PRICING URBUN CALL OPTION

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By

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ABSTRACT

Derivatives are very unique instruments and the value according to underlying assets. Derivatives have many forms the one we interested on in this study is Options contract that gives rights to buyer or seller to exercise their rights based on the price movement of an underlying assets. Nevertheless, an option is not acceptable according to many scholars due to its speculative nature and premium fee charge and not because of its promise. This Thesis is an application to pricing Urbun Call Options based on Urbun or deposits as a replacement to premium fee charged in conventional options by implement the conventional framework of pricing of currency option (Garman and Kohlhagen 1983) to price Urbun Call Option from an Islamic perspective. The need of the concept of hedging in Islamic finance we provide a reconsideration of currency options for the benefits of maslahah, and would enrich the Islamic economics literature.

Keywords: Urbun Call Option, Risk Management, Pricing

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I AM THANKFUL FOR ALL THAT I HAVE LEARNED THROUGH YOUR INTERESTING AND INFORMATIVE CLASSES. I AM ALSO JUST AS APPRECIATIVE OF YOUR OBVIOUS CARING AND CONCERN FOR ALL OF YOUR STUDENTS, INCLUDING ME. IT HAS MEANT SO MUCH TO HAVE A PROFESSOR LIKE YOU. I HOPE OUR PATHS WILL CROSS AGAIN SOON, AND PERHAPS I WILL HAVE THE PRIVILEGE OF BEING YOUR STUDENT IN ANOTHER CLASS.

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Chapter 1

1. Introduction

The complexity of global and domestic financial transactions implies that firms need to develop cohesive risk management strategies to safeguard their investments. In particular, the volatility of the financial market as evident with the global financial crisis of 2008 calls for the adoption of creative techniques to safeguard resources. One such technique is hedging. Hedging involves the use of financial derivatives as a tool for safeguarding or minimizing financial losses emanating from the volatile financial market. One such source of loss occurs from engagement in international trade whereby as firms indulge in using foreign currency, their subsequent and unexpected fluctuation implies that where the base currency losses value over the one that a firm is reserved to using, the differences often results in losses.

Depending on the volume of the transaction, these might result in losses ranging in the millions. Mitigating such a foreign currency exchange risk becomes critical for such firms. Whereas a number of economies do not have any moral or ethical reservations in its utility and use, nations that adhere to Islamic Sharia, such as the Gulf Cooperation Council (GCC), find their use as being controversial and thus unsuitable to their needs. In other words, the Islamic perspective towards hedging is that it is nothing more than a means to increase and diversify profit. Suffice to say that such a view varies greatly with those financial experts who posit that hedging offer an insurance policy covering such losses. Nevertheless, such experts are not oblivious to the fact

that profit is indeed a central aspect of hedging, as any profit accrued from the transactions would be used to offset any future losses. Based in these differences in theoretical perspectives, there is need to demystifying the concept of hedging.

Derivatives slightly use and away from countries where that reconcile of financial transactions with Islamic law demand the development of shari'ah-compliant framework and structures therefore using financial engineering to adopt these financial instrument based on shari'ah-compliant rules. Islamic finance under and subject to shari'ah governance, which prohibit speculation and gambling, and stated that income must be derived as profits from the shared goods and services between counterparties rather than interest or a guaranteed return.

A derivative is a financial instrument whose value depends on the value of other, more basic variables (Hull, 2005). 'Derivative' is therefore a generic term for instruments that derive their value from elsewhere. The main types of derivatives are forwards, futures, Options and swaps. Although option contracts are widely used in the conventional market, their use in Islamic finance is less prevalent.

This is partly due to a lack of understanding of the Instrument and its uses/benefits. However, Islamic businesses face the same financial risks as their conventional counterparts and similar instruments are needed to manage these risks. Hence, various Islamic options have been engineered to hedge against these risks using underlying Islamic instruments to replicate the

conventional instruments. Islamic commercial law also contains certain known permissible options.

1.1 Islamic versus conventional options

Comparison between conventional and Islamic option currency

A currency option defined as a contract between two parties – a buyer and a seller - whereby the buyer of the option has the right but not the obligation, to buy or sell a specified currency at a specified exchange rate, at or before a specified date, from the seller of the option. While the buyer of option enjoys a right but not obligation, the seller of the option nevertheless has an obligation in the event the buyer exercises the given right. There are two types of options:

• Call options – gives the buyer the right to buy a specified currency at a specified exchange rate, at or before a specified date.

• Put options – gives the buyer the right to sell a specified currency at a specified exchange rate, at or before a specified date. Options are particularly suited as a hedging tool for contingent cash flows.

The options market is simply an organized insurance market. One pays a premium to protect oneself from potential losses while allowing one to enjoy potential benefits.

Garman and Kohlhagen (1983) provided a formula for the valuation of foreign currency options following the Black & Scholes lines of thought but set their riskless hedge portfolio up by investing in foreign bonds, domestic bonds and the option.

Islamic Derivatives (Options)

Derivatives are financial assets that have a value, which is subordinate to the value of a hidden essential asset. This hidden asset could be in the form of a basic financial asset such as: stocks, bonds, currencies, commodities or even currencies. The main purpose of derivatives is to minimize possible risk. According to Smolo (2009) because Islam promotes the protection of wealth, any financial transactions leading to the unnecessary risk of wealth is disagreeable. Islamic derivatives can be extremely beneficial for the conservation of communal prosperity and welfare.

The Shariah does not forbid or frown upon making financial payments for the use of an asset, but it is crucial to ensure that both lender and borrower both share the investment risk. In this case, profits are not guaranteed, instead profits are obtained only if the investment itself generates income. According to Ayub (2003) the moral impediments of the Islamic law leans more permits passive investment, which leads to secured interest as method of compensation. It also requires the duplication of interest-aspect of conventional finance through a more compound structural system of contingent claims. The basic aim of this is to produce an equitable system of distributive compensation, which encourages authorized activities and public goods known as ***Maslahah***.

Options may not be acceptable since they are speculative in nature and the premium fees are charged. Therefore, Muslims are requested to accept options created using non-refundable deposit or Urboun in order to replace the premium fee charged by the traditional options. This

could benefit the Maslahah and Islamic economic. While Urboun is questionable, according to Dali (2007) it should be used on developing option since it offers an alternative for the Muslims for price movement hedging of a given asset or currency. However, the speculative elements should be avoided in order for its benefits to be realized and ensure a win-win situation for parties involved including the seller and the buyer.

Urboun or deposit is proposed as a shariah compliance substitute to the premium charged options. Consequently, the buyer is supposed a deposit for a call option and if a withdrawal takes place, this deposit will be surrendered in form of a gift to the seller. However, the deposit will be treated as a purchase price whenever the buyer continues with the purchase. Therefore, the seller will have no option for not selling. Dali (2007) indicates that Urboun is a fasid or void since it comes as a form of deception that welcomes danger and people will obtain property without replacement. However, other scholars favor the use of Urboun sale. according to Bin Hambal, Urboun should be employed in sale based on the Zaid Ibnu Aslam`s narration that options are acceptable in order to rumination on the feasibility of the deal and achieve knowledge about deal.

Usually pays a portion small amount of the price and approves to forfeit the paid portion of the full contract price when the buyer fails to complete the deal on a exact date for taking the goods and payment of the remaining price.

Generally. According to Ibnu Qudamah, Urboun must comprise of a time period within the contract in order to prevent gharar, uncertainty and conflicts. However, Ahmad indicates that Urboun should not stipulate time period. In recent times other financial scholars are of the opinion that Urboun should be permissible since it customary. According to Dali (2007), the modern options were not found in the Islamic fiqh law since contemporary financial transactions were not undertaken in the classical theory of fiqh.

Moreover, khiyar could take place only during the exchange transactions that tool place not as options but where delivery and payment would take place in future. Based on the opinions from different scholars, Dali (2007) indicates the approval of Urboun can be employed only for the call option. The put option cannot be integrated into Urboun because Urboun is usually a deposit to purchases while put option offers a promise to sell.

1.2 Problem Statement

Option pricing is believed to be based on the pivotal works of Merton and Black-Sholes (1973) who presented a groundbreaking document based on pricing option and liabilities of corporate. Garman and Kohlhagen (1983) developed a model for pricing foreign currency options based on the formula provided earlier by Black-Scholes (1973). Almost studies focused on pricing conventional options using different underlying assets (Stocks, Exchange rates, Commodities…) nevertheless Islamic derivatives researches

and studies focus on the area of designed product and provide mechanism and structure only regardless pricing zone.

1.3 Justification of the research

This thesis presents a literature review on Islamic derivatives in general and Islamic Options in details in term of increase and develop the Islamic economy. It will provide a model of pricing Urbun Call option to be useable, helpful for shariah scholars as a reconsideration of risk management within an Islamic framework.

1.4 Study Objectives

The main objectives of this thesis aim to:

- Assist the acceptance of Islamic Options by Muslims Scholars
- Provide a simplified model to price Islamic Options inspired from Garman and Kohlhagen's model for conventional currency options

1.5 Thesis Outline

Chapter Two will present a summary of the literature review of previous studies on option pricing in the conventional and Islamic environments. The methodology, Model and data description will be discussed in Chapter Three. Chapter Four will display the simulation results

derived from the empirical study. Chapter Five concludes, discusses the main findings and offers suggestions for further research and the potential drawbacks of the study.

Chapter 2

Literature review

2.1 History of pricing option

The pricing option theory was founded by Bachelier (1900) who invented the Brownian motion[1] in order to model stock options within the French government bonds. He developed the mathematics and statistics of Brownian motion five years before Einstein (1905). Einstein had employed Brownian motion in physics. Studies picked momentum in 1960 especially during Samuelson (1965) times whereby he considered long-term equity options and employed geometric Brownian motion in modeling the random behavior underlying stocks. Samuelson (1965) provided the first formal economic argument for 'efficient markets'. Modeled random values of the option using two assumptions: expected rate of return (α) and rate β for which the option value should be discounted back to the date of pricing. The named factors depended on unique characteristics of risk of the underlying option and stock. Other important scholars include Black-Scholes and Merton (1973) who offered the problem a new perspective.

2.2 Stock Option pricing

Stock Option pricing is believed to be based on influential works of Merton and Black-Sholes (1973) who presented a pioneering paper based on pricing option and liabilities of

[1] Referred to Encyclopedia Britannica: **Brownian motion,** also called Brownian movement, any of various physical phenomena in which some quantity is constantly undergoing small, random fluctuations. It was named for the Scottish botanist Robert Brown, the first to study such fluctuations (1827).

corporate. This document provided the first successful formulae for option pricing and defined a general framework for pricing derivative instruments. The paper of Black-Scholes (1973) on option pricing offers a formula that prices the European call or put options on stocks. It is based on the assumption that stock price tend to follow a geometric Brownian motion under constant volatility and the stock will not pay, make a distribution or pay a dividend. Scholes and Black (1973) derived a partial differential equation used for valuing claims liable and applied the boundary conditions based on the European call option on non-dividend-paying stocks to obtain their well-known formula of option pricing.

Cox and Ross (1975) made a vital contribution based on the technique of risk neutral valuation. This method employed Samuelson`s (1965) approach of pricing options. However, the empirical testing of this work was not possible till 1979 when Feigner and Jacquilat (1979) proposed the option of currency for market Option pricing.

Thereafter in 1982, the Philadelphia Stock Exchange (PHLX) of America began currency options. Before the Black-Scholes (1973) option pricing model, discounting expected value of a given stock was used in determining the option price at the date of expiration through arbitrary risk premiums as the discount factor that were to reflect on the volatility of the stock.

The Black-Scholes model of option pricing was employed first in pricing currency option. However, in due time, scholars found that the estimated prices based on this model suffered from several biases. For instance, Black-Scholes model (1973) demonstrates underpricing of out-of-the money options especially for the short-maturity and low volatility securities. . In the modern times, options pricing employs stochastic calculus that offer a

probability distribution for the future assets values and allows individuals to utilize risk-free rate in discounting the option value.

Merton (1973) formula of option pricing generalized the Black-Scholes (1973) formula of in order to price the European options on stock indices or stocks paying a recognized dividend yield.

