The Economics of Financial Derivative Instruments

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ABSTRACT

The phenomenal growth of derivative markets across the globe indicates their impact on the global financial scene. As the securitie s markets continue to evolve, market participants, investors and regulators are looking at different way in which the risk management and hedging needs of investors may be effectively met through the derivative instruments. However, it is equally recognized that derivative markets present market participates and regulatory (control) issues, which must be adequately addressed if derivative markets are to gain and maintain investor confidence. And yet, more and more companies are using (ordering forced to use) futures and derivatives to stay competitive in a fast- changing word characterized by both unprecedented opportunities and unprecedented risks. Thus, the thrust of this paper is to provide a detailed study of the manner in which the market works and how the knowledge can be used to make profits and avoid losses a competitive economy setting.

KEY WORDS: DERIVATIVES, FUTURES, OPTIONS, COMMODITIES, OTC, ASSETS, STOCKS, INDEXES, SWAPS, INSTRUMENTS, FOREIGN EXCHANGE, FOREX, HEDGING, SPOTMARKETS, ARBITRAGE, RISK, EXCHANGES, BROKERS, STORAGE, ECONOMIES, FINANCIAL, PRICES

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1.0 INTRODUCTION

A derivative security is a security or contract designed in such a way that its price is derived from the price of an underlying asset.

In other words, the price of the derivative security is not arbitrary; it is linked to the price of the underlying asset. In fact, changes in the price of the underlying asset affect the price of the derivative security in a predictable way. Consequently, transactions in derivatives can be used to offset the risk of price changes in the underlying asset. Although, derivatives encompass a variety of financial instruments, futures contracts are the most important form of derivative (in terms of transactions volumes).

Indeed, the late 1960s and early 1970s witnessed major structural changes in word financial markets. At this time, the two most important currencies (US$ and GB£) came out of the fixed exchange rate system and became floating currencies thus, the exchange rate of these currencies became uncertain. Again, the early 1970s saw a great degree of volatility in commodity prices, due in part to the oil price hike by OPEC and the turmoil in the currency market. Also, the central banks hard followed a policy of relatively stable interest rates; but guided by the advice of monetarist economists they beg as to exercise greater control were money supply and started using interest rate changes as a means for controlling it. Consequently, frequent changes of interest rate (both upwards and

downwards) became the order if the day. In sum, the 1970s and early 1980s were characterized by rapid changes in financial markets which increased uncertainties. The greater the risk, the greater the need to manage it and necessity being the mother of invention the increased risk led to the growth of risk management tools (derivatives).

A form of classification of derivatives is between commodity derivatives and financial derivatives. Thus, futures or options on gold sugar jute, pepper are commodity derivatives; while futures, options or swaps on currencies, gilt-edged securities, stools and shares, stock market indices, cost of living indices are financial derivatives. Another form of classification is between basic and complex derivatives. Basic derivatives are forward / futures contracts and options contract. Other derivatives and such as swaps are complex derivatives, because they are built up from either forward /futures contracts options contracts. Many of the latest complex derivatives are effectively derivatives of derivatives. Specifically, the forwards derivatives include Interbank foreign exchange forwards, and specific delivery forward contracts (Non- transferable / Transferable). The futures include commodity and financial futures. The options include commodity options and financial options. The complex derivatives include swaps forward rate agreements,

range forwards, exotic options, collars synthetic derivatives and credit derivatives.

Indeed, the derivatives explosion of the recent past owed much to the prevailing atmosphere of strong free market policies followed by government in the developed economies and the lifting of various controls. It was the removal of controls which created many of the short-term price risk that are being currently hedged. According to the classical economist's school of thought, exclusive use of market mechanisms to determine the prices of money and foreign exchange may be fine. However, market –based price determination involves transaction costs and thus the determination of exchange rate by the market mechanism creates costs in terms of the resources deployed in the forward and futures trading industry as a whole as well as the uncertainty cost which the system creates for business transactions' Again, market determined equilibrium may well be optimal in a comparative static sense, but the movement from one equilibrium to another many, follow a highly undesirable path. In other words, the transition from one established price equilibrium to a new equilibrium at a different level may be tortuous with huge costs in terms of uncertainty and wasted resources. Yet, the argument in favor of floating rates is basically that a wrong exchange rate imposes welfare costs on a country in terms of misallocation of resources, reflected in balance of payments gaps and this is

undenaiable. Therefore, derivative instrument is absolutely essential tool in a modern economy's survival kit.

The rest of this paper is divided into eight sections. Section two looks at the futures and forward contract. Options contract is discussed in section three. Section four discusses other complex derivatives derivative management and accounting is the theme of section five.

Section six discusses derivatives market structure and regulation. Commodities and metal trading is presented in section seven. Section eight presents the methodological foreword while section nine concludes the paper.

1.0 FUTURES (FORWARD) CONTRACTS

A futures contract is one of the many classes of derivative instrument in which its value is tied to or derived from another asset. It is an agreement today to buy or sell something in the future at a predetermined price. In other words, a futures contract is a contract to buy or sell a standard amount of a standardized or pre-determined grade (s) of a certain commodity at a pre-determined location (s), on a pre-determined future date at a pre-agreed price. On the other hand, a forward contract is an agreement between two parties to buy or sell, as the case may be, a commodity (or financial instrument or currency) at a pre-determined future date at a price agreed when the contract is entered into.

Essentially, a future contract is a standardized forward contract and here, all matters except price are pre-determined, making the contract freely transferable between different participants, as they know exactly what is being traded. Forward contracts are basically classified into three types: hedge contracts, transferable specific delivery (TSD) contracts and non-transferable specific delivery (NTSD) contracts. Hedge contracts are freely transferable and do not specify any particular lot, consignment or variety for delivery. Thus, delivery in such contract is unnecessary except in a residual or optional sense. TSD contract are contracts which, though freely

transferable from one party to another, are concerned with a specific and pre-determined consignment or variety of the commodity. However, NTSD contracts are concerned with a specific variety or consignment and are not transferable at all. Here, contract terms are highly specific are delivery is mandatory. Again, a futures contract or 'hedge contract' does not specify precisely which variety or consignment will actually be delivered because the limits are set by the rules of the exchange on which types can or cannot be delivered.

Indeed, the primary economic function of futures markets is the hedging function (or price insurance or risk-shifting or risk transference function). It provides a vehicle by which participants can hedge, that is protecting themselves from adverse price movements in a commodity or financial instrument in which they face a price risk. Similarly, futures markets provide a mechanism by which diverse and scattered opinions of the future are coalesced into one readily discernible number which provides a "consensus" of knowledgeable thinking. Unlike organized spot markets, future prices provide an expression of the consensus of today's expectation about some point in the future. By publishing and disseminating this, they also perform an information or publicity function. The process of price discovery also leads to the inter-temporal inventory allocation function, by

which market participants are able to compare the current and future prices and decide the optimal allocation of their tools between immediate sale and storage for future. Again, the use of standardized contracts makes sit easier to raise finance against stocks of commodities, sine traders have an assurance of standardized quality and quick liquidity. In other words, lenders are often more willing to finance hedged stocks than unhedged stocks, since the former are protected against risk of loss of value. Futures markets also operate on a fractional margin whereby the buyer and seller deposit only a fraction of the contract value at the time of entering into it. This therefore enables traders to buy and sell a much larger volume of contracts than in a spot market. Markets generally exercise a stabilizing influence on spot prices by reducing the aptitude of short term fluctuations

In its broadest sense, hedging is the act of protecting oneself against loss. More specifically, he dging was regarded as the use of futures transactions to avoid or reduce price risks in the spot market. On the basis of the multi-purpose hedging concept, hedging can be redefined as the use of futures contracts as a temporarily substitute for a merchandising contract. To this extent, merchandisers must carry out traditional hedging. Operational hedging is undertaken for convenience, but it is only possible because the futures market moves in tar den with spot market, thereby obviating the price

risk involved is not immediately buying up/selling on the spot market similarly, anticipatory hedges essentially aim at avoiding business uncertainties (if not price risks). Therefore, the empirical significance is that whatever the motivation behind hedging, the risk-reducing concept can be used to measure the actual hedging efficiency of markets. Unlike private sector use, a potential use of futures and other derivatives by governments is to stabilize a country's export earnings or to protect farmers producing export crops. This is in addition to the use of hedging against short-term rises in import prices (such as the price of crude oil). In terms of analytical distinction, hedging can be described as a method of protection against uncertainty. Since uncertainty is often referred to as risk, hedging can be described as a form of 'insurance' (protection) against non-insurable risks. That is, those risks which are not subject to objective probabilities. However, it provides a lower degree of protection than insurance since hedges are often only partially effective.

