WANGARI MAATHAI INSTITUTE FOR PEACE AND ENVIRONMENTAL STUDIES

Journal of Sustainability, Environment and Peace

Homepage: http://www.jsep.uonbi.ac.ke

ISSN: 2663-4627

# Effects of Civil Conflicts on Global Oil Prices and their Impact on the Energy Sector

Cohen Ang'u[1], Nzioka J. Muthama[1], Christopher Oludhe[2] and Lilian N. S. Kong'ani[1]

[1]*Wangari Maathai Institute for Peace and Environmental Studies, University of Nairobi*

[2]*Department of Meteorology, University of Nairobi*

*Article history:*
Received: 06 January 2019
Received in revised form: 30 January 2019
Accepted: 30 January 2019

*Corresponding Author*
Cohen Ang'u
Email Address:
angu.cohen23@gmail.com

*Keywords:*
Conflict,
oil price shock,
electricity,
renewable energy

## ABSTRACT

Recent research has increasingly interrogated the association between oil and civil conflicts within the political context while overlooking the primary use of oil. This paper examines three aspects of the claim "oil is a curse". First, is it true? Second, is there a link between oil and civil conflicts? And third, do higher oil prices affect the energy sector, specifically electricity generation and pricing? By employing correlation matrices with data spanning from 1970 to 2016 at both global and local scale, the results of this analysis indicate that oil may be a *curse* or a blessing. Observation of oil prices and civil conflicts suggest a relationship between higher oil prices and severe civil conflicts with foreign state intervention. Severe imperial/colonial conflicts are associated with lower oil prices while no relationship is observed between oil prices and state based civil conflicts. These findings demonstrate that civil conflicts can arise in cases when oil prices are low and that foreign states have a bearing on oil related conflicts. Both electricity generation from conventional thermal sources and the fuel cost charge component of electricity prices are highly affected by global oil prices with correlations of 0.54 and 0.74, respectively. Renewable electricity sources - hydropower and geothermal were unaffected by global oil prices. This study does not endorse the use of conventional thermal sources for electricity generation while inviting more in-depth case studies on the link between civil conflicts and oil price shocks and their effects on the energy sector.

## 1. Introduction

The significant role played by oil in the modern economy of states has made energy geopolitics a vital issue in global affairs. In many civil conflicts, contention over natural resources is a persistent issue (Nwokolo, 2018). This is because increase in resource revenues enhances the financial capacities for insurgents to engage in conflicts (Lacina & Gleditsch, 2005) while diminishing rents from resources reduce the opportunity cost of engaging in violence (Bazzi & Blattman, 2014; Berman, Couttenier, Rohner, & Thoenig, 2017). With regards to oil, factors such as onshore/offshore oil fields, the simple presumption or rumours of oil and oil discoveries have prolonged and aggravated armed conflicts especially in the African continent (Le Billon, 2010a). Offshore oil income can be used by the government to increase its fighting capacity whereas onshore oil could be looted by rebellious groups to finance rebellion (Andersen, Nordvik, & Tesei, n.d.).

Please cite this article as: Ang'u C., N. J. Muthama, C. Oludhe and L. N. S. Kong'ani (2019). Effects of Civil Conflicts on Global Oil Prices and their Impact on the Energy Sector. *Journal of Sustainability, Environment and Peace 1(1)* 12-18

Estimating the causes of oil price fluctuations in the oil market is an exercise of utmost importance but is usually surrounded by complexities due to the complex nature of the global oil market. High oil prices lead to oil-backed coercive diplomacy that embolden oil exporting states to be more aggressive abroad (Hendrix, 2017). It is therefore most probable that oil exporting states are more likely to engage in militarized disputes between states than other states and are among the most violent states in the world (Colgan, 2010). However, the conventional view suggests that oil producing states are targeted by other states thus act in self-defence. Some researchers argue that oil scarcity increases the likelihood of armed conflicts. Researches linking oil and conflicts usually follow the conventional notion and are mainly qualitative in nature. For instance (Barsky & Kilian, 2004) adduced the external political wars in oil producing countries as the main cause of extreme fluctuations in oil prices.

Oil price shocks is a phrase used to refer to the unexpected changes in price of oil that are mainly propagated by uncertainty surrounding the future availability of crude oil, market imbalances (demand shocks) and geopolitical events such as civil wars within OPEC countries (Economou, 2016). These shocks can be represented by the difference between the expected price of oil and the actual price that occurred (Baumeister & Kilian, 2016). Since 1986, there has been an estimated six episodes of sharp decline in oil prices of 30% or more occurring within seven months period (Mohaddes & Pesaran, n.d.). The oil price decrease of 2014 is attributed to higher oil production in oil rich countries such as Russia and Saudi Arabia while global financial crisis was the main driver of the 2008 oil price crash (Chen, Liu, Wang, & Zhu, 2016). However, shifts in global growth provide an incomplete explanation for the volatility in oil prices observed in 2014/2015 and are unlikely to be the primary factor (Davig, 2015). The doubling of oil prices in the second half of 1990 was a deliberate effort by Iraq to raise the global price of oil through the invasion of Kuwait prompting international reaction (Jones & Kaul, 1996). Such aggressions and interventions outline the dependence of the world economy on oil.