In 1976, Margrabe also developed a pricing model used of the exchange option called the option to switch from the delivery asset, one riskless asset to another, the one to be acquired or known as optioned asset .This model is beneficial in the pricing options in which the price exercised is uncertain. Margrabe (1976) assumes a log-normal diffusion process for the optioned and delivery asset. However Margrabe`s (1976) model needs an individual to know the correlation for the two assets. Both the nature and its strength (negative versus positive) influence how changes in volatility of one asset determine the value of the other asset. The major advantage in this application as compared to Black-Scholes`s formula (1973) includes the basic assumption that both future cost and value of the asset are stochastic.

$c = Se^{-qt}\ \Phi\ (d_1) -\ xe^{-rt}\ \Phi\ (d_2)$

$p = xe^{-rt}\ \Phi\ (-d_2) - Se^{-qt}\ \Phi\ (-d_2)$

$$d_1 \frac{= \log\left(\frac{S}{x}\right) + (r - q + \sigma^2/2)t}{\sigma\sqrt{T}}$$

$d_2 = d_1 - \sigma\sqrt{t}$

Where is:

□*s* = the price of the underlying stock

- x = the strike price
- r = the continuously compounded risk free interest rate
- t = the time in years until the expiration of the option
- σ = the implied volatility for the underlying stock
- Φ = the standard normal cumulative distribution function.

However, Black-Scholes assumes that the costs *K* are deterministic. Some studies have explored scenarios in which the future pay-off will not follow log-normal distribution but have the risk of dropping to zero on competitive entry (Liang et al., 2009). A real option valuation model that is based on diffusion process of mixed-jump, whereby the jump signifies the period when asset values and cash flows will fall to zero has been studied.

Another further extension includes the sequential exchange model that was proposed by Carr and Wu (2003, 2004, 2007). This model calculates compounded option value in which Margrabe `s model (1976) points out that the costs and future asset value will behave stochastically. This model offers an additional extension by assuming that investment occurs in sequential steps that will build each other (compounded). Despite all the indicated analytical models, several valuation challenges for financial options do not have acceptable analytical solutions. The analytical models will arrive at the value expected through solving of a stochastic differential equation. For this to work, one requires to have knowledge on the nature of stochastic process that will fit the movements of certain assets. This is challenging even for the financial assets and real assets.

2.3 Currency option

In 1977, Monte Carlo Simulation method was suggested by Phelim Boyle. Monte Carlo Simulation is based on the information that whatsoever the stock value distribution will be during the expiration time of the option, the distribution is determined through processes that influence the asset value movement between now and the date of expiration. Therefore, if such processes can be specified, computers can be used to stimulate it. Based on the simulation, the asset value during the time of expiration of the option is produced. Several simulations will develop a distribution for the future stocks values and based on this probability distribution, the expected stock value at the period of option expiration can be computed. The more the simulations are undertaken, the higher the method`s accuracy. When more accurate results are generated, the riskless hedge is better since it is possible to build it and individuals can employ the value expected at the riskless rate.

Sharpe offered another advances made originally in (1978). However, it was later made famous through Cox (1975), Rubinstein and Ross`s publication in (1979).

2.3.1 Garman-Kohlhagen model

Garman and Kohlhagen (1983) developed a model for pricing foreign currency options based on the formula provided by groundbreaking works of Black-Scholes (1973). This model is based on the assumption that:

- The underlying variable includes the spot exchange rate.
- No differential taxes, no transaction costs, no lending and borrowing restrictions as well as trading take place continuously.

- The term-structure of rate of interests within foreign and domestic country are non-stochastic and flat.
- The exchange rate (*S*) can be depicted through stochastic process.

  $dS = \sigma SdZ + BSdt$

  Where is:

  B refers to the instantaneous mean

  Z is the standard Wiener process

  σ^2 represents instantaneous variance.

  σ and B are constants inferring that the stochastic process that defines the evolution of the spot rate over a given period of time is log-normal.

$c = exp^{-r_F T}\text{SN}(d_1)$ - $exp^{-r_D T}\text{KN}(d_2)$, and

$p = -exp^{(-r_F T)}\text{SN}(-d_1)$ + $exp^{(-r_D T)}\text{KN}(-d^2)$

Where is:

- P is the put option price and C refers to the call option price.
- (r_F) is the foreign, (r_D) is the domestic risk-free rate of interest per a given unit time.
- T refers to the maturity of option where *T=T1-t* ; whereby *T1* refers to the maturity date for the option and *t* is the current time.
- $d_1 \frac{=\log(\frac{S}{k})+(rD-rF+\sigma^2/2)t}{\sigma\sqrt{T}}$

- $d_2 = d_1 - \sigma\sqrt{t}$
- N (d_1), N (d_2) includes the function of normal cumulative distribution.

Based on Black-Scholes model of (1973), the Garman-Kohlhagen`s (1983) approach has been a practical choice in currency option pricing for several years despite volatility and interest rate being non-constant in practice (Wang, 2011).

J. Hull, A. White (1990) employed Black-Scholes (1973) approach including comparable results obtained and dividends based in similar assumptions that were used by Garman Kohlhagen (1983). Furthermore, Grabbe (1983) also offered a model in European options that relaxes the assumptions regarding constant rates of interest. Grabbe (1983) assumed that the interest rates processes within the foreign and domestic currency are deterministic functions of time. He used the arbitrage-free methodology in obtaining partial differential equation (PDE) and hence the European call option. Nonetheless, this model was not supported by realistic evidence based on Adams and Wyatt (1987a) that indicated that interest rate risks are vital elements within the valuation of currency options (Veestraeten, 2013).

2.4 Other models for currency pricing

J. Hull, A. White (1996) came up with a second stochastic differential equation for modeling volatility process of the asset prices. However, both foreign and domestic rate of interest were held constant. They indicated that neither the constant volatility nor the lognormal probability related to interest rate of exchange can fit empirical data (Liu, Chen & Ralescu, 2015). Based on assumption of reverting to long-term mean, volatility and following the arithmetic Ornstein-Uhlenberk process, another model was developed by Stein and Stein (1991) for pricing options

(Lustig, Roussanov & Verdelhan, 2011). Volatility and stock prices were assumed to be independent. The assumption that volatility is governed through the Ornstein-Uhlenberk process arithmetic has the likelihood to have negative values. Hilliard and colleagues in (1991) proposed a simple methodology to price the European currency option under the stochastic rate of interest. They foreign and domestic bond prices were assumed to have local variance that depends only on time. By developing a delta-hedging strategy that followed Grabbe`s (1983) model and invoking Cox and Ross`s (1975) risk-neutrality argument, Hilliard derived a European currency option model of pricing based on the stochastic interests rates. Amin and Bodurtha (1991) later created a highly stochastic currency-option model that allowed American-bases characteristic (Liu, Chen & Ralescu, 2015). Their model considered arbitrage-free discrete time execution framework while utilizing multinomial version of lattice methodology hence deriving a path-dependent equation with specific rate of interest functions.

In 2001, Chang came up with a stochastic rate of interest economy model that employed values of once and twice in the exercisable option and explained how interest rates of stochastic have impacts on the option

Choi and Marcozzi (2003) obtained an analytic currency-options model for the European whereby they considered state variables as short rates of exchange and interest. They used associative diffusion that represents the universal economy and comprises of coercive diffusion matrix. In 2004, Chesney and Jeanblanc offered a model focusing on exchange-rate process using jump diffusion. This model obtained a partial differential approach for the European option. In the recent times, Dupoyet (2006) carried out an empirical examination into the

Japanese Yen versus the U.S.D currency option that are traded within the Philadelphia stock exchange in order to determine the information content of the European option price (Liu, Chen & Ralescu, 2015). Dupoyet tested Black-Scholes model and others three by using stochastic volatility, jumps stochastic volatility and stochastic interest rate. To increase the size of the sample, American and European calls were investigated within a stochastic environment of interest rate whereby the American call values can safely be estimated in relation to European call values. The greatest improvement to the Black-Scholes in hedging and pricing was found by employing stochastic volatility.

Haque and Saba (2012) applied currency option pricing that followed the rate of exchange on a daily basis. In this study, the exchange rate of one dollar in regard to Yen Feiger and Jacquillat rom (1960) January through to 2011 January was examined. Different models of regression analysis such as Logarithmic, Quadratic, inverse, S or S-curve, compound, power, cubic logistic, exponential and growth were used. The S-curve model was selected due to its high correlation coefficient then regression analysis was carried out to offer prediction of the rate of exchange through to 2020. In the first quarter of 2011, the rate of exchange for the Yen per dollar was studied and demonstrated a lower than S-curve predictions for 2012 but higher than 2011 for other models (Haque &Saba, 2012).

2.5 Islamic Derivatives

(Previous study on Islamic option structure on Urbun call option)

Islamic derivatives including Islamic options contracts as a critical financial instruments, which are designed and refined to be compliant under Shariah principles. Financial contracts and the

conditions specified in them are essential in banking business as well as in financial markets because these impact the rights and obligations of each party. Financial engineering is to combine and repackaging of contracts decades in ways that suit all parties concerned for the distribution of risks and rewards. The jurists had discussed mechanisms of mitigating risks of losses, misrepresentations or product defect. This is characterized in the number of traditional Sharia contract such as (Urbun, ju'alah[2], Hāmish Jiddiyah). The rationale of previous contracts as a common factor is the mechanism to permit both contracting parties a time period to think about the contract and to avoid damage may overwhelm them when the contract continued which Is translated to guarantee and mitigate risk or loss against mispriced in the market. The term hāmish al-jiddiyah is a good model of a call option should there be no difference between it and options. The commitment fee is to remedy damage or loss as a result of the customer's failure to conclude the contract. The institution holds the commitment fee on fiduciary basis. If the commitment fee is more than the loss incurred by the bank, the remaining balance after deduction of the value of the loss or damage must be returned to the customer. In addition, when the customer has fulfilled his promise and executed the contract the institution is obliged to refund the commitment fee to the customer or to consider it part of the price. Ju'alah contract concern of future contracts because it is allowed to claim payment fees or premium prior to submission of the subject matter and subject matter should be known. The parties may agree on the submission of the subject matter without specifying a date. To trade in financial option

[2] Performing a given task against a prescribed fee in a given period.

Ju'alah is a good contract where buyer and seller both offer public specifying reward or those who can consider shares for prices they are looking for the subject matter of Ju'alah is to carry out a certain task that would produce a result. The task is to produce the services requested and this stand until the outcome is completed. Ju'alah contract flexible as far as the premium price is concerned. Options classified from the viewpoint of Islamic law. some options contract are created by ordinary law and another created by contracting on a tangible subject matter.

the options that exist for purpose of interest both or one of the contracting parties is the options created by law. Options that are created by the law include, including others, khiyar al-majlis [3](option of session). both parties are allowed by law and have the right to terminate and concluded the contract if they did not separate from the place of the contract. automatically This form of option is granted to the contracting parties by the saying of the Prophet (pbuh) "both the buyer and the seller (contracting parties) have an option (to terminate the contract) so far as they did not disperse".

fiqh majority categorized options refer to the previous Khiyar[4] obviously , such as khiyar al-ayb [5](option for defect),khiyar al-ru'yah[6](on sight option), khiyar al-tadlees[7](fraud option) and option for violation of valid conditions stipulated in the contract.

[3] Option to rescind a contract during the same meeting in which contract is agreed.

[4] Options.

[5] Option to rescind a sales contract if a defect is discovered in the object of sale.

