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EXOTIC OPTIONS AS NON STANDARD DERIVATIVE SECURITIES IN FINANCIAL MANAGEMENT: A LITERATURE INSIGHT

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Abstrak: Dalam kajian literatur manajemen keuangan, khususnya manajemen keuangan internasional atau manajemen investasi, sulit ditemukan kedalaman teori dan kompleksitas contoh kasus yang membahas tentang surat berharga dengan opsi.

Tulisan ini mencoba menjelaskan tentang opsi yang tidak umum dari yang umumnya sering dijumpai dalam literatur keuangan yang terdiri dari opsi beli (call option) dan opsi jual (put option), baik jenis opsi Amerika (American option) maupun jenis opsi Eropa (European option) yang asumsi penyelesaiannya dengan kondisi nilai tukar mata uang yang berdistribusi normal. (normally spot exhange rate). Opsi yang tidak umum tersebut adalah exotic option yang penyelesaiannya dengan asumsi lognormally spot exhange rate.

Turnbull & Wakeman (1991) berhasil membuktikan secara empiris bahwa dengan obyek data-data keuangan di pasar keuangan derivatif internasional, pola opsinya adalah dengan fungsi lognormal. Implikasi dari hasil penelitian ini membuka wacana bahwa teori opsi dalam menajemen keuangan yang selama ini menjadi materi perkuliahan berdasarkan atas literatur dengan asumsi normally spot exhange rate adalah tidak link and match dengan fakta di lapangan untuk transaksi opsi. Penulis menyadari, sekalipun lebih realistis tetapi mengapa sampai saat ini exotic options belum dimasukkan dalam literatur keuangan yang ada, karena penyelesaian untuk soal/masalah exotic option ini membutuhkan bantuan program komputer.

Isi tulisan ini merupakan kajian dan pendalaman teoritis untuk teori opsi. Penulis mengharapkan minimal tulisan ini menjadi insight yang dikemudian hari dapat tercantum dalam satuan acara pengajaran (SAP) dan menjadi satu materi perkuliahan manajemen keuangan internasional, atau manajemen investasi. Dengan demikian diharapkan dapat dihasilkan lulusan perguruan tinggi dengan konsentrasi keuangan yang lebih siap pakai (marketable) jika berkehendak menjadi professional di perusahaan keuangan yang bergerak dalam pasar keuangan internasional (International money market).

Kata kunci: exotic option, literatur keuangan, menajemen keuangan

INTRODUCTION

Derivative securities have recently been blamed as the culprits behind huge corporate financial losses at firms like Gibson, Proctor & Gamble, and Barrings. So, what exacly are derivative securities? Why are they viewed as "bad"? Options, future contracts, and forward contracts are all examples of derivative securities. A derivative securities is a financial contract written on an underlying asset. Its value is derived from the value of the

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underlying asset, hence, the name. The underlying asset may be a stock,Treasury bills, foreign currency, or even another derivative security. For example, the value of a stock options depends upon the value of the stock on which it is written; the value of a Treasury bill futures contract depends upon the price of an underlying Treasury bill; the value of a foreign currency forward contract depends upon the foreign currency forward rate; and the value of a swaption depends upon the value of the underlying swap contract.

Derivative securities are sometimes viewed as "bad" because they are often complex instruments, difficult to understand, and highly leveraged. Moreover, the high leverage means that small changes in the underlying asset's price can cause large price swings in the derivative's price. If this characteristic is misunderstood, huge losses may be realized. Derivative securities are excellent financial instrument for speculation and for creating insurance; this latter motive is usually called hedging. Speculation and hedging are "flip sides of the some coin." We cannot have one without the other.

Two types of the derivative securities – future and options – are actively traded on organized exchanges. These contract are standardized with regard to a description of the underlying asset, the right of the owner, and the maturity date.

Future Contract

A future contract is an agreement to buy or sell a specified quantity of an asset at a specified price, and at a specified time and place. This part of the definition of a future contract is identical to that of a forward contract. But futures contract differ from forward contracts in four important ways. First, futures contract allow participants to realize gains and losses on a dailly basis, while forward contract are cash settled only at delivery. In essence, the delivery price is paid via a sequence of installments over the life of the contract. These installments are random and unknown at the time the contract is written; Second, futures contracts are standardized with respect to the quality and the quantity of the asset underlying the contract, the delivery date or period, and the delivery place if there is physical delivery. In contrast, forward contracts are customized on all these dimensions to meet the need of the two counterparties. Third, future contract are settled through a clearing house. The clearing house acts as a middleman to each transaction. This minimizes credit risk as the second party to a future markets are regulated, while forward contracts are unregulated.