Indeed, if a futures market was restricted to hedgers alone, it is conceivable that one or other group of hedgers (the longs or the shorts) would beunable to hedge without distorting the price because of the absence of counterparties to the transactions. It is the speculators who take up the slack in the market and provide liquidity for both long and short hedging. They have no specific interest in the commodity but are risk seekers whose interest stems from the

profit which they expect to make from assuring the price risk. Thus, futures market participants are of two types: hedgers (off-loading price risk as to avoid loss) and speculators (taking up price risk in order to make a profit). For those hedgers who are mainly interested in the use of a commodity, price risk is a nuisance which they would normally prefer to do without; and futures trading enable them to delegate this process to the breed of speculators (leaving the hedgers to specialize in what they know best). Thus, hedging in cotton enables the textile mill to concentrate on its manufacturing activity instead of worrying about exchange rates.

Arbitrage is the term used to describe transactions which involves buying and selling a good or asset in two different markets in order to achieve a risk less profit through the difference in price between them. While hedgers and speculators are the two main types of participants in the markets, the arbitrageur is the third types of participant (one who trades only to realize profits from discrepancies in the market). It has the role of ensuring that prices in futures markets do not diverge from the level dictated by supply and demand and in ensuring speedy correction of any pricing anomalies. In other words, arbitrage opportunities are temporary and self-correcting. However, it is significant to appreciate the difference between speculations on futures markets (like stock exchange). This difference I known as the

gearing factor of leverage. That is, a person who buys or sellers futures contracts does not make full payment of the value but, rather pays what is known as a 'deposit' or 'margin money' (usually 10% of contract value)

Essentially, the gearing factor multiplies the effect of price fluctuation and this explains the attractiveness of the futures markets to speculators. While it is possible to achieve similar gearing in the stock market through the mechanism of margin trading (borrowing against shares) the act of borrowing involves a separate loan with attendant transaction costs; the futures market allows the gearing automatically without having to seek a loan or have an evaluation of credit worthiness. Again, it is of much interest to economic analysts to be able to distinguish between those transactions and carried out for hedging and those for speculation. The regulatory authorities usually have some kind of statistical data on hedging volume in order to give (or take away) exemptions from margin requirements. However, the difference between short and long hedging does not have anything to do with the duration of a hedge. Here 'going short' means selling and 'going long' means buying. In a general sense, 'being short' means having a net sold position or a commitment to deliver while 'being long' means having a net bought position or an actual holding of the commodity or financial instrument or other underlying asset. These terms equally apply to both spot

and futures markets. In fact, a person who is long on the spot market benefits from price increases and loses from price decreases. To protect himself from a fall in price, such a person would hedge by selling in the futures market, that is, by going short in futures. Thus, such a person is known as a short hedger since he hedges by, going short in futures. On the other hand, a person who is short on the spot market benefits from a decrease in price, and loses from an increase in price. To protect himself against rise in price, such a person would hedge by buying in the futures market, that is, by going long in futures. Here, such a person is known as a long hedger since he hedges by going-long in futures.

Indeed, it has been observed in many futures markets, that the volume of short hedging exceeds the volume of long hedging. This net short hedging pressure has to be taken up by long speculators. Thus, Keynes (1930) postulated that in order to induce long speculators to take up the net short hedging volume, the hedgers had to pay a risk premium to the speculators. And thus, the futures price would generally be less than the expected price, by the amount of the risk premium. That is,

$$F = E - r \qquad (2.1)$$

Where F is the futures price for a future date; E is the expected price at that date and r is the risk premium. Here, Keynes felt that futures price would be

related to expected price but would normally be at a backwardation (discount) to expected prices. The theory of normal backwardation is based on the existence of an excess of short hedging. An attempt to provide a theoretical rationale for this phenomenon was by Hicks (1964) who attributed it to technological reasons. He pointed out that entrepreneurs generally had a freer hand in acquiring new inputs (which are necessary for production processes), than in the disposal of outputs. Once the process of production is commenced it cannot be reversed, and the entrepreneurs has to necessarily make arrangements to sell the output, whereas he can always refrain from acquiring an input in the event of unfavorable price charges. Hicks therefore felt that there would be a greater need and urgency to hedge planned sales than to hedge planned purchases, thereby leading to an excess of short hedging.

Unfortunately, the above argument has been criticized by Houthakker (1968). The most important criticism was that futures market participants include a large proportion of merchants and for these merchants, the commodity does not go through any production process and the technological considerations were clearly irrelevant. However, the observation of an excess of short hedging volume, and its explanation, evolved primarily from studies of futures markets in agricultural

commodities. The combination of seasonality and technological factors explains the phenomenon in these markets. Recently, a number of futures market in non-agricultural commodities have started and it has been observed that some of these markets do not have an excess of short hedging. In markets where there is generally an excess of long hedging, the futures price would exhibit a 'normal contango' instead of a normal backwardation, so that the long hedgers would pay a risk premium to short speculators. In such cases the relationship between expected prices and futures prices would be as follows:

$$F = E + r \qquad (2.2)$$

Holbrook Working (1949) postulated that futures prices essentially reflect the carrying cost of commodities, rather than an expected price at a future date. That expectations affecting futures price would usually also affect spot price equally, and thus not affect the spread. Rather, the inter-relationship between spot and futures prices reflect the carrying cost, that is, the amount to be paid to store a commodity from the present time to the futures maturity date.

Indeed, carrying costs are of several types. There are costs of warehousing, insurance, etc; there are costs due to deterioration of commodity overtime; and there is interest on capital locked up in the stocks. Unlike the first two

types that is applicable only to the commodities (but not financial instruments), the interest cost applies to all assets.

Apart from the carrying cost of holding stocks, there could be a 'convenience yield' from holding stocks. Thus, up to a certain level, stock holding has a yield, this yield being the savings in lost profits that could occur in the event of a stock-out, plus the profits of unanticipated demand. Beyond this minimum level, there is no convenience yield and the yield can be regarded as a negative carrying cost. Therefore, the net marginal carrying cost for any given quantity would be

$$C_t = C_t - Y_t \qquad (2.3)$$

Where C_t is the net carrying cost for that quantity; C_t is gross carrying cost for that quantity; Y_t is the convenience yield of that quantity and t is the time period of storage when the stock level in a particular commodity is low, the marginal convenience yield is higher because the chance of a stock out is greater. As stocks rise the chance of a stock-out recedes and the convenience yield diminishes gradually to zero. There, the marginal gross carrying cost remains constant over a large range of stock levels, but may increase at very high stock levels. Indeed, while expected prices are one element in the determination of future prices, carrying costs are another. Again, there is an asymmetry in the way carrying cost are reflected in futures prices. That is,

futures prices cannot exceed spot by more than the carrying costs, but they can well fall short of the level indicated by carrying costs. This asymmetry, in fact, leads to an inherent bias in hedging returns independent of whether or not futures prices are biased predictors of spot prices.

A dear enunciation of what can be called the theory of inherent hedging bias was made by M.G. Pavaskar (1976). He showed that futures market is inherently biased against short hedgers, and that the bias is based on the asymmetry of the spreads. Basically, Pavaskar postulated that all futures markets are inherently biased against short hedging as well as in favor of long hedging. Let Ro and Fo be the ready and futures prices at the time of placing the hedge and R_t and F_t the corresponding two prices at the time of lifting the hedge; and marginal cost of storage for the intervening period is denoted as C^{xx}. Since short hedging involves buying in the ready market and selling in the futures market at the time of placing the hedge and selling in the ready market and buying in the futures market at the time of lifting the hedge, the net return to a short hedger is $(F_o - R_o) + (R_t - F_t) - C$

(2. 4)

This can be rewritten as:

$(F_o - R_o) - (F_t - R_t) - C$ (2.5)

It follows that a short hedger will have a positive return if

$F_o - R_o > F_t - R_t + C$ (2.6)

A long hedger buys n the futures market against his forward sale. He lifts his hedge by buying in the ready market and selling it in the futures market. Therefore, the net return to a long hedger is

$(R_o + C - F_o) + (F_t - R_t)$ (2.7)

This can be rewritten as

$(F_t - R_t + C) - (F_o - R_o)$ (2.8)

Hence, a long hedger will have positive return if

$F_o - R_o < F_t - R_t + C^{XXX}$ (2.9)

From equations (2.6) and (2.9), it follows that both long and short hedgers will receive zero return if

$F_o - R_o = F_t - R_t + C$ (2:10)

Theoretically, ready and futures prices are expected to co merge with one another during the delivery period of the futures contract. Therefore the ready-futures prize spread basis (positive or negative) is expected to narrow down as the futures contract advances towards its maturity. Thus, if $F_o - R_o > O$, one would normally expect $F_o - R_o > F_t - R_t$ (2.11)

Since future price cannot exceed ready price by more than the cost of storage, that is, $Fo - R\,o \leq C$ (2. 11A)

Now at a point of time O, let the prevailing spot and futures prices for a commodity by R_o and F_o respectively. Let the cost of storage of the commodity up to the maturity rate of the futures contract be C_m. Suppose, that the futures prices exceeds ready price by more than storage cost-to-maturity, i.e. price spread exceeds C_m or $F_o - R_o < C_m$ (2.13)

This relationship is self-sustaining because of the arbitrage mechanism and for the arbitrage mechanism to work, the arbitrageur must have a 'locked in' pre-determined forward sale price. On the maturity date of a forward contract, he has he contractual right to deliver at the contracted price, and so this is a locked-in risk-free price.

