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Do terrorist attacks affect Kenya's financial markets?

By

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Thesis submitted in fulfillment of the requirements for the degree of

Masters of Management in Finance and Investment (MMFI)

in the

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WITS BUSINESS SCHOOL

At the

UNIVERSITY OF WITWATERSRAND

Declaration

I, **Dan Kiprono Kigen**, declare that the research work reported in this dissertation is my own, except where otherwise indicated and acknowledged. It is submitted for the degree of Master of Management in Finance & Investment in the University of Witwatersrand, Johannesburg. This thesis has not, either in whole or in part, been submitted for a degree or diploma to any other universities.

Signed……Date: 29th August 2016

ABSTRACT

This thesis studied the effects of terrorist attacks on Kenya's financial markets between January 2004 and December 2014. The study uses an augmented asset-pricing model similar to that in Eldor and Menelik (2004). The model includes terrorist attack dummies representing location of the attack, the type of attack, the intended target, number of people injured and number of people killed. Data on the terrorist attacks and share index values and foreign exchange rates variables are used to estimate the model.

The results show that attacks carried out using explosives had a positive impact on share prices on the NSE. On the flipside, attacks that were carried out on facilities/infrastructure or on religious figures/institutions as well as those carried out using incendiaries had a negative impact on the NSE. An increase in the number of people injured also led to a greater negative impact on the NSE. As regards the forex market, attacks carried out using firearms and incendiaries led to a depreciation of the local currency. Transport attacks on the other hand led to an appreciation. Similarly, the greater the number of people injured led to a greater appreciation of the KES.

ACKNOWLEDGEMENT

I would like to thank my beloved family for giving me with the emotional and financial support I needed to carry out this research project.

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2. INDEX OF ACRONYMS AND ABBREVIATIONS

AMISOM – African Mission Union in Somalia

CBR – Central Bank Rate (Kenya)

CMA - Capital Markets Authority

EAS – East African Shilling

EGARCH – Exponential Generalized Autoregressive Conditional Heteroskedasticity

FDI – Foreign Direct Investment

GARCH – Generalized Autoregressive Conditional Heteroskedasticity

GDP – Gross Domestic Product

GRETL –Gnu Regression Econometrics and Time-series Library

IAF –Israeli Air Force

ICU – Islamic Courts Union

IDF – Israeli Defense Force

IMF – International Monetary Fund

ISIL – Islamic State in Iraq & the Levant

ISIS – Islamic State in Iraq & Syria

JKIA – Jomo Kenyatta International Airport

KES – Kenya Shilling

KSE – Karachi Stock Exchange

NASI – Nairobi Securities Exchange All Share Index

NGO – Non-Governmental Organization

NSE – Nairobi Securities Exchange

PFLPP – the Peoples Front for the Liberalization of Palestine

SBP – State Bank of Pakistan

USD – United States Dollar

WTC – World Trade Centre

3. INTRODUCTION

3.1 Introduction

One of the major problems facing many countries in the 21st century is terrorism. Terrorism, has been defined as “the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives" (Legal Information Institute, 1969).Terror attacks happen almost on a daily basis worldwide, many of them causing loss of lives and catastrophic damage. In the month of November 2015 for instance, terror attacks took place in the form of suicide bombings in Baghdad, Iraq (VOA, 2015) and Arsal, Lebanon (English.alarabiya.net, 2015); and in the form of shootings in Colorado, US (Shapiro, 2015) and Paris, France (Almasy, 2015).

