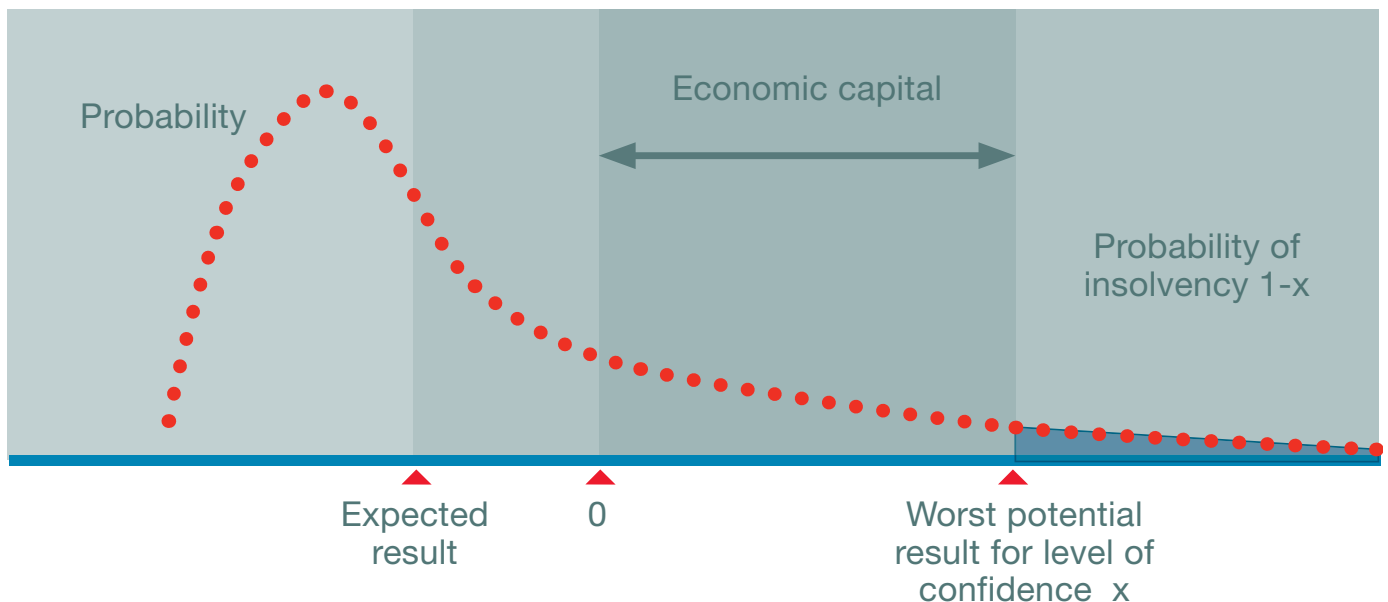
By means of a pioneering project in the Spanish sector, MAPFRE RE in conjunction with Ernst & Young, has developed an internal calculation model which enables it to determine the economic capital for the whole company, as well as the allocations for the various areas of activity, providing a powerful management tool for the company.

### What is economic capital?

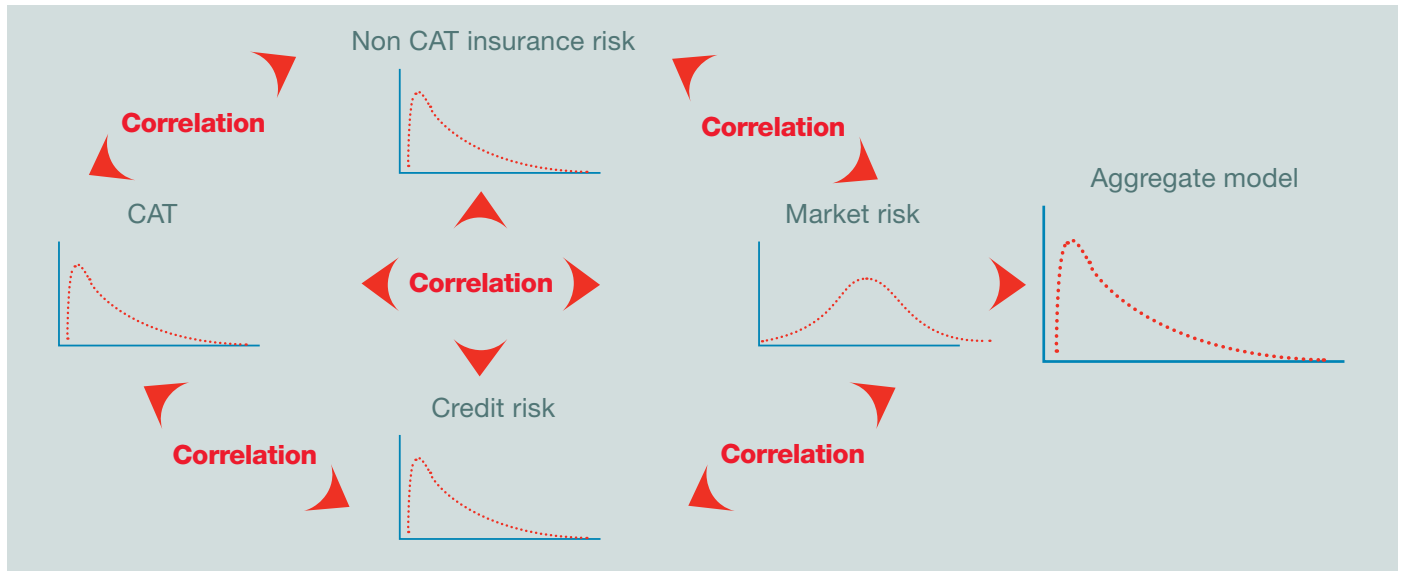
Economic capital is that level of capital and reserves that, for a given level of confidence, or to put it another way, for a given probability of insolvency, assumed by the company, enables the worst possible shortfalls in the company's results to be confronted. To do this, the model determines the distribution of possible results projected over one year.

