

## **STRATEGIC APPLICATION OF FINANCIAL DERIVATIVES IN THE INVESTMENT POLICY OF INSURANCE COMPANIES**

ESTHER NASS  
LE MELE STR. 35  
61462 KÖNIGSTEIN I. TS. - GERMANY  
TELEPHONE : 06174-9312333

### **ABSTRACT**

Within the legal framework set for the use of derivatives in the investment policy of insurance companies, derivatives can be applied in many variations.

In the interviews carried out it became very clear that insurance companies are extremely reserved towards using financial derivatives. Capital investments in general do not play as important a role in the insurance business as they should, if the development of the financial markets were taken into account. For the future a new way of thinking has to find its way into the insurance sector, thus making way for new ideas especially a new approach towards the use of derivatives. At the beginning a co-operation with experienced banks as well as the participation in seminars and workshops make sense.

In view of the up-coming home market of the EU the German insurance sector will not only have to face the growing competition, they will also have to stand up to it. This they can do by applying financial derivatives to their investment strategies.



## CONTENTS

	Page
1. Introduction	1203
2. Principles for the Use of Financial Derivative Instruments	1204
2.1 Principles of investment	1204
2.2 Insurance Regulations stated in § 7.2.2 VAG Transactions permitted under Section 7.2.2 of the VAG	1206
3. Motives for the application of financial innovations in the insurance business	1209
3.1 Transformation of national and international financial markets	1209
3.2 The idea of all-round financial services	1209
3.3 Process of concentration	1209
3.4 Deregulation on July 1st 1994	1210
3.5 Changing requirements of consumers towards insurance services	1210
3.6 Alterations in investment strategies of insurance companies	1211
4. Overview of financial derivatives	1212
4.1 Swaps	1212
4.1.1 Interest rate swaps	1212

	Page
4.1.2 Cross currency interest rate swaps	1213
4.1.3 Asset swaps	1213
4.2 FRA's	1214
4.3 Interest rate options	1214
4.3.1 Caps, Floors, Collars	1215
4.3.2 Swaptions	1216
4.3.3 OTC-options	1216
4.4 Putting financial derivatives into practice	1217
4.5 Prospects for financial derivatives in the insurance business	1222
Appendix	1223

## 1. Introduction

In the past twenty years international financial markets have been subject to far-reaching structural changes often described as "deregulation, Securitization, computerisation and globalization". National controls of the capital markets were reduced, making a free world-wide flow of capital possible. Formerly separate market segments grew together and developed a high degree of interdependence. At the same time a "technical revolution" took place, improving the flow of information between market participants and therefore ensuring market transparency and information efficiency.

Factors arising from the above named rapid changes were an increased volatility and sensitivity of interest and exchange rates, as well as the growing competition especially within the insurance sector. Financial innovations can be used to manage risk and equally used to make profit.

In view of the changes taking place in the financial markets, the insurance sector is forced to restructure their investment strategies. A professional interest-risk-management will become an indisputable basic element of the capital investment sector in the insurance branch. Growing demands for better services from the consumer side also compel insurance companies to take action towards improving their all-round performance and thus sustain in the competitive markets.

In the past financial derivatives have been applied extremely hesitantly by insurance companies. One reason for this is the relatively restrictive legal basis created by the Federal Insurance Provisory Office. Since 1991 the Federal Insurance Provisory Office has put down new legal regulations determining the use of derivatives in the insurance business. There were for example the law amending insurance regulations which came into force on 01.01.1991, enabling insurance companies to expand and further diversify their investments, the Principle for the use of Financial Derivative Instruments on 27.05.1992 and last not least, the Deregulation on 01.07.1994, making cross-border insurance business within the EU possible. The second reason for the above mentioned hesitance towards the use of derivatives is the relatively conservative attitude of investment strategies concerning risks in insurance companies. Especially the news of latest losses due to transactions with derivatives in large German insurance enterprises (Colonia, Gothaer) confirm their refusal to work with financial innovations.

The aim of this theses is to demonstrate the broad application possibilities for financial derivative instruments in the investments of insurance companies and, in a second step to develop individually designed structures that profit from the transactions permitted within the legal framework of the Federal Insurance Provisory Office. Finally derivatives should prove to be risk- and yield- optimising instruments.