The connection between oil and civil conflicts is not clearly established, and in cases where attempts have been made, the nature of causation between the two is still contentious. For instance, (Le Billon, 2010b) argues that African oil producing countries have not been more frequently at war than non-oil producers while (Michael, 2003) adduces the increasing conflicts in Africa to resources such as oil where revenues from oil finances mercenaries and purchases of foreign weapons. Whether or not - and especially how - the observed fluctuations in the global oil prices affect the availability and affordability of energy is hardly mentioned in the available literature. This poses a research question which forms part of the motivation for this work. This study takes a different approach to the oil conflicts debate. In addition to establishing the link between oil and civil conflicts, it sought to determine the implication of the global oil situation on the sustainability of the electricity sector using electricity generation and pricing in Kenya as case study. Oil price shocks can have devastating effects to countries that import oil or oil products which can be manifested in the form of high energy costs and fuel shortages thus affecting investors' expectations about future oil supply and demand (Fueki et al., n.d.). Oil dependence has been summarised by the *oil curse* hypothesis which suggests that oil dependence negatively affects the quality of institutions and results in economic shocks and long-term performance (Le Billon & Cervantes, 2009). In developing countries where there are no subsidy programs, governments deal with these events by imposing the price on consumers.

## 2. Materials and Methods

This study adopted a quantitative design approach. Using the performance analytic package in R programming environment, insightful correlation matrices and visualizations including scatter plots, histograms and trend lines were used to establish existence and significance of relationships. The data used in the study included electricity generation data spanning from 1980 to 2016 sourced from the Kenya National Bureau of Statistics (KNBS), and monthly oil prices data from West Texas Intermediate (WTI). Data on global deaths (for both oil producing and non-oil producing countries) resulting from different types of conflicts was extracted from "Our World in Data" website while electricity prices data was sourced from Stima rugus website (Stima Rugus, n.d.) website. Electricity prices were weighted against the number of kilowatt-hours of electricity sold at that price according to equation (1).

$$Wtd.Avg. = (P_1S_1 + P_2S_2 + P_3S_3 + \cdots P_nS_n)/T_s$$

(EQN 1)

Where Wtd.Avg. is the weighted average price, $P_n$ is the actual price in the $n^{th}$ month in KES/kWh, $S_i$ is total electricity sales in the $n^{th}$ month in kWh, $T_s$ is the total sum of electricity sales for the n months in kWh.

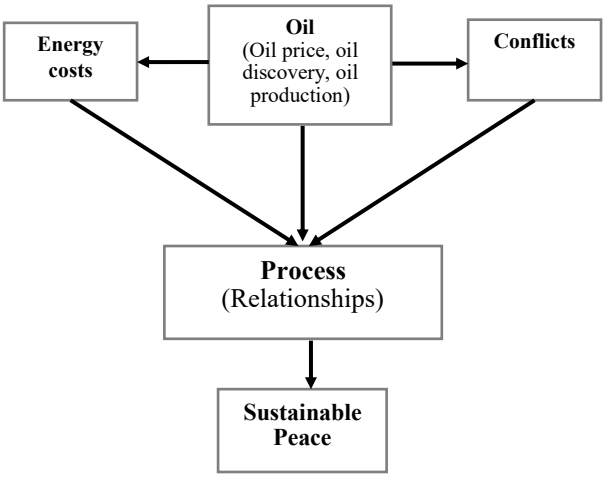


**Figure 1**: Processes and relationships towards sustainable peace

Figure 1 shows the link between oil and conflicts towards achieving sustainable peace. Oil prices affect the cost of other types of energy such as electricity. The relationship between conflicts and energy costs is manifested through high oil prices while oil discovery and production are associated with conflicts.

## 3. Results and Discussion

### 3.1 Oil price shock episodes and civil conflicts

Throughout the period considered (1970 to 2016), there have been both oil price surges and oil price recession episodes occurring at irregular intervals. Several authors have attempted to describe the nature and causes of the observed fluctuations in the oil prices. The causes range from conflicts to demand/supply shocks resulting from market imbalances and uncertainties surrounding the future of oil. Some of the notable events leading to increase in oil prices include the Iranian Revolution that started in October 1978 leading to increase in oil price in early 1980 (Dufeld, 2005).

This increase can be attributed to the reduction in oil production in Iran (Hamilton, n.d.) with oil prices more than doubling over a 12 month period. The invasion of Kuwait in August 1990 coincided with increase in oil prices in that year. The price of oil recessed to reach a low in November 1998 (figure 2-F) thereafter followed by a period of increasing oil prices that was marked by a remarkable increase between 2003 and 2008 to level even higher than those witnessed in the early 1980s (figure 2-C).

Increase in oil demand over several years due to the expansion of the global economy during the period 2003 and 2008 has been documented as the cause of the observed high prices during this period (Hamilton, n.d.; Kilian, 2008). Soon after the 2003-2008 episode, a recession in oil prices was observed as shown in figure 3. This recession has been attributed to financial crisis witnessed in late 2008 that dealt a blow to demand of crude oil (Baumeister & Kilian, 2016).