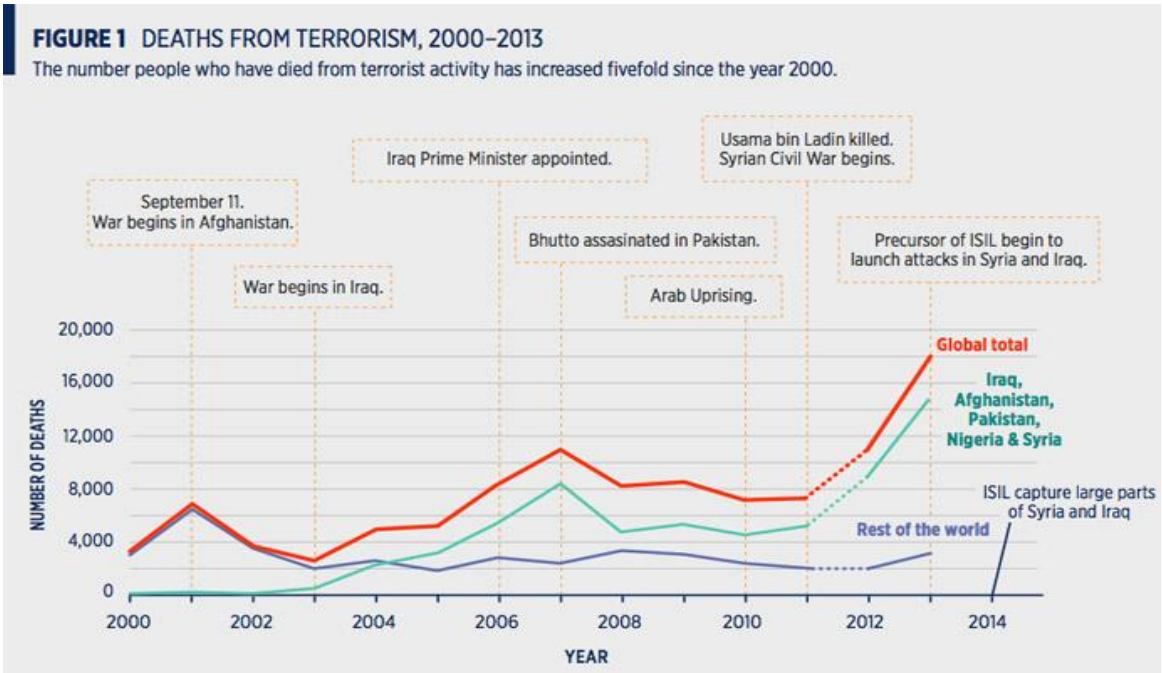


Figure 1: Chart showing the rise in global fatalities because of terrorism (Source: Global Terrorism Database)

Closer home, Africa has also had its share of terrorist attacks. On November 20 2015, Islamic militants affiliated to Al-Mourabitoun and Al-Qaeda carried out shootings in Bamako, Mali that

claimed 30 lives (the Guardian, 2015a). Earlier on in the year, on April 1 2015, several Al-Shabaab militants shot their way into a University college in the town of Garissa, the capital of Garissa County, in North Eastern Kenya. The attack resulted in the loss of 148 students' lives (BBC News, 2015a).These incidents demonstrate that terrorism is a global problem that is widespread and affects several countries in all continents across the globe. This is seen in Figure 1, which shows a rise in global terror attacks since 2000.

3.2 Motivation

Kenya has had a large number of terrorist attacks through its history. These attacks have had various political and social objectives. The citizens have suffered and the ever-increasing terrorist attacks have added to the pre-existing high rate of crime and insecurity within the country.

The first major set of attacks was the 1975 bombings. The first bomb was set off in a restroom of a popular club called 'The Starlight' in Nairobi's Central Business District while the second one went off at a Tourist Information Centre adjacent to the Hilton Hotel in Nairobi. The third and final bomb was set off in a Mombasa-bound bus at the crowded OTC Bus terminus on Ronald Ngala Street, also in Nairobi. The third bombing was extremely tragic with 27 killed and at least100 injured. The attacks were allegedly attempts to assassinate politician, J.M. Kariuki, an assistant minister and strong critic of the government. He was later found dead and the bombings ceased. His killers and the bombers were not brought to justice (Too Late for Worms, 2014).

In 1980, a bombing took place at the prestigious Norfolk Hotel on Harry Thuku Road in Central Nairobi. 20 people were killed and 80 injured. The attack was claimed to have been orchestrated by a Palestinian organization, the Peoples Front for the Liberalization of Palestine (PFLP). The possible motives were speculated as retaliation of Kenya arresting 3 Palestinians and 2 German nationals and allowing the Israeli Air Force (IAF) to refuel at Jomo Kenyatta International Airport (JKIA) before an attempt to rescue Israeli hostages from a civilian aircraft at Entebbe International Airport, in Uganda. The group however denied involvement (Mobile.nation.co.ke, 2015; Yahoo News, 2015b).

