# Option contracts and reinsurance

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The Chicago Board of trade (henceforth to be known as CBOT) has developed a series of option contracts based on claims experience in catastrophe losses in the United States. Despite the doubts which may be raised by the introduction of this new product, in principle it should be received with satisfaction because of the innovation which it represents in an activity which is as traditional as is reinsurance.

Futures and options contracts are an institutionalised form of delayed trading, and consist of an agreement by two parties to buy or sell a particular asset at some future date. Futures contracts were developed in 1960 by the Chicago Board of Trade and have had a spectacular development since then.

The futures and options markets have four general characteristics:

1. They are traded on organised markets.

2. They are based on standardised contracts with regard to the asset and the time and place of the final contract settlement.

3. There is a clearing house and there is a clear commitment of the parties to the clearing house, thereby reducing risks arising from bad faith.

4. There is a daily value for the future or option.

An option is a right - not an obligation - to buy or sell a certain asset under certain conditions in exchange for the payment of a fee or premium. Options can be traded for commodities (e.g. wheat) or for indices (e.g. futures on the IBEX-35). There are two types of options: "calls" and "puts". In both cases, when a buyer acquires a call or a put he acquires a right, not an obligation.

The party that does acquire an obligation is the seller of the call or the put. Let us take a simple example based on the Ibex 35 index (an index of the 35 most significant stocks on the Madrid stock exchange). Let us suppose that the purchaser wishes to buy "the option to buy" shares on the Ibex 35 to the value of 3,500 units in 6 months time (he wishes to buy a call). The present value of the index is 3,250, and to acquire this option he pays a fee. If within 6 months the value of the index is 3,700, the investor exercises his option and buys shares at 3,500. These shares have a market value of 3,700 and the purchaser will therefore have gained 200, less the cost of the fee. This amount will be exactly the same as the loss borne by the seller of the option.

As can be surmised, two of the key factors which allow an option market based on an index to work are:

1. The determination of the index.

2. The determination of the premium.

## 1) THE DETERMINATION OF THE INDEX

The main problem which is faced when developing a an index-based reinsurance options market arises from the difficulties which are generated by the formulation of this index. Principally these are: obtaining information from a significant number of insurance companies with the necessary regularity; the advantages which are given to these companies which provide the information as opposed to the other companies (inside information), and finally, once this index has been obtained, this should be capable of allowing the participants in the market, primarily insurance companies, to determine a relationship between the variations in the index and the variations in their individual risk portfolios.

All these problems would disappear if, instead of creating a new index, it were to be created based on existing information, this approach was finally taken by basing an index on catastrophe data which has been provided by the Property Claim Services since the Seventies in the United States.

The PCS defines a loss as being catastrophic when the insured sum is greater than $5 m, and it affects a significant number of policies and insurance companies. The estimate provided by the PCS, provides the best possible estimates of claims payable due to damage to assets, private property, vehicles, yachts, boats and associated material damage. The PCS estimate does not include losses which affect non-insured properties such as public assets, aircraft and assets which are insured by the National Flood-Insurance programme. The methodology employed by the PCS uses information sent by the insurance companies, their portfolio of insured domestic risks (an inventory of insured buildings and vehicles in 3,100 counties) and, when appropriate, its own estimates. From this information the PCS determines the approximate number of insured risks, the specific area covered by the catastrophe, and completes its estimates using information received from cedants.

### Functioning of the index and types of contract

The PCS reports to the CBOT on nine different indexes: a national index, five regional indexes and three state indexes. Only call and put oper-

| Contract month | Period in Force | Cut-off date | | Settlement or striking date | |
|---|---|---|---|---|---|
| | | 6 months | 12 months | 6 months | 12 months |
| March | Jan-Mar | SEPT 30 | MAR 31 | SEPT 30 | MAR 31 |
| June | April-June | DEC 31 | JUNE 30 | DEC 31 | JUNE 30 |
| September | July-Sept | MAR 31 | SEPT 30 | MAR 31 | SEPT 30 |
| December | Oct-Dec | JUNE 30 | DEC 31 | JUNE 30 | DEC 31 |
| ANNUAL | Jan-Dec | JUNE 30 | DEC 31 | JUNE 30 | DEC 31 |

ations are permitted on these indexes, and these are available "upper layer" and "lower layer" contracts (comparable to non-proportional reinsurance contracts). The contract period varies depending on the contract and on the settlement period. A breakdown of the possibilities offered by the CBOT is as follows:

### Index values

The index/es reflect catastrophe losses which range in value from $0 to $50,000 m. Therefore the index/es represent the sum of the PCS estimates for losses brought about by catastrophes on insured assets.

The index is published for each area and period, divided by $100 m. In other words, if the PCS estimate for losses totals $5,643,000,000, then the index will have a value of 56.43, and each point of the index will be equivalent to $200. A fee of 5.2 points will therefore be paid to buy an option, and the price of the option will be $1,040.

### 2) DETERMINATION OF THE PRICE

The price of the option, which is the equivalent to the cost of reinsurance, is determined on an open market and depends on various factors.
- Market conditions such as supply and demand and economic variables.
- Intrinsic value: difference between the index and the option value when taken up. In other words, if the price paid at the time of purchase is today less than the value of the index, the option will have a greater value.

- Temporal value: this depends on the volatility of the index and the time remaining until the settlement of the option. The longer the time remaining until settlement, the greater will be the value of the option. Volatility also affects the value of an option at any given time and consequently also affects the price.