## **2. Principles for the Use of Financial Derivative Instruments**

### **2.1 Principles of Investment**

The Principles of Investment create a legal framework in order to aid insurance companies to fulfil their function as institutional investors in the various financial markets. This legal framework is based on securing the insured persons capital. This would mean that the insurance corporation would have to protect the invested capital from losses and invest it accordingly. The investment strategy depends on the area of insurance (life-insurance etc.), where certain risks can or must be taken to meet the various profit- requirements.

"The function of an efficient insurance business within the national economy is primarily its fulfilment of the demands posed: provision of insurance cover, thereby covering an uncertain financial risk and in return receiving a fixed premium.[...] The received premiums and other earnings are to be invested in safe assets that serve as a possible guarantee/ security."

The German investment supervision provisions can be summarised as follows:

"The capital of an insurance company is to be invested, in consideration of the type of insurance business carried out, as well as the structuring- organisation of the enterprise, thus obtaining maximum profit while ensuring liquidity, variation and mixture of investments."

Five principles of investment can be deducted from the above cited investment supervision provisions.

**Principle of Safety**

The main criteria of capital investments by any insurance company is the safety of these investments. This safety is not only to be ensured at the time of the investment but also for its entire duration. Regular control of the assets and the debtors is absolutely necessary.

**Principle of Profitability**

The profitability of an asset is featured by the yield to be gained, while simultaneously meeting requirements of safety and liquidity in certain market situations.

The profitability of assets is also used to compensate for losses made due to events of damage.

**Principle of Liquidity**

Incoming and outgoing payment streams (premiums etc.) vary from one insurance area to another. In the life-insurance sector payment streams are relatively regular, whereas payment streams in other sectors can be subject to higher fluctuations derived from coincidental and irregular damage that occurs. Therefore demands put to the management of liquidity differ. This also influences the structure of a portfolio which can have different levels of liquidity, depending on the type of insurance cover that is offered.

**Principle of Mixture**

Mixture is meant in the sense of evaluating the individual assets of an entire portfolio according to the specific risk inherent in shares, bonds and options. By mixing the assets, the risk-momentum of each portfolio can be minimized.

### **Principle of Variation**

The aim of this principle is to place investment capital with numerous debtors, in order to avoid depending on the financial faring of only one debtor and hereby endangering the safety of the invested capital.

It is practically impossible to comply with all the above mentioned principles. Therefore one can say: "The general aim is reached, when a well mixed and varied asset stock is relatively liquid and safe while earning a competitive profit."

### **2.2 Insurance Regulations stated in §7.2.2 VAG on 1.1.1991 Transactions permitted under Section 7.2.2 of the VAG**

#### **Hedging transactions**

An insurance company's portfolio manager now has a wide choice of hedging facilities and strategies. Experience has shown that options and futures contracts are a particularly useful means of minimising the risks inherent in investment on the capital market. Every insurance undertaking must, however, select from the very wide range of hedging strategies - some of which can also be combined - the one which are most likely to meet its expectations in terms of returns. This is the only way it can achieve an optimum balance in the opportunity/risk profile of its securities portfolio.

A hedging operation necessarily involves the analysis of risks, which must be continued even after strategy has been selected, for the market trend may require a reassessment of risks and potential returns. But this may lead to a change in investment policy and accordingly a switch to, and use of, other hedging strategies. The use of hedging facilities is therefore not a static but a dynamic process for which properly trained personnel must be continually responsible.

According to Section 7.2.2 of the VAG, financial derivatives can be used mainly for so-called hedging transactions. Such transactions take place when options, futures contracts and swaps are used:



- a) to protect the current shares and/or fixed-rate securities portfolio fully or partly against future price fluctuations; or
- b) to protect the DM value of technical reserves and payables as far as possible from the additional costs which might otherwise arise as a result of currency fluctuations.

Every fixed-rate security, every share and every other item must appear in the insurance undertaking's balance sheet assets when a hedging transaction is carried out. The same applies to the liabilities that are to be protected from currency fluctuations.

### **Preliminary purchase transactions**

In accordance with Section 7.2.2 of the VAG, financial derivatives can also be used for the future purchase of securities. By purchasing a call option or concluding a futures contract, an insurance company can determine the peak price at the relevant time of the securities to be acquired.