Example: The Clearing House Function

Suppose that on Monday morning an individual, Mr. Mandra, decides to enter into a futures contract to buy 100 troy ounces of gold at the future price of $366 per troy ounce. For every buyer there must be a seller (writer), that is, there must be an individual, Mr. Basuki, willing to sell 100 troy ounces of gold. In contrast to a forward contract, the two parties need not know each other, because immediately after the trade is completed, the clearing house steps in with offsetting positions. Thus respect to individual Mr. Mandra, the clearing house writes a contract, and with respect to individual Mr. Basuki, the clearing house buys a contract. See Figure 1.1.

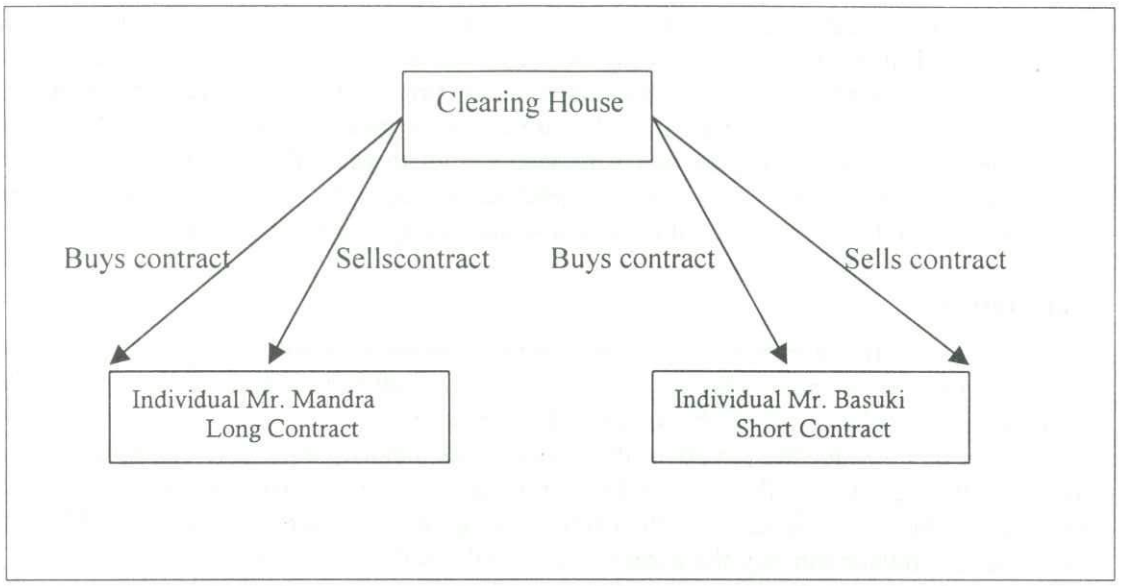

Figure 1.1. The Clearing House Function
Source: Turnbull, S.M. and Jarrow, R. (1996). *Derivative securities.* Cincinnati: Ohio. South-Western College Publishing. p-14

This intervention by the clearing house implies that the futures market has no counterparty risk. Individual Mr. Mandra looks to the clearing house to fulfill the contract and individual Mr. Basuki looks to the clearing house to fulfill the contract. The clearing house is thus the counterparty to every contract. The clearing house, having financial reserves to guarantee that its contractare executed, is considered default-free. It accepts the riks that a counterparty may default on a contract and in return receives a small fee for each contract axecuted. To minimized counterparty risk, it only accepts contract from "qualified traders" and it sets margin accounts. The net position of the clearing house is always zero, so that the only risk the clearing house bears is the credit risk that one party to a contract may default.

Options Contract

There are two basic types of option contract: call options and put options. A call options gives the holder the right to buy the asset at a stated price (called the exercise price or strike price) on or before a stated date (called the maturity date or expiration date). Conversely, a put option gives the holder the right to sell the asset at a stated price on or before a stated date.

The names "call" and "put" come from the actions potentially taken by the holders of the contracts (the long position). Call options give the holder the option to buy, that is, to call the asset away from someone. Put options give the holder the option to sell, or to put the asset to someone else.