On August 7, 1998, the United States Embassy in Nairobi was subject to a bombing that claimed 224 lives. Al-Qaeda militants drove a small truck carrying 900kg worth of explosives into the parking garage at the building housing the Embassy at approximately 10am (Africaanswerman.com, 2010). This was considered a precursor to the infamous 9/11 terrorist attacks that were also aimed at United States interests. The motivation for the attack was that Americans had assisted in the extradition of four members of a jihadist group from Albania to their hometown of Egypt. The extradited suspects allegedly assassinated the former speaker of the Egyptian parliament (Mayer, 2008).

On November 28, 2002, a militant group called 'Army of Palestine' launched ground-to-air missiles at an Israeli plane in the coastal town of Mombasa. At the same time, an all-terrain-vehicle was driven into the Israeli-owned Paradise Hotel, also located in Mombasa. 13 people lost their lives and 80 more were injured (News.bbc.co.uk, 2002).

In October 2011, Kenya launched a military offensive in Somalia nicknamed 'Operation Linda Nchi'. This was a joint operation with the Somali military. The main objective was to pursue Al-Shabaab militants who had claimed responsibility for a spate of kidnappings of foreign tourists in Kenya between 2011 and 2012 (Gettleman, 2011). During this period, there were at least 17 terrorist attacks carried out through grenades and other types of explosives. At least 48 people lost their lives and around 200 were injured. 4 of these attacks took place in Nairobi, 4 took place in Mombasa and the remaining 9 took place in the country's North Eastern province. The targets included buses, churches and nightclubs (Nairobi.usembassy.gov, 2015).

One of the deadliest attacks perpetrated by Al-Shabaab took place on 21 September 2013, leading to the death of at least 67 people. At around midday, 10-15 gunmen entered the upmarket Westgate Mall in Nairobi and opened fire on unarmed civilians. The resulting siege by the country's Kenya Defense Forces (KDF) lasted 3 days. In the end, it was unclear whether the gunmen escaped or perished (BBC News, 2015c).

On December 2, 2014, Al-Shabaab militants killed 36 non-Muslim quarry workers in the town of Mandera, in the Northern part of Kenya. The attacks took place at midnight when workers were asleep (BBC News, 2015d). Another attack perpetrated by Al-Shabaab took place on November

22, 2014: at least 28 people were killed by gunmen who shot up a Nairobi bound bus. Non-Muslims were specifically targeted and executed (Euronews, 2015).

Variable		Total No. of Attacks
Attack Type	Assassination	21
	Armed & Unarmed Assault	148
	Bombing/Explosion	153
	Hijacking& Hostage Taking	29
	Facility/Infrastructure	10
	Unknown	7
Target Type	Business	51
	Government (General)	152
	Other	40
	Private Citizens	75
	Religious Figures/Institutions	32
	Transportation/ Communication	18
Weapon Type	Firearms	145
	Explosives/Bombs/Dynamite	175
	Incendiary	15
	Melee	15
	Other	18
Fatalities	Unknown	7
	0	162
	1 – 10	180
	11 – 50	17
	51 – 100	1
	101 and above	1
Injuries	Unknown	21
	0	167
	1 – 10	150
	11 – 50	26
	51 – 100	1
	101 and above	3
Location	Cities*	84
	Other	284
Perpetrator	Al-Shabaab	201
	Other	167
	Total Injuries	5503
	Total Fatalities	1140
	No. of Attacks	368

Table 1: Summary of terrorist attacks in Kenya from 1995 to 2014

Variable		Killed*	Injured*
Attack Type	Assassination	1.43	0.70
	Armed & Unarmed Assault	3.49	1.83
	Bombing/Explosion	2.51	32.07
	Hijacking& Hostage Taking	8.12	11.74
	Facility/Infrastructure	0.20	0.56
	Unknown	1.83	11.4
Target Type	Business	2.92	7.86
	Government (General)	3.13	29.19
	Other	2.10	2.70
	Private Citizens	3.79	5.52
	Religious Figures/Institutions	3.81	4.32
	Transportation/ Communication	2.67	17.29
Weapon Type	Firearms	3.55	1.14
	Explosives/Bombs/Dynamite	2.96	30.06
	Incendiary	5.13	0.62
	Melee	1.53	3.27
	Other	1.33	5.64
Location	Cities	5.25	60.86
	Other	2.53	2.37
Perpetrator	Al-Shabaab	2.58	5.60
	Other	3.83	27.99

*The cities are Nairobi, Mombasa and Kisumu

Table 2: Proportion of people killed and injured by attack categories

** Proportion of people killed and injured by attack is calculated by dividing the total number of people killed or injured in that particular type of attack by the number of attacks that occurred*

On June 15, 2014, 48 people lost their lives when around 50 Al-Shabaab gunmen stormed into the town of Mpeketoni located near Lamu. They first attacked a police station and then shot up several civilians watching the 2014 world cup matches in local clubs (BBC News, 2015e).