On the other hand, the sale of put options (short puts) can also be used for preliminary purchase operations since the option premiums obtained from this transaction make it possible to acquire securities on more favourable terms. A short-put position can be accepted in connection with long-term investment strategy if, for example, shares in a particular firm are to be purchased at a later date. If the option is exercised because the market price is less than the exercise price, the insurance firm obtains the desired shares - but at a lower price than the exercise price since the previously collected option premium reduces the cost. If, however, the market price exceeds the exercise price or if they are the same, the option is not exercised. The insurance firm can then buy the shares on the market, in which case the option it has obtained also reduces the costs. In a short-put position, an insurance undertaking therefore benefits from steady rising prices. If the investment strategy changes while the option is running or if, because of special circumstances, the market price falls so far below the exercise price that there is no longer any point in buying the shares, the insurance firm must protect itself in good time with a counter-purchase to balance the short-put position.

### **Obtaining additional returns**

Lastly in accordance with Section 7.2.2 of the VAG, an insurance company can use financial derivatives to obtain additional returns from its existing securities portfolio. An adequate return can be obtained particularly if the insurance company uses its securities to act as the writer of call options in security option transactions, or if it uses them as reference stock for the sale of futures contracts. An insurance company can offset its delivery commitment as a writer by making an appropriate counter-purchase.

### **Limits**

Transactions which have nothing to do with hedging preliminary purchases or obtaining additional returns are not permitted under Section 7.2.2 of the VAG. In this respect bear sales of shares, fixed-interest securities and receivables not in the form of securities are prohibited. Call options may be sold only if the assets involved in the option deal are in the portfolio at the time of the sale. These assets may not be sold during the period of the call option. Put options may be purchased only if the assets involved in the option deal are in the portfolio at the time of purchase. The same applies to other financial derivative operations when they have no connection with the insurance undertaking's own investment in securities. The writer's delivery commitment can, however, be offset by a counter-purchase. Arbitrage transactions are also ruled out. The purchase of a call option which is out of the money is not permitted either.

### **Restrictions on the volume of financial derivative operations**

Hedging transactions must be limited to the portfolio of directly held securities and borrower's notes.

Preliminary purchase transactions should be limited to a maximum of 30% of the total securities and borrowers' notes to be acquired.

Transactions to obtain additional returns are limited to 10% of the securities and borrowers' notes directly held in portfolio. This limitation does not concern repurchase agreements since they are not affected by any price risk.

### **3. Motives for the application of financial innovations in the insurance business**

#### **3.1 Transformation of national and international financial markets**

A sharp acceleration in the pace of innovation, deregulation and structural change in recent years has transformed the international financial system. Financial markets have become far more closely integrated world-wide; capital has become much more mobile.

Increased complexity of financial transactions, as well as the higher volatility of interest rates and prices make risk- and interest rate management an absolute necessity.

#### **3.2 The idea of all-round financial services**

The attractiveness of the insurance market encourages further insurance agencies, banks and building societies to enter the market. As a result of this, markets, formerly reserved to the insurance branch only or the banking branch exclusively, began to overlap, thus breaking down existing market delimitations, depriving insurances of their traditional business area and forcing them to increase their offer of financial services in order to keep their position in the market. Most major banks in Europe already have their foot in the door in the insurance business. Due to customer data becoming the deciding factor, banks already have a head-start in the marketing sector which they owe to their regular contact with their clients as well as the data they accumulate in the course of their business connections. The general pressure of competition has increased sharply.

#### **3.3 Process of concentration**

New demands put to the insurance business by the market itself and the insurance customers, will give rise to intensified investments in marketing, new products, target-groups and cost-management. All in all, not every insurance corporation will be able to keep up with the new standards, so smaller companies will withdraw from the market, others will have to specialize on certain products.

"Of more than 2000 active insurance companies in Europe today, only 50% will survive. A large part will be bought up by financial institutions that sustain the sales-network while steadily reducing administrative functions. The remaining enterprises will loose further shares of the market and their profitability will continue to go down.

### **3.4 Deregulation on July 1st 1994**

The aim of this deregulation is to make cross-border insurance business activity within Europe's home market possible. The following regulations should simplify business transactions:

- supervision will move away from the end-user (insured)
- domicile supervision will switch to foreign supervision
- the quality of product-inspection will change
- consumer protection will no longer be carried out by qualified civil servants but will be effected by the competition in the insurance area and by the insight of the consumers.

This deregulation in Europe has created one of the largest economic areas of the world: in the future approximately 4300 insurance companies will be able to serve over 380 Million customers.