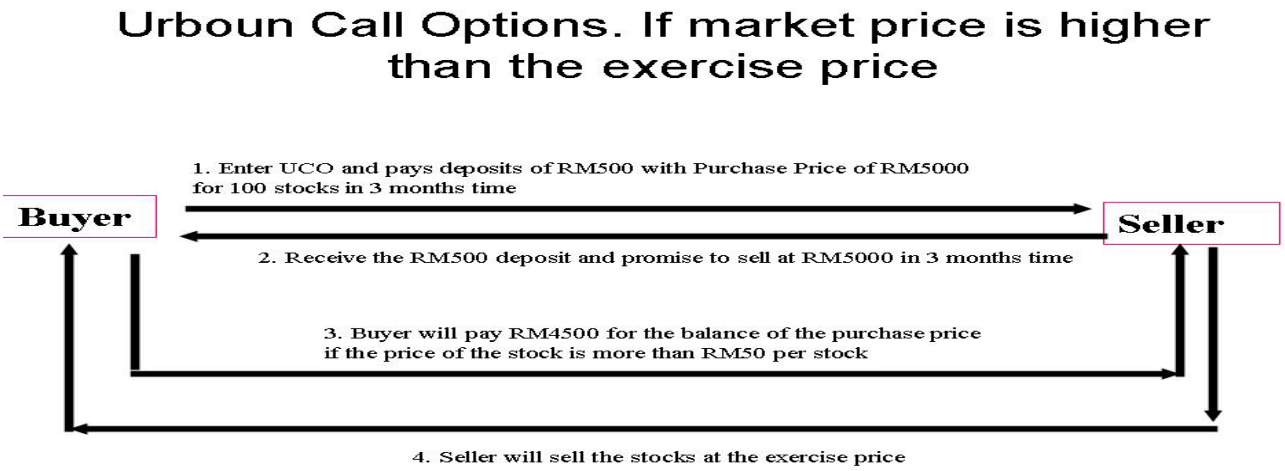
[6] Option to rescind a sales contract after physical inspection of the object of sale

[7] Option to rescind a contract if a party finds that it has been cheated.

Option contract produced by the agreement between parties these options will exist simply when the parties choose to assign a particular right to the contract. Example of contractual options is khiyar al-shart [8]or conditional option. The concept of financial options falls under the category of contractual options, hence therefore we tried to compare Islamic finance to financial contractual options due to their similarities in features and objectives. Urbun or deposit is proposed as a shariah compliance substitute to the premium charged options. Consequently, the buyer is supposed a deposit for a call option and if a withdrawal takes place, this deposit will be surrendered in form of a gift to the seller. However, the deposit will be treated as a purchase price whenever the buyer continues with the purchase. Therefore, the seller will have no option for not selling. Dali (2007) indicates that Urbun is a fasid or void since it comes as a form of deception that welcomes danger and people will obtain property without replacement. However, other scholars favor the use of Urbun sale. according to Bin Hambal, Urbun should be employed in sale based on the Zaid Ibnu Aslam`s narration. According to Ibnu Qudamah, Urbun must comprise of a time period within the contract in order to prevent gharar, uncertainty and conflicts. However, Ahmad indicates that Urbun should not stipulate time period. In recent times other financial scholars are of the opinion that Urbun should be permissible since it customary. According to Dali (2007), the modern options were not found in the Islamic fiqh law since contemporary financial transactions were not undertaken in the classical theory of fiqh.

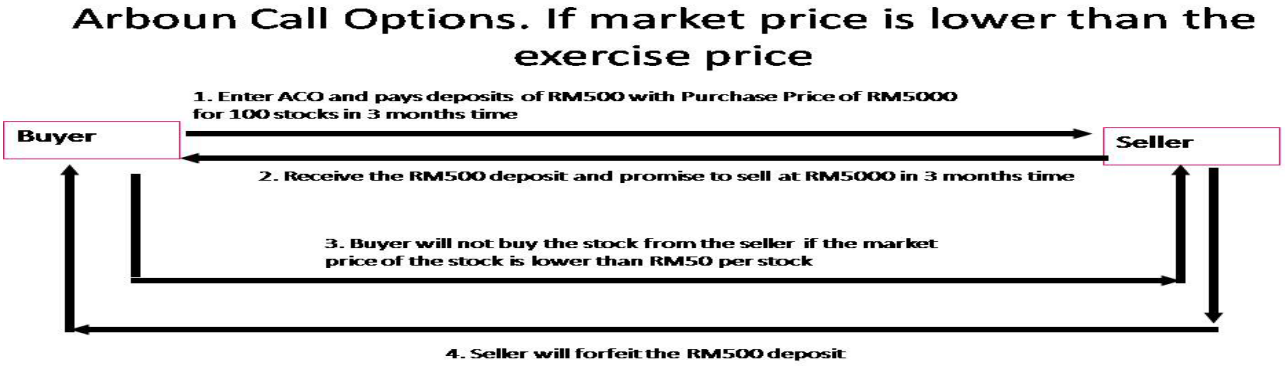
[8] The option to rescind a sales contract based on some conditions. One of the parties to a sales contract may stipulate certain conditions, which if not met, would grant a right to the stipulating party an option to rescind the contract.

Moreover, khiyar could take place only during the exchange transactions that tool place not as options but where delivery and payment would take place in future. Based on the opinions from different scholars, Dali (2007) indicates the approval of Urbun can be employed only for the call option. Based on Dali (2007) structure the Urbun Call Options will consider the premium paid by the buyer as Urboun or deposit. Meanwhile Urboun is a deposit, it will be a part of the purchase price when the options is exercised. It is unlike conventional options that consider the premium as a fee charge and it is not a part of the purchase price of contract. The following diagram illustrate the process of Urbun Call Options if the market price is higher than the market exercise price at the exercise date.



The buyer and seller will enter into mutual agreement with a promise to buy and sell. The seller will receive the RM500 as a deposit (Urboun) and promise to sell to the buyer at RM5000 in 3

months. The buyer pay the deposits (Urboun) of RM500 with the purchase price of RM5000 for 100 stocks. The exercise period is in 3 months time. At the exercise date the buyer will pay RM4500 for the remaining of the purchase price if the market price of the stock is more than RM50 per stock. In this case he will buy at RM50 per stock and can sell the stocks at the market price. The profit for the buyer is the differences between the market price and the strike price. The seller will sell the stocks at the exercise price even though at the exercise date the market price is higher than the strike price. In the event of the market price is lower than the strike price, the following diagram would be best to illustrate the overall processes:

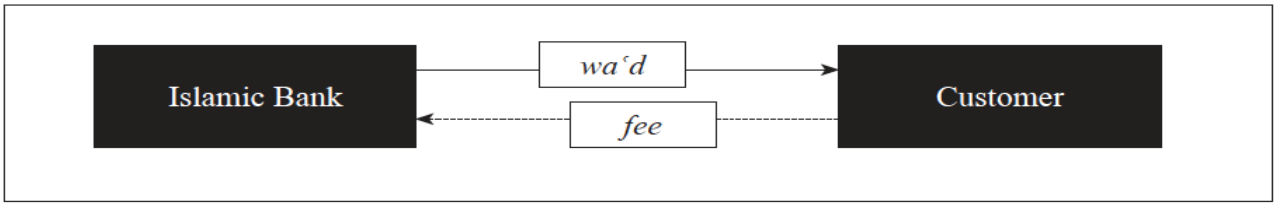


In the case if the market price is lower than the strike price, the buyer will not buy the stocks from the seller because it would be profitable for him to buy from the market. Nevertheless, the buyer not buying from the seller only after the price of the stock is above RM45 because the buyer will try to exercise his promise to buy from the seller. But if the price is lower than RM45 the buyer will exercise his promise and the seller will forfeit the RM500

deposit. This currency option contract exchange based on wa'ad structure is also very similar to the conventional option. the wa'ad promise binding agreement on one party thus, On the start date of the transaction, the bank will promise the investor to exchange Currency 1 against Currency 2 at a pre-agreed rate on a future date. On the same date, the bank will receive a fee from the investor.

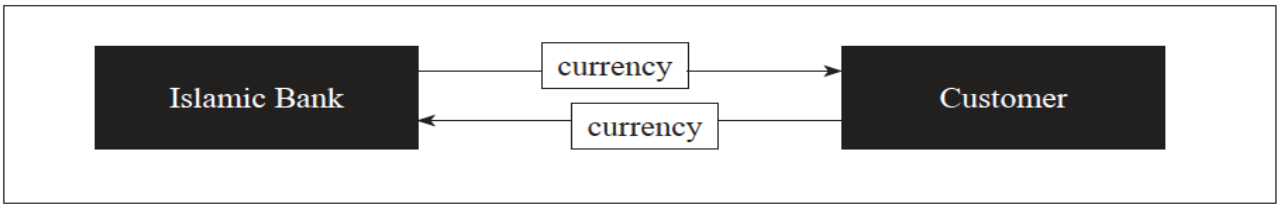
Figure : FX *Waʿd*

1. Start date:



On the future date, the investor might ask the bank to fulfil its promise or might release the bank from its undertaking. On the maturity date, if the investor wants to execute the wa'ad, the bank and the investor will exchange the currencies.

2. Maturity date, if the investor asks the bank to fulfil the *waʿd*:



The investor will want to execute the wa'ad if the currency rate is favorable to him. The upside

of this contract is that the investor can wait and see whether the wa'ad is more favorable or less favorable then the prevailing market rate. However, the investor is required to pay a fee for the wa'ad. Both structure as explained has a component of fees and structure has been approved by Shariah Advisors Board of the banks. Furthermore AAOIFI standards have approved Urbun, and hamish jiddiyyah. On a wide range of research and studies all papers subject to option contract designate the structure and mechanism of the process without figure or equations .

Derivatives from the perspective of the Islamic have been debated heavily by different Ulama including swaps, future, forward and option contract. Many scholars have their personal reasons for inclusion or disapproving such contract except the contract of Salam (Iqbal, Kunhibava & Dusuki, 2012). Obiyatullal (1999) offered some resourceful knowledge by depicting these instruments in a broader perspective by pointing out critical matters on why the communities of Islam require derivatives within the marketplace and highlighted several implications that are likely to impact on the Islamic business when the derivatives are ignored. Mohammed obaidullah (1999) indicates options and futures are prohibited based on sarf`s definition of two different perspectives (Iqbal, Kunhibava & Dusuki, 2012). The first view indicates that only silver and gold would be directed by regulations of bai-sarf while the paper or fiat currency did not fall into the bai-sarf class. Therefore, buying or selling fiat cash with other currency within deferred delivery when the currencies are not manufactured from silver or gold is acceptable since fiat currency has not be classified as sarf. However, in the current economic system, if this perspective is seized, the lending of fiat cash with interest is acknowledgeable that can lead to major repercussions to the Islamic banking system.The review of modern financial derivatives

evolution and their needs has urged many Islamic researchers to do some evaluation and reconsideration (Dali, 2007). However, the recent completion of the first standard derivatives documentation testifies to the greater convergence of shari'ah interpretations in this area. In March 2010, after more than three years of negotiations and industry consultations, the International Swaps and Derivatives Association (ISDA) and the Bahrain-based International Islamic Financial Market (IIFM) published the long-awaited Tahawwut (Hedging) Master Agreement (TMA), which standardizes shari'ah-compliant swap-based hedging transactions. The TMA is marking an important step toward greater transparency as the first standardized documentation for privately negotiated Islamic derivatives, providing much-needed consistency and predictability of shari'ah-compliant risk management.

The modern opinions indicate that paper or fiat currencies are classified under the bias as-sarf hence deferring delivery is riba (Iqbal, Kunhibava & Dusuki, 2012). Moreover, OIC fiqh academy`s verdict support this bai-as-sarf viewpoint. Monzer Kahf (prominent scholar of Islam) has opposed the sale of currency with deferred delivery. This standpoint is very practical in the modern system in light of the recent Ummah economic development. Refer to A. Jobst and Juan Solé (2012) research that the Efforts to develop legal standards and uniform market practices for shari'ah-compliant derivatives have started only recently. Regulatory consolidation and supervisory harmonization through standard settings still at an early stage. Leading organizations in Islamic finance, such as the Accounting and Auditing Organization of Islamic Finance Institutions (AAOIFI), the Islamic Financial Services Board (IFSB), the General Council for Islamic Banking and Finance Institutions (GCIBFI), the Islamic International Rating Agency

(IIRA), and, most of all, the Fiqh Academy in Jeddah, has been working on new regulatory norms. However, these efforts have not addressed various risk management techniques that involve derivatives. In the meantime, some industry initiatives are already showing promising results. In October 2006, the International Swap and Derivatives Association (ISDA) and the International Islamic Financial Market (IIFM), in cooperation with the International Capital Markets Association (ICMA), had signed a memorandum of understanding to develop a master agreement protocol for Islamic derivatives, which Eventually led to the publication of the multi-product ISDA/IIFM Tahawwut (Hedging) Master Agreement (TMA) on swap transactions (with standardized documentation) in March 2010. Derivatives are uncommon and far among in countries where the relate of capital market transaction with Islamic law obligation the elaboration of sharia –compliant agreement. Islamic finance synthesis close equivalents to equity mortgage and derivatives known in conventional finance. Financial globalization accelerates larger diversification of investment and permit risk to be relocated across financial system within derivatives.