The premium is the price paid for an option. As each option can be viewed as a type of insurance contract for hedging risks, the terminology is analogous to that used for the price paid to purchase (life) insurance contracts.

In general, call and put options are defined in one of two manners: American or European. A European option can only be exercised at the maturity date of the option, whereas an American option can be exercised at any time up to and including the maturity date. Hence, the definitions of a call and of a put option given above are of the American type. These adjective – European and American – refer to when the exercise of the option can occur, and despite the names, have no relation to geographic considerations. European options trade on the American continent, and American options trade in Europe.

Call Option

Consider first a European call option written on an asset with spot price S(t), where t denotes the current date. The option is assumed to mature at date T (for t <= T). The exercise price (strike price) of the option is denoted by K.

Let us consider the payoff to the option at its maturity date. The call option gives its owner the right to buy the asset at the exercise price, K at the maturity date. If the asset price at this date, S(T), is less than the exercise price, the call option is worthless. Why? At this time, the owner can buy the asset more cheaply in the market than he or she can buy exercising the option. For example, if the asset's price at maturity is $20 and the strike price $25, the option is worthless. The option holder would be better off buying the asset in the spot market. If the asset's price at maturity is greater than the exercise price, the option owner can exercise the option and obtain the asset at the exercise price, K, saving S(T) – K. For example, if the asset's price at maturity is $27 and the strike price is $25, the option is worth $2.

We can write the call option's payoff in the form:

$$S(T) - K;\ S(T) >= K$$
$$C(s(T), 0; K) = 0\ ;\ S(T) < K$$

This is sometimes called the option's *boundary condition*. This payoff is shown in Figure 1.2. the payoff curve starts at a 0 value when the asset price is zero and runs horizontally at zero until the asset's price rises to K. At this time, the curve increases in value one dollar for each dollar increase in the asset's price. When the asset's price exceeds K, the call option is said to be *in-the money*. Gains from holding the call option are unlimited. Losses are bounded below by zero. The option's profit is the payoff minus the initial cost of the option. Thus, the maximum one can lose from owning a call option is the initial cost.

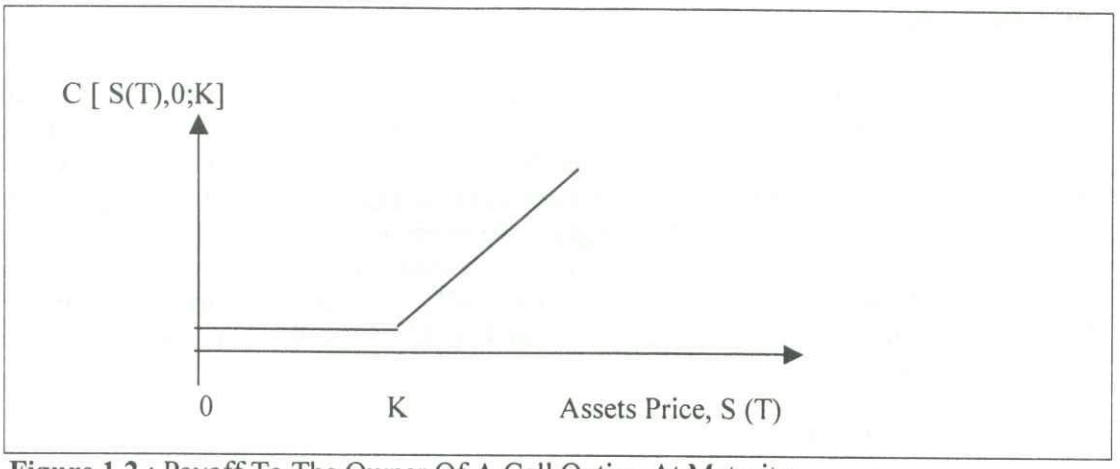

Figure 1.2.: Payoff To The Owner Of A Call Option At Maturity
Source: Turnbull, S.M. and Jarrow, R. (1996). *Derivative securities.* Cincinnati: Ohio. South-Western College Publishing. p-15

