Oil Retail Pricing and Price Controls: A case of Oil Marketing Sector in Kenya

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Abstract

Purpose- the study sought to foremost, determine the effect of international crude oil prices and exchange rate on average monthly retail prices of four oil products in Kenya and to secondly, establish the relationship between the monthly oil retail prices in the period before and after introduction of price controls.

Methodology- a descriptive longitudinal design was adopted utilizing secondary data. Multiple regression analysis and simple correlation analyses were used for data analysis.

Findings- the two predictors had a significant effect on average monthly retail prices for all the products though they had a lesser explanatory power on average monthly oil retail prices in the period after introduction of price controls compared to the period before thereby suggesting that price controls had caused some effect on average monthly retail oil prices of all the four oil products. In the period before introduction of price controls, monthly international crude oil prices and exchange rates explained much of Super prices and little of Kerosene prices; after the introduction of price controls, the two variables explained more of Diesel prices but very little of Regular prices. A positive correlation between average monthly retail prices of Super and Diesel products in the period before and after introduction of price controls was documented unlike Kerosene and Regular whose prices exhibited a negative correlation.

Implications-both predictors were found to be key in explaining monthly oil retail prices singly; there is noted need for ERC to consider other factors in setting maximum monthly oil retail prices due to the low coefficient of determination documented.

Value- ERC to consider other factors in setting maximum oil retail price ceilings and researchers to study other factors explaining oil retail pricing other than the two predictor variables of the study.

Key Words: price controls, price ceiling, price floor and price asymmetry.

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Background

The oil marketing sector plays a significant role in the economic growth of Kenya considering that oil is an essential commodity in industrial production, transportation and generation of water, electricity amongst other products. Hardwick, Langmead and Khan (1999) indicate that oil marketing is characterized by oligopoly with only a few firms controlling the market, besides the sector being associated with barriers to entry and exit and the high volume of threshold that the firms are required to maintain. The oil marketing sector received increased attention in Kenya following the rise of international crude oil prices in the period 2007-2008 which prompted the oil marketing firms to pass on the cost to consumers. When the oil retail prices declined towards the end of year 2008, the firms did not reciprocate to reduce the retail prices for their oil products. This prompted the Kenyan government, through the Energy Regulatory Commission (ERC), to introduce price controls to regulate retail prices of selected oil products. Kilian (2009) attributes the sharp price increase in 2007–2008 to the combination of increased demand and stagnant supply, linking the increase in oil demand to the fast growth of emerging economies such as China and India.

The pricing of oil products is often a complex process which is controlled by the relevant government department. When the price controls were introduced in Kenya, kerosene became expensive and the government had to reduce taxes on kerosene. According to Petroleum Insight (2012), in year 2011, sales for diesel were $1,769,029m^3$, petrol $781,032m^3$ and sales for kerosene were $340,603m^3$. Grant, Ownby, and Peterson (2006) indicate that the price of crude oil is the most significant factor in determining retail prices for petroleum products besides the interaction of forces of demand and supply. Despite the ERC setting the maximum pump prices for selected products, the retailing firms have a leeway in determining the actual oil retail prices bearing in mind their unique conditions, international crude oil prices, exchange rate changes among other factors. This has often led to a fluctuation in average monthly retail prices for several oil products.

Governments often introduce price controls to protect the general public against exorbitant prices by retailers and other oil marketers. Taylor and Weerapana (2011) define price controls as a government regulation that sets or limits the price to be charged for a particular good which can either be a price ceiling, price floor, or a minimum price at which a good can be bought or sold. Price ceiling controls set a maximum price that may be charged but do not prevent goods to be sold at lower prices below the ceiling price (Tucker, 2010). Price floor is defined as a government price control that sets the minimum allowable price for a good according to Taylor and Weerapana (2011). Taylor (2006) contends that price controls are only effective for a short term basis and when they take place over a long term, they can lead to shortages, rationing, quality deterioration, long queues and black markets. Such controls are instituted by governments to protect consumers against oligopolistic price practices (Mostert & Mathews, 2000). In most jurisdictions, price controls include: setting price ceilings/caps and floors, setting a pricing formulae, creating a price stabilization fund, government interventions in the form of calculating and publishing new prices to protect consumers against exploitation, extending subsidies and favourable tax treatment to oil marketing firms among others (Kojima et al., 2010; Taylor et al., 2011; Mankiw, 2008; www.erc.go.ke).