The magnitude of this spreading of risk largely capital markets more efficient while the availability of derivatives has increased liquidity in the underlying cash market.The progress of financial derivatives in initial markets performance an extraordinary role in this framework as more recognized and accurate to outgrowth market structural engagements of allocate asset resettlement between borrowers and lenders to follow interest –bearing financial contract As a final result .

3.1 Types of Islamic Derivatives

Derivatives are financial assets that have a value, which is subordinate to the value of a hidden essential asset. This hidden asset could be in the form of a basic financial asset such as: stocks, bonds, currencies, commodities or even currencies. The main purpose of derivatives is to minimize possible risk. According to Smolo (2009) because Islam promotes the protection of wealth, any financial transactions leading to the unnecessary risk of wealth is disagreeable. Islamic derivatives can be extremely beneficial for the conservation of communal prosperity and welfare.

The Shariah does not forbid or frown upon making financial payments for the use of an asset, but it is crucial to ensure that both lender and borrower both share the investment risk. In this case, profits are not guaranteed, instead profits are obtained only if the investment itself generates income. According to Ayub (2003) the moral impediments of the Islamic law leans more permotes passive investment, which leads to secured interest as method of compensation. It also requires the duplication of interest-aspect of conventional finance through a more compound structural system of contingent claims. The basic aim of this is to produce an equitable system of distributive compensation, which encourages authorized activities and public goods known as ***Maslahah***.

3.1.1 Swaps

A Swap refers to a two-sided contractual settlement whereby the parties involved agree all together to carry out periodic payments in exchange of two kinds of stream cash flows

(Dusuki, 2009). These payments are depicted as sides or legs of swap and are determined based on the hypothetical values or notional of the underlying assets. The swap agreements can be undertaken through exchange of liability or asset in similar or dissimilar currencies or even floating rate interest stream with other fixed rate. Several kinds of financial swaps are available including currency swap, interest swap, equity swap and commodity swap (Dusuki, 2009).

According to Dusuki (2009), the primary objectives of swaps include hedging against financial risk, operating at large scale, reducing financial cost, undertaking speculative activities in order to maximize profits and accessing new markets. Swap appears to be one of the first derivatives instituted whereby the currency swap was exclusively offered in U.S market in 1970 followed by interest Swap that took place in 1981. Dusuki (2009) indicates that swap derivatives were acknowledged by the public to a degree that the total transactions of swap increased significantly from USD700 billion (1989) to USD4.6 trillion (end of 1992). The swap mechanism for hedging has aided insurance companies, multinational organizations, banks, local financial companies and other companies. According to Dusuki (2009), the volatility within financial markets such as the currency and interest rate market is a serious threat for the numerous market participants. Therefore, the broader usage of swap is evident on the role it plays including hedging against market risks (currency and interest rate instabilities). The use of swap instruments is vital especially for risk management through hedging.

In regard to Islam, swap is also used. For instance, he Islamic foreign Exchange Swap that refer to a contract created as a mechanism for hedging in order to reduce the exposure for market participants to the rate of currency exchange which is usually fluctuating and volatile.

Even though the Islamic Swap functions are nearly similar to the conventional counterpart, Shariah principles largely guide its structure hence elements prohibited by Islam such as gharar (excessive ambiguity), riba (usury) and maysir (gambling) are eliminated (Kotzé, 2011). These eliminations fundamentally offer a level playing ground and enhance justice to circumvent harms and protect parties interests tangled into market transactions.

The CIMB Islamic Profit Rate Swap has been recognized as the world's first Islamic derivative product. In recognition for this innovation, the CIMB's Islamic Profit Rate Swap has been conferred the Islamic Finance Product of the year in 2005 by Euro money. Some of the Islamic structured swaps complying with Shariah principles include Profit Rate Swap, FX Swap and Cross Currency Swap. Indicate to Dusuki (2009) Shariah Parameters on Islamic Foreign Exchange Swap and classification we can find in table the type of swaps.

Table 1: Types of swaps

Interest rate swap:	Currency swap	Commodity Swap	Equity Swap
This swap involves exchanging a stream of payments based on the performance of an underlying quantity of equity shares or an equity share index	This swap is applied based on the average price of an underlying Commodity (i.e. oil, gas, or other natural resources) where the parties exchange payment of fixed price over the commodity with another floating price.	This type of swap includes exchange of interest payment but with payment of interest on a notional amount of principal denoted in different currencies.	This type of swaps comprising an Exchange of interest rate payments on a specified amount of principal. Basically done by exchanging a fixed interest rate payment on the principal with a floating rate that is adjusted periodically. This is popular type of swaps

Dusuki (2009) indicates that FX Swap is a derivative with the motive of hedging against exchange rate fluctuation risk and it normally involves two foreign currencies.

Through using swaps can provide Hedging by sculpting an existing cash flow to a favorite arrangement that maximizes profit.

The start and expiry date for the FX Swap involve the exchange and re-exchange of different foreign currencies. Therefore, the dual exchange means that FX Swap is dissimilar to the forward contract whereby exchange takes place only once. FX Swap will involve two phases of exchange whereby at the beginning the exchange of the first currency will be undertaken and both parties will then seal a forward contract.

Islamic finance has been well established for over thirty years. Some financial commentators have opined that Islamic finance's approach could be the future of global finance given the fallout from the global financial crisis (Yankson 2011). Warren Buffet, Chairman of Berkshire Hathaway, is one of the prominent financial commentators who have experience in working with Islamic derivatives. Yankson's (2011) journal article analyses the prospective of the use of financial derivatives in Islamic finance, particularly for the interest rate swap derivative.

The main results of Yankson's (2011) analysis are as follows:

- Constructed interest rate swaps that have been made specifically to follow the form of Sharia law.
- Islamic legal computer-assisted trading, which allows interest rate swaps to be created in actual substance.

Examples of researchers who have experience working with SWAP and the results that they have presented warren Buffett (2002) on Derivatives accepts from the Chairman of Berkshire Hathaway shown in table2.

Table 2: Berkshire Hathaway research result

Warren Buffet Chairman of Berkshire Hathaway	Results
The analysis of the prospective of financial interest Swap derivatives use in Islamic finance.	• Constructed interest rate swaps that have been made specifically to follow the form of Sharia law. • Islamic legal computer-assisted trading, which allows interest rate swaps to be created in actual substance.

3.1.2. Future and forward

Several models have been developed for forward and future, forward rate agreements and future contracts lock in the future costs and revenues. However, it is not a must to exercise options hence the downside risk will be hedged but a way will be open for the upside gains that should eventuate.

According to Obaidullah (1999), currency future and forwards offer tool that allow hedging or risk management. Within the currency markets, high volatility rates occur and the use of future and forward contracts can allow parties involved to eliminate or transfer risks that arise from fluctuations. While hedging can improve planning and even performance, the intentions for the parties contracting cannot be ascertained. The use of futures and forwards to enable speculative business transactions can lead to a greater level of volatility in relation to exchange rates hence deteriorating the problem within a macro level. Obaidullah (1999) argues that the resulting instability that is brought into the system may at times be too costly to the economy.

Obaidullah (1999) indicates that settlements involving two parties relating to forwards and future where settlements are deferred to a given future date is forbidden based on the large jurists since it leads to excessive gharar. In these contracts the parties involved are obliged to exchange currencies that are different at a known rate after the expiry of the period. Obaidullah (1999) argues that traditionally, such contract have been disapproved especially when obligations are deferred to the future date even contracts that involve exchange of currencies.

3.1.3. Options

Options derivatives form a complex instrument because their value is usually derived from the underlying assets (Salehabadi & Aram, 2002). As we defined earlier that is give the right not the obligation to buy or sell underlying asset a fixed amount at a fixed rate of a predetermined date in the future. Options may not be acceptable since they are speculative in nature and the premium fees are charged. Therefore, Muslims are requested to accept options created using non-refundable deposit or Urboun in order to replace the premium fee charged by the traditional options. This could benefit the Maslahah and Islamic economic. While Urboun is questionable, according to Dali (2007) it should be used on developing option since it offers an alternative for the Muslims for price movement hedging of a given asset or currency. However, the speculative elements should be avoided in order for its benefits to be realized and ensure a win-win situation for parties involved including the seller and the buyer.

Urboun or deposit is proposed as a shariah compliance substitute to the premium charged options. Consequently, the buyer is supposed a deposit for a call option and if a withdrawal takes place, this deposit will be surrendered in form of a gift to the seller. However, the deposit will be treated as a purchase price whenever the buyer continues with the purchase. Therefore, the seller will have no option for not selling. Dali (2007) indicates that Urboun is a fasid or void since it comes as a form of deception that welcomes danger and people will obtain property without replacement. However, other scholars favor the use of Urboun sale. according to Bin Hambal, Urboun should be employed in sale based on the Zaid Ibnu Aslam`s narration that options are acceptable in order to rumination on the feasibility of the deal and achieve knowledge about deal.

Usually pays a portion small amount of the price and approves to forfeit the paid portion of the full contract price when the buyer fails to complete the deal on a exact date for taking the goods and payment of the remaining price. Generally. According to Ibnu Qudamah, Urboun must comprise of a time period within the contract in order to prevent gharar, uncertainty and conflicts. However, Ahmad indicates that Urboun should not stipulate time period. In recent times other financial scholars are of the opinion that Urboun should be permissible since it customary. According to Dali (2007), the modern options were not found in the Islamic fiqh law since contemporary financial transactions were not undertaken in the classical theory of fiqh. Moreover, khiyar could take place only during the exchange transactions that tool place not as options but where delivery and payment would take place in future. Based on the opinions from different scholars, Dali (2007) indicates the approval of Urboun can be employed only for the call option. The put option cannot be integrated into Urboun because Urboun is usually a deposit to purchases while put option offers a promise to sell.

Option pricing is believed to be based on the pivotal works of Merton and Black-Sholes (1973) who presented a groundbreaking document based on pricing option and liabilities of corporate. Garman and Kohlhagen (1983) developed a model for pricing foreign currency options based on the formula provided earlier by Black-Scholes(1973). Many developments have been undertaken including the neural networks utilization that are suitable for solving nonlinear problems such as estimation of option prices and can train different types of option series simultaneously. Islamic communities require derivatives within the marketplace and there are

several implications that are likely to impact on the Islamic business when the derivatives are ignored. A Swap refers to a two-sided contractual settlement whereby the parties involved agree all together to carry out periodic payments in exchange of two kinds of stream cash flows. The use of forwards and futures model offer means of balancing options and future that can be negotiated in different markets such as the commodities, equities, currencies as well as market indices. Options derivatives form a complex instrument because their value is usually derived from the underlying assets. Muslims are requested to accept options created using deposit or Urbun in order to replace the premium fee charged by the traditional options.

$c = exp^{-rFT}\text{SN}(d_1)$ - $exp^{-rDT}\text{KN}(d_2)$,and

$p = -exp^{(-rFT)}\text{SN}(-d_1) + exp^{(-rDT)}\text{KN}(-d_2)$

4. Urbun Call option (UCO)

Options derivatives form a complex instrument because their value is usually derived from the underlying assets (Salehabadi & Aram, 2002). Option may not be acceptable since they are speculative in nature and the premium fees are charged. Therefore, Muslims are requested to accept options created using deposit or Urboun in order to replace the premium fee charged by the traditional options. This could benefit the Maslahah and Islamic economic. While Urboun is questionable, according to Dali (2007) it should be used on developing option since it offers an alternative for the Muslims for price movement hedging of a given asset or currency. However,

the speculative elements should be avoided in order for its benefits to be realized and ensure a win-win situation for parties involved including the seller and the buyer.