Figure 1.3. shows the payoff to the writer of the call option considered in figure 1.2. the payoff to the written call is similar to that of the long call, but reflected across the horizontal axis. If the option expires worthless—the asset price being less than the exercise price—the option writer is happy. Why? The option writer has the initial premium and no additional obligation. If the option expires in-the-money, the option writer is unhappy. The option is worth S(T) – K, which must be paid by the writer. What is the maximum amount the writer can lose? Theoretically, the loss is unlimited! The writing of an option without any offsetting position is an underlying asset is referred to as writing a *naked option.* Writing a call option, while simultaneously owning the underlying stock, is called a *covered call.*

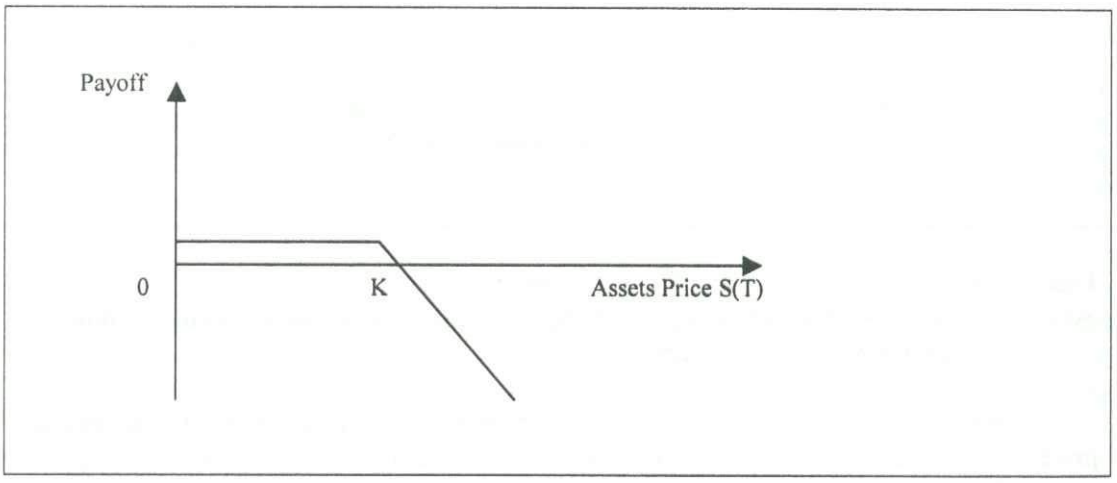

Figure 1.3. Payoff To The Writer Of A Call Option At Maturity
Source: Turnbull, S.M. and Jarrow, R. (1996). *Derivative securities.* Cincinnati: Ohio. South-Western College Publishing. p-16

PUT OPTION

Now consider a European written on the same asset. Let the option mature at date *T*, and the exercise price (strike price) be *K*. Consider the option's payoff at maturity. If the asset's price at maturity is greater than the exercise price, what is the option worth? Suppose the exercise price is $25 and the asset's at maturity is $27. a put option gives you the right to sell the asset at $25, but this right is worthless at the asset is selling for $27.

In symbols, if the asset's price, S(T), is less than the exercise price, *K*, selling the asset at the exercise price generates a profit of K – S(T). For example, if the asset's price is $19, the option to sell the asset for $25 is worth $6 (=$25-$19). We can write the option's payoff in the form:

$$S(T) > K$$
$$P(S(T), 0; K = S(T) <= K$$

This is sometimes called the option's boundary condition. The payoff is shown in figure 1.4. the payoff to the put option starts at its highest value of *K* dollars if the asset is worthless at maturity. It then decreases one dollar in value for each dollar increase in the asset's price until it has zero value. This occurs when the asset's price equals the exercise price of *K* dollars. For higher asset values, the put is worthless and the put is said to be *out-of-the-money*.