### **3.5 Changing requirements of consumers towards insurance services**

A further consequence of the changes taking place is the sensitisation of the consumers for differences in service and price within the terms of business of the various insurance agencies. The main motive for taking out an insurance has changed from a retirement insurance to a new awareness for profitable investments, consequently using retirement insurances as assets. Another reason for increasing investments in insurance policies is the fact that consumers are better educated and informed nowadays, enabling them to "make their money work" by investing it. Their knowledge makes it possible to demand better services from the insurance companies. But not only the insurance's performance has to be improved, the products themselves have to be adapted to the new standards set by the market and by the customers.

Product-innovations will head in the direction of designing products that maximise the fulfilment of the needs of the clients.

### **3.6 Alterations in investment strategies of insurance companies**

Decisions concerning the structure of capital investments of insurance companies are made on the basis of foreign exchange, interest rate and profit prognosis. Investments today are exposed to the following risks:

- economic risk = recession
- risk of inflation
- interest rate and price risk
- political risks; national and international
- credit risk of debtors

Taking these risks into account, decisions to buy, hold or sell are made. Risk management will become one of the most important tools of capital investment strategies. Modern risk management consists of:

- regular evaluation of each business transaction
- determination of factors that influence investment positions
- analysis of cash flows and sensitivities
- quantification and management of risk
- setting of limits

An active investment management is very important in order to avoid available capital from "lying fallow". The buy-and-hold idea is out-dated and causes unnecessary opportunity costs.

Another factor that will influence investment strategies is the profitability of investments. The risk-yield-relation will be of more interest in the future, due to competition being carried out on the basis of profitability of portfolios owned by the different insurance companies.

## **4. Overview of financial derivatives**

### **4.1 Swaps**

Swaps are financial transactions in which two counterparties agree to exchange streams of payments over time according to a predetermined rule, which reflects interest payments and may also reflect amortisation of principal. Swap markets are utilised for several reasons: in order to obtain low-cost financing, to obtain high-yield assets, to hedge interest rate or currency fluctuations generated from the structure of normal business.

#### **4.1.1 Interest rate swaps**

In an interest rate swap no principal amount is exchanged either initially or at maturity, but interest payment streams of differing character are exchanged according to predetermined rules and based on an underlying notional principal amount.

The two main types are:

- a) fixed-to-floating-rate swap
- b) floating-to-floating-rate swap or Basis swap

to a) In a fixed-to-floating rate swap, one party pays fixed rate interest payments and receives floating rate payments, both denominated in the same currency. The counterparty receives the fixed interest rate payments and pays floating. No cash flows of principal are exchanged.

to b) Basis swaps allow parties to swap from one floating-rate instrument to another, thereby allowing them to enter markets which may not directly be available to them. For example the following floating rates can be swapped:

- 3-month-LIBOR against 6-month-LIBOR or
- 6-month-LIBOR against 1-month-LIBOR

Basis swaps can be carried out in the one currency or in different currencies. For example:

- 6-month-US-\$-LIBOR against 6-month-DM-LIBOR or
- 3-month-US-\$-LIBOR against 3-month-YEN-LIBOR

#### **4.1.2 Cross currency interest rate swaps**

A cross-currency interest rate swap involves the exchange of payments in different currencies (principal) and also on different interest rate bases, such as floating rate or fixed rate.

A cross-currency interest rate swap consists of three steps:

##### **(1) Initial exchange**

The swap parties exchange principal amounts in the predetermined currencies at the prevailing spot rate.

##### **(2) Interest rate payments**

During the period of the swap the interest rates are exchanged on a semi-annual or annual basis. The rates are regularly adjusted to the current market rates.

##### **(3) Final principal exchange at maturity**

When the swap matures, principal amounts are re-exchanged at the initial spot rate. Therefore exposure to currency fluctuations is eliminated.

#### **4.1.3 Asset swaps**

The distinguishing feature of an asset swap is that it is a swap linked to an asset. This means that asset swaps are used by investors. They are used to manage interest rate or currency risk, in order to anticipate changes in interest or exchange rates.

In an asset swap the basic interest rate and currency can be transformed.

An asset or a portfolio receiving fixed interest payments can, by entering an asset swap, be switched to floating rate payments in the same or in another currency.

Before an asset swap can be carried out, the cash flows on underlying assets have to be adjusted in order to produce asset swaps which can appeal to investors. Detailed description of all adjustments can be found in the **appendix I**.