4.1. Sharia opinon of Urbun

Urbun or deposit is proposed as a shariah compliance substitute to the premium charged options. Consequently, the buyer is supposed a deposit for a call option and if a withdrawal takes place, this deposit will be surrendered in form of a gift to the seller. However, the deposit will be treated as a purchase price whenever the buyer continues with the purchase. Therefore, the seller will have no option for not selling. Dali (2007) indicates that Urbun is a fasid or void since it comes as a form of deception that welcomes danger and people will obtain property without replacement. However, other scholars favor the use of Urbun sale. according to Bin Hambal, Urbun should be employed in sale based on the Zaid Ibnu Aslam`s narration. According to Ibnu Qudamah, Urbun must comprise of a time period within the contract in order to prevent gharar, uncertainty and conflicts. However, Ahmad indicates that Urbun should not stipulate time period. In recent times other financial scholars are of the opinion that Urbun should be permissible since it customary. According to Dali (2007), the modern options were not found in the Islamic fiqh law since contemporary financial transactions were not undertaken in the classical theory of fiqh. Moreover, khiyar could take place only during the exchange transactions that tool place not as options but where delivery and payment would take place in future. Based on the opinions from different scholars, Dali (2007) indicates the approval of Urbun can be

employed only for the call option. The put option cannot be integrated into Urbun because Urbun is usually a deposit to purchases while put option offers a promise to sell. Islamic communities require derivatives within the marketplace and there are several implications that are likely to impact on the Islamic business when the derivatives are ignored. Urbun is non-refundable portion amount will be deducted from the original price of contract unlike the premium fee as a premium fees separated from the price of contract. The premiums paid for currency options depend on various factors that must be monitored when anticipating future movements in currency option premiums.

Since participants in the currency options market typically take positions based on their expectations of how the premiums will change over time, they can benefit from under-standing how options are priced.

The call option premium (C) has a lower bound of at least zero or the spread between the underlying spot exchange rate (S) and the exercise price (X), whichever is greater, as $C = \mathrm{Max}(0, S - X)$ If the call option premium ever exceeds the spot exchange rate, by selling call options for a higher price per unit than the cost of purchasing the underlying currency. Even if those call options are exercised, one could provide the currency that was purchased earlier (the call option was covered as $C = S$

Table 3: Example different between premium and Urbun

Premium fee	Urbun
If the Europe option contract priced 5000$ The premium fee is 10$, Maturity after 3 months. If he didn't exercise the option the Maximum loss the 10$ only.	If the Europe option contract priced 5000$ Assume Urbun 5% from the total price of contract thus, it 250$ Maturity after 3 months , Urbun its part from the original price if he wants to exercise the right he will pay the remaining amount of 4750$

The buyer will give the seller the premium at time zero if the buyer exercises his right he will get The underlying asset the problem from Sharia prospective is the premium permissibility and uncertainty.

Figure1: time line of investment information

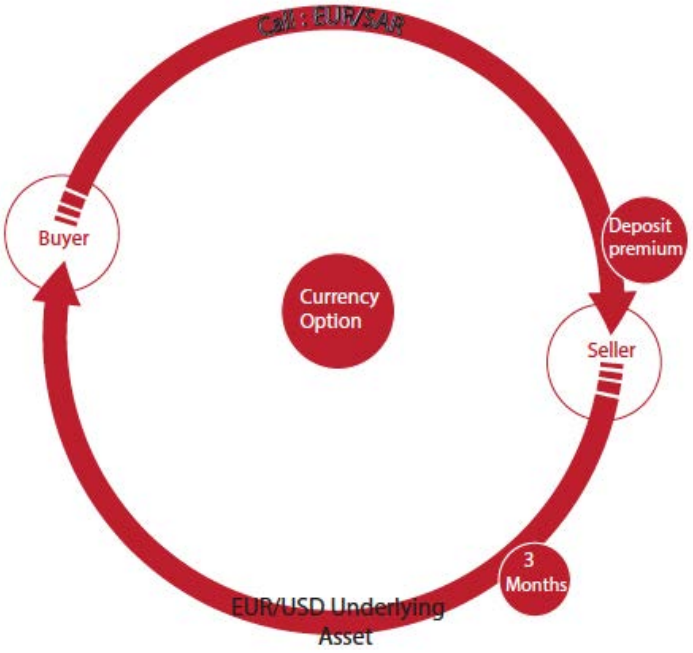
When we in time zero we have no idea about prices in the future thus, I have no information when I can exercise my right.

In currency option we have to be fully aware about what will happen in the future about price and payment by forecasting through historical data and others variable.

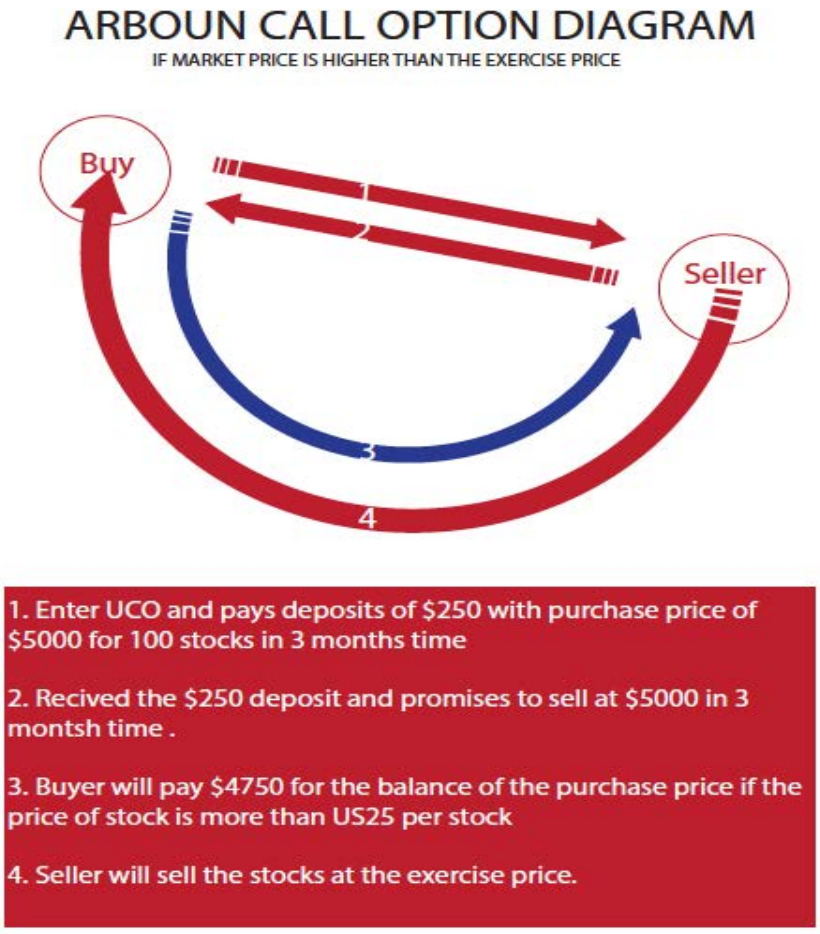
Urbun call option Diagram

In the agreement between buyer and seller UCO consider deposit money by buyer as a part of the purchasing of EUR/USD option contract Unlike conventional option that consider the premium fee exclude the purchase EUR/USD. The mechanism show in figure 2.

Diagram 1



If the market price is higher than the exercise price figure3



The buyer and seller will enter into an agreement or a promise to buy and sell the underlying asset.

1-The buyer will pay the Urbun deposits of $250 with the purchase price of $5000 for 100 currencies. The exercise period is in 3 months' time.

2-The seller will receive the $250 Urbun deposit and promise to sell to the buyer at $5000 in 3 months' .

3-At the exercise date the buyer will pay $4750 for the balance of the purchase price if the market price of the stock is more than $25.

4-In this case he will buy at $25 per stock and can sell the stocks at the market price.

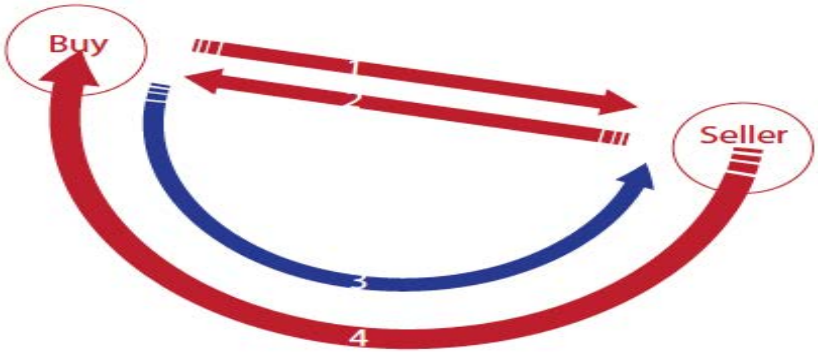
The profit that the buyer will make is the differences between the market price and the strike price.

The seller will sell the currency at the exercise price even though at the exercise date the market price is higher than the strike price.

In the event of the market price is lower than the strike price, the following diagram would be best to illustrate the overall processes in figure 4

ARBOUN CALL OPTION DIAGRAM

IF MARKET PRICE IS LOWER THAN THE EXERCISE PRICE



1. Enter UCO and pays deposits of $500 with Purchase Price of $5000 for 100 stocks in 3 months time

2. Recived the $500 deposit and promises to sell at $5000 in 3 montsh time .

3. Buyer will not buy the stock from the seller if the market price of the stock is lower than US50 per stock

4. Seller will forfeit the US500 deposit

Chapter 3

Methodology and Data Description

pricing European UCO Methodology

Garman and Kohlhagen (1983) matched the benefits of holding a foreign exchange option with those of holding its underlying currency based on Black and Scholes (1973) assumption that the volatility of the returns is constant, No dividends distributions, and theoretical valuation price European option. Kohlhagen (1983) pricing currency option is versions from Black-Scholes (1983) model options.

The Garman-Kohlhagen (1983) model will be used as the main model in this application with comprehensive sample of our data.

The model is specifically an illustration of the call option price using rD and rF the domestic foreign currency mainly the Euro/USD, JPY/USD, GBP/USD and the risk free of the interest rate that is calculated per unit.

On other hand for pricing Urbun instead of rD and rF operating IIBR.

This application will be able to determine the option price for the EUR/USD, JPY/USD, GBP/USD Based on information about a currency option (such as the exercise price and time to maturity) and about the currency (such as its spot rate, standard deviation, and interest rate), pricing.

Models can derive the premium on a currency option and Urbun.

The currency option pricing Model Garmanand Kohlhagen (1983)

$C(\mathrm{S},\tau) = exp^{-rFT}\mathrm{SN}(d_1)$ - $exp^{-rDT}\mathrm{KN}(d_2)$,

$U(\mathrm{S},\tau) = exp^{-IIBR}\mathrm{SN}(d_1)$ - $exp^{-IIBR}\mathrm{KN}(d_2)$,

Where is:

• C is the Call option price

• rD is the domestic , rF foreign risk free interest rate per unit time.

• T is the maturity of the option: $T = T_1 - t$ where T_1 is the date the option matures and t the current time.

• K is the exercise price.

• N is the cumulative normal distribution function.

S : Exchange rate €,$,¥,£

T: Time to maturity

r : domestic interest rate

ρ: Foreign interest rate

X : Strike price

U : Urbun

IIBR: Islamic Interbank benchmark

$$d1 = \frac{\ln\left(\frac{S}{K}\right) + \left((r_D - r_F) + \frac{\sigma^2}{2}\right)T}{\sigma\sqrt{T}}$$

$d_2 = d_1 - \sigma\sqrt{t}$

H_0= Domestic interest rate = foreign interest rate =IIBR

Generally, if the risk-neutral likelihood density purpose of a future security's price is $f(s_T)$, K is The price the exercise price, the time to maturity is τ = T − t of a European call option can be created as,

$$C = e^{-r\tau}\int_K^{\infty}(S_\tau - K)f(S_\tau)dS_\tau .$$

We use option with maturity date 91 days, the daily options with the strike/spot price ratio.