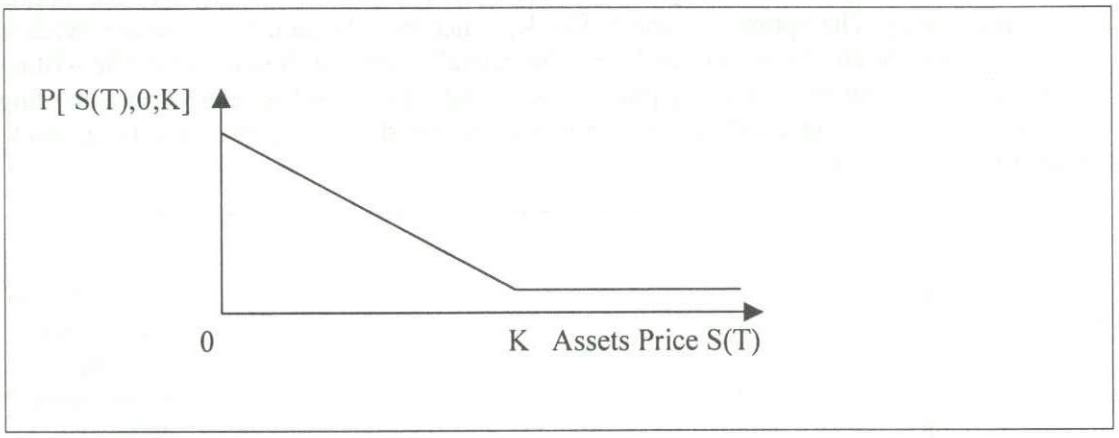

Figure 1.4. Payoff To The Owner Of A Put Option At Maturity
Source: Turnbull, S.M. and Jarrow, R. (1996). *Derivative securities.* Cincinnati: Ohio. South-Western College Publishing. p-17

What is the payoff to the writer of a put option at maturity? Suppose that the asset price S(T) is greater than the exercise price. The owner of the put option is unhappy, of course, because the option is worthless. The writer is pleased because there is no payout to the owner. If the asset's price at maturity was less than the exercise price, the option is worth K – S(T) to its owner. This represents a loss to the writer of the option. This payoff is graphed in figure 1.5.

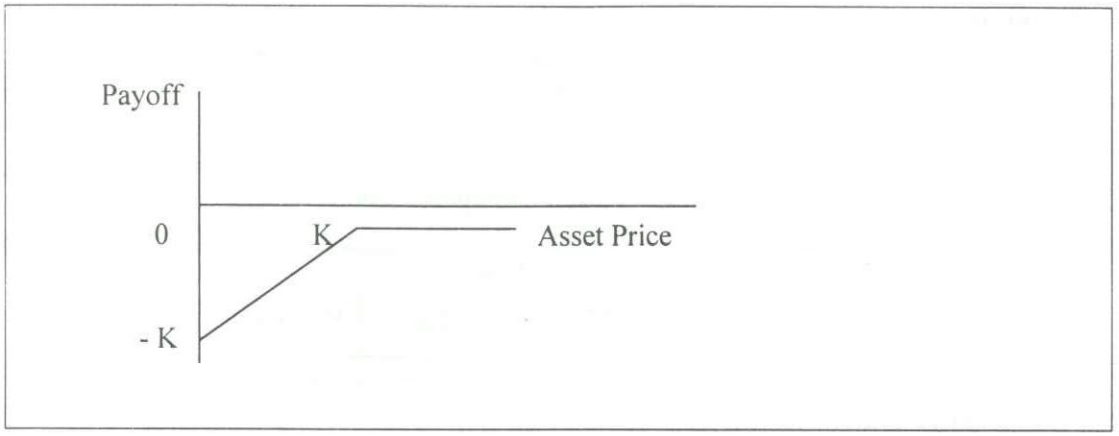

Figure 1.5. Payoff To The Writer Of A Put Option At Maturity
Source: Turnbull, S.M. and Jarrow, R. (1996). *Derivative securities.* Cincinnati: Ohio. South-Western College Publishing. p-18

Example : Option Newspaper Quotes

Table 1.1. gives an example of quoted stock option prices, as reported in the 12 August 1994 issue of *The Wall Street Journal.* The figures refer to the trading that took place the previous day. Let us describe the various items within table 1.1.

Stock Identification
The first column identifies the stock on which the option is written. For the example, the first option is written on AMR, the second option is written on ASA, and so forth.

Option and NY Close Price
The price listed under the company's name in the first column refers to the closing price of the stock on 11 August 1994. For AMR, the closing stock price was 56 ¾. There is one exception. Look at Actava. Here, there is only one option contract recorded on this stock. Consequently, all the information is given on one line and the stock's closing price is omitted.

Strike Price
The second column refers to the strike or exercise price of the option. The first option for AMR has an exercise or strike price of $55. the second column is for another option on AMR with a strike price of $60, and so forth. Note that the strikes listed surround the current stock price of $56 ¾.

Expiry Cycle
The remaining columns refer to the expiry months. Stock options expire on the third Friday of their expiry month.