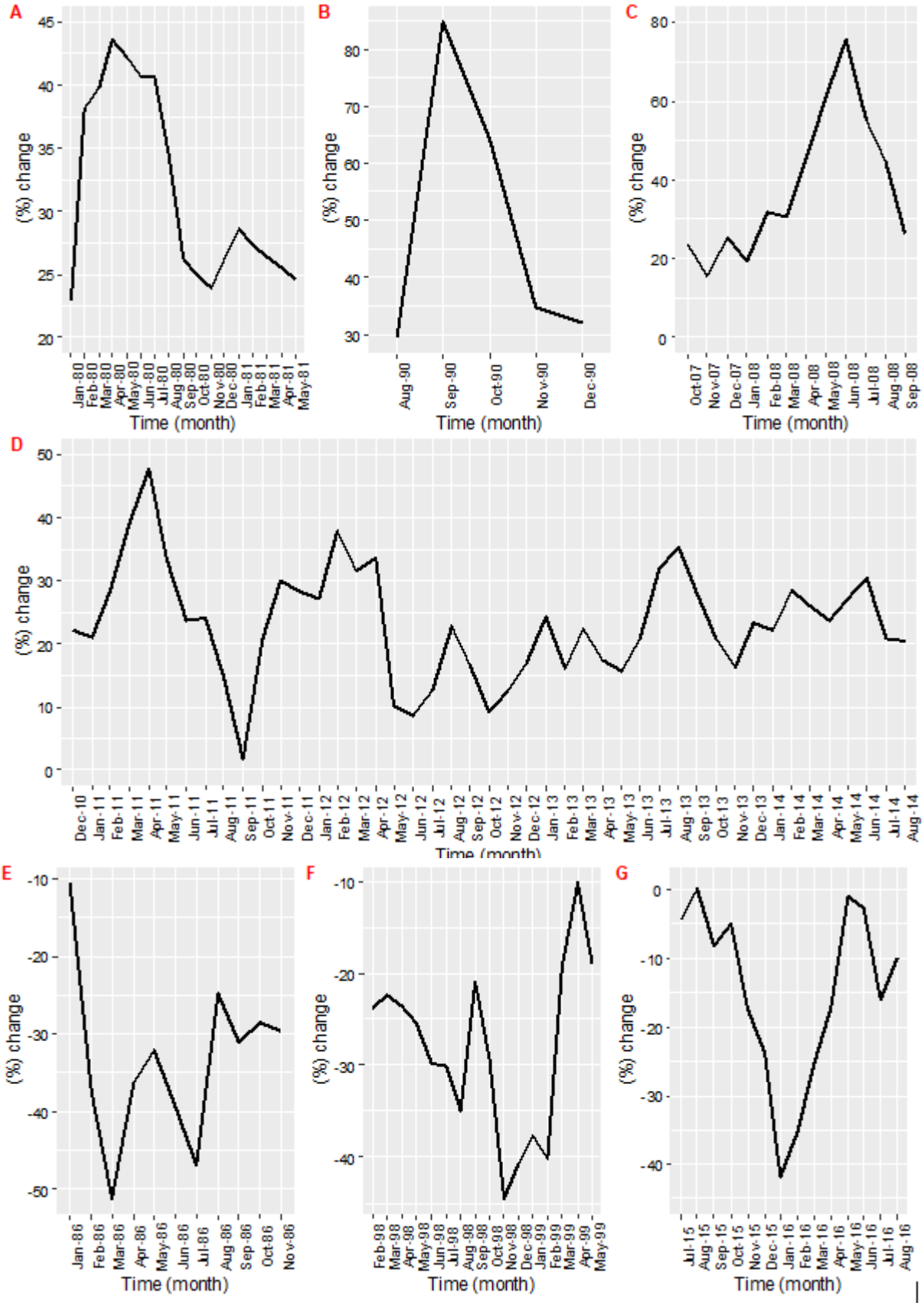


***Figure 2**: Oil price shock episodes showing percentage changes in observed oil prices from the expected price*

Demand and supply shocks were observed between December, 2010 and August, 2014 leading to a series of oil price shocks that saw oil prices change by over 45% in April 2011. Throughout this period, oil prices were at least 10% above the expected price apart from the month of September 2011. The Libyan apprising of 2011 coupled with tensions in Iran in 2012 may have contributed to this increase. The second half of 2015 (figure 1-G) experienced decreasing oil prices coinciding with increase in oil production in Russia and Canada and also increase in shale oil production by the United States.

Considering views held by (Baumeister & Kilian, 2016), that oil price shocks represent the difference between the expected price of oil and the actual price, four episodes (A-D) of oil price surge and three episodes (E-G) of oil price recession have been identified between 1980 and 2016. These are: January 1980 to May 1981 oil price surge which coincides with the Iran-Iraq war; August - December, 1990 oil price surge coinciding with the invasion of Kuwait; October 2007 to September 2008 oil price surge due to oil demand crisis and a series of oil price surges between December 2010 and August 2014 attributed to the Libyan uprising and tension in Iran. Oil price depression episodes were witnessed between January and November, 1986; February 1998 - May 1999 and also between July 2015 - August 2016.