Where call is: $C > Se^{rFt}$ - Ke^{-rDt}

Table 4: S and E relationship in Premium and Urbun

Premium	Urbun
S>E	Profit = S-E
E-U < S < E	Profit S – (E – U)
S < E-U	Profit = -U

4.3Data:

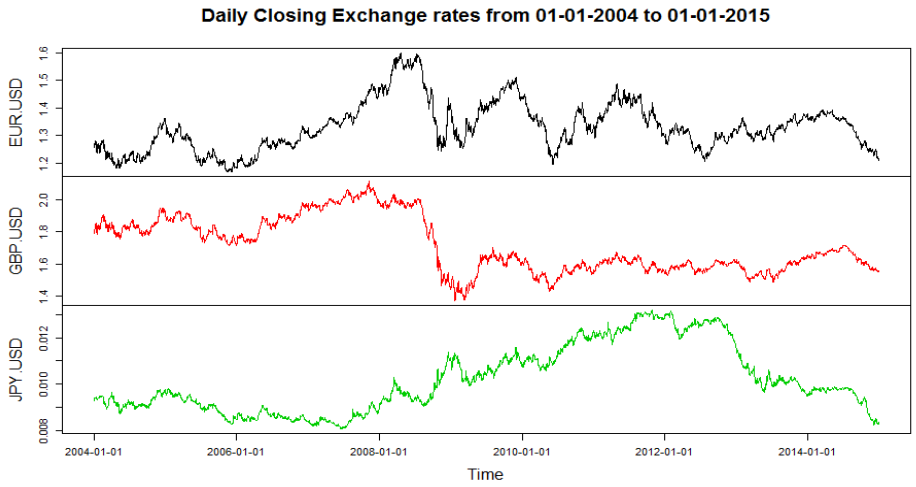
Historical Date daily of the period from 01/01/2014 to 01/01/2015 EUR/USD, JPY/USD, GBP/USD selected European exercise style to our samples.

4.4 Result

Table 5 shows daily statistics of the EURO, GBP and Japanese YEN currency exchange rate in relation to the US Dollar from Jan 01 2004 to Jan 01 2015. These statistics in real terms show the volatility of the currencies. In the Black Scholes (1973) model of the call option, volatility holds greater weight in option valuation (Kaeppel, 2012). Volatility as a pricing consideration it makes calculation of the actual option values.

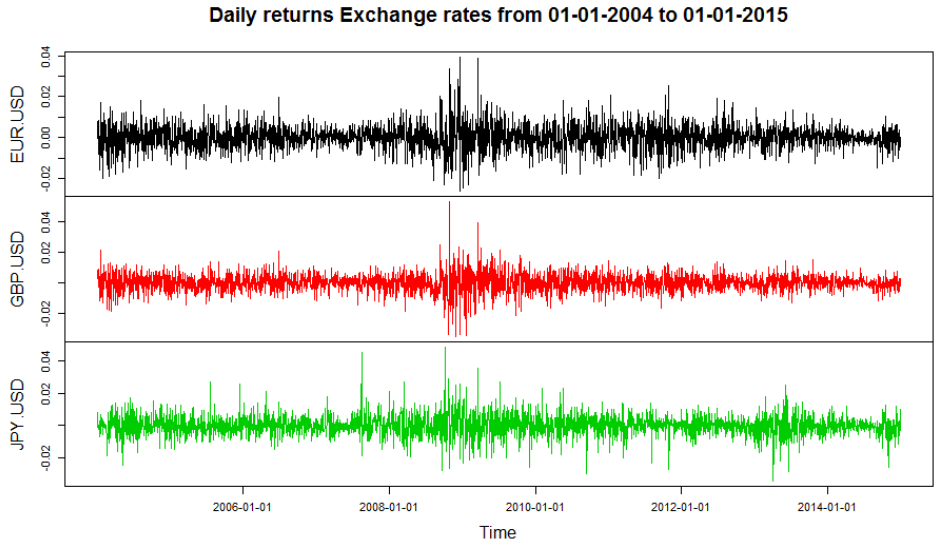
The call option taken in the regard to the EURO in the period of the ten years had a positive valuation depending on the underlying currency asset. As depicted in the diagram showing the daily statistics of the currency, the currency volatility increased progressively from 2004 to reach its maximum of 0.04 EURO/USD in 2009. In this regard the intrinsic value of the options as well as the premium paid in as part of the contract again went up. However, the cyclical flow of the currency started going as low as 1.2 EURO/USD in 2010 lowering the value of the premium paid by the long position in the contracts.

Figure 5: Daily closing Exchange rates from 01-01-2004 to 01-01-2015



This figure shows daily statistics of the EURO, GBP and Japanese YEN currency exchange rate in relation to the US Dollar from Jan 01 2004 to Jan 01 2015. However, these statistics in real term shows the volatility of the currencies

Figure 6: Daily returns Exchanges rates from 01-01-2004 to 01-01-2015



The volatility details helps to determine the future pricing of the options. The past data indicate that the EURO/USD option had frequent fluctuations in the currency values.

Table 5: Descriptive Statistics of Daily Exchange rates EURO/USD, GBP/USD and YEN/USD

	EUR.USD	GBP.USD	JPY.USD
Mean	0.01	0.01	0.01
SD	0.00	0.01	0.01
Min	-0.03	-0.04	-0.03
Max	0.04	0.09	0.05
Skew	0.18	-0.04	0.24
Kurtosis	2.69	5.02	4.21
Jarque-bera test	882.1735***	3022.9403***	2153.7142***
observations	2870	2870	2870
Significance codes: *** at 1%, ** at 5% and * at 10%			

In spite of the difference in volatility in the currency seen in different years, the options were priced constantly averaging at 0.1. Their deviation from the average comparing to the USD was very minimal with zero on EURO/USD and 0.01 on YEN/USD; GBP/USD call options respectively. In addition, of the volatility frequencies are shown by the kurtosis values provided in the table. The GBP/USD frequencies had the highest kurtosis value of 5.02. it was the most peaked. This means that GBP/USD option only went to once and its intrinsic value declined to

end of the period. EURO/USD option maintained its high intrinsic value severally in the period. It had fair enough cyclical in the ten year period. Peakedness level of this option was the lowest with 2.69.the frequencies were fairly skewed upward compare to the other options. Compared to the EURO; GBP/USD options, YEN/USD options were relatively peaked reaching a kurtosis value of 4.21 second to GBP/USD option. The frequencies on the volatility of the currency were mostly skewed upward in the near yeas compared to the initial years. However, in the year 2015 the Peakedness and skewness tend to be relatively normal stabilizing the intrinsic values of the options

Similarly the daily returns on the premium paid as deposits kept varying up and down in relation to the volatility of the currency. On the returns analysis, the three options showed returns on the premium goes as high as 0.04 in 2009 but still thy touched their floor in the same year as shown in the diagram below. Furthermore, depending of the individual type of option taken, the returns and intrinsic value of the call option may vary an as the level of volatility increase or decline (Kaeppel, 2012).

On the goodness of fit of the model as described by the Jarque-bera test, the model used was best fitted for the GBP/USD call option. Statistics done with 2870 observations, the highest value of 3022.9023 in goodness test at significance level of 1%, 5% and 10%.similarly, at the same condition of observation and significance level, YEN/USD option ranked second in terms of fitness of the pricing model with 2153.7142.However despite the good pricing as a result of remarkable currency volatility, EURO/USD showed poor fitness for the pricing model with

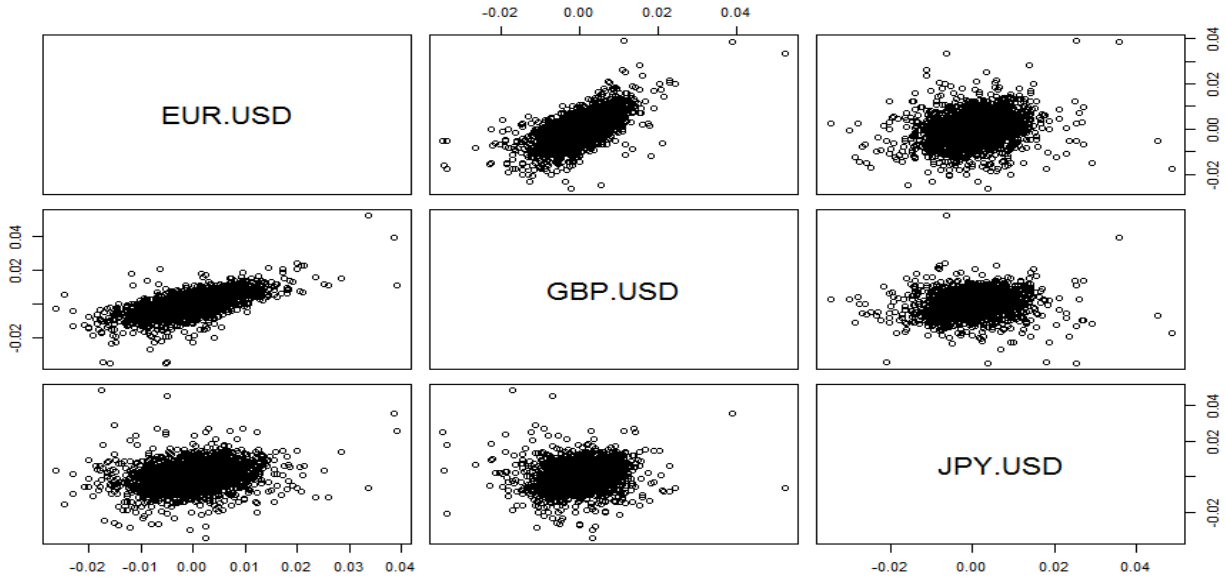
882.1735 as per the test done in similar observation of 2870 and 1%, 5% and 10% significant levels.

Table 5: Correlation between Daily Exchange rates EURO/USD, GBP/USD and YEN/USD

	EUR.USD	GBP.USD	JPY.USD
EUR.USD	1	0.6719513	0.2506414
GBP.USD	0.6719513	1	0.1415358
JPY.USD	0.2506414	0.1415358	1

Moreover the relationship of the daily currency frequencies for the options as described by the correlation coefficient shows that the all call options have positive relationship. As indicated in the correlation table, EURO/USD to GBP/USD had +0.6719513 correlation coefficient. This is high level of strength signifying that the two currencies are strongly related. The EURO/USD to YEN/USD had +0.2506414 in strength.it shows that EURO/USD and YEN/UD has lower level of positive relationship as it is below +0.5 coefficient of correlation a set bar of weakness or strength of a relationship. However GBP/USD to YEN/USD showed the least coefficient of + 0.1415358. Since the coefficient is again below the +o.5 bar of positive relationship the two daily currency exchanges had a weak positive relationship. The relationship between similar currency is shown to 1(one) showing that it’s the same and incomparable.

Figure7: scatterplot of correlation between Daily Exchange rates EURO/USD, GBP/USD and YEN/USD



Correlation coefficients measure the strength of association between two variables.

The value of a correlation coefficient ranges between -1 and 1

The scatterplot drive to explain general illustration of the Relationship between the two

Variables.

The EURO/USD plot against the GBP/USD points are densely populate around the center with a steep edge to the left of the bar. This show that most of the daily exchange were done around the mean currency value but the relationship between the two currency call options were strongly

relate. On the EURO/USD plot against YEN/USD points were also located at the center part on the bar but they were more flatter compared to the EURO/USD –GBP/USD. The daily currency exchange had a moderate positive relationship.

The latter YEN/USD plot against GBP/USD plots were also closely populated in the center more flat than the latter. Their relationship was more-less of a positive relationship.