### Options - call spreads

The so called call spreads involve a simultaneous purchase and sale of call options with the same cut off dates but with different settlement or striking prices. Let us suppose that a company wishes to buy catastrophe coverage to protect itself against the risk of hurricanes during the third quarter of 1996 in Florida for total losses of between $6,000 m and $8,000 m; since traditional reinsurance only provides cover up to $6,000 m, the company is therefore estimating, using its individual portfolio of risks as a basis, that it may be affected by a global loss in Florida of $8,000 m.

If we suppose that it has a 0.2% stake in the global portfolio of the state, its catastrophic accumulation would be 0.2% x $8,000 m = $16 m. It would therefore buy a 60/80 "call spread" option for the September period, or what amounts to the same - it would buy a call option for an index of 60 and it would sell a call option for an index of 80, for a price of let us suppose 5 points.

In monetary terms, it is buying cover of $4,000 (20 points x $200 per point) for the price of $1,000 (5 points x $200 per point).

Its real cover would therefore be determined by two factors:

a) The number of options it is buying.

b) How much the insurance company would be affected by a hurricane occurring in Florida causing losses of between $6,000 m and $8,000 m.

If, as we have supposed, the company has 0.2% of the insurance market for catastrophic risks, and the catastrophe occurs and is valued by the PCS at $8,000 m, the participation of the company in the loss within the limits which have been bought would be $(8,000-6,000) m x 0.2% of market share = $4 m. Therefore to cover itself it would need to buy 1,000 60/80 call spread options (1,000 options x 20 points of cover x $200 per point = $4 m cover) paying a premium of $1,000 m (1,000 options x 5 points of premium x $200 per point).

In other words it is buying XL CAT cover of $4 m in excess of $12 m, for a premium of $1 m (or a 25% rate on line).

If a loss of $7,500 m occurs and the insurance company's estimates are correct, its portfolio will be affected by a loss of $15 m ($7,500 m x 0.2% participation). As it has an option to buy for a price of 60 and the index will increase to 75 ($7,500,000 m loss/$100,000,000 m); it will exercise its option and buy at 60 that which in the market is worth 75, gaining 15 or, what amounts to the same, recovering as if it were dealing with a reinsurance contract, 1,000 options x 15 points difference (75-60) x $200 price per point = $3 m.

This amount is exactly the same as if it had bought a conventional reinsurance line. As the company has bought the equivalent of a cover of $4 m in excess of $12 m, the recovery which corresponds to it would be $3 m ($15 m loss - $12 m retention).

As can be deduced, the greatest risk which the insurance company runs if it decides for the alternative of options as against reinsurance arises from an error in the calculation of its individual participation in the globally calculated loss. If the 0.2% estimate in fact turns out to be 0.3%, the company's participation in the loss will be $22.5 m instead of &16 m, leaving it with an excess exposure of $6.5 m. The amount of the loss in excess of $16 m would be attributable to the company.

### Options as an alternative

Without going into a comparison of the price of options used as reinsurance cover with the price of reinsurance for programs similar to those which are traded in the CBOT, American legislators do not believe that at the moment options are a valid alternative to reinsurance for various reasons. These reasons are basically related to the treatment which this instrument should receive and the consequences of this legal treatment.

• The purchase of options - is this an expense or an investment? (Premiums paid for catastrophe cover are an expense.)

• Treatment of the solvency margin, reserves for unearned premiums, cover for technical reserves, minimum capital, security etc.

Finally, the problems which are created by the calculation of the correlation between the individual portfolio of an insurance company and the globally considered loss should not be forgotten. These problems do not have an easy solution and their negative consequences can be the cause of large losses for insurers/reinsurers.

No one knows what will happen in the future with this new instrument or whether it will be exclusively used in only a few specific operations on the CBOT. Its advantages and disadvantages and the way it works have been dealt with very briefly in this article and only time will show its true usefulness.

# Asset valuation

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**One of the pillars on which the insurance sector depends in order to give satisfactory service to its policyholders is to find and establish uniform evaluation procedures concerning the sum insured or the compensation to be given in case of loss.**

### Introduction

One of the factors which causes the greatest problems in the insurer/policyholder relationship is, in a number of cases, the difference between the sum insured and the sum to be compensated which is determined by loss adjusting.

It is not infrequent that these differences are brought about due to the fact that the policyholder is unaware of the established evaluation criteria. These problems may also be caused by an inadequate distribution of insured sums (building, contents, merchandise and stock).

When an insurance policy is taken out, either due to poor advice, or due to tacit presumption of valuation criteria, erroneous values are frequently established which lead to greater compensation expectations than are in fact due to the policyholder.

Given the importance of the consequences of this situation, the most commonly used procedures and criteria for asset valuation are given below.

### Definitions

The most commonly used valuation concepts are: replacement value, as-new replacement value and new value.

**Replacement value:** also known as **real value,** this is the cost of replacing the assets by others of similar characteristics and economic value, discounting, if applicable, those factors which affect their value (depreciation), such as deterioration due to physical causes and functional or economic obsolescence. This is obtained by subtracting the corresponding depreciation from the as-new value.

**As-new replacement value:** this is the cost of replacing the asset by another of similar characteristics and economic value which exists in the market, without any kind of depreciation being made for use or obsolescence.

**New value:** the difference between the new value and the as-new replacement value does not come from the determination of the sum insured but from the calculation of the compensation, where the following limit is established. In the case of a loss, the damaged assets are compensated by adding to the real value of the assets a complementary compensation which should not exceed a given percentage (30 - 50%) of the as-new replacement value of the damaged assets.

Given the similarity of the terminology which is used there are numerous confusions amongst the policyholders in the interpretation of these terms.

When applying an as-new replacement value clause the insurance companies should pay special attention, above all, to the installations and machinery. It is necessary to assess the age of the installations