Institutional investors use asset swaps to create investments with a higher yield than corresponding traditional investments.

#### **4.2 FRA's**

A Forward Rate Agreement (FRA) is a forward contract, obliging one counterparty to buy, the other to sell a specific underlying at a specific price, amount, and date in the future. The underlying in this case is an interest rate receiving bond.

The purchaser of an FRA wants to hedge rising interest rates, the writer of an FRA wants to hedge falling interest rates.

#### **4.3. Interest rate options**

An option is a contract conveying the right, but not the obligation, to buy (call) or sell (put) a specified financial instrument ( underlying) at a fixed price (exercise or strike price) before or at a certain future date. There are two parties to an option contract: the option seller (writer) and the option purchaser (buyer). The buyer purchases from the writer a commitment that the option writer will stand ready to sell or purchase a specified amount of the underlying instrument on demand. The option buyer's cost for his right (premium or option price) is paid to the option writer and can be expressed in a variety of ways, for example as a percentage per unit of the underlying. Options are purchased and traded either on an organised exchange or in the over-the-counter (OTC) market.



The value of an option contract is composed of its "intrinsic" value - the payoff on the option at expiration - plus its "time" value - the value attributable to the volatility in the underlying over the remaining life of the option.

### **4.3.1 Caps, Floors Collars**

#### **Caps**

An interest rate cap is designed to provide corporate borrowers with protection against the rate of interest on a floating-rate loan rising above a certain level. This level is known as the cap rate. If the rate of interest on the loan does go above the cap rate, the seller of the cap provides the difference between the interest on the loan and the interest that would be required if the cap rate applied.

#### **Floors**

Interest rate floors are designed to provide the corporate investor with protection against the rate of interest on a floating-rate asset falling below a certain level. Again the difference between floor rate and the prevailing interest rate is provided by the seller of the floor.

#### **Collars**

Collars specify both the upper and the lower limits for the rate that will be charged or paid. A collar is a combination of a long position in a cap and a short position in a floor.

### 4.3.2 Swaptions

Swaptions or swap options are options on interest rate swaps. They give the holder the right to enter into a certain interest rate swap at a certain time in the future. There are call swaptions (receiver swaption) and put swaptions (payer swaption). As a receiver one has the right to receive the fixed interest rate out of the swap, as payer one has to pay the floating interest rate of the swap.

### 4.3.3 OTC-options

Not all options are traded on exchanges. Over-the-counter options markets, where financial institutions and corporations trade directly with each other are becoming increasingly popular. The main advantage of an over-the-counter option is that it can be tailored by a financial institution to meet the needs of a corporate client.

	<b>Call option</b>	<b>Put option</b>
Strike price < Bond price	in the money	out of the money
Strike price > Bond price	out of the money	in the money
Strike price = Bond price	at the money	at the money

### Call option

The purchaser of a call option can make profit, if the bond price is higher than the option strike price plus premium at maturity of the option. In this case we call it an "in the money" option. If the strike price of the option is higher than the bond price, we speak of an "out of the money" option. If the strike price and the bond price are the same, it is called an "at the money" option.

### **Put option**

A put that is "in the money" means that the bond price is lower than the strike price. If the put is "out of the money", the bond price is higher than the strike price.

The more an option is "out of the money" and the shorter the remaining period until maturity, the higher the risk that the owner of the option will lose his investment. The chances to make profit are higher in the "in the money" option, the more the option is "in the money".

### **4.4 Putting financial derivatives into practice**

An individual and problem-oriented application of the above mentioned derivatives can be shown by structures. Various insurance companies, clients of the DG BANK, were interviewed concerning their present use of derivatives. According to the demand of these clients, structures were discussed with the Financial Engineering department. The questionnaire can be found in **appendix I** and a summary of the interviews is to be found in **appendix II**.

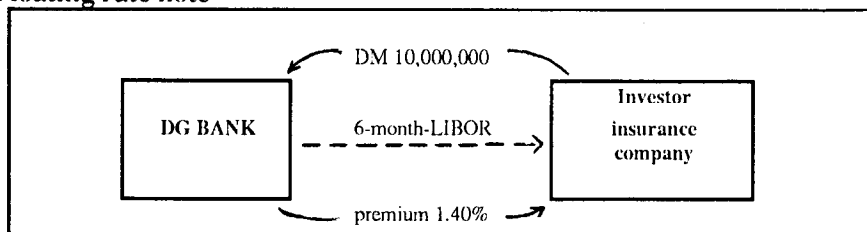
The structures developed are based on hedging transactions, preliminary purchase transactions and the realisation of additional returns as stated in § 7.2.2 V.A.G.