Oil price shocks of 1980/81, 1990 and 2010-2014 coincide with civil conflict periods. Civil war/ conflict is defined as an internal conflict with at least 1,000 combat related deaths per year (Collier & Hoeffler, 2004). The number of deaths arising from conflicts is a measure of the severity of the conflict and figure 3 demonstrates that severe conflicts are associated with severe changes in oil prices. From figure 3 and the cross correlation in figure 4, it is evident that increase in conflict related deaths lag behind high oil price episodes. The correlation is significant at lag 0 but gets stronger at lag 1 to lag 5. Conflict-ridden oil producers are highly dependent on resources and abundance in revenues from natural resources, especially oil, encourages civil wars (Basedau & Lay, 2009). Wealth increases the likelihood of civil war onset by providing opportunity and related motive for armed rebel activity (Collier & Hoeffler, 2004). Unsurprisingly, findings by different authors on the link between resources and civil conflicts vary because of the complexity of the link. According to (Lujala, Gleditsch, & Gilmore, 2005) resources do not make the onset of civil war more likely but influence the duration of a conflict while (Bodea & Ibrahim, 2007) established that oil increases the risk of civil war whereas other forms of violence such as coup d'états and violent unrest are not linked to natural resources. Hypotheses linking higher oil prices to higher conflicts state that increases in oil prices promotes a mix of "greed" and "grievances" thus increasing the likelihood of civil wars, secession, coup and foreign intervention through growing nationalism (Le Billon & Cervantes, 2009). Results in figure 5 show a significant relationship between oil prices and deaths arising from civil conflicts with foreign state intervention. Others state that higher oil prices increase the resilience of countries already at war to external initiatives such as mediation and peacekeeping, thereby prolonging conflicts (Ross, 2001).

The results in figure 5 agree with Bodea & Ibrahim's findings where the link between conflict and oil depends on the type and nature of the civil conflict. At a correlation of just -0.098, civil conflicts in general have no relationship with oil price. However, civil conflicts with foreign state intervention show a significant correlation with oil prices.