In Kenya, petroleum retail prices are controlled through price capping by ERC which is reviewed monthly. The ERC sets maximum retail pump prices for selected products on a monthly basis and become effective and remain in force from the 15th of the calendar month until the 14th of the following calendar month (www.erc.go.ke). The situation may vary across different jurisdiction. Kojima et al. (2010) found that Malawi's system of price controls was some price stabilization fund while in Botswana, Senegal and South Africa, oil prices were controlled in such a way that the price adjustment was automatic based on some pre-established administrative procedures. Johnson and Johnson (2006) indicate that the oil industry is characterized by unstable prices hence the need for price controls.

Literature has attempted to document the effect of changes in crude oil prices and exchange rates on oil retail prices (Manning, 1991; Really et al., 1998). A rise in crude oil

prices to a high of US $ 147 per barrel (in the second half of year 2008) led to a sharp rise in the retail price of premium petrol in Kenya to over Ksh. 100 per litre (Petroleum Insight, 2009). Kilian (2008) contends that most economies in the world are largely affected by global increase in petroleum product prices which influence retail prices. International crude oil prices rose sharply in the second half of year 2008 to a high of US $ 147 per barrel causing a sharp rise of oil products in Kenya; in the last quarter of year 2008, crude oil prices plummeted a great deal to an average of about US $45 per barrel (Petroleum Insight, 2009). The volatility of the Kenyan shilling further complicates the situation for the oil marketing firms who have to do their settlement in foreign currency. The Borenstein, Cameroon and Gilbert (1997) study found some evidence of price asymmetry between gasoline prices and changes in crude oil prices. The US dollar-Kenya shilling exchange rate is similarly key in explaining retail pricing of petroleum products in Kenya since imported petroleum products are settled in US dollars and the same appreciated over the Kenya shilling in the better part of year 2008 and 2011 (National Energy Policy, 2012).

Most of the East African countries depend on imported crude oil and refined petroleum products from the Middle East region (Knight, 2003) with Kenya being no exception. In Kenya, the ERC instituted a pricing formula to be used by oil marketing firms and the same was published in the Kenya Gazette Legal Notice 196 in year 2010. In determining the maximum retail pump prices for super petrol, regular petrol, kerosene and diesel products, the formula takes into account transportation cost from Mombasa to the nearest wholesale depot, allowed loses in the pipeline and in the depot, allowed gross wholesale and retail margins among other considerations. In view of the formulae, actual oil retail prices for various oil products will vary from one oil marketing firm to the other bearing in mind the unique aspects of each of the firms. The 1974 oil crisis in Kenya prompted the government to undertake some structural adjustment programmes in the late 1980s (KIPPRA, 2010) which saw the introduction of some price controls but the same was to be abandoned shortly thereafter after the 1989 Restrictive Trade Practices, Monopolies and Price Control Act was introduced. The ERC was to be established as an energy sector regulator in Kenya through the Energy Act of 2006 which came into effect in July 2007

(ERC, 2008). The regulator sets retail prices for oil products using a pricing formula and corrects price irregularities as stipulated in the Energy Act of 2006.

Kenol-Kobil and Total Kenya are among the major oil firms in the country which consistently performed better in the period before and after the implementation of price controls. The two are the only listed oil marketing firms at the Nairobi Securities Exchange. Total Kenya is one of the major oil marketing companies in Kenya with over one hundred and seventy service stations country wide and a large market share. The company has often experienced an increase in net turnover by up to 10% despite the rise in international oil prices and the impact of the depreciating Kenya shilling against the US dollar (www.total.co.ke). The key players in the Kenyan oil industry include: Kenol-Kobil, Total Kenya, Shell, Oil Libya, National Oil and GAPCO (Petroleum Insight, 2011). Three major oil marketing firms (KenolKobil, Total and Shell) have large market share of over 50% of the market share in the oil industry in Kenya; by September 2012, the multinational oil marketers were controlling 51.4% of the market share that is Kenolkobil 19.4%, Total 17.9% and Shell 14.1% (Petroleum Insight, 2012).

For purposes of this study, the predictor variables were the monthly international crude oil prices and the monthly US dollar-Kenya shilling exchange rate over the period 2009-2012. The average monthly pump prices for Super, Diesel, Kerosene and Regular oil products were the dependent variable of the study. The predictor effects and relationship between the predictors and the dependent variables were evaluated using multiple regression analysis and simple correlation analysis respectively.

