THE RELATIONSHIP BETWEEN USE OF FINANCIAL DERIVATIVES AND FUEL COSTS IN KENYA AIRWAYS

SUBMITTED BY,

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DECLARATION:

I, the undersigned declare that this project is my original work and affirm to the best of my knowledge that it has not been presented for any academic award in any University.

Signed: ………………………………… Date: ………………………………..

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This research project has been submitted for examination with my approval as the university supervisor.

Signed: ………………………………… Date: ………………………………..

Name: Mr. Mirie Mwangi

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DEDICATION

This research project is dedicated to my family. Their devotion and dedication towards my education will remain stamped in my heart all the days of my life.

ABSTRACT

Oil has been used for many years as the main source of energy and its demand has made it to be one of the most sought after commodity globally. Its impact on national economies and institutions is enormous. The study used several theories in its study in order to bring out the issue of fuel pricing in the world economy. Various determinants of fuel costs were also analyzed by various institutions and scholars, bringing out the issue of price fluctuation and hedging. The objective of the study was to determine the relationship between use of financial derivatives and fuel costs in Kenya. With these objectives, empirical studies on relationship between use of financial derivatives and fuel costs, both local and international were done which assisted in the formulation of data analysis model. The research design was based on a longitudinal study, which looked at the unit of analysis (Kenya Airways) for three years, gathering information relevant to the study in order to come up with a proper analysis. After data collection and cleaning, analysis was done through regression analysis, Pearson's correlation test, and Chi-square test using Statistical Package of Social Sciences (SPSS). The results of the study showed that financial derivatives do not have a relationship with fuel costs in Kenya Airways. The regression test showed that the financial derivative had an R value of 0.017 which indicated that financial derivative is not a good predictor of fuel cost at Kenya Airways. Correlation tests performed also indicated that there was no correlation (r=-0.017) between financial derivatives and fuel costs in Kenya Airways. However, Chi-square tests indicated that financial derivatives are effective means of fuel cost management in the airline. The study recommended the establishment of a fuel derivatives market in the country so that people can be able to transact the derivatives. This will help monitor the prices from a central point, and also can help in the predictability of the fuel prices as earlier studies have pointed out. The study had the limitation of absence of centralized data for the airline and a derivatives exchange in the country. With that, the study had to look at the contract prices of Kenya Airways and the banks. These prices may not truly reflect the nature of derivatives as different companies would have different contract prices which are confidential to them.

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ABBREVIATIONS

BMA - Bayesian Model Averaging

CPT - Cumulative Prospect theory

GMM - Generalized Method of Moments

IAS - International Accounting Standards

IATA - International Air Traffic Association

IEA - International Energy Agency

NYMEX – New York Mercantile Exchange

OPEC - Organization of the Petroleum Exporting Countries

OTC - Over the Counter

SEC - Securities and Exchange Commission

WTI - West Texas Intermediate

VECM - Vector Error Correction Model

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CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Oil is a commodity with high value and international oil prices, in as much as it depends on demand and supply, a big factor of its price is political. Sharp changes in the oil prices led to uncertainties on both the buyer and the seller and this led to oil-producing countries to form OPEC, which is a body that regulates international oil prices. An oil-price increase leads to a transfer of income from importing to exporting countries through a shift in the terms of trade. The magnitude of the direct effect of a given price increase depends on the share of the cost of oil in national income, the degree of dependence on imported oil and the ability of end-users to reduce their consumption and switch away from oil. It also depends on the extent to which gas prices rise in response to an oil-price increase, the gas-intensity of the economy and the impact of higher prices on other forms of energy that compete with or, in the case of electricity, are generated from oil and gas. Naturally, the bigger the oil-price increase and the longer higher prices are sustained, the bigger the macroeconomic impact (International Energy Agency, 2004).

High prices do not only affect countries but also companies that use fuel as its input. Both high prices and high price volatility make business difficult and the airline industry is one that has been hit the most since jet fuel comprise an average of 15% of the total costs (International Energy Agency, 2004). Volatility in oil prices often leads to uncertainties in forecasting costs which is bad for business planning and competition. This has led to companies to use derivatives to hedge the fuel price to minimize volatility.

1.1.1 Financial Derivatives

According to Hull, (2012), a derivative is a financial instrument whose value depends on (or derives from) the values of other, more basic, underlying variables. Very often, the variables underlying derivatives are the prices of traded assets. A derivative can be traded on a derivatives exchange or over-the-counter. A derivative exchange is a market where individuals trade standardized contracts that have been defined by the exchange. An over-the-counter is an important alternative to exchange markets, and has of late globally become traded more than the exchanges. A key advantage of over-the-counter market is that the terms of a contract do not have to be those specified by an exchange. Markets participants are free to negotiate any mutually attractive deal. However, an OTC has a risk that the contract will not be honored.

It is known that derivative securities provide economic benefits (Stoll and Whaley, 1985). The key attribute of these securities is their leverage, i.e., for a fraction of the cost of buying the underlying asset, they create a price exposure similar to that of physical ownership. As a result, they provide an efficient means of offsetting exposures among hedgers or transferring risk from hedgers to speculators. In addition, derivatives promote information dissemination and price discovery. The leverage and low trading costs in these markets attract speculators, and as their presence increases, so does the amount of information impounded into the market price. These effects ultimately influence the underlying commodity price through arbitrage activity, leading to a more broadly based market in which the current price corresponds more closely to its true value. Because this price influences production, storage, and consumption decisions, derivatives markets contribute to the efficient allocation of resources in the economy (Fleming and Ostdiek, 1998). Marking to market means accounting for gains or losses in any outstanding unrealized derivatives position at the end of each financial reporting period. Derivatives include futures, forwards and options.

A futures contract is an agreement to buy or sell a specified quantity and quality of a commodity for a certain price at a designated time in the future. The buyer has a long position, which means he/she agrees to make delivery of the commodity (i.e., purchase the commodity). The seller has a short position, which means he/she agrees to make delivery of the commodity (i.e., sell the commodity). Futures contracts are traded on an exchange, which specifies standard terms for the contracts (e.g., quantity, quality, delivery, etc.) and guarantees their performance (removing counterparty risk) (Carter *et al.*2004). According to Hull (2012), a futures contract is an agreement between two parties to buy or sell an asset at a certain time in the future for a certain price.