Derivatives should be applied under the premise of a definite yield forecast. That means each insurance company should form an opinion as to how they expect the yield-curve to develop in the future; whether it expects the interest rates to rise, to remain the same or to fall. Then the influence of changing interest rates on each portfolio has to be analysed. Last but not least suitable strategies have to be developed either to hedge or to make profit.

**Structure 1.**

**An insurance buys a floating rate note (nominal DM 10,000,000) and sells a payers swaption (7 years).**

For selling the payers swaption the insurance receives a premium of 1.40%.

**Floating rate note**

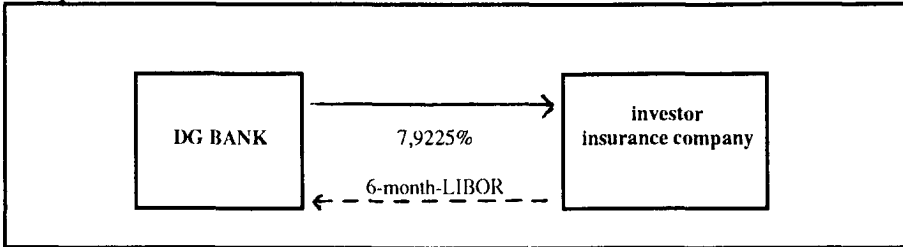
The insurance (investor) receives floating interest payments at 6-month-LIBOR out of the floating rate note.

In the third year the DG BANK has the right out of the option to pay a fixed rate until maturity, for e.g. the 5-year forward. Depending upon how the agreed fixed rate lies in comparison to the 5-year forward rate, it is either "at the money", when the agreed fixed rate is the same as the forward rate, or it is "out of the money" when the agreed fixed rate is higher than the forward rate; when the agreed fixed rate is lower than the forward rate it is "in the money". According to the positioning of the agreed fixed rate the premium is lower when the fixed rate is "out of the money" and it is higher when the fixed rate is "in the money", because it is very probable that the option will be exercised.

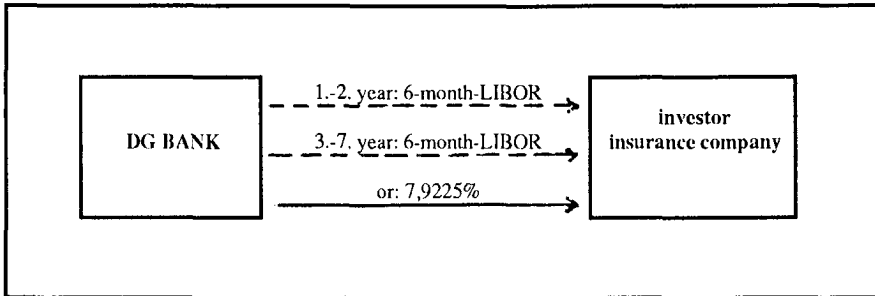
The forward rate for 5 years in 2 years is calculated by using the 2-year-swap rate and the 7-year swap rate.

On the 02.03.95 the 2-year swap rate was 6.43% and the 7-year swap rate was 7.42%; therefore the forward rate for 5 years in 2 years is 7.9225%.

**Swaption**



The entire structure is as follows:



Should the DG BANK not exercise the option it continues to pay 6-month-LIBOR for the floating rate note.

**When will the DG BANK exercise the option ?**

The DG BANK will only exercise the option if the 5-year rate in 2 years (forward) is lower than 7.9225%. Because then she can rediscount lower than in the market.

### What is the advantage for the investor ?

For the sold swaption he receives a premium. This premium can be an upfront payment 1.40%, or be paid as a yearly rate amortised over the remaining 5 years:

present value of the premium = 140 bp, amortised over 5 years it is 39.95 bp per year.