Objectives of the Study

The study sought to achieve two objectives:

i.   To determine the effect of international crude oil prices and US Dollar-Kenya shilling exchange rate on average monthly oil retail prices in the period before and after introduction of price controls in the oil marketing sector in Kenya.

ii.   To determine the relationship between average monthly oil retail prices in the period before and the period after the introduction of price controls in the oil marketing sector in Kenya.

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Methodology

Average actual monthly retail oil prices (for Super, Diesel, Kerosene and Regular products), average monthly international crude oil prices and the US dollar-Kenya Shilling monthly average exchange rates (all for the period 2009-2012) were obtained from the Petroleum Institute of East Africa, Ministry of Energy and the Kenya National Bureau of Statistics. Monthly data was considered appropriate considering the erratic nature of fuel prices and fluctuations in international crude oil prices and exchange rates.

Data analysis methods were Multiple Regression Analysis (standard) and Simple Correlation analyses which were aided by Statistical Package for Social Sciences (SPSS) version 21. R square and p-values were used to determine the effect of the predictors on the outcome variable at a significance level of 0.05. Pearson's Simple Correlation was used to determine the nature and strength of relationship between maximum oil retail prices for the four products in the period before and after the introduction of price controls in the Kenyan oil marketing sector. Preceding the regression analysis were preliminary diagnostic tests of: normality, multicollinearity and homoscedasticity which were all within acceptable thresholds. The regression model is captured hereunder.

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$$

Where: Y = average monthly retail price for the ith product (Super, Diesel, Kerosene and Regular); X_1 = average monthly international crude oil prices; X_2 = average monthly US dollar- Kenya Shilling exchange rate; β_0 = constant; ε = error term

Results and Discussion

To establish the effect of international oil prices and the exchange rate (US dollar-Kenya shilling) on maximum retail oil prices 4 oil products, a standard multiple regression analysis was adopted. Average monthly International oil prices and the US dollar- Kenya Shilling exchange rates were taken to be the independent variables whereas average maximum monthly retail prices for Super, Diesel, Kerosene and Regular products were the dependent variable of the study.

Table 1: Regression results for period before price controls (2009-2010)

Retail price (Y)	Constant(β_0)	International oil price	Exchange Rate	R^2	F-statistic	P-value
Super	-92.93146	0.6315395	1.730869	0.9116	103.125	0.0000
Diesel	-84.93465	0.5648996	1.581599	0.8972	87.28925	0.0000
Kerosene	-26.06242	0.02588	1.108873	0.5380	11.64574	0.0004
Regular	-128.0425	0.4213999	2.344514	0.8471	55.40708	0.0000

Significance level = 0.05

From the output in Table 1 above, regression functions are extracted as follows:
Super - $Y_s = -92.93 + 0.63X_1 + 1.73X_2$; Diesel- $Y_d = -84.93 + 0.56X_1 + 1.58X_2$
Kerosene - $Y_k = -26.06 + 0.03X_1 + 1.11X_2$ Regular $Y_r = -128.04 + 0.42X_1 + 2.34X_2$

In view of the results in Table 1 above for the period before introduction of price controls in Kenya, international crude oil prices and average exchange rates explained much of retail prices of *Super petrol* than any other petroleum product (91.16%) whereas the two variables had the least contribution in explaining retail prices for *kerosene* (53.8%). Katisya (2010) indicates that depending on the product mix, oil marketing companies would subsidize some products like kerosene and subsequently maximize their margins on their products. International crude oil prices and exchange rates explain much of retail price changes for *Diesel and Regular products*. In general, international crude oil prices and exchange rate changes have a significant effect on retail prices for all the four oil products (Super, Diesel, Kerosene and Regular) at a significance level of 0.05. The Asplund et al. (2000) study in the Swedish gasoline market found that gasoline prices responded more rapidly to exchange rate movements than to spot market prices.

However, evidence from other markets shows that there are other factors and different forms of price controls which affect pricing of oil products: Bacon (2009) found that taxation was a key factor in explaining retail fuel prices in Cambodia. Bloomberg and Harris (1995) attribute changes in retail prices to exchange rate movements based on the law of one price. Drollas (2012) indicates that sort term prices of oil are mainly explained

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by stock disequilibrium that is the difference between stocks that the companies want to hold and the stock they are actually holding. Hence, the retail prices in the current study could similarly be explained by these factors over and above international crude oil prices and exchange rate changes.