A forwards contract is an agreement to buy or sell an asset at a future time for a certain price. It can be contrasted with a spot contract which is an agreement to buy or sell an asset today. A forward contract is traded in the over-the-counter market, usually between two financial institutions or between a financial institution and one of its clients (Hull, 2012). Forwards contracts are designed to neutralize risk by fixing the price that the hedger will pay or receive for the underlying asset. The mostly commonly used model to price the asset is the Black and Scholes model.

Option derivative can either be a call option or a put option. A call option gives the holder the right to buy the underlying asset by a certain date for a certain price. A put option gives the holder the right to sell the underlying asset by a certain date for a certain price. This price is known as the exercise price or strike price while the date in the contract is known as the expiration or maturity date. The holder of an option has a right but does not have to execute the right, but a holder of a forward or a future is obligated to buy or sell the underlying asset. Whereas there is no cost to enter into a futures or a forwards contract, there is a cost to acquiring an option.

Beginning in the 1970s, deregulation dramatically increased the degree of price uncertainty in the energy markets, prompting the development of the first exchange-traded energy derivative securities. The success and growth of these contracts attracted a broader range of participants to the energy markets and stimulated trading in an even wider variety of energy derivatives (Fleming and Ostdiek, 1999).

1.1.2 Fuel Prices

Oil is one of the most sought after commodities in the world, providing energy that is used to run machines in industries, for transportation, and for household usage. It is the largest commodity market in the world. Two most important benchmarks for pricing crude oil are Brent crude oil (which is sourced from the North Sea) and West Texas Intermediate (WTI) crude oil (Hull, 2012). According to the International Energy Agency, IEA, (2004) higher oil prices since 1999, partly as a result of OPEC supply-management policies, contributed to the global economic downturn in 2000-2001. The vulnerability of oil-importing countries to higher oil prices varies markedly depending on the degree to which they are net importers and the oil intensity of their economies. The agency continued to say that fears of OPEC supply cuts, political tensions in Venezuela and tight stocks had driven up international crude oil and product prices even further in recent weeks. By March 2004, crude prices were well over $10 per barrel higher than three years before. Market conditions are more unstable than normal, in part because of geopolitical uncertainties and because tight product markets are reinforcing upward pressures on crude prices.

These shocks make it difficult for companies to predict oil prices, especially a global carrier like Kenya Airways whose oil consumption comprises of a big percentage of its overall cost and therefore fluctuating profits.

Hamilton, (2008) states that various ways have been tried to explain changes in oil prices. The first includes statistical investigation of the basic correlation in the historical data, the second looks at the predictions of economic theory as to how oil prices should behave over time, and the third examines in detail the fundamental determinants and prospects for demand and supply. Since the prediction of oil prices became difficult, companies and countries started to use derivatives for the commodity in order to 'smoothen' the price fluctuations. As companies and countries hedged themselves for predictability, others used the derivatives market for speculation. The efficient market hypothesis argues that an observed market price reflects all available information. With respect to futures markets, this hypothesis means that the observed future prices fully incorporate all existing information which affect future spot prices.

1.1.3 Relationship Between Fuel Costs and Financial Derivatives

The role of futures market in providing an efficient price discovery mechanism for commodities has been an area of interest to researchers. Bekiros and Dicks, (2008) in a study stated that if new information indicates that oil prices are likely to rise, perhaps because of an OPEC decision to restrict production, or an imminent harsh winter, a speculator has the choice of either buying crude oil futures or spot. Whilst spot purchases require more initial outlay and may take longer to implement, futures transactions can be implemented immediately by speculators without an interest in the physical commodity per se and with little up-front cash. Moreover, hedgers who are interested for the physical commodity and have storage constraints will buy futures contracts. Therefore, both hedgers and speculators will react to the new information by preferring futures rather than spot transactions. Spot prices will react with a lag because spot transactions cannot be executed so quickly (Silvapulle and Moosa, 1999).

The price discovery mechanism supports a hypothesis that futures prices lead spot prices. Garbade and Silber (1983) in their study of seven commodity markets indicated that, although futures markets lead spot markets, the latter do not just echo the former. Futures trading can also facilitate the allocation of production and consumption over time, particularly by providing a market scheme in inventory holdings (Houthakker, 1992). In this case, if futures prices for late deliveries are above those for early ones, delay of consumption becomes attractive and changes in futures prices result in subsequent changes in spot prices. According to Newberry (1992), futures markets provide opportunities for market manipulation by the better informed or larger at the expense of other market participants. For example, it is profitable for the OPEC to intervene in the futures market to influence the production decisions of its competitors in the spot market.

1.1.4 Kenya Airways

Kenya Airways is a national airline that was privatized in 1996 and this was meant to improve the performance of the company. The performance of the company improved as a result of this privatization, albeit various challenges. One of the major challenges that the airline faces is cost of fuel. Due to the international crude oil price fluctuations, the airline experienced a big variance in profitability hence reducing investor confidence. This is because investors prefer to invest in companies which are predictable in terms of performance. As a result, the airline started to hedge its fuel costs to guard itself against the high fuel fluctuations through commodities derivatives, and fuel derivative in particular. At the end of the contract period, the derivative price is compared to the actual price and any major difference is either paid to the airline or the bank. In the long run the effects cancel each other except in the year 2010 when Kenya Airways made a big loss as a result of hedging its fuel. The study will seek to find out whether the contract prices it has initiated in the past have a relationship with the fuel cost.

1.2 Research Problem

Given the fuel price volatility and a need for airlines to stabilize their costs, focus is being shifted on the relevance of derivatives for fuel and if there is any relationship between the two prices that can be used to predict the other. Studies by Kaufmann and Ullman, (2009) indicated that the long-term uptrend in fuel price is triggered by speculation. Price sensitivity of fuel oil has brought speculation and creates huge impact in the economy. The usage of derivatives has been seen as a way to curb the uncertainties of price fluctuations. However, studies abound as to the effectiveness of derivatives in managing fuel costs with some stating that derivatives help in the management of price variability, while others see it as a waste of time and it does not have any benefit in the long run. Organizations protect fuel costs through hedging and futures have been the most common derivative used especially in oil commodity. The commonly stated reason is that hedging stabilizes fuel prices and therefore overall costs, cash flows, and profits. The implication is that the market will respond to reduced volatility in profits with a higher price for the airline's stock. This implication is deduced from the correct observation that risk has a cost in the investment marketplace. The derivative beta on oil commodity will have to be calculated so as to measure the sensitivity of oil price with regards to hedging.