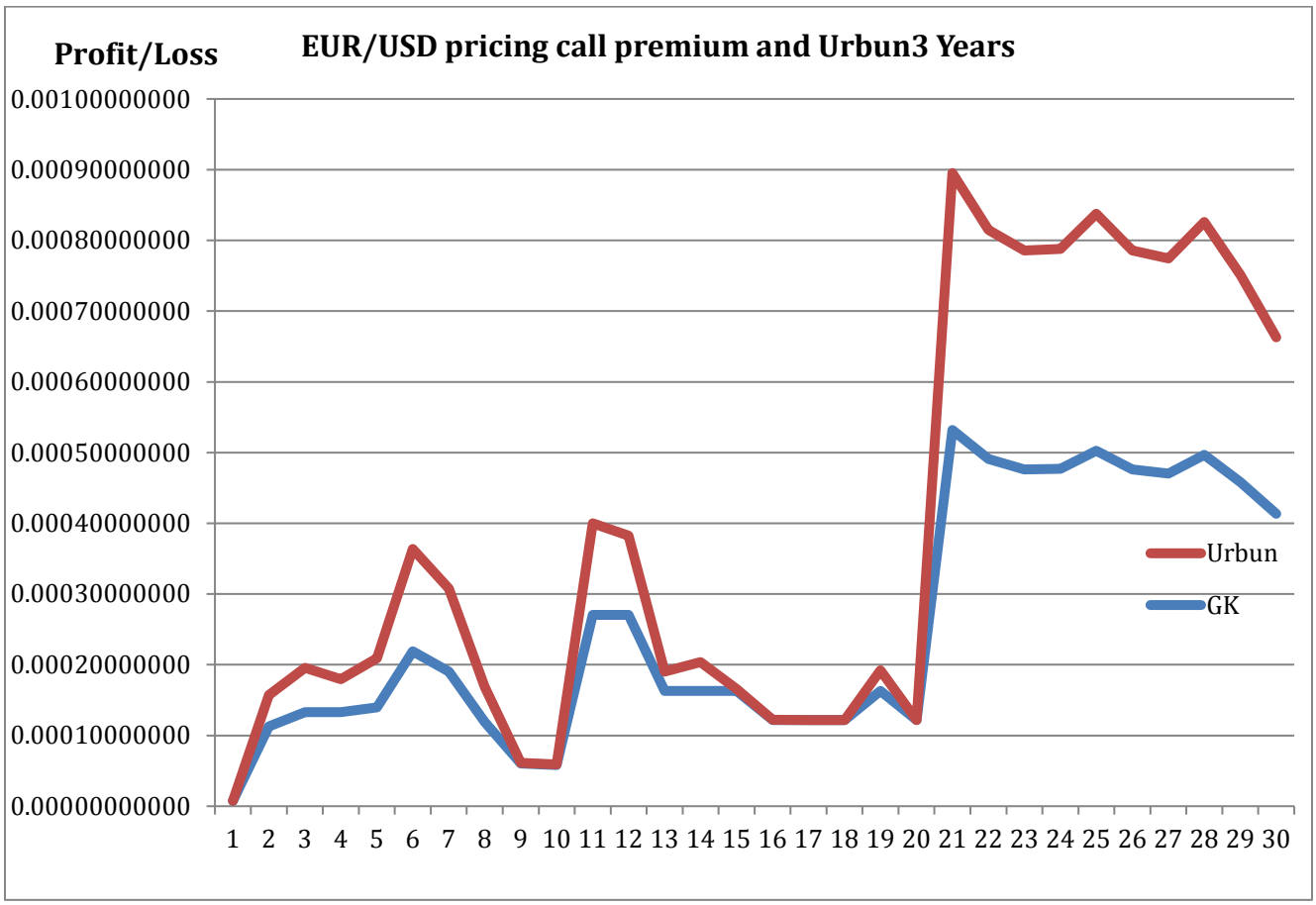
In fact there are 10 strike prices observation for each currency selected within one-year maturity are computed. Then the yearly Garman Kholhagan (1983) option prices are

computed with variable domestic and foreign interest rates ,Urbun by IIBR and variable spot foreign exchange rates over the sample period. The actual payoffs are regressed onto the future value of both call and Urbun as specified by equation.

Table 6: pricing currency call option for 3 years with 10 observation of each currency

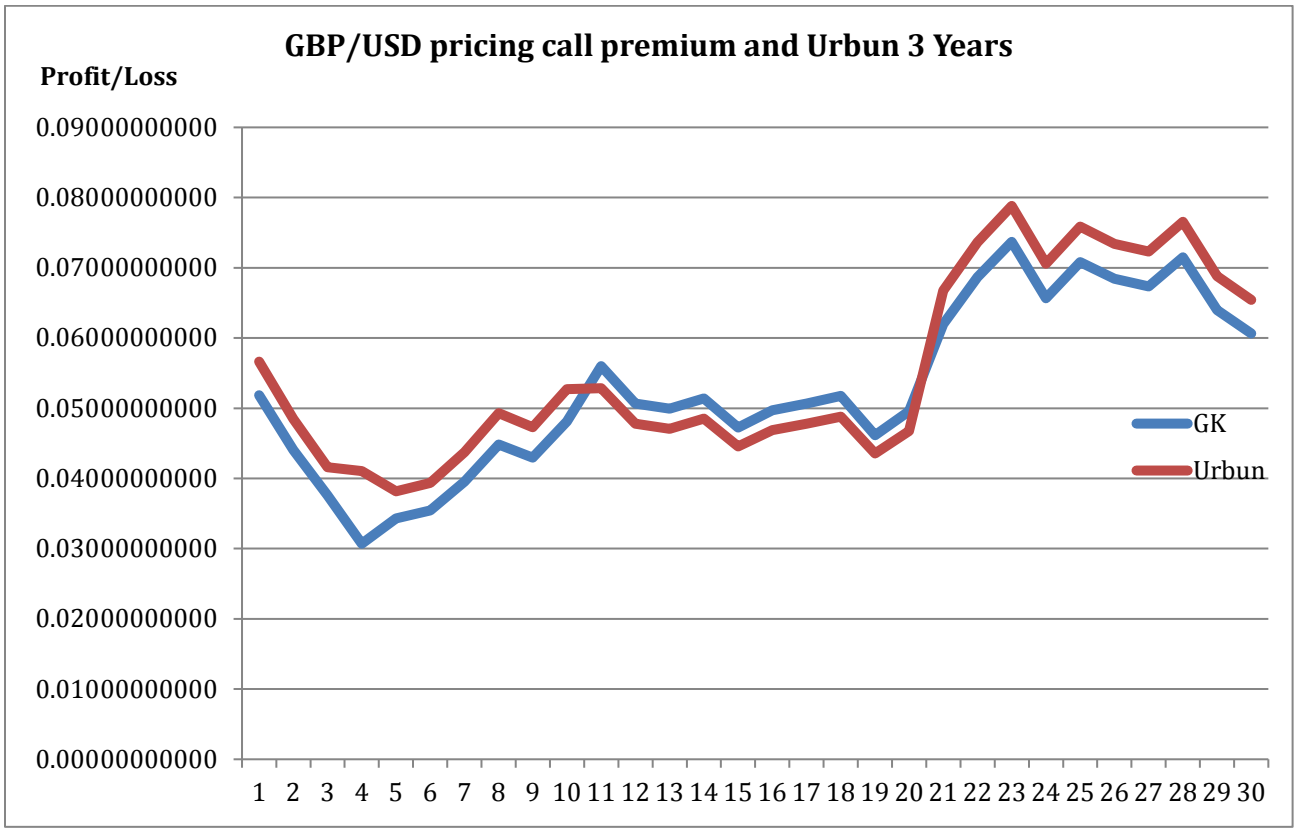
JPY/USD			GBP/USD			EUR/USD		
E	GK	Urbun	E	GK	Urbun	E	GK	Urbun
0.00913300000	0.00000758734	0.00000000000	1.79860000000	0.05187230830	0.05664402791	1.24780000000	0.00733423884	0.00681347033
0.00902600000	0.00011291932	0.00004412304	1.82020000000	0.04406236759	0.04847066990	1.23860000000	0.00929888254	0.00864809860
0.00900600000	0.00013276672	0.00006289880	1.84050000000	0.03756646958	0.04161668550	1.26360000000	0.00447474907	0.00440271571
0.00902300000	0.00013276672	0.00004693940	1.84230000000	0.03070283113	0.04104633524	1.26240000000	0.00491287525	0.00455670053
0.00899900000	0.00013971331	0.00006947032	1.85170000000	0.03431466848	0.03816400567	1.25340000000	0.00631127227	0.00589553675
0.00891900000	0.00021910292	0.00014457336	1.84770000000	0.03544972658	0.03937093629	1.25820000000	0.00552974411	0.00513124383
0.00894800000	0.00019032419	0.00011734851	1.83400000000	0.03956038487	0.04372638873	1.27060000000	0.00387245359	0.00358840010
0.00902000000	0.00011887354	0.00004975577	1.81790000000	0.04484902754	0.04929708808	1.26430000000	0.00465317110	0.00431490788
0.00907900000	0.00006032371	0.00000094596	1.82350000000	0.04295199366	0.04730290219	1.25850000000	0.00548366512	0.00508831631
0.00908100000	0.00005833897	0.00000059459	1.80870000000	0.04810190543	0.05270668762	1.237000	0.00968054263	0.00900361112
0.009407	0.00027062984	0.00012955275	1.867800	0.05598098467	0.05283100483	1.217200	0.08359317124	0.07297143695
0.009426	0.00027062984	0.00011171578	1.881900	0.05064407053	0.04777303169	1.21530000000	0.08525003334	0.07458743386
0.009516	0.00016320577	0.00002722528	1.88390000000	0.04991876545	0.04708583761	1.22370000000	0.07800920253	0.06789001823
0.009502	0.00016320577	0.00004036789	1.87980000000	0.05141404508	0.04850260230	1.22230000000	0.07920044777	0.06898947354
0.009546	0.00016320577	0.00000264959	1.89150000000	0.04723318249	0.04454180975	1.22830000000	0.07414209624	0.06432780896
0.009558	0.00012181301	0.00000019302	1.88450000000	0.04970269123	0.04688112664	1.22670000000	0.07547881896	0.06555791624
0.009594	0.00012181301	0.00000000000	1.88190000000	0.05064407053	0.04777303169	1.22840000000	0.07405885411	0.06425124987
0.009582	0.00012181301	0.000000000006	1.87890000000	0.05174667948	0.04881779901	1.24100000000	0.06387553531	0.05492693354
0.009514	0.00016320577	0.00002902588	1.89460000000	0.04616950744	0.04353439766	1.23900000000	0.06544955202	0.05636252544
0.009620	0.00012181301	0.00000000000	1.88490000000	0.04955902991	0.04674502287	1.24470000000	0.06100864988	0.05231789930
0.008454	0.00053193438	0.00036331097 1	1.99010000000	0.06194947527	0.06673777277	1.46990000000	0.00123184436	0.00104778727
0.008496	0.00049073429	0.00032388187 4	1.97410000000	0.06865671519	0.07364671045	1.470400	0.00121279955	0.00103134171
0.008511	0.00047601997	0.00030980005 3	1.962800	0.07369477750	0.07881495378	1.465900	0.00139400306	0.00118798097
0.00851	0.00047700093	0.00031073884 1	1.981100	0.06566131372	0.07056538695	1.46510000000	0.00142861176	0.00121793857
0.008484	0.000502505744	0.00033514733 0	1.96920000000	0.07081048489	0.07585828257	1.46680000000	0.00135595605	0.00115506166
0.008511	0.000476019971	0.00030980005 3	1.97460000000	0.06843958894	0.07342357468	1.47560000000	0.00102970523	0.00087346534
0.008517	0.000470134244	0.00030416732 5	1.97710000000	0.06736128375	0.07231492225	1.46660000000	0.00136433062	0.00116230625
0.00849	0.000496620017	0.00032951460 2	1.96770000000	0.07147923678	0.07654432268	1.46330000000	0.00150926920	0.00128780372
0.008529	0.00045836279	0.00029290186 8	1.98520000000	0.06395102406	0.06880305949	1.47600000000	0.00101669945	0.00086226757
0.008575	0.000413238881	0.00024971761 8	1.99330000000	0.06066713400	0.06541294796	1.47720000000	0.00097855732	0.00082944147

Figure 8: EUR/USD pricing call premium and Urbun3 Years



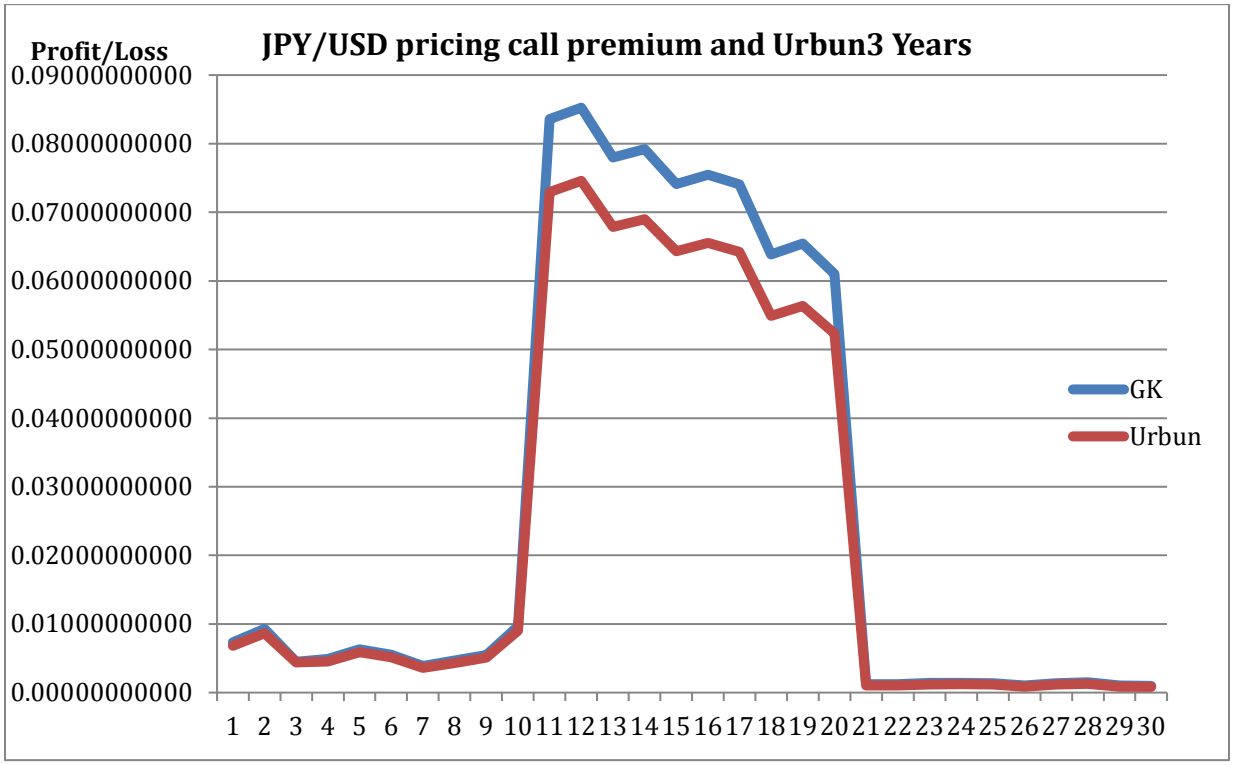
From the graph we can realize that Urbun is giving a higher trend more than premium which is meant the investors or buyer will deposit amount more than premium this explain our assumption on the begging about Urbun and premium.