Table 2: Regression analysis of period after introduction of price controls (2011-2012)

Retail price (Y)	Constant(β_0)	International oil price	Exchange Rate	R^2	F-statistic	P-value
Super	12.44403	0.2680342	0.808742	0.3733	6.551178	0.0059
Diesel	3.842277	0.3875789	0.6602314	0.4536	9.131447	0.0013
Kerosene	16.68555	0.2224884	0.5032951	0.3181	5.13057	0.0148
Regular	21.48292	0.2983062	0.6539614	0.2674	4.015519	0.0326

Significance Level= 0.05

The output in Table 2 is summarized into the following regression functions:

Super $Y_s = 12.44 + 0.27X_1 + 0.81X_2$; Diesel : $Y_d = 3.84 + 0.39X_1 + 0.66X_2$

Kerosene $Y_k = 16.69 + 0.22X_1 + 0.5X_2$;   Regular $Y_r = 21.48 + 0.3X_1 + 0.65X_2$

Results in Table 2 above are in view of the period after introduction of price controls (years 2011-2012). In comparison to the period before the introduction of price controls (see Table 1), international crude oil prices and exchange rates explained much less of monthly retail prices for each of the four petroleum products (Super, Diesel, Kerosene and Regular). In particular, the two predictor variables explained much of the changes in retail prices for Diesel compared to the to the other three petroleum products. Considering that Diesel is highly consumed worldwide especially in the manufacturing sector (and Kenya is no exception), the forces of demand and supply in the global market could be an explanation for Diesel prices being more sensitive to changes in international crude oil prices and exchange rates in comparison to the other three products. Similarly, Bashmakov (2003) and Cropper (2004) suggest a higher price ceiling for Diesel.

Results further indicate that the two predictor variables had the least effect in explaining monthly retail prices for Regular. However, international crude oil prices and exchange rates had a joint significant effect on retail prices for all the four products (in the period 2011-2012) similar to the period before introduction of oil price controls in Kenya (2009-2010).

In view of the regression coefficients of international crude oil prices and exchange rates over the period before and after introduction of price controls, a unit change in the two predictor variables caused *a smaller change* in monthly retail prices for each of the four products in the period after introduction of controls compared to the period before introduction of price controls (see Table 3 below).

Table 3: Summary of regression coefficients before and after price controls

Product	Regression coefficient of International price (before price control)	Regression coefficient of International price (After price control)	Regression coefficient of Exchange (before price control)	Regression coefficient of Exchange (After price control)
Super	0.6315395	0.2680342	1.730869	0.808742
Diesel	0.5648996	0.3875789	1.581599	0.6602314
Kerosene	0.02588	0.2224884	1.108873	0.5032951
Regular	0.4213999	0.2983062	2.344514	0.6539614

Source: research data, 2015

Correlation of maximum retail oil prices in the period before and after price controls

The essence of the correlation analysis of maximum retail prices for the four products over the 2 periods was to determine the consistency in price changes. In view of the results in Table 4 below, Super1, diesel1, kerosene1 and regular1 *represents retail prices* in the period *before introduction of price controls* whereas super2, diesel2, kerosene2 and regular2 *represents retail prices* in the period *after introduction of price controls.*

Correlation results in Table 4 below indicate the nature and strength of relationship between the maximum retail oil prices for the four products in the period before and

period after introduction of oil price controls in Kenya. The results indicate that Super and Diesel products had a *positive relationship* that is the retail prices moved in the same direction over the two periods indicating some consistency over the two periods. In addition, Super retail prices exhibited a *moderately positive correlation* (0.3665) in the period before and period after introduction of price controls whereas Diesel exhibited a *fairly weak positive correlation* over the two periods (0.2232).