Indeed, speculation can and does exist without a futures market. However, futures trading greatly facilitate speculation and measure its volume. It allows short selling and greatly reduces the transaction costs associated with speculation. Some distinguished economists and great luminaries (such as Adam Smith, J. S. Mill, Alfred Marshall and Milton Friedman) have propounded the view that speculation had a stabilizing influence on prices. The essence of this view is that speculators tend to buy when a good is cheap and sell when it is costly. In other words they take efforts to acquire information on market conditions and prospects, and they then use the acquired information to buy cheap and sell dear (thereby reducing the extremes of price movement). Yet, it is nevertheless true that in most

circumstances, destabilizing speculation results in losses for the speculator. Again, futures markets give market participants a very liquid mechanism to use their knowledge of future events to make profits, and they give rise to a large class of professional speculators who specialize in obtaining and gathering information on the commodity, analyzing that information and putting it to use in making speculative profits.

As an illustration, news of a banquet harvest in Ghana, if a crop exported by Nigeria, may be gathered by professional speculators in a commodity futures market. To take advantage of this news, they will sell futures contracts in Nigeria and thereby drive down the futures price. Given this concurrencies spot market traders will notice that the attractiveness of holding stocks of the commodity is reduced, because the price which they can expect to get has come down. As a result, spot market traders will move to reduce their stock holdings by discharging ready stocks onto the spot market and this will lower the spot price. When this happens, demand for the commodity will expand since the price has fallen and the extent of the expansion will depend on the price elasticity of demand for the commodity. Because of the enhanced demand, the surplus at the time of the actual harvest will be less than harvest fall in the price will also be of a lesser magnitude than would have occurred in the absence of futures trading.

Alternatively, assume a bad harvest in Ghana is expected and this information comes to the notice of professional speculators who monitor price trends all over the world. Speculators will now buy up futures contracts for delivery after the harvest period. This act of buying will push up the futures price, giving spot market traders a greater incentive to hold stocks. It will result in additional demand for spot pushing up the spot price and the rise in the spot price will lead to a contraction in the demand for the commodity. This, in the absence of futures trading, such self-corrective mechanisms would either not operate at all, or operate in a much smaller way. Futures trading therefore enable a much bigger and a much quicker supply and demand response to information about the future. Thus, future trading acts as an agent which brings forward the consequence of a future event and thereby reduces the influence of the event itself when it actually occurs. In other words, enables advance corrective measures to be taken so as to avoid the adverse effects of the anticipated event.

As the major economies moved to systems of floating exchange rates, and market-determined interest rates, the value of futures trading in transferring and avoiding risk came to be increasingly appreciated. Thus, a financial futures contract is a contract for future delivery of a specified quality and type of financial instrument. In the major financial futures markets of the

world, a wide variety of contracts currently exists. Speculators and hedgers generally categorize financial futures on the basis of the type of the risk each contract is intended to cover. This categorization includes interest rate futures, currency futures, stock index futures and cost of living index futures. Here, interest rate futures comprise short and long term debt instruments; currency futures comprise futures markets in foreign currencies. Stock index futures comprise futures contracts on stock market indices; and cost of living index futures comprise contracts on cost of living index.

Indeed, Financial instruments correspond to 'continuous storage' goods, in that there is no seasonality in production' and no limit to storage, with hardly any physical costs of storage. Again, the stock of any financial instrument generally dominates the flow i.e. the stock at any given time is far larger than any annual accretion or depletion. The economic functions of financial futures include risk transference, price stabilization, price discovery/registration and so on. In the case of interest rate futures, many financial institutions like banks, insurance companies, and pension funds (acting either as borrowers or as lenders) are protected from adverse changes in the value of their assets and liabilities due to changes in interest rates. With currency futures, exporters, importers, borrowers/lenders in the forex market, banks and other financial institutions are protected against exchange

rate depreciation. Stock market index futures protect large scale market investors from adverse changes in portfolio value. Again, inflation futures can potentially provide a unique method for avoidance of unanticipated inflationary risk. Significantly, financial futures markets have created employment and attracted a considerable volume of transactions from non-residents, thereby generating invisible foreign exchange earnings for the countries where they are located.

2.0 **OPTION CONTRACT**

Options are simply legally binding agreements (contracts) between two people to buy and sell some specified asset at a fixed price over a given time period. As a popular trading tool, options give you a limited risk but unlimited reward profile. In contract, spot and futures market offer unlimited reward but with unlimited risk. Basically, an option is a contract between two parties whereby one party acquires the right (but not the obligation) to buy or sell a particular commodity or instrument or asset, at a specified price, on or before a specified date. Here, the person who acquires the right is known as the option buyer or holder while the contest-party is known as the seller or writer. In return for giving such an option to the buyer, the seller charges an amount which is known as the option premium. The specified price is called the exercise price or strike price while the commodity or instrument or asset covered by the contract is called the underlying commodity or instrument or asset. Again, the specified date is called maturity date or expiration date or strike date.

Essentially, there are two types of options: calls and puts. A call option gives the owner the right (not the obligation) to buy a futures contract at a specific price over a given period of time. That is, it gives you the right to "call" that contract away from another person. On the other hand, a put

option gives the owner the right (not the obligation) to sell a futures contract at a specific price through an expiration date. That is, it gives you the right to "put" the contract back to the owner. Thus, option buyers have rights to either buyer (with a call) or to sell (with a put). Option is said to be in the money when the strike price relates to the market price in such a way that there is an advantage in exercising the option. Specifically, a call option will be "in-the-money" if the strike price is below the current price while a put option will be "in the money" if the strike price is above the current market price. Similarly, an option is said to be 'out-of-the-money' if strike price relates to the market price in such a way that the buyer has no advantage in exercising the option. Here, a call option is 'out-of-the-money' when the strike price is above the current market price, while a put option is 'out-of-the –money' when the strike price is below the current market price. Yet, an option is said to have intrinsic value when it is in the money

If option contracts are standardized, that is, with standard contract sizes, standard strike prices and standard contract terms, and are traded through an exchange, they are known as traded options. And most traded options market use a cleaning house system. Where an options contract is no executed through an exchange, it is an 'over-the-counter' option. Since options can be resold in the market, it is sufficient to take an off-setting

position; a call buyer will sell a call and a put seller will buy a put. Thus, the difference between the premium received and premium paid will be the profit or loss. Again the price of an option has two components: intrinsic value and time value. If the strike price is such that the option is in-the-money, obviously the buyer will have to pay at least the intrinsic value in order to acquire the option. The price may be unattractive today but future fluctuations may make the option profitable. Thus, the time value is influenced by the interplay of some factors. Even for options with no intrinsic value, the difference between strike price and exercise price affects the option premium. The longer the period of time, the greater the chances of price fluctuations and vice versa. The time value of the options will also depend on the volatility (price variability) of the underlying asset; and the absolute value of the underlying asset also influences the absolute amount of the premium.

Indeed pricing of options on dividend-yielding securities is more complex than pricing of options on commodities. In the case of a share, the dividend has to be factored into the calculation of the time value. Over the years, a number of mathematical formulae have been evolved for calculating the composite (intrinsic plus time) value of options. There, the most important of these is known as the Black and Scholes option pricing model. Fischer

Black and Myron Scholes (1973) give a formula by which the premium can be worked out. Thus, the value of a European call option on shares under Black Scholes Option Pricing Mode is

$C = SN(d_1) – Ke^{-rT} N(d_2)$ (3.1)

Where C is European call premium; S is the current market price of underlying asset or security; T is the time left till maturity; K is the exercise price; N(d1), $N(d_2)$ s the cumulative normal distribution function of d_1 and d_2; e is the 2.71828 (exponential constant) d1 = [In (S/K) + (r + $(\sigma)^2/_2$) T]

$\sigma / \sqrt{T}$

$d_2 = d_1 - \sigma/ \sqrt{T}$

In its natural logarithm, σ is the standard deviation of price changes of the underlying (volatility); r is risk minus free interest rate. Yet, this basic formula can be adapted to price European puts, with the following formula:

$P = Ke^{-rT} N(-d_2) – SN(d_1)$ (3.2)

There are various adoptions of the formula to price options on futures, American options, barrier options, and commodity options and so on. In practice, market participants do not need to do these calculations as they can be programmed into a computer, for all traded options and for active or options, price quotations are usually published.