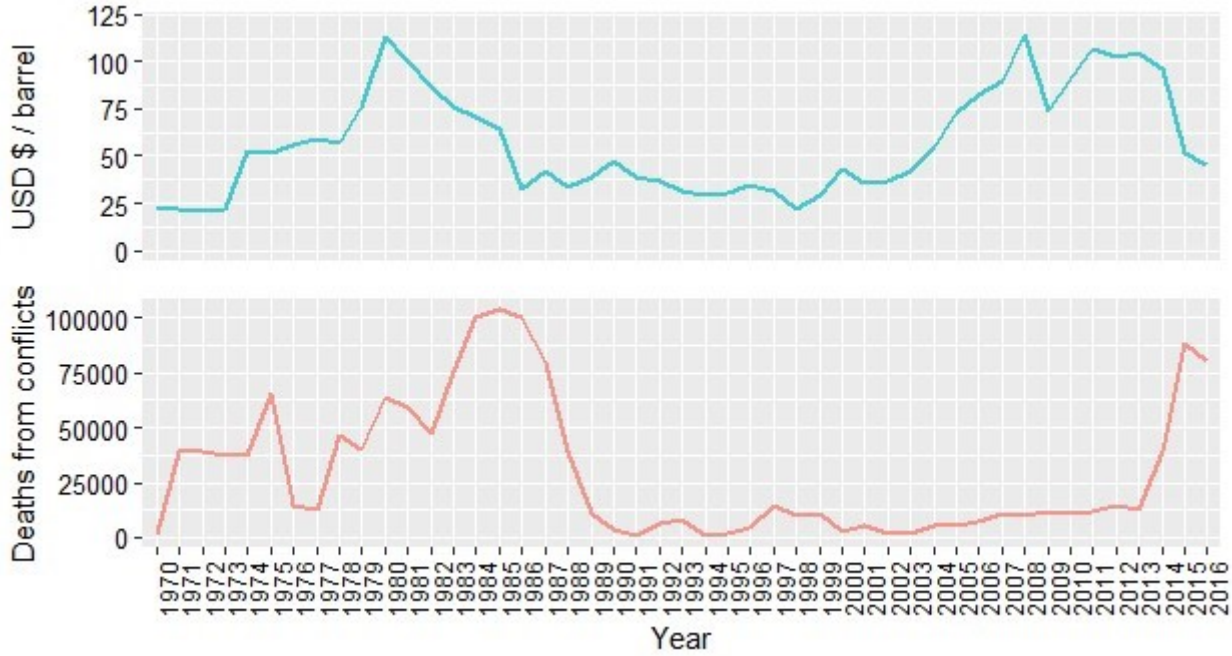


**Figure 3**: Global oil prices and deaths arising from civil conflicts with foreign state intervention

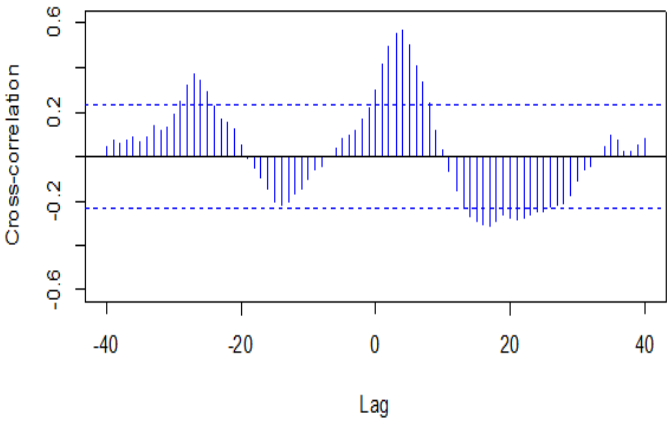


**Figure 4**: Cross correlation between global oil prices and deaths arising from civil conflicts with foreign state intervention at different time lags.

**In figure 4 the region beyond the two dotted lines represents significant correlation*

In figure 6, the significance of relationships is indicated by the following significance codes using p-values as follow (***) 0, (**)0.001, (*)0.01, (.)0.05, and ( )1. Colonial/imperial conflicts (conflicts resulting from the creation of colonies by foreign powers) have a significant negative effect on oil price while conflicts between states and state-based conflicts does not portray significant relationship with oil prices. According to (Brunnschweiler & Bulte, 2008) resource abundance is associated with reduced probability of civil war onset while civil war creates dependence on primary sector export. However, the reverse of the latter statement is not necessarily true that primary export from resource creates civil war. By analogy to the economic assertion of supply and demand, resource abundance is associated with decrease in price of the particular resource. Colonial/imperial conflicts seem to be associated with resource abundance thus the negative correlation with oil price.

### 3.2 Oil Price Shocks and Electricity Generation

Kenya's electricity generation has for long been dominated by hydropower, thermal and geothermal sources. Hydropower has been the major power source until 2014 when geothermal took the lead as shown in figure 5. During the 1990 oil price shock, conventional thermal generation is seen to decline while hydropower is stepped up. Thermal generation is eventually stepped up during the oil price slump of 1998/1999 signifying capacity to generate more thermal electricity by taking advantage of cheap oil prices. The rise in thermal generation only lasts until another episode of oil price surge begins. The rising limb of oil prices between 2001 and 2008 coincides with declining thermal generation. In 2009, a sharp drop in oil prices necessitated a sharp rise in thermal generation and a corresponding sharp drop in hydropower. This was followed by the prolonged oil price surge episode of 2011-2014 amid flattening of the thermal curve. During this episode, the country stepped up geothermal generation and hydropower to compensate for the declining thermal power due to high oil prices. The oil price slump episode of 2015/2016 did not see much fanfare from thermal generation partly because geothermal power had been stepped up thereby proving to be the much-needed remedy to counter thermal generation.

Electricity generation from conventional thermal sources shows dependency on global oil situation. This is because diesel, an oil product, is the main source of fuel used in thermal generators in Kenya. There is a significant relationship between oil prices and conventional thermal electricity generation in Kenya as shown in figure 7. This type of electricity generation is therefore affected by civil conflicts especially those with foreign state intervention which have been found to have a bearing on oil prices (figure 6). Electricity generation from hydro and geothermal sources is not affected by the global oil situation. This is demonstrated by the insignificant correlation coefficient of 0.22 between geothermal and oil prices and almost non-existent correlation between hydropower and oil prices (figure 7). Factors such as fluctuations in rainfall and depressed hydrology leading to drought could be more responsible to the observed annual variation in hydropower generation.

