STRUCTURED BONDS TAKING THE EXOTIC OPTION

L. ASSOUN & C. CHAUSSADE
RESEARCH & INNOVATION DIVISION
D. KHOUGAZIAN
CORPORATE FINANCE, CAPITAL MARKETS DIVISION
CCF, 103 AVENUE DES CHAMPS ELYSEES
75419 PARIS CEDEX 08
TEL. : 33 1 40 70 33 64
FAX : 33 1 40 70 74 25

ABSTRACT

A structured bond is a cross between a traditional financial instrument and a derivative. These new-generation products, which are easy to describe insofar as they are so different from conventional products, all serve a single purpose: to meet every aspect of a user's requirements. That is why structured bonds are the nearest one can come to finding an ideal product. But more importantly, they are astonishingly diverse instruments that continually push back the boundaries of a possible definition. It is impossible to predict what form the next issue of structured products will take! In this issue of Quants, we examine the reasons for the development of this market by describing the main advantages for investors, issuers and structuring teams (or arrangers). We illustrate our study with examples of recent issues of structured bonds.

The key to the flexibility of these instruments lies in the use of options that are both complex and innovative: so-called exotic options. We have chosen to focus on a specific instrument - the corridor bond - not just because of the surge of interest that it aroused at the beginning of the year but also because it is representative of the development of this range of financial instruments. A corridor bond makes it possible to pay a premium in order to sell volatility, which is done by means of digital options. The valuation of these bonds involves the use of an interest rate model, which we have tested by computing the cost of hedging the corridor bond.

Introduction*

Structured products are expanding the limits of financial markets every day. This fast-growing area of activity is both recent and highly innovative. Before describing it more in detail, we shall attempt to define a structured product. While no exact definition currently exists, our experience of the market allows us to affirm that a structured product is a combination of a conventional instrument and one or more derivative products. Derivatives allow users to tailor strategies to the needs of a carefully targeted constituency - issuers or investors - by modifying or adapting one or several features of the conventional instrument (e.g. the value of the coupon or the amortization of the bond). Derivatives are an integral part of the structured product and in most cases cannot be dissociated from it or traded separately. The choice of conventional instrument underpins the user's strategy and usually determines the regulatory, legal and tax characteristics of the structured product.

It is difficult to provide an exact figure for the annual issuance of structured bonds since many such issues take the form of private placements. And the approximate figures vary enormously. Hence some observers put the amount issued in structured bonds in the US market in 1993 at $50bn while others claim around $100bn! Furthermore, structured bonds account for around 60% of new issues in the euro-MTN market. Although these figures should be viewed with caution, there is a consensus that the market for structured fixed-income products has grown exponentially over the past three years, chiefly in the MTN segment in the USA and the euromarkets.

Rather than drawing up an exhaustive list of the structured bonds that are currently in fashion, we thought it would be more relevant to first examine the features that attract practitioners to these new products. We shall focus on the valuation of a particular structured product, the corridor bond. We will explain the reason of our choice, based on the corridor's innovative content. We will then deal with the evaluation and try to show how it is influenced by the main parameters. We shall end with a simulation of our hedging strategy, in order to validate our model.

* *Our special thanks to Dominique Poudevigne for his invaluable assistance.*

I. Why practitioners are attracted to structured products

Structured products are specially tailored to the user's individual requirements and, for that reason, their attraction varies from case to case. Nevertheless, it is possible to identify certain motives that are common to each constituency of user, be they investors or issuers.

I.1. Attractions for investors

Structured products attract investors for a number of reasons. The most significant of these are the possibility of profiting from specific expectations, the ability to solve individual problems and the chance of gaining access to restricted or complex markets. Another major attraction is the ease with which these products can be used.

a) Profiting from specific expectations

The uncertainty that affects the different markets - in equities, fixed-income instruments, currencies and commodities - has prompted participants to formulate specific expectations for each one. Depending on their requirements, investors can obtain a higher rate of return or establish a hedge against the risks stemming from their expectations.

Typically, reverse floaters were developed to allow investors to adopt a more dynamic stance in response to a sharp drop in interest rates.

If an investor wants to play on interest rate stability, he will contract a corridor bond. Let us go into more details of this product which we will deal with frother on. Most corridor bonds are issued for one year and are pegged to the 3-month or 6-month LIBOR. A bond with this type of structure, which proved extremely popular in the euromarkets in the first two months of 1994, was issued by Compagnie Bancaire in January 1994, with Paribas acting as lead bank. The principle consists in determining an interest-rate range (or corridor) within which each investor can anticipate what the base rate will be throughout the life of the bond. Investors are therefore betting that interest rates will remain relatively stable around the trend set by the corridor. In practical terms, the coupon is proportional to the number of days during which the base rate remains within the corridor, which thus acts as a kind of meter.