It has also been shown that in markets where short sales of the underlying asset are possible, the premium for a call and a put with the same maturity

date and an at-the-money strike price will be equal because of arbitrage. If there is any deviation, risk free arbitrage profits can be earned by simultaneously buying the underlying asset (if the call is higher priced)or short selling the underlying asset (if the put is higher priced); selling the option with higher premium and buying the option with lower premium. Essentially, only one of the two (call or put) will be exercised depending on the price. This gets cancelled out by the purchase or sale of the underlying asset leaving the difference in premium as profit. Mathematically, the put-call parity relationship is expressed as follows:

$$P = C + E^{-rT} K - S \qquad (3.3)$$

Where C is derived from the Black and Scholes formula as shown above. Unlike many theoretical models, the presented model can be applied to real life on the basis of observable statistics. The volatility of the underlying asset can be calculated from data on past price behavior and every other variable in the formula is directly observable. Yet over the years, several refinements to the model have been made on the basis of advanced theoretical research using complicated mathematical techniques. And to a large extent, option writers base their price quotes on one or other version of the model.

Essentially, options provide participants with a vehicle for both hedging and speculation. It performs the hedging and speculation. It performs the hedging function even better than the futures markets because of the predetermined exercise price (but at a higher cost via option premium). In fact, some economists have suggested the use of currency options by central bank as a means of stabilizing exchange rates (Hull, 1996). However, the relationship between options markets and the price of the underlying is much weaker than that between a futures market and its corresponding spot market. This is because options are contingent claims and thus, one way in which the options market can affect spot prices is through the practice known as dynamic hedging. This is the practice of buying or selling the underlying asset itself in order to stimulate or mimic the effect of an options position. Here, a call option writer will hedge by buying the underlying, while a put option writer will hedge by selling the underlying. It is not necessary for them to buy or sell the full quantity of underlying involved in the option contract. The option writer can therefore replicate the price risk by buying or selling the underlying asset adjusted for the delta. However, since the delta itself undergoes change, the option writer has to continuously (dynamically) adjust his long or short position in the underlying share to make the price risk on his position mirrors that of the option writer. Thus, dynamic hedging whether by calling option writers or put option writers,

involve buying against a rising price. Similarl y, dynamic hedging by both put and call option writers involve selling against a falling price. Here, there is no doubt that the extent of the destabilizing influence would depend on the size of the net short position in options in comparison to the spot market volume. Therefore, dynamic hedging is more prevalent in OTC options markets than in exchange traded options where options sellers can usually hedge by acquiring long positions in options rather than simulating the long position through the spot market.

A capped option is an option which will be automatically exercised if the underlying interest (commodity of financial instrument) touches a particular predetermined price prior to the expiry of the option. If the Cap is out reached during the validity of the option, it can be exercised at the end of the period like an European option. Most capped options are 'cash settled,' that is instead of delivering the underlying interest, the cash value of the difference between market price and exercise price on the date of exercise is paid. Here, the advantage is that exercise takes place automatically once a predetermined level of profit has occurred, without risk of reversal in the price trend latter. However, the disadvantage is that the option gets exercised automatically even if the option buyer would like to hold on to it in the anticipation of further favorable price changes in the asset. On the other

hand, flexibly structured options are those in which some of the terms are not standardized. Here, when a flexibly structured option is purchased and sold in an opening transaction, the parties have the flexibility to decide certain terms of the option. In flexibly structured options, some of the terms are standardized while others are to be decided by the parties, and these terms which are left to be decided by the parties are called v ariable terms'. These options are usually used by sophisticated investors or hedgers seeking to manage highly specific portfolio or trading risks. Options can also be used purely as speculative vehicles, by the purchase or sale of naked options. Here, the speculators' opinion on market prices (and appropriate option strategy) is given as: very bullish (buy a call); moderately bullish (write a put), moderately bearish (write a call); and very bearish (buy a put).

As with futures contract, most option contract are simply bought and sold in the open market without a single futures contract ever changing hands. However, contract ever changing hands. However, if you wish to physically trade the futures contract, you must exercise your option. Consequently, there are two styles of options: American and European. Here, American style options can be exercised at any time through the Friday preceding the third Wednesday at the expiration month. On the other hand, the European style options can only be exercis ed on Friday prior to the third Wednesday.

Most currency futures options are European style, which is due to the fact that most traders will not exercise early even if they intend to take delivery of the futures contract. It is important to remember thatthe futures contract holder has unlimited liability and could loose the amount they pay for the option. However, the option buyer can only loose the amount they pay for the option. Once they exercise the option and take delivery of the futures contract then they have switched from a limited liability to an unlimited liability. Basically, the trader should wait as long as possible before exercising. Thus, users of American style currency futures are usually businesses that would have the need to take delivery of the currency to settle transactions. However, a business may be uncertain as to whether they will need the currency. If they need it for sure they will buy the futures contract. But if they may not need it, for sure, they will buy the option since it is much cheaper and offers limited liability. And if it turns out that the business does need the currency, they are always free to exercise it and take deliver of the currency. For speculators trading in the currency markets, there is never a need to take delivery of the contract, which is why most traders will just trade the European style contract. Yet, the biggest advantage of options is the limited risk they offer and the amount you pay for the option is the most you could ever loose. However, they came at a price that you must pay at a time premium over and above the current price of the underlying asset. And

that implies that the underlying asset must make some size of a move just for you to break even depending on your out look and risk tolerance, options may be the perfect solution for many of your currency trades. Again companies that have a high business risk or high operating risks should tend towards a 'high everything' policy. The riskier a business, the greater its cost of capital. Yet, these companies with a high business and operating risk cannot usually afford a high financial risk from foreign currency exposure. Thus, whatever hedging philosophy is adopted, there must be clear internal documentation setting out the general philosophy and detailing the techniques that can be used.

3.0 COMPLEX DERIVATIVES

A swap transaction is one where two or more parties exchange (swap) one set of predetermined payments for another interest rate swaps and currency swaps are the two main types of swaps.

An interest rate swap is an agreement between two parties to exchange interest obligations or receipts in the same currency on an agreed amount of notional principal for an agreed period of time. On the other hand, a currency swap is an agreement between two parties to exchange payments or receipts in one currency for payments or receipts in another. The party which pays floating rate in the swap transaction is known as the floating rate payer or seller of the swap. And the party which pays fixed rate in the swap transaction is known as the fixed rate payer or buyer of the swap. Here, it should be noted that the terms fixed or floating rate payer refer to the obligations in the swap itself and not the obligations to the original lenders. The term index is used to denote the benchmark rate of interest which acts as the reference point for the floating rate (and LIBOR is the most commonly used index).

Indeed, interest rate swaps can be mutually beneficial if there is a comparative advantage for the two parties in one market over another. Here, the rationale for currency swaps is that one party has a comparative advantage in borrowing in one currency while another has an advantage in the other. Yet another type of currency swap involves exchange of a fixed rate obligation in another currency. This act is known as fixed to floating currency swap or a 'circus swap' or 'currency swap'. Just as the interest rate swaps can be used to hedge interest exposures, currency swaps can be used to hedge exchange rate risk. Again, a commodity swap is an arrangement by which one party (commodity user/buyer) agrees to pay a fixed price for a designated quantity of a commodity to the counter party (commodity producer/seller), who in turn pays the first party a price based on the prevailing market price (or an accepted index) for the same quantity. Commodity swaps are therefore means of hedging commodity price risk, over a long period. However, swap leaves both parties with full operational flexibility in the spots market, but without price risk. Yet, the disadvantage is the transaction cost and fees. Depending on the prevailing sentiment, one of the parties may also have to pay a premium to attract the counterparty.

An equity swap is an arrangement by which one party pays to the counter-party an amount based on the value of the shares in a company, and receives

from the counter-party an amount of fixed or floating interest on an equivalent notional value. In effect, an equity position is converted into a deposit or debenture. Financially, the effect of an equity swap is the same as that of selling the shares for reasons of control or to avoid capital gains tax, or to avoid giving a negative signal to the market. However, the disadvantage is that there is a transaction cost and depending on the prevailing market sentiment, a premium may have to be paid by one or other party to attract the counter party. When a company wants to enter into a swap, it goes through an intermediary, which is usually a special purpose subsidiary, which is usually a special purpose subsidiary of a bank or major stock broker. In order to enable them to respond quickly to clients' needs and earn their commissions, these intermediaries generally engage in ware housing. They enter into one side of the swap transaction (as fixed rate payer to a client who wants to be a floating rate payer). They then wait for a suitable counterparty and offload the swap to him. This means that users of the swap market need not wait for locating a suitable counterparty and the warehousing activity enables the intermediary to become a 'market maker', and thus enhances the liquidity of the swap market.