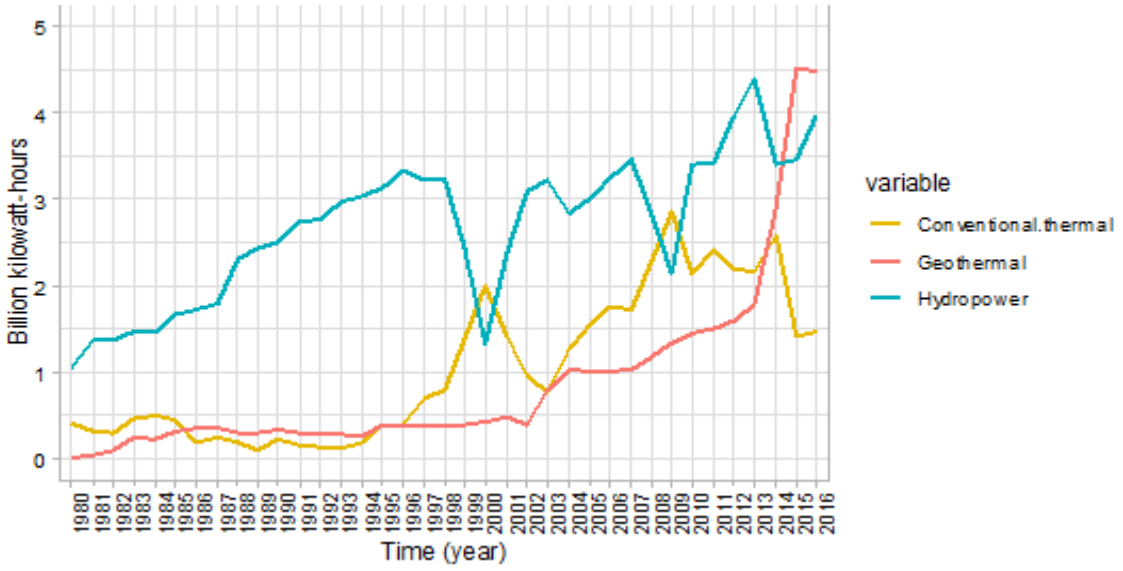


**Figure 5**: Evolution of the dominant electricity sources in Kenya

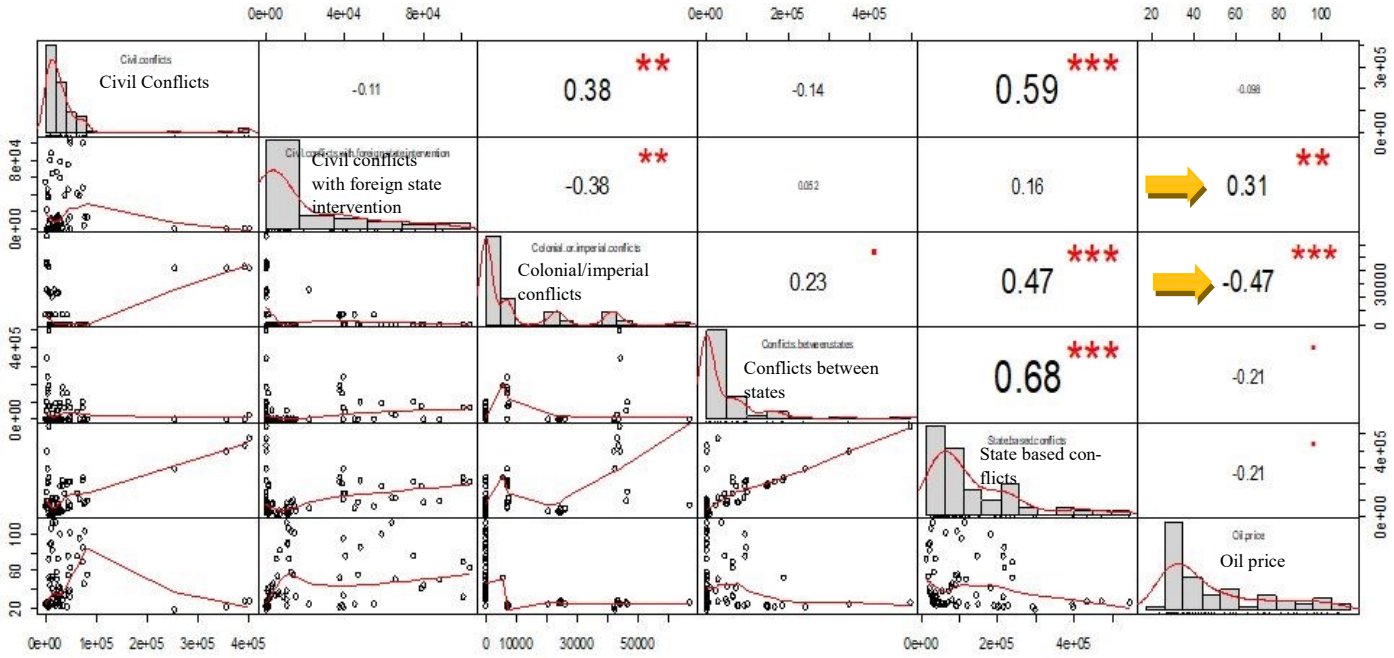


**Figure 6:** Chart showing scatter plots, histograms, correlation coefficients between oil prices and civil conflicts and their significance.

**In figure 6 significant correlations are indicated by two stars (**) and above. The more the number of stars the more the significance. Smaller (by size) numbers represent insignificant relationships while increasingly bigger (by size) numbers represent significant relationships*

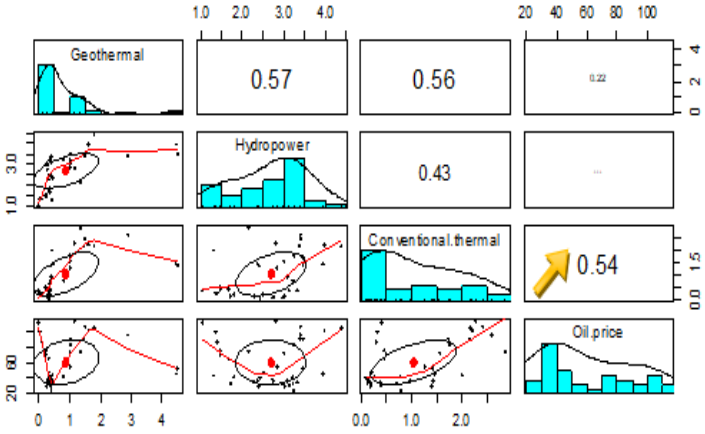


**Figure 7**: Plot showing histograms, scatter plots and correlation coefficients between the major electricity sources in Kenya and oil prices