Global research has been undertaken in examining the relationship between oil price movements (and shocks) and both economic activity and corporate profitability (and stock prices). Indirectly, this becomes an exploration of whether oil futures have a beta. Contrasting results were reported for the impact on stock prices: Jones and Kaul (1996) found that oil prices do have an effect on aggregate stock returns, while Huang et al. (1996) found no evidence of any correlation between oil price future returns and aggregate stock returns. J P Morgan (2001) found 'little correlation between the price of jet fuel and airlines' relative performance on the stock market'.

A few local studies have been done with respect to the impact of derivatives on commodity prices. This is because of the absence of a derivatives exchange in Kenya. Odeny, (2007) in is study on derivatives and how it is effective in hedging stated that there are no substantive evidence in Kenya of how derivatives have been able to affect stock prices. He stated that even though they have been used in other sectors such as foreign exchange hedging and commodities hedging, they have not been able to influence stock prices. There has been no empirical evidence of a local study showing relationship of derivative price and the asset costs, in this case fuel costs, our study will seek to extensively look at the relationship between derivative price at Kenya Airways and fuel costs in the same period. However, as stated by Kaufmann and Ullman (2009), we shall try to identify if derivative prices at Kenya Airways could be used to predict future fuel costs since the country does not have a derivatives exchange.

This study seeks to establish whether use of derivatives is related to fuel cost at Kenya Airways. The derivative prices used at the airline, as the independent variable, will be the analyzed with the fuel costs that the airline would have incurred in the same period and the trend of the two costs analyzed. The study should be able to come up with a model to answer the following questions that form the basis of our research:

i) What is the nature and extent of relationship of use of financial derivative and the fuel costs in Kenya Airways?

1.3 Research Objective

To establish the relationship between use of financial derivatives and fuel cost in Kenya Airways.

1.4 Value of the Study

The study seeks to improve knowledge both in theoretical field (researchers and scholars), and in the practical field (airline companies, government and policy makers).

To the airline companies, fuel cost stabilization is important to effectively predict their performance since investors shy away from companies that have high profit variability. The study would help the airline companies to make better decisions with regards to hedging of fuel in order to maximize its shareholder value.

To policy makers and government, this study will generate information for designing and/or improving appropriate policies that will help in economic growth. The airline industry contributes a large percentage to the economy and therefore the government should ensure that they can come up with policies that will help the industry to manage its fuel costs for profitability.

To researchers and scholars, the results will help to increase the general knowledge of the subject and will provide useful reference to future studies.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter reviews both theoretical and empirical literature on relationship between use of financial derivatives and fuel costs at Kenya Airways and a summary of variables of the conceptual framework.

Several studies have been done to identify relationship between derivatives and fuel prices. These studies have tried to identify both linear and non-linear relationships in the two variables, i.e derivatives and fuel price. Some have dealt with the lead-lag relationship between spot and future prices of commodities with the objective of investigating market efficiency. The *Garbade-Silber model* presented a model to examine the price discovery role of futures prices and the effect of arbitrage on price changes in spot and futures markets of commodities.

Bopp and Sitzer (1987) tested the hypothesis that futures prices are good predictors of spot prices in the heating oil market, while Serletis and Banack (1990), Cologni and Manera (2008) and Chen and Lin (2004) tested for market efficiency using co-integration analysis. Crowder and Hamed (1993) and Sadorsky (2000) also used co-integration to test the simple efficiency hypothesis and the arbitrage condition for crude oil futures. Finally, Schwarz and Szakmary (1994) examined the price discovery process in the markets of crude and heating oil.

Another approach to evidence of causality is based on the *Granger test*. The conventional approach of testing for Granger causality is to assume a parametric linear, time series model for the conditional mean. Although it requires the linearity assumption, this approach is appealing since the test reduces to determining whether the lags of one variable enter into the equation for another variable. Other studies of relationship (Abhyankar, 1996; Chen and Lin, 2004; Silvapulle and Moosa, 1999) have revealed that nonlinear structure indeed exists in spot and futures returns. These non-linearities are normally attributed to non-linear transaction cost functions, the role of noise traders, and to market microstructure effects.

Bekiros and Diks (2008) stated that it is important for studies to take into account the possible effects of co-integration on both linear and nonlinear Granger causality tests. Controlling for co-integration is necessary because it affects the specification of the model used for causality testing. If the series are co-integrated, then causality testing should be based on a Vector Error Correction model (VECM) rather than an unrestricted VAR model (Engle and Granger, 1987). When co-integration is not modeled, evidence may vary significantly towards detecting linear and nonlinear causality between the predictor variables. Specifically, the absence of co-integration could mean the violation of the necessary condition for the simple efficiency hypothesis (Dwyer and Wallace, 1992), which implies that the futures price is not an unbiased predictor of the spot price at maturity.

2.2 Theoretical Framework on Financial Derivatives and Fuel Costs

2.2.1 Theory of Storage

The theory of storage links the spot price with the contemporaneous futures price through a no-arbitrage relationship known as the "cost-of-carry model". This theory is based on the notion of "convenience yield", which is associated with the increased utility from holding inventories during periods of scarce supply. The classical no-arbitrage relationship between spot and futures prices is given by:

$$F_{t,T} = S_t(1 + R_{t,T}) + w_{t,T} - y_{t,T}$$

Where $F_{t,T}$ is the price at time t of a futures contract maturing at T, S_t is the spot price of the commodity at time t, $R_{t,T}$ is the interest rate for the period from t to T, $w_{t,T}$ is the marginal cost of storage per unit of inventory from t to T, and $y_{t,T}$ is the marginal convenience yield per unit of storage. If the above equation is re-written as $[F_{t,T}S_t(1+R_{t,T})]/S_t=(w_t,T-y_{t,T})/S_t$, then the left part represents the interest-adjusted basis as a function of marginal storage costs and the convenience yield. Thus, assuming that storage costs do not vary much over the period (t,T), variations in the interest-adjusted basis are mainly determined by variations in convenience yields.