Indeed, it is possible to sell a swap to another party with the agreement of the intermediary. However, the secondary market is not very active and rather

liquid. Yet the obligations in a swap can also be extinguished by 'unwinding' it (that is by reversing the transaction). The kind of swap transactions depicted under interest rate swaps are known as 'plain vanilla' or plain swaps A basis swap is one where two parties swap floating rate payments but these rate payments are determined by different indices. A forward swap is an arrangement by which a swap is entered into with a commencement date in the future. In a callable swap, the fixed rate payer has an option to terminate it before maturity and the right to terminate comes at a price reflected in a higher fixed rate. In a putable swap, the floating rate payer has an option to terminate a swap before maturity. The price of this option is reflected through a higher floating rate and in some cases a termination fee. An extendible swap I one in which the fixed rate payer is given an option to extend the maturity date of the swap. This additional facility is reflected in a higher fixed rate (extension fee). A rate capped swap is one where the maximum rate payable by the floating rate payer has a ceiling or 'cap' and this cap reduces the risk to the floating rate payer but reduces the benefit to the fixed rate payer.

Essentially, swaps, by exploiting comparative advantage, make fu nds available to borrowers at cheaper rates than would otherwise be possible, and they perform a financing function by making investment capital cheaper.

Again, interest rate swaps can reduce borrowing cost for both parties by exploiting the differences in the interest spreads in different segments (fixed is floating). The availability of swaps tends to increase the demand or reduce supply in the under priced segment as well as reducing demand or increasing supply in the over priced segment. Swaps therefore act as an arbitrage mechanism which helps market integration and reduces interest rate distortions. Since swaps are analytically equivalent to a strip of futures transactions and acting as a hedge, they therefore perform hedging functions. Whereas futures only provide a short-term hedging facility. Swaps provide a very long-term hedging facility.

A Forward Rate Agreement (FRA) is a contract between a bank and a customer which gives the latter a guaranteed future rate of interest to cover a specified sum of money over a specified period of time in the future. FRA does not involve actual lending or borrowing of sums of money. It is merely an agreement which fixes a rate of interest for a future transaction. At the time when the customer actually requires funds he has to separately borrow he money in the cash market at the rate of interest prevailing then. If the rate of interest payable in the cash market turns out to be higher than the rate of interest fixed in the FRA, the bank which signed the FRA will pay to the customer the difference in the interest rate. However, if the rate of interest

payable in the cash market turns out to be lower than that fixed in the FRA, the customer has to pay the difference in the rate of interest. Again, a customer may which to have a guaranteed rate of interest for a sum of money which he intends to deposit at a future point of time. He can then enter into an FRA with a bank and has to separately make a deposit in the cash market at the appropriate point of time. If the market rate on the deposit turns out to be lower than the guaranteed in the FRA, the bank will compensate for the difference. But if the deposit interest rate turns out to be higher than what was fixed in the FRA, the customer pays the difference to be bank. Consequently, purchase of a FRA protects against a rise in interest rate where a company needs to borrow from a bank. On the other hand, sale of a FRA protects against a fall in the interest rate where a company needs to deposit money with the bank. Here, the bank charges different interest rates for borrowers and lenders and the spread between the two constitutes its profit margin.

Range Forwards are an instrument found in the forex markets. They are essentially a variation on the standard forward exchange contracts and also known as flexible forward contracts. In such contracts, instead of quoting a single forward fate, a quotation is given in terms for a range. Essentially, range forwards differ from normal forward contracts by giving the customer

a range within which he can benefit or lose from exchange fluctuations as well as providing protection from extreme variation in exchange rates. Again, a 'swaption' is a contract by which a party acquires an option to enter into a swap. A call swaption gives the purchaser a right to enter into a swap as the fixed rate payer and a put swaption gives the purchaser of the swaption the option of entering into a swap as a floating rate payer. Here, a swaption has got a strike rate and a maturity date which can be either on European or American terms. Again, swaptions can be used to hedge uncertain cash flows. As an illustration, a company may not be sure whether a lender which it has bid for will be awarded to it and if the bid is successful, it may have to enter into a swap. Therefore, to hedge such contingent borrowing, it can enter into a swaption.

Commodity-linked loans and bonds are instruments designed primarily to meet the needs of companies and countries whose earnings are closely linked to commodity prices. Here, a commodity-linked bond would involve a loan to a borrower in which the interest payable and repayment-schedule is linked to a commodity price. If the commodity price rises, the debt serve obligation increases by a predetermined margin, and if the commodity price falls, then the debt service obligation is also reduced, (though with a minimum debt service obligation). The positive correlation between the commodity price

and debt service, reduces hardship to the commodity producer and for the lender, the bond reduces the risk of default since, repayment is linked to ability to pay.

INTEREST-ONLY (10) and PRINCIPAL-ONLY (PO) STRIPS are synthetic securities which split up the interest and principal-elements of a security, and allow the holder to receive a return based on one component alone. Here, a 1O strip holder receives interest only on a particular type of asset (such as securitized pool of mortgage loans or treasury bonds) but no principal payments. A PO strip or 1O strip costs much less than the underlying asset and these instruments are useful to financial institutions in matching their assets with liabilities. Consequently, these and related derivatives are collectively known as 'asset/liability -based derivatives.'

Equity-linked bonds and notes are bonds linked to a specified equity index. If the equity index rises, the bond earns higher return and vice versa. In protected equity-linked bonds, both principal repayments and a pre-set minimum coupon rate are fixed but additional returns are payable depending on the performance of a specified index or indices. Here, the protected (minimum) coupon interest rate is lower than the normal bond interest rate. Again, credit derivatives are derivatives based on the credit risk (default risk)

of loans. A typical credit derivative is a ‘default swap’ in which one party swaps the default risk (credit risk) alone with a counter party while the latter agrees to pay the first party in the event of a default by the borrower, but receives a regular payment in turn. CFD is a contract for difference, a contract between you and your CFD provider to settle the difference in cash between the price at which you buy the CFD and the price at which you sell. Here, the price of the CFD mirrors the price of the underlying instrument (share, index or metal price). This means that instead of buying and selling physical stocks, the CFD buyer gets access to the performance (price movements of the same stocks) without ever having to take delivery of them. CFDs originated in 1980s in the inter bank market – are used by the banks (institutions) to hedge their share position known as equity swaps. As an illustration, suppose you believe that XYZ shares will rise in price and decide to buy ‘going long’) 1000 XYZ shares at the market price of N4.45. Then, the value of your CFD position is N4450. You are therefore required to have 5% margin to secure your position and the 5% of N4450 is N222.50. Now if after three days, the price of XYZ shares went up as you have expected and you decide to close the position at the price N4.52. Consequently, your profit is calculated as the difference in the price you entered and exited the trade, multiplied by the size of the position (1000 x 12 cents = N120). This, in three days, you made a profit of N120 from the

initial investment of N222.50 (which would have ordinarily cost N44450). Assuming one decides to 'go short' with CFDs(where you can enter a sell transaction and profit on the falling market) In this case, you believe that the shares of XYZ will fall in the next few days and sell 1000 shares at the current price N4.50. Again, you would be required to have a margin of at least five percent to secure your position (and this margin is N225 which is 5% of N45oo). Much later, if the XYZ share price has fallen down to N4.30 and you decide to close your position by entering an opposite transaction (by buying CFDs for the same number of XYZ shares). Consequently, your profits is the difference between the price you sold the CFDs for and the price you bought them back (1000 x 20 kobo = N200).

Using the building blocks of futures and options, it is therefore possible to construct a number of complex derivative instruments. These can be designed to suit the particular needs and circumstances of a particular client. International banks and brokers have been structuring such specialized derivatives known as 'synthetic or custom-made derivatives. A number of such instruments have been introduced out by derivatives specialist and such complex instruments have subsequently been used and available over the counter from financial intermediaries

4.0 COMMODITIES TRADING

Indeed futures markets exists for a wide array of real and financial assets including grains and feeds, livestock, industrial raw materials, precious metals, financial instruments and foreign currencies. Specifically, Energy commodities include crude oil, heating oil, Gs oil and Natural Gas oil. The industrial commodities include Aluminums, lead, Tin, Copper, Nickel, Zinc and plastics. The precious metals include Gold, Silver, palladium and platinum. The soft and agricultural commodities include cocoa, coffee, sugar. corn, orange juice, pulp, lumber, potatoes, soyabeans and wheat. In fact, the last three decades have witnessed a dramatic increase in the types of contracts traded, and in the volume of transactions and open interest.