*In figure 7, smaller (by size) numbers represent insignificant relationships while increasingly bigger (by size) numbers represent significant relationships. The histograms on electricity sources shows cumulative generation in billion kilowatt-hours while oil price is measured in $/barrel

### 3.3 Oil Price Shocks on Electricity Price

The Fuel Cost Charge (FCC) component of electricity price is as a result of fuel costs incurred for thermal generation. This component is highly variable and constitutes about 40% of the total electricity price that is transferred to consumers. In this analysis, monthly data from November 2008 were utilized due to unavailability of past records on electricity prices. The burden of shifts in oil prices is only shouldered by the FCC component. Oil prices affect diesel prices leading to a corresponding effect on generation charges.

The relationship between oil prices and the weighted average FCC is best seen during the oil price depression of November 2014 all the way to November 2017 as shown in figure 8. During this period, the FCC component (red) declined drastically parallel to the oil price limb (brown) before levelling off but increased again towards the end of 2017 following an increase in oil price. There were high electricity prices and public outcry during this period extending into early 2018. The weighted average FCC component is largely affected by global oil prices as demonstrated by a significant correlation coefficient of 0.74 obtained between the two variables.

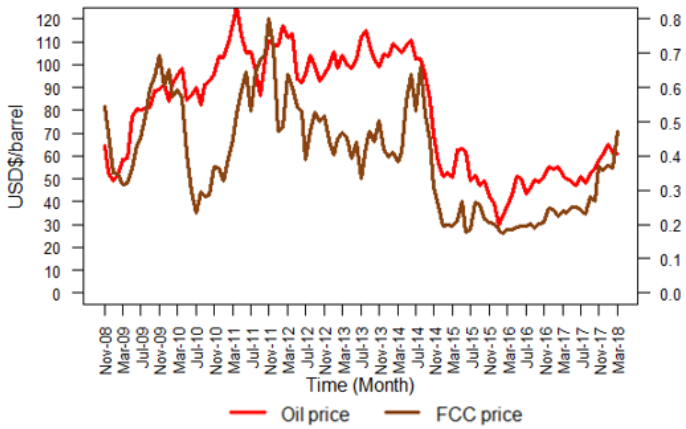


**Figure 8**: Oil prices against the weighted average Fuel Cost Charge component of electricity price

## Conclusions

Oil presents both opportunities and grievances. Previous researches on the link between oil and civil war have failed to consider the opportunities presented by oil thus labelling oil as a curse. Contrary to the conventional wisdom that oil is a curse, this study has demonstrated that oil can reduce the probability of civil war especially imperial/colonial conflicts.

This is evidenced by the significant negative correlation of -0.47 between the two. By examining the relationship between oil price shocks and civil conflicts, the results suggest that civil wars have a bearing on oil prices. This is particularly the case when they occur in oil producing states such as Iran, Kuwait, Libya and the oil rich states in the middle east. Statistical findings portraying significant correlation between oil prices and civil conflicts with foreign state intervention outline some of the grievances presented by oil. However, other types of civil conflicts including state-based conflicts have no bearing on oil prices with imperial/colonial conflicts having a stabilizing effect on oil prices. This study concludes that oil is both a *curse* and a fortune. The most important aspect of oil is in its use for energy purposes and therefore this study sought to determine the effects of oil dependency on electricity availability and costing. In terms of policy priorities, these findings do not endorse the use of conventional thermal sources such as diesel generators for electricity generation. The empirical evidence in this study suggest that electricity generation from conventional thermal is vulnerable to oil price shocks. At the same time, these findings suggest a more elaborate understanding of the disassociation between renewable energy sources - hydropower and geothermal with oil prices. Electricity utilities seeking to supply electricity at affordable prices ought to rethink the use of conventional thermal generators. The arguments and findings presented in this study invite more in-depth case studies on how civil conflicts and oil price shocks affect the electricity sector.

## REFERENCES


Andersen, J. J., Nordvik, F. M., & Tesei, A. (n.d.). Oil and Civil Conflict: On and Off (Shore), 34.

Barsky, R. B., & Kilian, L. (2004). Oil and the Macroeconomy Since the 1970s. *Journal of Economic Perspectives*, *18*(4), 115.

Basedau, M., & Lay, J. (2009). Resource Curse or Rentier Peace? The Ambiguous Effects of Oil Wealth and Oil Dependence on Violent Conflict. *Journal of Peace Research*, *46*(6), 757–776. https://doi.org/10.1177/0022343309340500

Baumeister, C., & Kilian, L. (2016). Forty Years of Oil Price Fluctuations: Why the Price of Oil May Still Surprise Us. *Journal of Economic Perspectives*, *30*(1), 139–160. https://doi.org/10.1257/jep.30.1.139

Bazzi, S., & Blattman, C. (2014). Economic Shocks and Conflict: Evidence from Commodity Prices. *American Economic Journal: Macroeconomics*, *6*(4), 1–38. https://doi.org/10.1257/mac.6.4.1

Berman, N., Couttenier, M., Rohner, D., & Thoenig, M. (2017). This Mine is Mine! How Minerals Fuel Conflicts in Africa. *American Economic Review*, *107*(6), 1564–1610. https://doi.org/10.1257/aer.20150774

Bodea, C., & Ibrahim, E. (2007). Riots, coups and civil war: Revisiting the greed and grievance debate. *The World Bank Development Research Group*, (Policy Research Working Paper 4397).