Figure9: GBP/USD pricing call premium and Urbun 3 Years



From the graph we can realize that Urbun is giving a higher trend more than premium and in specific point it gives equality with a premium and this is explain a possibility to be lower than the premium which is meant the investors or buyer will deposit amount more than premium or equal the premium or lower than premium its depend on volatility factors of the market.

Figure 10: **JPY/USD pricing call premium and Urbun3 Years**



From the graph we can realize that Urbun and premium going in parallel trend and in the point 11 exactly the trend of premium is trend higher thans Urbun and giving a higher

trend more than premium and return back to be with a same level of Urbun price. Specific point gives equality.

Table7: t-test for EUR/USD,GBP/USD and JPY/USD for one year and three years

	EUR/USD	**GBP/USD**	**JPY/USD**
t-test for one year	**2.1372E-05**	**1.12781E-05**	**2.72952E-06**
t-test for 3 years	**4.40235E-15**	**0.001331671**	**0.000132431**

From this table we can arise a result of t-test that there is a significance indicates between EUR/USD, GBP/USD and JPY/USD.

4.5 conclusion

In this research, the hypothesis H_0: Domestic interest rate = foreign interest rate =IIBR

Tested by Garman Khohlhgan (1983) pricing currency call option premiums and Urbun.

We have tested three different currencies against dollar through different 10 strike price

Selected yearly and over three years.

The results are fairly helpful for this application of currency option to provide a reconsideration pricing based on Urbun .

In the case of the EUR the null hypotheses rejected as the Urbun give a very high trend.

In JPY we recommend the application strongly as the GK and Urbun in parallel trend .

In EUR we can consider cointegration with long run relation to be covered.

As a conclusion the Garman Kholhagen (1983) pricing currency option model is still strong, practical, suitable, applicable, and appropriate.

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Appendix

EUR/USD			
2004			
	E	GK	Urbun
1	1.2478	0.007334238841	0.006813470329
2	1.2386	0.009299882535	0.008648098600
3	1.2636	0.004474749066	0.004402715711
4	1.2624	0.004912875252	0.004556700534
5	1.2534	0.006311272274	0.005895536750
6	1.2582	0.005529744114	0.005131243831
7	1.2706	0.003872453587	0.003588400101
8	1.2643	0.004653171103	0.004314907876
9	1.2585	0.005483665115	0.005088316305
10	1.237	0.009680542626	0.009003611117

4- Figure EUR/USD pricing call premium and Urbun yearly

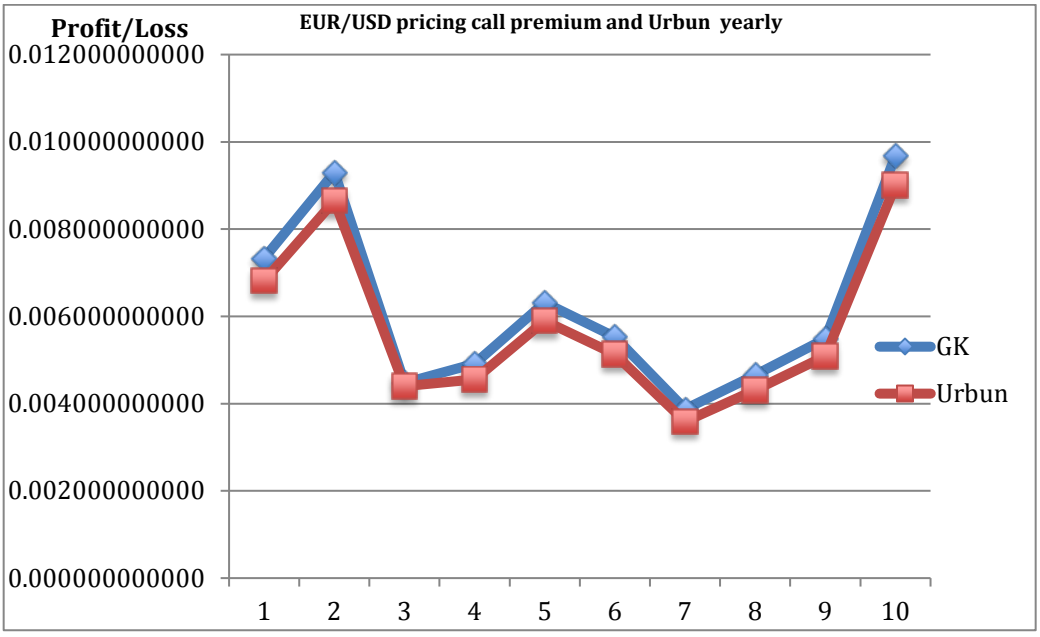
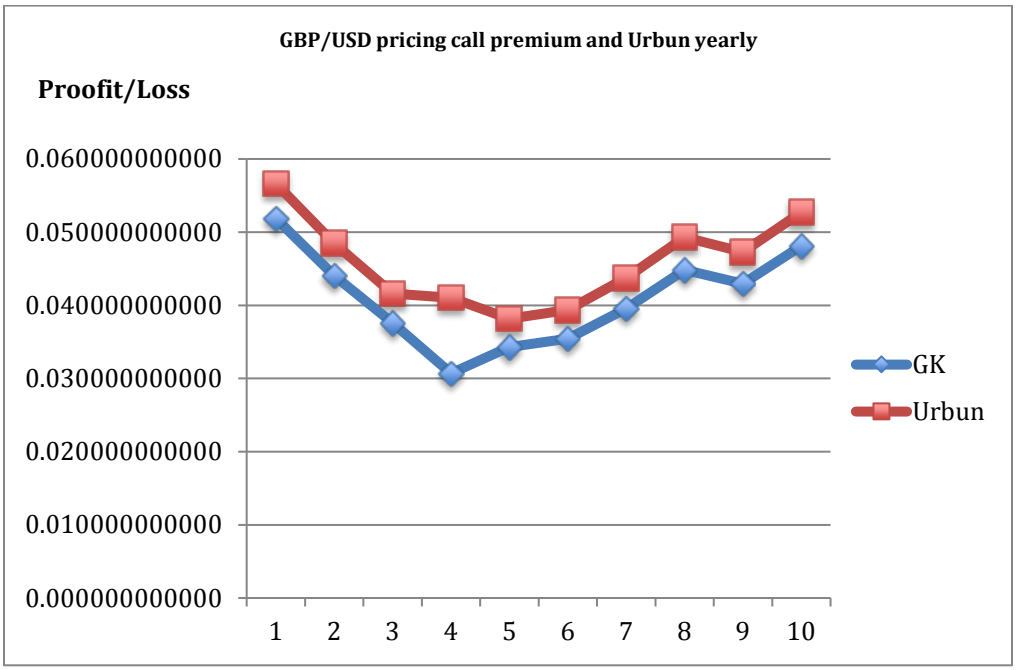


Table2: GBP/USD pricing call premium and Urbun yearly

GBP/USD			
2004			
	E	GK	Urbun
1	1.7986	0.051872308302	0.056644027914
2	1.8202	0.044062367593	0.048470669895
3	1.8405	0.037566469576	0.041616685499
4	1.8423	0.030702831130	0.041046335242
5	1.8517	0.034314668482	0.038164005665
6	1.8477	0.035449726577	0.039370936294
7	1.834	0.039560384868	0.043726388734
8	1.8179	0.044849027541	0.049297088082
9	1.8235	0.042951993656	0.047302902187
10	1.8087	0.048101905432	0.052706687624

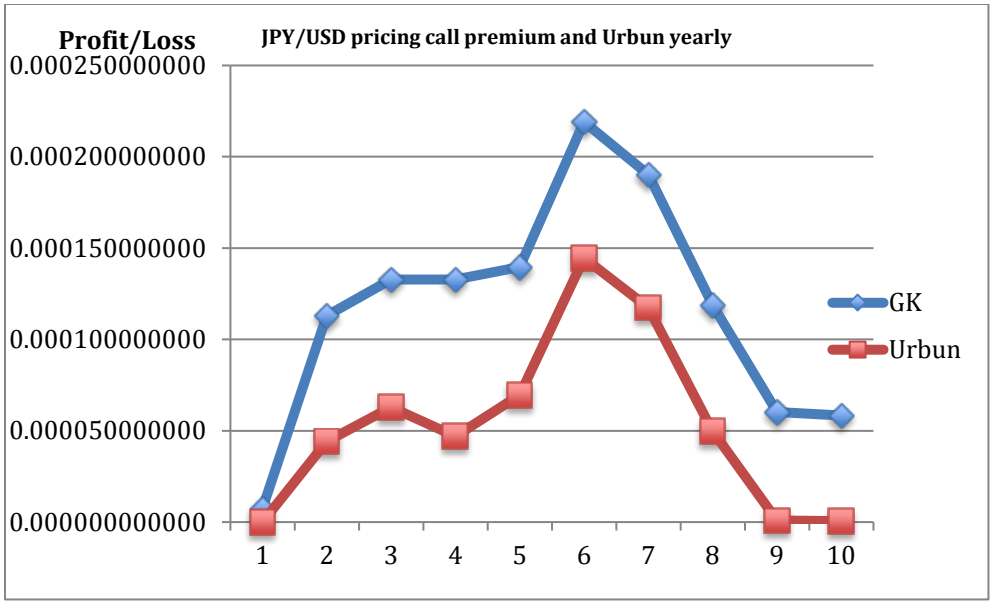
5- Figure EUR/USD pricing call premium and Urbun yearly



3- Table JPY/USD pricing call premium and Urbun yearly

JPY/USD			
2004			
	E	GK	Urbun
1.000000000000	0.009133000000	0.000007587341	0.000000000000
2.000000000000	0.009026000000	0.000112919322	0.000044123038
3.000000000000	0.009006000000	0.000132766723	0.000062898799
4.000000000000	0.009023000000	0.000132766723	0.000046939402
5.000000000000	0.008999000000	0.000139713314	0.000069470315
6.000000000000	0.008919000000	0.000219102921	0.000144573358
7.000000000000	0.008948000000	0.000190324189	0.000117348505
8.000000000000	0.009020000000	0.000118873542	0.000049755766
9.000000000000	0.009079000000	0.000060323707	0.000000945959
10.000000000000	0.009081000000	0.000058338967	0.000000594586

6- Figure JPY/USD pricing call premium and Urbun yearly


Profit/Loss
JPY/USD pricing call premium and Urbun yearly
0.000250000000
0.000200000000
0.000150000000
0.000100000000
0.000050000000
0.000000000000
1
2
3
4
5
6
7
8
9
10
GK
Urbun