Typically, a futures market develops in response to economic forces in the spot market. After its development, the market facilitates the operation of the spot market. Consequently, commodity futures trading were introduced in response to seasonal fluctuations in the supply of cops. Unlike the past periods, commodities futures trading are now a closely regulated activity. The purpose of the regulation is to maintain the 'competitiveness' and 'fairness' of the trade. Consequently, the regulatory body of each country attempts (in one way or another) to govern the relationship of an exchange

with its members and that of the members with each other. Specifically, in the United States of America, commodity futures markets were first regulated by the federal government. Much later, this trading turned into a legislative issue and the congress passed the commodity exchange act, which assigned to the Department of Agriculture the responsibility or monitoring the activities of futures trading. After the significant increase in the level of futures trading, congress decided to establish an independent federal agency to pursue the task. Consequently, commodity futures trading commission (CFTC) was created and charted by congress to license futures exchanges, to approve the terms and conditions of any futures contract before being introduced on an exchange and to monitor the implementation of commodity regulations on all United States exchanges. In other words, CFTC is especially responsible for detecting and investigating the problems of market manipulation.

Petroleum futures developed in response to instability in petroleum prices. In 1974, the "first-generation" petroleum futures were introduced, reflecting the reaction to the 1973/74 fluctuations in the price of oil. Unfortunately, these futures failed given the relatively stable price that prevailed in the market (in 1975). The second-generation petroleum futures started with the introduction of a heating oil contract and then expanded to include several

futures in crude oil and petroleum products. This market started with the introduction of two contracts on the New York Mercantile Exchange (NYME). Here, the first contract called for the delivery of No. 2 heating oil ad the second contract called for the delivery of No. 6 fuel oil. The success of the heating oil contract encouraged NYMEX and other exchanges to introduce various other petroleum futures including a contract for leaded gasoline. Subsequently, crude oil futures contract was introduced. In addition to NYMEX, the Chicago board of Trade (CBT) introduced petroleum futures in unleaded gasoline, no. 2 heating oil and crude oil. In fact, the CBTS's crude oil contract initially performed better than the gasoline contract but eventually failed latter, they introduced a No.2 heating oil contract and despite the success of the heating oil contracts at NYMEX and the International Petroleum Exchange of London, the CBT's heating oil contract did not experience high volumes of trading and died latter.

And benefiting from NYMEX's experience, a petroleum futures market was established in London (called the International Petroleum Exchange, IPE). The rapid growth of IPE's gas oil futures was primarily due to the entry of new traders in the market as well as an increase in the level of trade activity by those already in the market. Encouraged by the success of its gas oil futures, IPE introduced much latter, a crude oil contract. However, crude oil

trading on IPE was not successful and IPE latter introduce a revised crude oil contract.

Essentially, a commodity, exchange is a voluntary association of people whose business involves/among other things) trading in commodity futures contract. Here, the primary aim is to provide and regulate a trading place so that its members have the facility to sell or buy futures contracts for specific commodities. Although memberships are held by individuals, many of them are effectively and ministered by companies. Once a member of an exchange, you can enter the exchange's trading floor of the commodity you want to trade and make a bid or offer. The first person who accepts the bid or offer will get the trade and observers at each pit overlook the trading and note the prices at which trades are made. These observers record the prices and feed them into their communication systems. Prices are then almost instantaneously displayed on the boards and are communicated to the brokerage offices and commodity firms all over the world. Here, when a trade is made, each of the traders makes a note on a card of the price, quantity, delivery month, and the person with whom the trade was made; and the record is submitted to the "clearing house" for reconciliation on a daily basis.

Each commodity exchange has its own clearing house and the members of the clearing house are not necessarily the same as the members of exchange. Owning a seat on the exchange entitles a person to trade on the exchange floor and any deal he makes has to be registered with the clearing-house through a clearing house member. Here, each clearing house member has an account with the house and the member file a report with the house of the transactions that should be included in its account. In fact, a trader in the futures market does not need to be concerned about who took the opposite side of his trade and thus, the clearing house guarantees performance of all contracts under the exchange rules. Each clearing house member is required to deposit an initial margin on its contract positions with the clearing house; and each day the member must send to the clearing house a variation margin on each outstanding net contract on which there has been a loss for that day. In order to trade in a futures exchange, you have to act through a member of the exchange and that member can buy or sell futures contracts on the exchange floor. If he is not a member of the clearing house, he should then register his trade through a house member. After accomplishment, a futures contract is issued that declares the house member as one party and the other party as the clearing house.

Although petroleum futures and crude oil contracts provide powerful instruments for managing the risk associated with price fluctuations; there

are areas in which further flexibility is required, that is, futures contract extend over a fairly short period of time and trading is usually active only for contracts of up to six months maturity. Again, hedging with futures contracts involves committing to a fixed price regardless of future events. Consequently, options can be used independently or in conjunction with futures contracts providing a wide range of possibilities for managing risk in petroleum trading. In general, the premium that a purchaser of an option is willing to pay depends on his judgment about the possibility and the extent that the price of the underlying stock or commodity moves above the strike price of the option. Indeed the NYMEX crude oil options have become the second most actively-traded commodity option, trading only the treasury bond option contract traded on the Chicago Board of Trade.

6.0 DERIVATIVES: MANAGEMENT AND ACCOUNTING

Indeed, derivatives are powerful tools for risk management and they are highly geared. Consequently, it is possible to lose far more than one's original capital in a derivative transaction. Thus, derivative transactions require a much tighter supervision and control mechanism. Again, derivative markets move a great speed and are open virtually on a 24 hour basis, due to the integration of various exchanges across the world. Here, big price movements can occur over night with grave consequences. Another problem is that several derivative transactions fall into a grey area between hedging and speculation. Thus, derivative securities used as hedges are a risk-reducing device but derivatives used for speculation become a risk enhancing device. Again, there is sheer complexity, given the pressing tribe of complex and synthetic derivatives. Therefore, the precise financial implications of market price movements on the derivative transaction are often not obvious and easy to comprehend.

Basically, risks involved in derivatives trading can be of the following kinds: credit/default risk, operational risk, model/formula risk, liquidity risk, legal risk, and market risk. For successful use of derivatives, a company must

therefore evolve a clear policy; establish a system of controls to monitor adherence to the policy and enforce adherence to the system of controls. Again, any firm that uses derivatives for hedging need to evolve a clear set of policy guidelines. What types of risks can potentially be hedged given the available hedging instruments; of the risk which are potentially hedgeable, which risks does the company want to hedge; and for these risks which the company decides to hedge, should the hedging be universal or selective; should hedges be for the full value of the expected exposure or can they be for only part of the exposure; whose empowerment to take the decision on when to hedge or how much to hedge; and does the company envisage only straight forward hedges or does it permit more complex synthetic hedges. Thus in deciding this hedge policy, the company has to keep in mind legal, accounting and taxation implications. And having established a derivatives management policy, it is therefore necessary to have a system of control to ensure that the policy is followed. Give the complexity of many derivatives transactions, only control system is only as effective as its enforcement. When entering into a new or complicated type of derivative transaction, it is necessary to insist on sensitivity analysis a nd depiction of the worst case scenario. It is equally advisable to ascertain and obtain a written commitment on the costs of unwinding a position. Here, bankers and brokers earn fat commissions from over-the-counter and synthetic derivative

transactions and therefore the worst-case scenario is often the least-explained scenario. However, some derivatives users are going in for a dependent risk management and vice through consultants, because of the feeling that banks are guided more by their own commissions than by the client's interests. And yet, the appointment of a consultant is no substitute for supervision on a fully-informed basis (by a company's own management).

Indeed, for financial institutions and companies with a large volume of derivatives transactions, the task of measuring the risk inherent in the over all derivatives position is very complex. Thus, the most widely accepted method for doing this, is the value-at-risk technique (VAR).

VAR is a statistical concept and an attempt to answer the question of what is the maximum amount one can lose from a particular set of holdings, within the next day or so. Specifically, it is an estimate with a predetermined confidence interval of how much an entity can lose from holding a position over a set time horizon. This confidence interval can be 95%, 98%, 99% and so on; while the time horizon could range from a single day for trading operations to a month or longer for portfolio management. Here, the estimate is based on historical data of volatilities of individual prices and of the correlation between prices. If the prices of two derivatives are closely

correlated, then the risk during an adverse move is more than if they are poorly correlated. VAR is in fact, the generally accepted 'best practice' for risk measurement. Thus, historical data on volatility and correlation for each item are necessary and need to be constantly up dated. Again, various mathematical models are necessary to compute the volatility of a portfolio, based on the interplay of innumerable factors affecting each instrument and here different analysts may use different methods.