The distribution of the company's total result is determined by combining the distributions of the various sources of

**Figure 1: Distribution of results and determination of economic capital**



**Figure 2: Combining the various sources of risk**



losses and profits which enable a joint distribution to be achieved. The combination is carried out by determining the various levels of correlation between the different risks.

**Management by means of economic capital**

Determining the company's economic

capital for various core elements and levels (by line of business, management centre, business type etc.) allows portfolios, products and/or distribution lines to be analysed and managed, adding a new dimension to the traditional approach, adjusting profitability to the actual risk assumed.

We consider traditional management to

be those measures which analyse the profitability of the various units, products, business lines etc. by means of purely financial measures which do not include measuring the risk assumed.

Within an economic capital management environment, we can compare the company's various products or business lines uniformly, requiring greater profi-

**Figure 3: Comparison between traditional approach and economic capital approach**





tability where there is more risk and vice versa.

### MAPFRE RE's economic capital model

Taking into account the particular nature of the business conducted by MAPFRE RE, the model projects results for various business areas, establishing a profit and loss account on a global level and for the various core elements and levels projected as well as the economic impact of other sources of risk.

To model the company's profit and loss account, the following were modelled:

- ▶ The future loss experience of current policies as well as possible variations

in reserves due to changes in losses already incurred. Ultimately, modelling of the company's main risk which is changes in loss experience. The information supplied and used in the model to project the technical account, not counting catastrophe business, is made up of information on current policies and historical information on acceptance accounting data. The input data required by the model to make the necessary hypotheses for the stochastic projection of the model on the basis of historical ratios is generated from that information.

- ▶ As mentioned in the previous point, loss experience in catastrophe and non-catastrophe branches has been modelled separately due to their diffe-

rent natures. For modelling catastrophe risks, PML tables were used by geographical area, which were converted into statistical distribution functions with probabilities assigned to each of the potential losses.

- ▶ The projection of the rest of the items on the technical account such as premiums, commission and brokerage.
- ▶ In turn, those items which make up the non-technical section, such as financial income and expenditure and management costs were also projected according to data on the fixed and variable income portfolio, deposits, open foreign currency positions and the company's overheads budget.



▶ The effect of reinsurance in its various forms was modelled enabling a projection of the net result of retrocessions to be projected.

In turn, the economic impact of other sources of risk was modelled, such as:

▶ The impact on the possible change in value of the investment portfolio. For this projection, an economic scenario generator was used with market data (interest rates, stock market indices, volatilities) taken from financial information sources.

▶ The impact of possible non-payment of both assets and by reinsurers to whom the company has retroceded business.

▶ Fluctuations in the various foreign currencies in which the company trades and their impact on the total result.

The level of confidence was established in line with reinsurance economic capital sector practice and the number of scenarios generated was 5,000. The number of scenarios will shortly be increased to 10,000 with regard to catastrophe risks in

order to obtain projections more closely related to reality.

In conclusion, it is an innovative tool, both within the group and the sector, capable of generating extensive information on the company's existing risks and activities, offering a wide range of utilities for analysis, control and management as well as a strategic decision taking aid within a more wide-ranging framework than that which has existed until now. ■

## Purposes of MAPFRE RE's economic capital model

MAPFRE RE's pilot experiment within the MAPFRE Group with the design and installation of the Economic Capital model has various purposes:

- ▶ To have an initial framework for analysing profitability – risk for various core elements and levels modelled within the whole company such as analysis by each line of business, management centre and business type (proportional reinsurance, non-proportional reinsurance and facultative business).
- ▶ To compare the Standard & Poors capital model, based on calculating the required capital on the basis of fixed percentages of the company's various accounting figures, with the developed model in which the company's actual risk profile is adjusted.
- ▶ To cover the future Solvency II requirement to have an internal economic capital model and the possible requirement of the United Kingdom regulator in its CP 190 proposal, which is in line with the Solvency II proposal.
- ▶ To serve as an experiment for the rest of the SISTEMA MAPFRE companies in the setting up and handling of these type of models.