AN ATTEMPT TO CLASSIFY EXOTIC OPTIONS

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ABSTRACT

Numerous exotic options have been tailor-made over the last twenty years to meet investors' specific needs. This article aims to propose an intelligiable method for classifying the most commonly used exotic options. According to the different combinations of five elementary criteria and when compared with traditional options, more than seventy existing products may be put into one and only one of the thirty-two option classes. Furthermore, the proposed method allows the creation of new exotic instruments, hitherto unexplored.

INTRODUCTION

Tailor-made to fit investors' specific needs, most exotic options have appeared since the 1980s. Research on exotic options has been very active since the beginning of 1990s (cf. Rubinstein (1991)). In spite of abundant literature devoted to this topic (cf. Lyden (1996), Nelken (1996), Haug (1997), and Lipton (2003)), as far as we know, there exists no definition for exotic options that is commonly accepted by professionals and/or researchers. As no definition exists, nor is there a widely accepted classification method. The few existing classification methods (cf. Zhang (1998), Ong (1996)) suffer from a certain number of weaknesses. Firstly, many options cannot be classified by these methods. Secondly, according to these methods, some options can be put into two or more option classes. Finally, these methods are sometimes ambiguous. In such a context, it will be useful to propose a new classification method, one that is able to overcome the aforementioned weaknesses.

This article aims to propose a classification method covering most existing non-traditional options on the one hand, and facilitating the creation of new instruments on the other hand. In Section 2, we propose a definition for exotic options according to certain specificities not present in traditional options, and on this basis a classification method is defined. This method can be used to classify existing products and to create new instruments. In the third and last section, we summarize the main results obtained.

PROPOSITION OF A NEW CLASSIFICATION METHOD

We find that five conditions are met by traditional options, but not always by exotic ones. These five conditions, henceforth to be called "traditional conditions", are as follows:

- Condition 1 (or C1): The option is unconditionally activated throughout the life period of the contract, and it cannot be cancelled before reaching maturity;
- C2: The maturity of the option can be neither reduced, nor extended;
- C3: The premium, paid by the buyer to the seller at the beginning of the life period of the option, is obligatory and cannot be reimbursed;
- C4: All the variables of the option contract, namely the underlying asset price, the strike price, and the option price, are written in the same currency;

C5: The option has only one underlying asset that is a basic risky asset, with a standard payoff, namely the positive or negative part of the difference between the spot price of the underlying asset and the pre-determined strike price.

An option is deemed "traditional" if and only if all of these traditional conditions are met. As soon as one of these conditions is no longer respected, the option becomes non-traditional or exotic. On this basis, the "exotic degree" of an option can be defined as the number of traditional conditions that are not met by the option. The higher its exotic degree, the more the option is "exotic": for example, the exotic degree of traditional options is zero, while that of the most exotic options is five. Moreover, we distinguish "basic exotic options", whose exotic degree is one, from "complicated exotic options", whose exotic degree is strictly superior to one.

Within this framework, options with an exotic degree of i, where i ∈ {1, 2, 3, 4, 5}, can be gathered together into the same category, entitled "option category with an exotic degree of i". Within each of these categories, options for which the same i conditions are not met can be grouped into the same class, entitled "option class for which traditional conditions n_1, n_2, …, and n_i are not met", where $n_j \in \{1, 2, 3, 4, 5\}$ for $j \in \{1, 2, …, i\}$ and $n_1 < n_2 < … < n_i$. The number of such option classes is C_5^i, namely the number of possible combinations of i elements among 5 elements, with $C_5^i = \frac{5!}{i! \times (5-i)!}$, where i! = i × (i – 1) × … × 2 × 1. As we have $C_5^0 = 1$, $C_5^1 = 5$, $C_5^2 = C_5^3 = 10$, $C_5^4 = 5$, and $C_5^5 = 1$, options with an exotic degree of 0 can be grouped into a single class (i.e., the class for traditional options), options with an exotic degree of 1 can be put into 5 classes (i.e., non-C1, non-C2, non-C3, non-C4, and non-C5), options with an exotic degree of 2 can be put into 10 classes (i.e., non-C12, non-C13, non-C14, non-C15, non-C23, non-C24, non-C25, non-C34, non-C35, non-C45), options with an exotic degree of 3 can be put into 10 classes (i.e., non-C123, non-C124, non-C125, non-C134, non-C135, non-C145, non-C234, non-C235, non-C245, non-C345), options with an exotic degree of 4 can be put into 5 classes (i.e., non-C1234, non-C1235, non-C1245, non-C1345, non-C2345), and options with an exotic degree of 5 can be grouped into a single class (i.e., non-C12345, the class for the most exotic options). Definitively, all options, traditional or exotic, can be put into one and only one of these 32 classes.

The proposed classification method allows the classification of 72 existing exotic options, among which 64 are basic exotic options, while 8 are complicated ones. It also facilitates the creation of new exotic instruments. For example, with the help of the proposed classification method, we can design naturally 10 options with an exotic degree of two (namely Money-back double barrier option, Barrier quanto option, Barrier quanto option, External double barrier option, Money-back extendible option, Extendible quanto option, External extendible option, Money-back quanto option, Money-back fixed-strike average option, and Fixed-strike average quanto option), 10 with an exotic degree of three (namely Money-back extendible barrier option, Extendible barrier quanto option, External extendible barrier option, Money-back barrier quanto option, Money-back external barrier option, External barrier quanto option, Money-back extendible quanto option, Money-back external extendible option, External extendible quanto option, Money-back fixed-strike average quanto option), 5 with an exotic degree of four (namely Money-back extendible barrier quanto option, Money-back external extendible barrier option, External extendible barrier quanto option, Money-back external barrier quanto option, Money-back external extendible quanto option) as well as 1 with an exotic degree of five (namely Money-back external extendible barrier quanto option).

DISCUSSIONS

Specially designed to fit users' specific purposes, exotic options are more effective than traditional options in risk transferring. As it is nearly impossible to list all exotic options, it is important to propose a method that allows them to be classified.

In this article, exotic options are defined as those for which at least one of the five conditions met by traditional options is not met. If we group all the options for which the same traditional conditions are not met within the same class, all options, including traditional and exotic ones, can be put into one and only one of the 32 classes, namely 1 class with an exotic degree of zero, 5 with an exotic degree of one, 10 with an exotic degree of two, 10 with an exotic degree of three, 5 with an exotic degree of four, and 1 with an exotic degree of five. The proposed classification method has at least two advantages. Firstly, it enables the classification of 72 existing products, of which 64 are basic exotic options and 8 are complicated ones. Secondly, it helps to design new instruments. In this article, 26 new complicated exotic options seem almost to have evolved naturally.

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