Basically, the limitations and weaknesses of the VAR are of two weaknesses of the VAR are of two kinds: fundamental or inherent weaknesses and purely practical limitations. For the fundamental weaknesses, it should be clear that the VAR is a probabilistic estimate. Even if the data is perfect and all the assumption in the model hold perfectly, the loss can exceed VAR in several occasions. Here, historical data on volatility and correlation is taken to represent future volatility/correlation; and price changes are assumed to follow a 'Normal Distribution'. However, these assumptions may not hold in practice; and volatilities do change and tend to change most in times of turmoil. Consequently, assumed historical volatilities can then be highly misleading. Thus, because of these deficiencies of VAR, it is essent ial that all derivatives user do 'stress-testing.' This is another term for sensitivity analysis and it involves asking questions like what will happen to a portfolio

if a currency is devalued by a particular percentage within some days. Despite its flows, VAR is perhaps the available technique for measuring the risk of a large and complicated portfolio. It must however be used with caution and in conjunction with stress tests. Finally when a derivative strategy is being decided upon, the advisability of the strategy and its risks must be clearly and intelligibly communicated in a form understandable by non-specialist top managers and those responsible for the decision must ultimately take the decision not just o the basis of models and mathematics, but also on the basis of sound common sense.

At this juncture, it is pertinent to point out that there is no standard accounting practice for derivatives as a whole. Standards do exist for disclosure of derivative transactions but not yet for the precise accounting treatment of different transactions. Specifically, conventional accounting principles do not specifically recognize the risk reducing effect of a hedge. Therefore, in order to deal with the specific problem of hedges, as alternative accounting system (Hedge accounting) has evolved. This accounting can be defined as a method of accounting that differs from normal accounting in that the books of account reflect the reduction in exposure to risk. In other words, hedge accounting is a special accounting treatment for one or more components of a hedge in which the counter-balancing nature of changes in

the values of the hedge instrument and the underlying hedged items is taken into account. Here, the existence of a hedge through copper futures would be recognized and hence the unrealized loss on stocks and the unrealized gain on futures would offset each other. The correct accounting practice depends on whether a derivative transaction is a specific hedge transa ction; a general hedge transaction; or a trading transaction.

A specific hedge is one which can be identified with a specific asset, liability or commitment at the time of execution f the hedge transaction. A general hedge is a transaction used to cover broad risk affecting the entity as a whole; which are not identified with a particular asset, liability or commitment. Trading transaction refers to speculative transactions and also to transactions undertaken by financial market intermediaries (banks and brokers) for whom derivatives are regular business. Therefore, hedge accounting can be used only for specific hedges. However, to qualify for hedge accounting, it is enough if a transaction is a specific hedge. The transaction should also have been designated as a hedge at the time it way entered into; reduce exposure to the identified risk and have a high level of price correlation with the hedged item. Here, any derivative used as a trading transaction should be ‘marked-to-market. That is, it has to be valued at market value and resultant capital gains or losses must be taken into the

profit and loss account for the current period as part of earnings. This means that not only realized gains and losses but also unrealized gains and losses will be accounted for at the end of each accounting period. Swaps entered into as trading transactions should be marked-to-market with the arrangement fee being recognized immediately. An entity acting as an intermediary may buy or sell a derivative and soon after re-sell/buy it back at a profit.

Though the concept of hedge accounting has existed for long, there have been a number of uncertainties and disputes over how and when hedge accounting can be used. The evolution of a number of complex and custom-made derivatives means that the relationship between the item being hedged and the cash flow of the hedge itself is often not very obvious. Again, the 'hedge accounting itself can be accomplished in more than one way, and the different way may produce differing results. Though, the object of a hedging contract may be to secure oneself against loss in a physical delivery contract, these transactions are not treated as inter-connected under income tax law for the purposes of timing of accrual of profit or loss. The profit or loss on the physical delivery contract accrues only on the rate of actual delivery. On the other hand, the profit or loss on the hedge accrues at each settlement period of the forward market. In other words, for income tax purposes, hedge

contracts are market-to-market while the corresponding underlying transaction is taken into account only at the time of actual delivery.

7.0 DERIVATIVES: MARKET STRUCTURE AND REGULATION

Several derivatives markets are run as part of the same organization as the spot market. For example, the stock options and index futures on the Nikkei index are traded on a separate floor of the Tokyo stock exchange. Yet, other derivative markets are not organically linked to any spot market and these include Chicago mercantile exchange and London International financial futures (and options exchanbge0. Again, various ownership structures exist for futures and options markets. Here, some markets are joint stock companies (either profit-seeking or non-profit) while others are association or other agencies of a non-profit nature. Profit seeking exchanges tend to be more efficient and user-oriented, and can attract equity capital.

Unlike ownership, membership refers to the right to trade on the floor of the exchange and the by-laws of each exchange normally establish the membership criteria.

In all derivative exchanges, there are numerous intermediaries who bring together buyers and sellers. Member brokers may employ sub-brokers to procure business and some brokers may act as 'market-makers' while others

may only execute trades. The terms 'floor-broker' or 'pit-broker' or 'pit-trader refers to the persons who actually carry out trades on the exchange floor. Scalpers are floor traders who try to profit from very small price changes, and carry out a number of trades, each of which I only held for a short while. They rarely carry over any position beyond the trading day, and add considerable liquidity to a market as well as facilitating smooth trading. Day-traders hold positions for longer than scalpers but still liquidate them each day so that they are not exposed to overnight risks.

When entering into a futures transaction, an amount known as the 'initial margin' is to be paid and it is generally determined as a percentage of contract value and fixed by the exchange or regulatory authority. Normally this ranges from five to ten percent but is often lower for financial futures. Here, the holder of an open position is required to maintain the overall level of margin with reference to his opening price, usually with a permissible 'grace' level of fluctuation. Essentially, the purpose of margin money is to guard against Default. When the price of the futures contract changes in an adverse manner, the holder of an open position will get a 'margin call', that is, a requirement to deposit additional funds with the exchange. Here, if he fails to meet the margin call, his position will be closed out. However, if the

price moves favorably, the holder of an open position can withdraw cash to that extent.

Each exchange usually prescribes the minimum unit of price variation, known the 'tick size.' The exchange (in consultation with the regulator) determines the minimum contract size and the futures or options contract months to be traded. Depending on demand, there may be a contract for each month or less. Settlement is the process by which changes in position are recorded and each participant is credited (debited) with open gains and losses, so that margin calls can be assessed and collected. In international markets, settlement is done daily on the basis of the 'settlement price', usually the closing price. Weekly settlement is only appropriate when volumes and volatilities are low. Clearing houses are usually owned by banks, financial institutions and major brokers. They can earn profits by means of deploying the cash margins deposited with it by both buyers and sellers.

Basically, there are two main types of trading systems – open outing and screen-based. Open outing is the older method and is essentially a 'continuous action'. In this system, there is a physical trading floor where traders shout out their trades and a trader is usually required to keep shouting

till his trade is executed, unless he no longer wishes to carry out the trade. Since many people will be shouting at the same time, there is a lot of noise and to make trading intentions clearer, designated hand signals are used to supplement what is shouted out. In multi-contract exchanges, there are different 'pits' for each contract and a trader must stand in the designated pit for a given contract in order to trade in it. However, a more recent trading system is the automated or screen-based system (on-line-system) which involves the use of computers and the degree of automation can vary differently. In order routing, orders are automatically routed to exchange floor but actual execution is manual. In order routing and matching, the computer acts like an automated broker and matches the trades, but clearing and settlement is done separately. In order routing, matching, clearing and settlement the computer not only matches trades but automatically does the clearing and settles broker's accounts also. Indeed, several western markets which use open-outing for normal trading use screen-based systems (such as Globex) as a secondary system for use after normal trading hours. Again, screen-based trading can be operated by traders sitting in their offices who do not need to actually meet. It also results in lower transaction costs as well as better audit trails and more transparency. Thus, there is little doubt that a certain degree of automation is required in order to enhance the immediacy and accuracy of market information. However, full automation may not

always be an optimal solution for either developed or developing countries; and therefore suggests that a combination of screen based information dissemination and order entry with open outing trading, could provide the appropriate mix of technology in an emerging market.

In addition to the need for regulation in order to enforce orderly trading, there is the practical justification for regulating forward trading. This arises in connection with such matters as which varieties of a particular commodity or financial instrument may be delivered against the futures market, where delivery can be given or taken, how price differences are to be fixed between one variety and another and so on. Generally, regulations on such matters are framed by trading associations which operate futures markets; and the national regulatory authority does not come into the picture except in abnormal circumstances.