Within the context of the theory of storage, convenience yield can be regarded as an option to sell inventory in the market when prices are high, or to keep it in storage when prices are low. Milonas and Thomadakis (1997) argue that convenience yields exhibit the payoff profile of a call option with a stochastic strike price, which can be priced within the framework of Black's model (Black, 1976). Evidence has also shown that convenience yield is a convex function of the available stocks (Brennan, 1958; French, 1986).

A high convenience yield during periods of low inventory drives spot prices to be higher than contemporaneous futures prices and the adjusted basis becomes negative. Specifically, as inventories decrease, the convenience yield increases at a higher rate due to the convex relationship between the two quantities. Equivalently, the higher probability of a stock-out increases the value of the timing option embedded in the convenience yield. As a result, a demand shock cannot be absorbed by available inventory and spot prices tend to be higher than futures prices due to a high convenience yield. In contrast, at high levels of inventory, the convenience yield is small and futures prices tend to be higher than contemporaneous spot prices to compensate inventory holders for the costs associated with storage.

2.2.2 Asset Pricing Theory

From the asset pricing theory, a relationship between the futures price and the expected future spot price can be established. Assuming that at time t, a trader buys one unit of a commodity at price P_t, which he plans to hold until t+T and then sell it for P_{t+T}. The expected return of this investment is given by $E_t(P_{t+T}) - P_t + \gamma_{t,T} - k_T$. Because P_{t+T} is unknown at t, this return is risky and must equal the risk-adjusted discount rate times the price of the commodity at t, that is, $\rho_T P_t$. Hence:

$$E_t(P_{t+T}) - P_t + \gamma_{t,T} - k_T = \rho_T P_t.$$

This theory, proposed by Ross (1976) follows that the futures price is a biased estimate of the future spot price because of the risk premium ρ_T - r_T. More specifically, the futures price should typically be lower than the expected future spot price due to the positive risk premium (that is $\rho_T > r_T$).

2.2.3 Non-arbitrage Theory

An explicit relationship between spot and futures prices can be derived from the non-arbitrage theory. Following Pindyck (2001), let $\gamma_{t,T}$ denote the capitalized flow of marginal convenience yield over the period t to $t+T$. Then, to avoid arbitrage opportunities, the following condition must hold:

$$F_{t,T} = (1 + r_T)P_t - (\gamma_{t,T} - k_T)$$

where $F_{t,T}$ is the futures price of a (agricultural) commodity at time t for delivery at $t+T$, P_t is the spot price at t, r_T is the risk-free T-period interest rate, and k_T is the per-unit cost of physical storage.

Two implications can be derived from the above equation. Firstly, the futures price could be greater or less than the spot price, depending on the net (of storage costs) marginal convenience yield $\gamma_{t,T} - k_T$. If the net marginal convenience yield is positive and large, the spot price will exceed the futures price (futures market exhibits strong backwardation); however, if the net marginal convenience yield is negative, the spot price will be less than the futures price (the futures market is in contango). Secondly, spot and futures prices should move together across time to avoid arbitrage opportunities. That is, we expect price movements in spot and futures markets to be correlated.

Provided that futures markets are generally considered to perform two major roles in commodity markets, a risk-transfer role and, in particular, an informative or price discovery role—we might be tempted to assume that futures markets dominate spot markets. The risk-transfer role results from the fact that a futures market is a place where risks are reallocated between hedgers (producers) and speculators.

Producers are then willing to compensate speculators for sharing the risks inherent in their productive activity. Futures prices also transmit information to all economic agents, especially to uninformed producers who, in turn, may base their supply decisions on the futures price. It can also be argued that physical traders use futures prices as a reference to price their commodities due to the greater transparency and (often) greater liquidity of commodity futures over physical commodities.

2.2.4 Cumulative Prospect Theory

Cumulative Prospect Theory (CPT) says that agents have utility which is concave above a reference point, convex below it, with big losses and gains that occur with small probability weighed particularly heavily. Such loss aversion is thought to explain, for example, the simultaneous existence of insurance and gambling, or the difference in willingness to pay for objects you possess versus objects you don't possess (Ebert and Strack, 2012).

Several studies have been done on the aspect of financial derivatives and airline fuel costs. These studies have assisted in coming up with a theoretical backbone which will be used in conceptualizing the study. According to Fleming and Ostdiek (1999), in perfect markets, derivatives should have no effect on the underlying asset market because they are redundant securities, i.e., they can be synthetically created by some combination of the asset and riskless bonds. According to Ross (1976) and Hakansson (1982), with market imperfections, derivatives make the market more complete by allowing investment choices that were previously cost inefficient or impossible due to regulatory or institutional constraints. Since investors benefit from an expanded opportunity set, the required returns and risks in existing asset markets should fall. In addition, Danthine (1978) argues that derivatives, by promoting information-based trading, increase the depth and liquidity of the market and reduce volatility. Grossman (1988) shows that option trading allows diverse opinions about volatility to be revealed which can reduce volatility. Detemple and Selden (1991) show that option trading can allow more efficient risk sharing which increases the demand for the asset and reduces volatility. Stein (1987) is the only theoretical study that implies volatility could increase, arguing that poorly informed speculators can have a destabilizing effect on the market.

In addition, Damodaran and Lim (1991) and Skinner (1990), respectively, find that the speed with which information is incorporated into price and the accuracy of this information increases after options are introduced. Kumar, Sarin et al., (1998) found a decrease in the adverse selection component of the bid/ask spread and a reduction in the pricing error variance after option introduction, signaling an improvement in pricing efficiency and market quality. In other markets, Edwards (1988) finds reductions in volatility following the introductions of stock index futures and treasury bill futures, while Harris (1989) shows that the volatility of S&P 500 stocks increased after the introduction of S&P 500 future.

Triulzi, D'Ecclesia, and Bencivenga, (2010) in a study confirmed the worries expressed by consumers about the extreme volatility of the oil price induced by speculation and by the erratic trend of the dollar/euro exchange rate. Moreover, Stevans and Sessions (2008) and Acharya et al. (2009) provide evidence that, crude oil inventory holdings and futures prices do show a positive correlation and thus also influence prices on the spot market. Büyüksahin et al. (2011) stated that “fundamental data as well as the increased activity of hedge funds and other financial market participants are responsible for the stronger co-integration of futures contracts with near and far terms.” However most studies do not support that speculation as cause of the increase in oil prices, Alquist and Gervais (2011) explain that oil-price fluctuations in terms of large and persistent demand shocks are related to growth in global real activity in the presence of supply constraints.