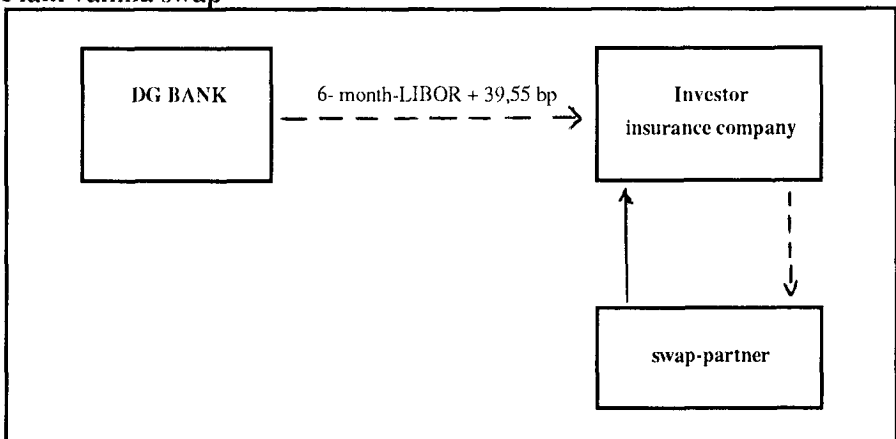
All in all the insurance company receives 6-month-LIBOR + 39.50 bp out of the floating rate note.

The advantage for the investor (insurance company) can be shown by calculating the **break-even-point**:  $7.9225\% + 0.395\% = 8.3175\%$

In effect the insurance company receives 8.3175% and only makes loss should the 5-year swap rate rise over 8.3175%. Looking at the yield curve it is rather improbable that the 5-year swap rate will be higher than 8%, so the investor secured himself a high interest rate for 5 years.

Should the investor expect interest rates to fall on the date of exercise, he can enter a plain vanilla swap and secure himself a fixed interest rate. He is floating rate payer in the swap and passes the 6-month-LIBOR out of his floating rate note through to the swap.

### Plain vanilla swap



The insurance company has to take a certain credit risk into account. This lies in the possibility of the debtor being downgraded and therefore an increase in the spread over the 6-month-LIBOR.

### **Structure 2**

The insurance company owns a floating rate note. She expects the interest rates to fall and wants to protect her investment. By buying a floor she has the guarantee of receiving a minimum interest rate. She pays a premium for the floor. Now the investor has to find a good time buy the floor as cheaply as possible. The best time to buy a floor is when the interest rate-curve is steep and positive. 1991 had this constellation of interest rates. A 7%-floor was very cheap at that time. Today this floor would have a certain time value and would fulfil its "securing function" because the 6-month-LIBOR is now at 5.1875%.

### **Structure 3**

The insurance company can obtain an additional return by selling a cap to the debtor of a floating rate note for which she receives a premium. For the debtor a cap is of interest because it protects him from a rise in interest rates up to a certain degree.

For the insurance company the best time to sell the cap is when the yield curve is steep and positive, because the cap premium is the most expensive then. But the insurance company has to make sure that the interest rates will not rise above a certain level, otherwise she will have to compensate the cap buyer.

The insurance company sells a 10% cap and receives a premium of 3.00%. This premium is discounted over 10 years and amounts to a spread of 20 bp over the 6-month-LIBOR.

#### **Structure 4**

Combination of structure 2 and 3 to form a collar. Since both strategies apply to the same interest rate constellation, they can also be applied in combination with each other.

The insurance company owns a 10-year floating rate note. She sells a 10% cap at a premium of 3.00% and buys a 7% floor at a premium of 1.50%. The remaining difference is 1.50%, discounted over 10 years it is 20 bp. So altogether the insurance company receives 6-month-LIBOR + 20 bp.

#### **4.5 Prospects for financial derivatives in the insurance business**

After the bad experience large German insurance enterprises had last year the insurance sector is extremely cautious this year in their approach toward the implementation of derivatives in their investment management. But even so, most investment managers of insurance companies are of the opinion that derivatives will become part of the general investment strategy in the future. It is very important that the use of derivatives is precisely determined and enclosed. This can be put into action by creating an internal organisation responsible only for derivatives and by building up a backoffice as a control mechanism that regulates limits and competences. Last but not least the insurance company dealing with derivatives has to ensure that the personnel is qualified and that they have access to modern computer systems.

When these requirements are fulfilled financial derivatives can be applied professionally and under the necessary supervision.

It is clear that the application of derivatives will return to simplification; exotic and complex structures will be abolished in order to keep a good general overview and avoid failures. Consequently insurance companies will have to invest further in up to date equipment and specialized staff.