In contrast to the United Kingdom, the United States of America has a strong statutory framework for futures and options markets, enforced through powerful statutory authorities. Here, the most important authority is the commodity futures Trading Commission (SEC) set up under the Securities Exchange Act 1934. Here, the CFTC regulates all futures trading not only in commodities but also in financial instruments (including stock indices) and

options on futures contracts, commodities and foreign currency. The SEC is in charge of stock options (options on individual shares or stocks), stock index options; and options on foreign currencies traded on securities exchanges. With the Treasury Amendment of 1974, the CFTC jurisdiction does not extend to the over the counter transactions in foreign exchange and government securities by sophisticated investors conducted outside a regulated exchange. Other countries equally have similar regulatory bodies with distinct characteristics.

Indeed, one set of issues faced by regulators is the key structural characteristics of the exchanges trading derivatives. These cover issues like market structure; minimum capital required to become a trading or clearing member of the exchange; whether trading is screen-based or open-outing, tick size, whether or not there is a clearing house; and whether or not margins are deposited with the clearing house if one exists. But gives the crucial importance of clearing and settlement in maintaining the integrity of a market, the establishment of a clearing house is an inevitable concomitant of a good derivatives exchange. The second set of issues relates to the response of regulators to evolving market situations in order to ensure orderly trading. Here, the main instruments of regulation include the following: margin variation; imposition of special margins; daily (weekly)

limits on price charges; l limits on open position, temporary suspension of trading; charge in number or timing of contracts traded; fixation of price limits; and indefinite suspension or banning of trading. Indeed, all the above instruments can be used to enforce orderly trading and keep prices within reasonable levels.

8.0 METHODOLOGICAL FRAMEWORK

Hedging efficiency is the degree to which hedging in a futures market compensates for spot market price risks. Perhaps, the best hedging efficiency indicator is computed as

$$\frac{F_t - F_o}{R_t - R_o - C} \quad X \quad 100 \qquad (8.1)$$

Where F_t is the futures price at time t; Fo is the futures price at time O, R_t is the spot price at time t; Ro is the spot price at time O; and C is the carrying cost for period t – o. Where, however, such calculation yields a percentage in excess of 100, the formula used is:

$$2 - \frac{Ft - Fo}{Rt - Ro - C} \quad X \quad 100\% \qquad (8.2)$$

This is because hedge which 'over-compensates' one category of hedger, by the same token 'under-compensates' the other category of hedger. Thus, the

hedging efficiency indicators can be aggregated and used for further analysis in two ways: by means of frequency distribution and by means of computing aggregative averages. By means of frequency distribution involves the classification of hedges into effective and ineffective hedges followed by further classification based on degree of effectiveness or ineffectiveness. Here, the frequencies in each category and sub-category can then be used to assess market performance. On the other hand, by means of computing aggregative averages involves the calculation of average rates of hedging efficiency for individual months, years, etc., by aggregating the results of individual hedges. Thus a good average to use is the weighted arithmetic means, with the extent of spot market price risks as the weights.

The portfolio analysis as an empirical technique attempts to ascertain the optimal level of hedging to be adopted in order to optionise the risk-return trade-off. This involves the construction of a portfolio selection problem in the following form:

$$ER_p = Q_u E (R_t - R_o) + Q_b - E (F_t - F_o) \qquad (8.3)$$

Where ERp is the expected return on hedged portfolio; Qu is the unhedged stock; Qb is the hedged stock; E (Rt – R o) is the expected change in the ready (spot) price and (ft – fo) is the expected change in the futures price. In some tests, the analysis aims to calculate a risk minimizing ratio h* (where h

= Qh/Q_u) such that the portfolio risk is minimized. This is given by the following formula:

$h^* = cov(R, F)/Var(F)$ (8.4)

where cov(R,F) is covariance between changes in R and F; while Var (F) is the variance of futures price changes. However, other test introduce a risk aversion function into the analysis and attempt to select an optimum hedge ratio which results in the best risk return trade-off. Here, many tests involve regression of futures against spot prices to ascertain whether or not futures are good predictors of spot prices or to test other typo theses on the interrelationships between them. The extent of correlation and its significance are used to draw conclusions on the efficiency of futures trading. Similarly, a number of texts have been detected at studying whether or not speculators earn a positive return; whether they earn returns due to normal backwardation or due to superior forecasting ability; whether prices follow a random walk, and so on. Variate difference analysis is another method used to study the effect of futures trading on price fluctuations. Here, price changes are divided into two parts: a systematic component which reflects economic fundamentals and an error term which reflects derivations from economic fundamentals. Therefore these effects of futures trading on the error portion of the fluctuations can be studied.

The following model shows the relationship between foreign participation in futures market and invisible earnings of foreign exchange. Assume that $\frac{V}{P} = t$ (8.5) where t is a constant, measuring the relationship between trading volume and average open position, can be called the turnover ratio. This ratio depends on the frequency with which market operator's close out old contracts and opens new contracts. This frequency generally depends on the investment attitudes of market participants which do not change significantly in the short run. Thus, the foreign exchange earned on margin moves is

$F_1 = C_m$ (8.6)

But $M = Mp$ and therefore F1 = CMP but from equation (8.5),

$P = \frac{V}{t}$ (8.6a)

Thus,

$F1 = \frac{cmv}{t}$ (8.7)

The foreign exchange earned through brokerage is

$F2 = bv$ (8.8)

The foreign exchange earned through sundry charges levied by the association

$F_3 = Av$ (8.9)

The foreign exchange earned through stamp duty and other government levies.

$F_4 = dv$ (8.10)

The foreign exchange earned through remittance and other charges levied by banks.

$F_5 = RV$ (8.11)

Consequently, the total foreign exchange earning is

$F = F_1 + F_2 + F_3 + F_5$

$= (\frac{cmv}{t} + bv + av + dv + rv)$

$= \frac{cmv}{t} + bv + av + dv + rv)v$ (8.12)

But c, m, t, a, b, d, and r are constants. Therefore, $F = KV$ (8.13)

Where $k = \frac{cm}{t} + a + b + d + r$

In fact, foreign exchange earnings vary directly with trading volume of foreign participants. In the above model, V is the trading volume per annum by foreign participants (in money terms); P is the average net open position held by foreign participants (in money terms); M is the average quantum of margin money of foreign participants; F is the foreign exchange earned per annum; C is the marginal interest rate on foreign currency (borrowing cost) b is the brokerage rate, a is the rate of laga and other charge levied by the association; d is the rate of stamp duty levied by the government; r is the average rate o remittance costs and other banking charges per transaction and m is the rate of margin

9.0 CONCLUSION

Indeed, fresh and new instruments and trading techniques have occurred within the African economy and the global financial system in recent times. The pace at which this innovation in financial services is accelerating under the combined pressure of increased competition, rising cost and growing risk is alarming. These forces are profoundly and continuously re-shaping the structure and operations of the entire financial system today. Africa is not left out of this global phenomenon as it is witnessing its own transformation within the financial landscape (though at a slow pace). A derivative instrument value from the value of some other financial instrument or variable. Here, a stock option is a derivative because it derives value from the value of a stock while assets based securities are derivatives because it derives its value from an underlying asset.

There should be no doubt that derivatives are an absolutely essential tool in a modern company's survival kit. They are basically necessary because risk exist. However, some of the risks are man made and can be controlled at a macro level by means other than futures and options. A growing rend is fierce competition between different futures exchanges. The benefit of this is improved trading convenience and lower cost. But exchanges are in important self-regulatory link in the regulatory framework; attempts by them

to maximize turnover lead to a clear conflict of interest which could lead to a weakening f the whole chain. Perhaps, this may lead eventually to a reconsideration of the profit-oriented status of the exchanges in favor of non-profit organizations.

Unlike the developed economics, Africa does not have to be one hundred percent ready in order to start derivative market. What are actually important are the appropriate regulatory framework and the commitment to do it right from the onset. A well regulated settlement and clearing system, as well as strict standards for qualification to trade in derivatives instruments are equally needed. The nature of derivatives trading creates more opportunities for both insider and outsider abuse, and which is why the appropriate market surveillance procedures will need to be put in place. In other words, investor knowledge, market confidence; licensing requirements; trading and clearing rules; efficient trading system; and liquidity of the underlying instruments are necessary prerequisites for the establishment of successful derivatives markets in Africa. Thus, the development of modern trading skills, like that of any other know-how, requires an action plan to build the needed institutions and train the concerned staff. However, before preparing an action plan, the staff, planners and policy makers involved in

derivative marketing need to acquire a fundamental understanding of the workings and the issues involved in the new era of derivative trading.

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