Lutz et al., (2012), emphasize that, futures and spot prices reflect “common economic fundamentals.” There is strong evidence that the co-movement between spot and futures prices reflects common economic fundamentals rather than the financialization of oil futures markets. Not only was the surge in the real price of oil well under way by 2005. But also the ability of economic fundamentals such as unexpectedly strong demand for crude oil from emerging Asia.

Various studies (Al-Yousef, 2011; Breitenfellna et al., 2009) show that the four main determinants of oil prices are: (i) demand side, fast-growing demand due to high global economic growth; (ii) supply side, declining non-OPEC supply; (iii) Factors relating to the structure of the crude oil market and the coordinated action on the part of crude oil producer; (iv) Factors associated with the behavior of financial market participants (speculation).

Opinions are diverse on the actual significance of speculation and have brought two schools of thought that will be the reference of our theoretical structure. On one hand, derivatives are considered to be destabilizing and dangerous, such as in cases where large-scale transactions are used to achieve profits from price changes. On the other hand, derivatives are deemed useful in that it allows for transparent and efficient liquidity-based price discovery. The use of derivatives is the basis of our study and in the sub section we may try to answer: Is a derivative speculative and influential on the spot price on a commodity such as oil?

2.3 Determinants of Oil Costs

According to Al-Yousef, (2011), the controversy over the causes of the rise in the price of crude oil is a major subject of debate and one view is that oil price behavior is due to fundamental supply and demand factors. Other explanations refer to the market power OPEC, the crude oil producers, and lastly, price fluctuation is the result of the major increase in oil derivatives trading over the past decade (speculation). Krichene, (2006) and Dees et al. (2007) attempted to explain the rise in oil price using macroeconomic supply and demand frameworks. Other analysts emphasized the dynamic demand by emerging economies, most notably China and India. Advocates of market fundamental, who emphasized the importance of global production maximum (peak oil), refer to supply shortfalls as drivers behind oil price movements. Dees et al. (2008), and Kaufmann and Ullman (2009) focus on OPEC power and the role of speculation.

On speculation as a determinant of oil prices, the unprecedented surge in the spot price of crude oil during 2003-08 and 2010-2011 sparked a heated public debate about the determinants of the price of oil. The popular view was that the surge in the price of oil during 2003-08 and 2010-2011 could not be explained by economic fundamentals. Instead, it was caused by what has been called the "financialization" of oil futures markets, with speculators becoming a major determinant of prices. This interpretation led to calls from politicians to regulate oil futures markets. In theory, prices on futures markets could raise prices on spot markets, where real oil is bought and sold. Some studies (Kaufmann and Ullman, 2009) indicate that the change in the relationship between spot and futures markets, observed over a number of years, and the long-term uptrend in prices triggered by fundamental market developments have been exacerbated by speculation. Hamilton (2008) and Dees et al. (2008) show that all four theories do not necessarily contradict, but rather may complement one another.

Breitenfellna et al., (2009) stated that the methods and models used to determine oil prices vary, giving the impression that disparate findings are in part the result of the research approach taken. The conventional model and Bayesian Model Averaging (BMA) model are the widely used models in determining fuel prices. The Bayesian approach is particularly suited for analyzing the factors determining crude oil prices. Empirical studies that focus on a multitude of possible determinants yield no conclusive results in this regard. This lack of consensus suggests that the simultaneous application of different model approaches would be beneficial.

2.4 Empirical Studies on Fuel Derivatives and Oil Prices

Studies done do not support the assertion of these airline executives that a hedging strategy is not valuable. Carter *et al.*, showed using regression analysis that there is a "hedging premium" for stocks of airlines using derivatives to hedge jet fuel price exposure. Their analysis measures the premium by the impact to Tobin's Q which measures relative firm value by taking the ratio of the value of a firm to the net replacement costs of firm assets. The independent variables in their regression include the following: 1) change in value of a market portfolio, 2) the percentage change in jet fuel prices, 3) a dummy variable set to one if the company discloses any use of derivatives to hedge jet fuel, 4) a dummy variable set to one if the company has disclosed it is currently hedging, 5) the percentage the company has hedged of its fuel purchases for the next year, 6) size of the airline, 7) whether the airline pays dividends, 8) degree of leverage, 9) profitability, 10) investment opportunities, and 11) a dummy variable for each year in the study. The regression used the natural logarithm of Tobin's Q because it enabled the coefficients of the hedging dummy variables to be interpreted as the hedging premium. This turned out to be between 12-16% and was statistically significant, which is very supportive of the notion that hedging helps to create value for a firm.

Okuto (2011) also did a study of management of financial risks exposure of fuel on African airlines. He examined the relationship between fuel price movements, cash flow and capital expenditure in order to establish whether managing fuel costs through derivative hedging would guarantee cash flow certainty hence help solve the underinvestment problem. The results of the study showed that there was a slight relationship between fuel price movements and both cash flow and capital expenditure. This is as a result of increase in profitability and reliable forecast in cash flow. This was also seen in the study by Leland (1998) who argues that firms that can significantly reduce distress probability by hedging would increase financial leverage upon hedging to achieve additional tax benefits.

Kaufmann and Ullman, (2009) in their study investigated the changes in the price of crude oil by examining causal relationships among prices for crude oils from North America, Europe, Africa, and the Middle East on both spot and futures markets. Their study results indicated that innovations first appear in spot prices for Dubai–Fateh and spread to other spot and futures prices while other innovations first appear in the far month contract for West Texas Intermediate and spread to other exchanges and contracts. It showed links between spot and futures markets are relatively weak and this may have allowed the long-run relationship between spot and future prices to change after September 2004. Their results suggested that market fundamentals initiated a long-term increase in oil prices that was exacerbated by speculators, who recognized an increase in the probability that oil prices would rise over time.