**APPENDIX**

**Appendix I:** Adjustments in an asset swap p. 1224

**Appendix II:** Questionnaire p. 1225

**Appendix III:** Summary of interviews p. 1227

## Appendix I

### Adjustments in an asset swap

1.) When an investor purchases an asset he usually has to pay accrued interest if the asset is not purchased at issue or on a coupon payment date. Any payment of accrued interest by the investor when it purchases the underlying asset has to be immediately compensated by the intermediary (Swap-intermediary, usually a bank) by an upfront cash payment to the investor. The intermediary will recoup this payment of accrued interest, and the cost of funding it until a coupon is actually paid, by subtracting a margin from the floating interest which it pays to the investor through the swap. The margin is calculated by amortising the accrued interest over the remaining life of the asset.

2.) Any premium or discount on the price of the underlying asset when it is purchased by the investor needs to be eliminated by the intermediary so in net terms the investor ends up paying for the asset at par. The compensation paid by the intermediary is called premium when the underlying asset is over par and it is called discount when the underlying asset is under par. The margins required to offset the cash payments made to eliminate premiums or discounts are calculated by amortising the amount of a premium or discount over the remaining life of the asset.

3.) If the coupon rate and the swap rate differ, an investor is exposed to reinvestment risk: uncertainty about the total return on the swapped asset, because the future interest rates at which a net interest gain can be invested or a net interest loss funded are unknown in advance. Reinvestment risk in asset swaps is solved by setting the swap rate at the same level as the coupon rate on the asset, which will mean the swap rate is off market. However, the counterparty which is disadvantaged by this off market swap rate - the payer, if the off-market rate is above the current swap rates; the receiver, if it is below - must be compensated by either:

- a cash payment from the other counterparty

- an adjustment in the form of a margin to the floating interest through the swap

## Appendix II

### Questionnaire

- 1.) What is the structure of your asset portfolio?
- 2.) What do your payment streams look like?
- 3.) What hedging have you carried out so far to protect your assets against various risks?
- 4.) Which derivative products have you used until now?
- 5.) What internal guidelines does your company have for the department dealing with derivatives?
  - backoffice
  - control board
  - research
- 6.) What products are mainly used:
  - structured products
  - separate products, individually combined?
- 7.) Can these products be priced by the internal department?
- 8.) What experience have you had with derivatives?
  - transparency
  - cancellation of structures
  - market information ?
- 9.) Investment strategies ?
- 10.) Interest in individual structures developed by the Financial Engineering department of the DG BANK ?
- 11.) Consequences of the Deregulation 1.7.1994 ?

- 12.) Possible development of financial derivatives in the investment policy of insurance companies?

## Appendix III

### Summary of interviews

1.) The main focus of investments is on fixed-interest assets that take up 2/3 of all investments:

- debentures
- mortgage bonds
- note loans
- bonds

exposure to the following risks:

- reinvestment risk
- depreciation risk
- risk of changes in the interest rate

2.) Incoming payment streams:

- insurance premiums

Outgoing payment streams:

- compensation due to events of damage

3.) - liquidity planning

- asset allocation
- pre-purchase agreements
- hidden reserves

4.) -pre-purchase agreements

- put-options
- otc-options
- swaptions
- swaps/ asset swaps
- caps
- futures

5.) Partly the insurance companies do not deal in derivatives, so they do not have an organised department for derivatives, or is in its beginnings. A

research department is not usual for an insurance company but one of the insurance companies that was interviewed did have a separate research department that supports the department responsible for investment arrangements.

6.) If derivatives are used at all, then in as simple structures as possible. The insurance companies rarely create their own structures. Their general matter of concern is that the products can be calculated by the investments department itself without having to rely entirely on the intermediary bank.

7.) Most insurance companies do not have the necessary computer equipment for derivative calculations to their disposal. Therefore they are mostly not able to scrutinize price calculations.

8.) - no experience

- theoretical experience: seminars, computer simulations
- the more complex the derivative structure, the more difficult it is to cancel before maturity
- insufficient transparency concerning margin transactions by banks

9.) Investment strategies based on the three criteria safety, profitability and liquidity. Depending on the insurance sector (life insurance etc.) the three factors are of different importance.

10.) Yes, interest is there, if individual problems and wishes are taken into account.

11.) -Increasing demand for unit-linked life assurances

- a further minimising of costs in the insurance sector
- new individualization and differentiation of insurance products
- earnings-oriented capital investments of growing importance

12.) In general positive prospects for an increased application of derivatives in the investment policy of insurance companies.