Example
Corridor bond issued by Compagnie Bancaire – January 1994

Redemption at 2/3/95: $MN + \left(MN \times 8\% \times \frac{n}{360} \right)$

Upper bound determined by the following formula:

$$6.6\% - \left[(6.6\% - 5.2\%) \times \frac{D}{365} \right]$$

Lower bound determined by the following formula:

$$5.6\% - \left[(5.6\% - 4.2\%) \times \frac{D}{365} \right]$$

where

MN = Nominal

n = no. days between 1/3/94 and 1/3/95 during which 3-mth PIBOR remains within the range (corridor)

D no. days between 1/3/94 and 1/3/95 (D=0 on 1/3/94)

Yield on 1-3 yr French Treasuries in January 1994: 5.27%

If the base rate remains within the corridor throughout the life of the bond, the investor receives a maximum coupon of 8%, which is extremely attractive in comparison with the yield on 1-3 yr government paper at the time of the issue. The coupon payment declines each time the base rate moves outside the corridor. Hence this product offers the investor a high potential rate of return as soon as his expectations prove to be founded. However, he is taking the risk that interest rates will be more volatile than he expects, which will lower his rate of return. We shall examine this product in greater detail in the second part of the study, looking at how to value the price of a corridor bond and how to establish a hedge.

Structured products also allow investors to take advantages of trends in markets other than that in the underlying instrument.

b) Access to restricted markets

This is often the case for insurance companies and pension funds as well as for collective investment schemes, which have been prohibited by prevailing regulations or by their management companies from dealing in the swaps, options or futures markets, for example. Structured products provide synthetic exposure to these markets so long as the underlying interest is an instrument permitted by regulations. Investors are thus able to take advantage that these markets offer in terms of returns, diversification or hedging. Hence, Fleetwings Ltd issued a bond linked to the futures market in November 1993, with Citibank Investment Bank acting as lead bank. The coupon comprises a fixed, declining annual rate and a 50% participation in the net earnings of one of America's largest futures funds.

c) Responding to a specific problem

Structured products can be specially designed to cover the asset management risks faced by certain investors.

A good example are the insurance companies that run a risk of prepayment on their guaranteed-minimum life contracts. When interest rates rise, large numbers of policyholders want to cash in their contracts before maturity in order to move into higher yielding contracts. To offset the effects of this disinvestment, insurance companies are forced to dispose of some of their assets. A puttable issue is designed to hedge that market risk by allowing the insurer to sell the security at a pre-set price whenever the relevant rate of interest exceeds a threshold.

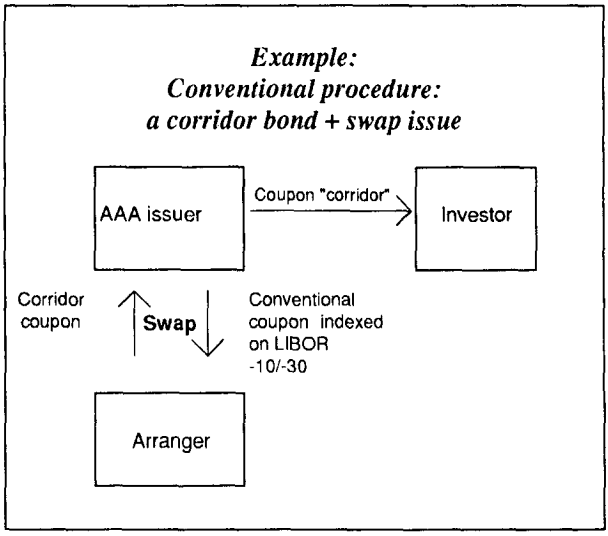
d) Simple to use

Before the arrival of structured products *per se*, investors could obtain a comparable tool only by relying on several separate markets. This complicated the decision-making and dealing processes and pushed up the cost of the product that investors ultimately obtained. By reducing the number of decisions to just one - the administration of a single instrument - structured products have simplified the task of investment management. This can be illustrated by structured products that offer built-in exchange rate guarantees. Such products, which are widely available, allow the investor to take positions in foreign markets without having to rely on the

currency market. This ease of use is an important feature and explains the exponential growth of this new market.

I.2. Attractions for issuers

Structured products allow issuers to obtain funds more cheaply than is the case with conventional products. The standard procedure is to issue a structured bond, which is swapped simultaneously with the bank that arranged the issue.



Another striking example of the way in which the cost of financing can be cut is the procedure known as delayed rate setting (DRS). In a situation where a borrower expects interest rates to fall, DRS allows him to raise capital in the bond market at a given date while setting the borrowing rate at a later date (For further information refer to the article of L. Assoun).

After this brief overview of the market in structured bonds, we shall now look in detail at the technical complexity of evaluating and hedging a particular product: the corridor bond.