An empirical study by Bekiros and Diks (2008) investigated the linear and non-linear causal linkages between daily spot and futures prices for maturities of one, two, three, and four months of Western Texas Intermediate (WTI) crude oil. They applied linear Granger test, non-linear causal relationships of VECM filtered residuals, and non-linear non-causality after controlling for conditional heteroskedasticity in the data using a GARCH-BEKK model. Granger (1969) causality has been a useful notion for characterizing dependence relations between time series in economics and econometrics. The data collected consisted of time series of daily spot and futures prices for maturities of one, two, three, and four months of WTI and it covered two equally sampled periods; October 1991 to October 1999 (PI), and November 1999 to October 2007 (PII).It was shown that the pair-wise VECM modeling suggested a strong bi-directional Granger causality between spot and futures prices in both periods, whereas the five-variate implementation resulted in a uni-directional causal linkage from spot to futures prices only in PII. This empirical evidence appears to be in contrast to the results of Silvapulle and Moosa (1999) on the futures to spot prices uni-directional relationship. Additionally, whilst the linear causal relationships have disappeared after the co-integration filtering, nonlinear causal linkages in some cases were revealed and more importantly persisted even after multivariate GARCH filtering during both periods.

In another study conducted by Cobbs, (2004), 13 airlines were analyzed with regards to a fuel hedging strategy. The study looked at the fuel cost and the fuel hedging strategy for the airlines. In their analysis, they observed that jet fuel represents a critical expense category for any airline that bears its own fuel costs and in 2003, fuel cost represented on average over 16% of the total operating expenses for the airlines under analysis. In fact, fuel has consistently been the second biggest expense after personnel expenses. Airlines however were generally unable to increase fares to offset fuel cost increases. The study also shows that the same airlines experienced a 25.9% compounded annual increase in jet fuel costs while average airline pricing decreased by 0.1%. In addition to the obvious importance of controlling such a significant operating expense for an airline, numerous academic studies have demonstrated that measurable fuel hedging can increase the value of the firm.

Carter et al. (2002) showed that measurable fuel hedging by airlines can increase the value of the firm an estimated 12-16%. The impact of rising fuel costs on the profitability of hedged and unhedged airlines is readily apparent in 2004. As the spot price for crude oil reached $37 per barrel in March 2004 and averaged $34 per barrel year-to-date, industry analysts began revising earnings estimates for the airline segment.

Rao (1999) took a different approach by estimating how much better off an airline would be if it had bought different heating oil futures at different periods of time. He concluded that quarterly income volatility would have declined by 23% on the basis of following his assumed hedging policy. The author admits that the use of a fictional airline may have inflated the advantage of hedging. He also assumes that the purchase of futures is costless and the marking to market requirement of some accounting requirements ignored.

Fleming and Ostdiek (1999) did a study of the effect of energy derivatives introductions on the crude oil markets, and focused on the West Texas Intermediate (WTI) crude oil market. This involved the examination of the volatility of oil returns using the Stochastic Volatility Model (Poterba and Summers, 1986) i.e standard deviation of returns approach over a fixed window of observations and the Generalized Methods of Moments. The study period was held between December 3, 1984 and December 31, 1997. After analysis of the data, the results of the study indicated large unexpected increases of volatility for three consecutive weeks after the introductions of crude oil futures. However, the researchers refused to attribute this volatility on derivatives. Following the introduction of crude oil futures, they found there is little evidence that subsequent derivative introductions had any effect on crude oil volatility. In particular, Fleming and Ostdiek found no effects following the introduction of crude oil options and no pattern in the effects across the time series of introductions of other energy derivatives.

Contrasting results were reported for the impact on stock prices: Jones and Kaul (1996) found that oil prices do have an effect on aggregate stock returns, while Huang et al. (1996) found no evidence of any correlation between oil price future returns and aggregate stock returns.

In this study we aim to establish whether there is a relationship between hedging and fuel cost control, specifically to the airline as this does not come out clearly with these studies.

2.5 Summary of the Literature Review

From the various studies that have been done earlier, there seems to be varied opinions on the relationship between derivative prices and fuel costs (spot prices), with some studies indicating a relationship between the two variables while others indicating no relationship between the two variables. The literature review has looked at theoretical issues that influence fuel prices and determinants of oil costs, models of analyzing the relationships, empirical studies, and a conceptual model that will help us with conducting a study on whether there is a relationship between derivative price and fuel costs in Kenya Airways. Currently, no empirical studies have been done to confirm on the same.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter contains the methodology, which was used in the study. Section 3.2 begins with discussion of the overall research design; section 3.3 explains the target population and the sampling procedure, which will be used to arrive at the appropriate sample size. Section 3.4 presented the procedure and the data collection instrument that was used in data collection and the justification for the choices. The technique of data analysis is contained in section 3.5. This section described data preparation for data analysis, the appropriateness for the statistical methods used for analysis, and the data analysis model.

3.2 Research Design

The study employed a longitudinal design over a period of the last three years which analyzed the fuel cost trends for Kenya Airways over the period in tandem with the derivatives prices. The aim of the study was to evaluate the relationship between use of fuel derivatives and fuel costs, the research used regression analysis to test the extent to which derivatives impacts on fuel cost of the airline. The study also used correlation coefficient to determine the extent of relationship between financial derivatives benefits and fuel cost.

Since our study was a case study, it did not have a sample and therefore collected all the relevant data for the last four years. This was useful in analyzing the variability of fuel costs and the hedge benefits in its effort to stabilize fuel prices.

3.3 Instrumentation and Data Collection Procedure

The study utilized both primary and secondary data collection methods. For primary data contract records were used and they were authenticated from the company. The primary data collected were the contract prices between Kenya Airways and the banks within the research period**.** The airline enters into zero cost collars with banks, thus here the cost of the derivatives are the losses or gains the company incurs as a result of the hedge contracts. These losses or gains are then compared to the fuel costs for the same period. Interviews were also done to corroborate information given in contracts and financial statements. Secondary data was also used and this was from past financial statements that were gathered from their website and also journals and materials that provided information relevant to the study were analyzed. The data covered the period between years 2011 and 2013.

3.4 Instrument Validity and Reliability

Credible financial statements and hedging contracts will be used to gather information that will be used for data analysis. Statements such as hedging contracts will be from Kenya Airways offices and financial statements which include fuel costs will be downloaded from the Kenya Airways website as this is public information. Most of these statements and documents were authenticated for reliability of analysis. Expert opinion from the supervisor will also used to determine the data reliability.