Brunnschweiler, C. N., & Bulte, E. H. (2008). Natural Resources and Violent Conflict: Resource Abundance, Dependence and the Onset of Civil Wars. - *Center of Economic Research at ETH Zuric*, (Working paper 08/78), 36.

Chen, H., Liu, L., Wang, Y., & Zhu, Y. (2016). Oil price shocks and U.S. dollar exchange rates. *Energy*, *112*, 1036–1048. https://doi.org/10.1016/j.energy.2016.07.012

Colgan, J. D. (2010). Oil and Revolutionary Governments: Fuel for International Conflict. *International Organization*, *64*(04), 661–694. https://doi.org/10.1017/S002081831000024X

Collier, P., & Hoeffler, A. (2004). Greed and grievance in civil war. *Oxford Economic Papers*, *56*(4), 563–595. https://doi.org/10.1093/oep/gpf064

Davig, T., Melek, N. Ç., Nie, J., Smith, A. L., & Tüzemen, D. (2015). Evaluating a Year of Oil Price Volatility, 26.

Dufeld, J. S. M. T. K. (2005). Blood and Oil: Te Dangers and Consequences of America's Growing Dependency on Imported Petroleum. *Naval War College Review 58*, *2*, 142–143.

Economou, A. (2016). *Oil Price Shocks: A Measure of the Exogenous and Endogenous Supply Shocks of Crude Oil*. Oxford, UK: Oxford Institute for Energy Studies. Retrieved from https://www.oxfordenergy.org/wpcms/wp-content/uploads/2016/08/Oil-Price-Shocks-A-Measure-of-the-Exogenus-and-Endogenous-Supply-Shocks-of-Crude-Oil-WPM-68.pdf

Fueki, T., Higashi, H., Higashio, N., Nakajima, J., Ohyama, S., & Tamanyu, Y. (n.d.). Identifying oil price shocks and their consequences: the role of expectations in the crude oil market, 31.

Hamilton, J. D. (n.d.). Oil Prices, Exhaustible Resources, and Economic Growth, 64.

Hendrix, C. S. (2017). Oil prices and interstate conflict. *Conflict Management and Peace Science*, *34*(6), 575–596. https://doi.org/10.1177/0738894215606067

Jones, C. M., & Kaul, G. (1996). Oil and the Stock Markets. *The Journal of Finance*, *LI*(2).

Kilian, L. (2008). The Economic Effects of Energy Price Shocks. *Journal of Economic Literature*, *46*(4), 871–909. https://doi.org/10.1257/jel.46.4.871

Lacina, B., & Gleditsch, N. P. (2005). Monitoring Trends in Global Combat: A New Dataset of Battle Deaths. *European Journal of Population / Revue Européenne de Démographie*, *21*(2–3), 145–166. https://doi.org/10.1007/s10680-005-6851-6

Le Billon, P. (2010a). Oil and Armed Conflicts in Africa. *African Geographical Review*, *29*(1), 63–90. https://doi.org/10.1080/19376812.2010.9756226

Le Billon, P. (2010b). Oil and Armed Conflicts in Africa. *African Geographical Review*, *29*(1), 63–90. https://doi.org/10.1080/19376812.2010.9756226

Le Billon, P., & Cervantes, A. (2009). Oil Prices, Scarcity, and Geographies of War. *Annals of the Association of American Geographers*, *99*(5), 836–844. https://doi.org/10.1080/00045600903245730

Lujala, P., Gleditsch, N. P., & Gilmore, E. (2005). A Diamond Curse?: Civil War and a Lootable Resource. *Journal of Conflict Resolution*, *49*(4), 538–562. https://doi.org/10.1177/0022002705277548

Michael, G. (2003). Resource Wars: The New Landscape of Global Conflict. Book review. *Population and Environment*, *24*, 359–364. https://doi.org/10.1023/A:1022405806645

Mohaddes, K., & Pesaran, M. H. (n.d.). OIL PRICES AND THE GLOBAL ECONOMY: IS IT DIFFERENT THIS TIME AROUND?, 25.

Nwokolo, A. (2018). Oil Price Shocks and Civil Conflict: Evidence from Nigeria. *HiCN Working Paper 274*.

Ross, M. L. (2001). Does Oil Hinder Democracy? *World Politics*, *53* (03), 325–361. https://doi.org/10.1353/wp.2001.0011

Stima Rugus. (n.d.). Electricity cost in Kenya; Historic electricity cost data for Kenya. Retrieved December 11, 2018, from https://stima.regulusweb.com/historic