Table 4: Correlation of maximum oil retail prices for periods before and after price control

Product	Super1	Super2	Diesel1	Diesel2	kerosene 1	kerosene 2	Regular 1	regular 2
Super1	1.0000							
Super2	**0.3665**	1.0000						
Diesel1	0.9780	0.3399	1.0000					
Diesel2	0.2337	0.9493	**0.2232**	1.0000				
Kerosene 1	0.4186	-0.5231	0.4339	-0.6366	1.0000			
Kerosene 2	-0.2827	0.7041	-0.2642	0.8235	**-0.7254**	1.0000		
Regular1	0.8988	0.0178	0.8910	-0.1247	0.7365	-0.5217	1.0000	
Regular2	0.3231	0.9108	0.2785	0.8843	-0.5173	0.6272	**-0.0306**	1.0000

As presented in table 4 above, the retail prices for Kerosene and Regular exhibited a negative correlation over the two periods showing some inconsistency. In particular, Kerosene exhibited a *fairly strong negative correlation* (-0.7254) unlike Regular whose correlation of prices over the two periods was *fairly weak* (-0.0306). These results are similar to Borenstein et al. (1997) who found price asymmetries in retail prices and changes in crude oil prices in the US gasoline market. Similarly, Contin (2000) found inconsistencies between gasoline prices and changes in crude oil prices in the Spanish gasoline market. Manning (1991) indicates that such inconsistencies in petrol prices are an indication of market imperfections.

Findings

The study documents several findings in view of the results. Firstly, international crude oil prices and exchange rates explain much of Super retail prices and very little of Kerosene prices in the period before introduction of price controls; secondly, international crude oil prices and exchange rates had a significant effect on monthly retail prices in both periods (before and after introduction of price controls); thirdly, upon introduction of price controls, international crude oil prices and exchange rates had a lesser joint explanatory power on monthly retail prices for all the four products compared with the period before introduction of the price controls; fourthly, after introduction of price controls, international crude oil prices and exchange rates explained more of Diesel retail prices than any other product but the two predictors explained less of Regular retail prices; fifthly, a unit change in international crude oil prices and exchange rates brought about a smaller change in all the four retail prices after the introduction of price controls compared to the period before introduction of price controls; Lastly, when comparing the correlation between retail prices for the four products before and after introduction of price controls, the study found a positive correlation for retail prices for Super and Diesel unlike Kerosene and Regular whose correlated prices were negative over the two periods respectively with the former uncharacteristically exhibiting a strong negative correlation.

Conclusions

In view of the documented findings, the study makes several conclusions. Firstly, international crude oil prices and the US dollar-Kenya shilling exchange rates have a significant effect on monthly retail prices for Super, Diesel, Kerosene and Regular products in Kenya; secondly, the introduction of oil price controls in Kenya in the latter part of year 2010 brought about some effects on retail pricing of the four products considering the reduced predictive power of international crude oil prices and exchange rates in the period after introduction of the controls; international crude oil prices and exchange rates have an individual and joint effect on the retail pricing of the four oil products; lastly, there is some consistency (for Super and Diesel) as well as inconsistency (for Kerosene and Regular) in oil retail prices in Kenya considering the positive and

negative correlations of the individual product prices over the period before and after introduction of price controls in Kenya.

Recommendations

The study makes the following recommendations from the findings and conclusions. Firstly, the ERC should still consider changes in international crude oil prices and the changes in the US dollar-Kenya shilling exchange rate in setting maximum oil retail prices for the four products; secondly, ERC should similarly consider the effect of other factors on oil retail prices considering the low coefficient of determination (R square) after the introduction of oil price controls; thirdly, the Government of Kenya ,through the central bank, should regularly manage the US dollar-Kenya shilling exchange rate to avoid an adverse effect of the same on oil retail prices considering the strategic nature of the oil sector in industrial production and transportation; lastly, ERC should consider introducing more price controls in the pricing of oil products since the controls currently in place leave much of the oil retail prices unexplained.

Limitations and Areas for further Study

The study encountered several limitations which are noteworthy. Firstly, though international crude oil prices and exchange rates are widely documented as the key determinants of oil retail prices, other factors such as competition, government policy and transportation cost do have an effect on retail pricing but the same were outside the scope of the study- and this could be an area for further study; secondly, discussions of findings were limited to the extent of lack of adequate empirical literature from the Kenyan oil market; thirdly, the use of secondary data is often associated with undetected errors which could have been in the data and the same could affect the final outcome of the study; fourthly, the study was carried out over a four year period- a longer period could have provided more explanatory power but the same could not be adopted since price controls were introduced in Kenya towards the end of year 2010- in future, similar studies covering at least 6 years could be carried out.

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