3.5 Data Analysis

Data collected was coded and analyzed. This stage involved data capture, processing cleaning and tabulation. Data was validated and analysis done using the Statistical

Package for Social Sciences (SPSS). Statistical techniques will be applied to the data, with *regression analysis*, *Pearson's correlation coefficient* and *Chi-square test* being used to determine the relationship between derivatives and fuel cost. The impact of the variables was analyzed using P-values. The resulting P-values were compared with the critical P-value. Descriptive statistics were be used to determine the measures of central tendency among the variables. Frequency distributions will be used to determine the frequency levels of both the dependent and independent variables. The results were presented in percentages and tables.

The model that was be used to investigate the relationship between the two variables is:

$$y_1 = a + bX_1 + e$$

Where:

a is the equation constant.

b is the derivative coefficient, beta.

X_l is the financial derivative price.

y_1 is the fuel cost.

e is the error term of the study.

Correlation was also important in analyzing the relationship between derivatives and fuel costs. It was used to reinforce the regression analysis that will be used.

These models (regression analysis, correlation coefficient, and Chi-square test) were able to show the relationship between use of financial derivatives and fuel costs and we used the calculated values to be compared to the critical p-value of 0.05. This critical value is derived from the 5% test of significance.

CHAPTER 4: DATA ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

The main purpose of this study was to investigate the relationship between the use of financial derivatives and fuel costs in Kenya Airways. This chapter contains the findings and the interpretation of the study results that attempted to investigate the research objectives.

4.2 Demographic Characteristics

The study used two variables, hedge price and actual fuel costs, and the characteristics of the variables are shown using the mean and standard deviation.

Table 1: Descriptive statistics

		STRIKE PRICE ($)	SPOT PRICE (US $)
N	Valid	16	16
	Missing	0	0
Mean		115.0094	109.7787
Std. Deviation		10.43394	4.53913

From table 1 above, the derivative fuel cost had a mean of $115.0094 per barrel and a standard deviation of $10.4339 per barrel between the period January 2011 and September 2013, while the spot price had a mean of $109.7787 per barrel and a standard deviation of $4.539 per barrel under the same period of analysis. From the table it can be seen that the average cost per barrel for strike price was more than that for the spot price. This shows that the company saved $5.23 dollars per barrel on average as a result of entering into the derivatives contract.

4.3 Regression Analysis

From the data analysis that was performed, the following results were found:

Table 2: Regression analysis of hedge benefit on fuel costs

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.017[a]	.000	-.071	4.69777

a. Predictors: (Constant), STRIKE PRICE ($)

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.089	1	.089	.004	.950[a]
	Residual	308.967	14	22.069		
	Total	309.055	15			

a. Predictors: (Constant), STRIKE PRICE ($)

b. Dependent Variable: SPOT PRICE (US $)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	110.626	13.421		8.242	.000
	STRIKE PRICE ($)	-.007	.116	-.017	-.063	.950

a. Dependent Variable: SPOT PRICE (US $)

Regression value shows whether the financial derivative cost is a good predictor of the dependent variable spot price. As shown in Table 2, R shows a value of 0.017 which indicated that the independent variable, fuel hedge cost, is not a good predictor of fuel costs, while R^2 shows that the independent variable, hedge contract price does not explain any variance of the dependent variable, spot fuel cost. This shows that the hedge cost cannot explain the fuel spot price.

An ANOVA table tests whether the overall regression model is a good fit for the data. It tests the statistical significance of the test. The ANOVA table shows the F-Value and whether the independent variables statistically significantly predict the dependent variable. From the coefficients table above, F(1,14=0.004), while p-value(0.950)>0.05 showed that the variable is not a good fit of the data at 5 percent significant level.

The coefficients table provided values that were used for the regression model. The model from the output was:

$$\boldsymbol{Y = 110.626 - 0.007(Fuel\ hedge\ Price)}$$

The above equation states that for every increase in unit of hedge benefit, fuel cost reduce by 0.007 units. This may be attributed to the derivative contract agreements in 2011 that resulted to hedge losses for the airline.

4.4 Correlation Analysis

Table 3: Correlation matrix

		STRIKE PRICE ($)	SPOT PRICE (US $)
STRIKE PRICE ($)	Pearson Correlation	1	-.017
	Sig. (2-tailed)		.950
	N	16	16
SPOT PRICE (US $)	Pearson Correlation	-.017	1
	Sig. (2-tailed)	.950	
	N	16	16

Pearson's correlation test was performed to investigate the nature of relationship of the variables in the study. From Table 3 above, the fuel derivative cost had no relationship with the actual fuel cost. The two-tailed significance test had a value of 0.950 which indicated that the derivative contract price had no relationship to actual fuel price.

4.5 Chi-Square Test

Table 4: Observed and expected benefit outcome

	Observed N	Expected N	Residual
No	4	8.0	-4.0
Yes	12	8.0	4.0
Total	16		

Test Statistics

	BENEFIT?
Chi-Square	4.000[a]
df	1
Asymp. Sig.	.046

a. 0 cells (.0%) have expected frequencies less than 5.
The minimum expected cell frequency is 8.0.

The study also conducted a Chi-square test to analyze the observed and expected outcome of the financial derivative contract. In normal circumstances, a company is expected to contract a derivative cost that will be above the spot price for it to be favorable. If the number of times when derivative contract cost is favorable to the company is more than expected then the contract can be said to be effective.

Table 4 above shows the observed and expected distributions of derivative contract favorability. The table shows that the number of times favorable derivative contracts were observed was N=12 as compared to the expected number of favorable contracts N=8. The significance test showed a value of 0.046 which is less than the significant 0.05 value. This showed that the derivative contracts were effective. This can also be shown by the value of monetary benefit gained by the airline as a result of the derivative contracts.

4.5 Summary and Interpretation of Findings

Relevant data for analysis was collected from Kenya Airways financial statements and management accounts. Data analysis was done with regression analysis, Pearson's correlation tests and Chi-square being done to ascertain the objective of the study. For regression analysis done, the output showed that there was no relationship between the financial derivatives used at Kenya Airways with the company's fuel cost. The regression output had an R value of 0.017, and a two-tailed significant value of 0.950 which was greater than 0.05. This indicated that derivative contract price is not a predictor of the dependent variable, fuel costs. Correlation study performed showed a value of r = -0.017 which indicated that there was no association between derivative contract prices and the fuel spot prices.

Earlier empirical studies showed that there is a relationship between financial derivatives and fuel costs (Kaufmann & Ullman, (2009); Bekiros & Diks, (2008); Cobbs, (2004)). Bopp & Sitzer, (1987) in a study also showed that futures prices are good indicators of spot prices. However, British Airways CEO Rod Eddington's comments that hedging does not saves a company bills, but only flatten the bumps and remove the spikes show similarities with this study that there is no relationship and benefit of financial derivatives and fuel costs in Kenya Airways.

The Chi-square test showed that the use of derivatives is an effective means of fuel cost management. The number of favorable contracts (N=12) were more than the unfavorable contracts (N=4) which showed that contracts were indeed effective.

Even though the derivatives cannot be used to predict the fuel spot prices, they are effective in the management of fuel prices since the contracts entered were beneficial to the airline.

CHAPTER 5: SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter summarizes the interpretations of the findings in Chapter 4 and draws conclusion and offers recommendation for the study. The data was analyzed using descriptive statistics, regression analysis, correlation coefficient and Chi-square test. These techniques were believed to provide useful information in finding out the relationship between use of financial derivatives and fuel costs at Kenya Airways.

5.2 Summary

Oil prices have for many years been caused influenced by many factors such as demand and supply factors, politics, and even speculation. These factors brought about huge price shocks that it made countries and companies that are using the commodity not to be able to plan adequately. Its impact on national economies and institutions is enormous, affecting the national reserves and even companies' profits. These fluctuations made countries and institutions to hedge themselves against these high price fluctuations through derivatives. Common forms of financial derivatives that are used include futures, forwards and swaps.

The objective of the study was to determine the relationship between use of financial derivatives and fuel costs in Kenya. Empirical studies were analyzed in order to come up with proper conceptual models that will be used in the data analysis.

The study research design was based on a longitudinal study, which looked at the unit of analysis (Kenya Airways) for three years which was done quarterly, gathering information relevant to the study in order to come up with a proper analysis. After data collection and cleaning, analysis was done through regression analysis and Pearson's correlation test using Statistical Package of Social Sciences (SPSS).

The results of the tests showed that there is no relationship between the use of financial derivatives and fuel costs in Kenya Airways. This was after the regression analysis showed an R value of 0.017, significant value of 0.950 which is more than 0.05, while the correlation coefficient had a value of -0.017. However, Chi-square tests done on the effectiveness of the derivatives contracts showed that they were indeed effective in the management of the airline's fuel costs.

5.3 Discussion

The objective of the study was to ascertain the relationship between use of financial derivatives and fuel costs in Kenya Airways. The results of the study showed that independent variable, derivative contract prices (strike prices) do not have a relationship with fuel costs (spot prices) in Kenya Airways. This has made the study to conclude that the independent variable (derivative strike price) do not provide good prediction on the independent variable (spot price). From previous studies in the literature, hedge benefit was expected to have significant relationship with fuel cost, but it showed that there was little relationship between them. Further test were done through correlation test which showed that there was low positive correlation (0.486) between the two variables. In terms of cost management, the derivatives were shown to be effective in the management of spot prices. This was ascertained through the Chi-square tests.

5.4 Conclusion

The study looked at the relationship between the use of financial derivatives (hedge benefit) and fuel costs at Kenya Airways. After analyzing the company data for the three years, the study results showed that there is no relationship between the two variables, financial derivatives and fuel costs. This was contrary to the expectation after earlier empirical studies showed linear relationship existed between the two variables.

The benefit and effectiveness of the derivatives were as expected using the Chi-square test. The overall benefit from the derivative use in the period between January 2011 and September 2013 was amounting to $16.9 million.

5.5 Limitation of the Study

The study provided an opportunity to delve into the derivatives market and its effects and relationship with the fuel cost. The objective of the study was to test the relationship between use of financial derivatives and fuel costs in Kenya. During the conduct of the study, one of the challenges was data collection.

Even though data was collected, gathering of the data was a challenge since there was no central database for all the required information. The derivatives contracts and the management accounts were sourced from different sections, making it difficult to gather the information.

5.6 Recommendation

With the cost of fuel being large, taking a large percentage of total costs in Kenya Airways, it is important for these companies to have measures that ensure that the fuel costs do not fluctuate much, leading to unexpected losses, such as was the case in the year 2009. Literature studies (Kaufmann and Ullman (2009), and Bekiros and Diks (2008)) highlighted how derivatives can affect the actual crude oil prices. With the absence of an oil derivatives exchange in Kenya similar to that of NYMEX, the country and the institutions cannot adequately influence the actual price at the global market.

One of the recommendations therefore is for the country to introduce commodities markets which would lead to financial impact that can impact on oil prices. With this market, price indices can be monitored by everyone buying the commodity and a common price used. This is contrary to what is happening where each and every company that wants to hedge must enter into derivatives a contract with the banks.

5.7 Suggestion for Further Research

The study suggests that more insight research should be done on relationship, impact and effectiveness of financial derivatives and actual fuel costs in Kenya and other factors that may affect it, including other variables which may have further impact than currently analyzed. Other analytical models such as time series model may be used for the analysis.

Since the derivatives market is not fully grown in Kenya, other studies may be done to comprehensively understand it, including for other companies and sectors. This is because Kenya is a huge importer of fuel and therefore controlling the costs would reduce the country's expenditure and would help in maintaining dollar reserves which is the currency for oil purchase.

Also, researchers may do studies in other industries so as to compare the results with that of this study. Since this study looked at the relationship in Kenya Airways, other international airlines and other industries can be analyzed.

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Appendix I: Data used for analysis

i) Kenya Airways Hedge Contracts 2011 – 2013

ii) Brent Oil Prices

Jan-11	96.29
Feb-11	103.96
Mar-11	114.44
Apr-11	123.15
May-11	114.46
Jun-11	113.76
Jul-11	116.46
Aug-11	110.08
Sep-11	110.88
Oct-11	109.47
Nov-11	110.5
Dec-11	107.97
Jan-12	110.99
Feb-12	119.7
Mar-12	124.93
Apr-12	120.59
May-12	110.52
Jun-12	95.59
Jul-12	103.14
Aug-12	113.34
Sep-12	113.38
Oct-12	111.97
Nov-12	109.71
Dec-12	109.64
Jan-13	112.93
Feb-13	116.46
Mar-13	109.24
Apr-13	102.88
May-13	103.03
Jun-13	103.11
Jul-13	107.72
Aug-13	110.96
Sep-13	111.62

Source: Index Mundi.com