As can be seen in table 1, Kenya has been plagued by many terrorist attacks that have taken various forms and have occurred in different locations across the country. This can be seen in the chart above. On 21 September 2013, Al-Shabaab gunmen carried out a shooting in Nairobi's up market Westgate shopping mall. Over 80 people lost their lives. Key to note is that the Nairobi Securities All Share Index (NASI) recorded a 0.32% decline while the Nairobi Securities 20 Share Index (NSE20) dropped by 0.26% on the Monday following Westgate attack (Figure 2). As for the Garissa College University massacre, the NASI dropped by 1.29% while the NSE 20 declined by 0.33% when the markets opened (Figure 2).

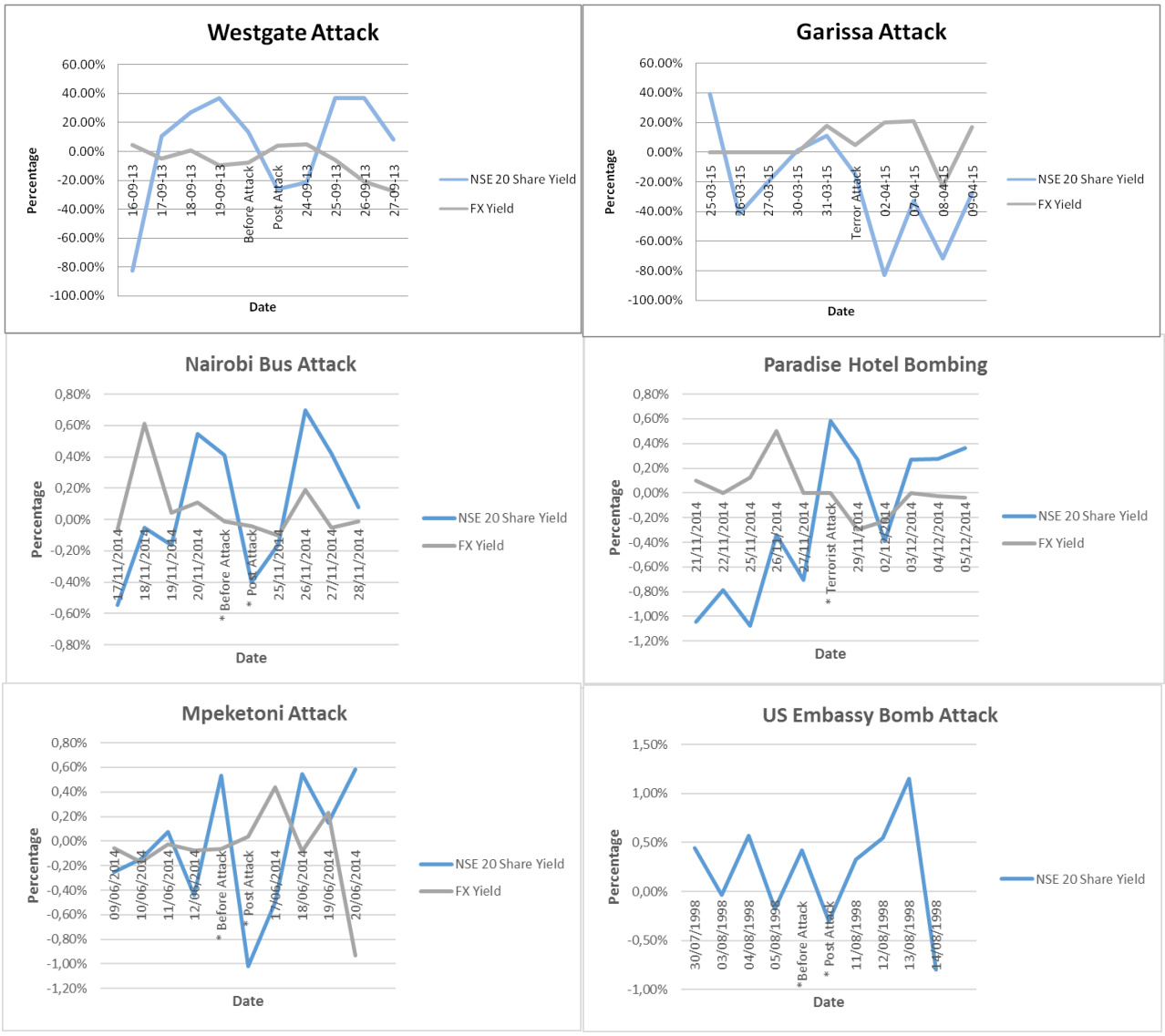


Figure 2: Yield on the NSE and the USD/KES Exchange Rate after significant attacks (Obtained from Global Terrorism Database)

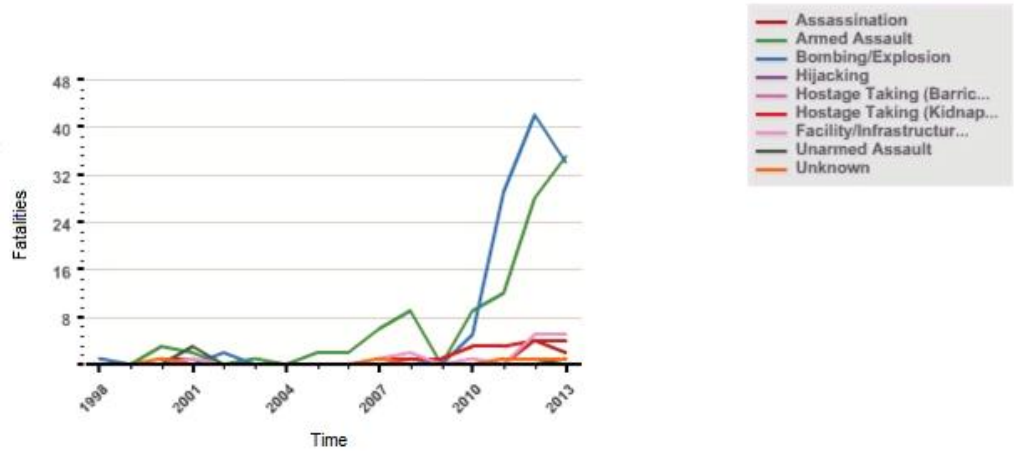
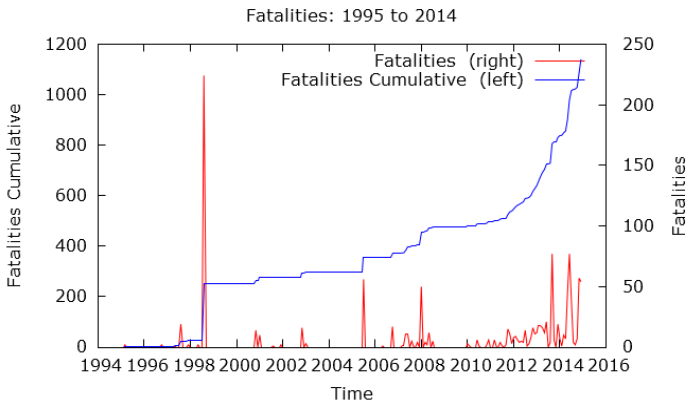
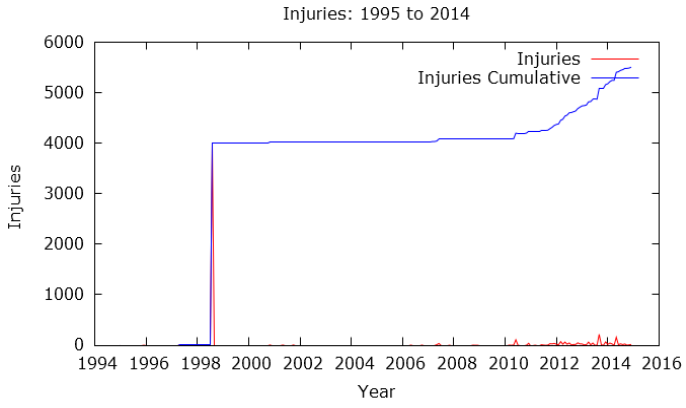
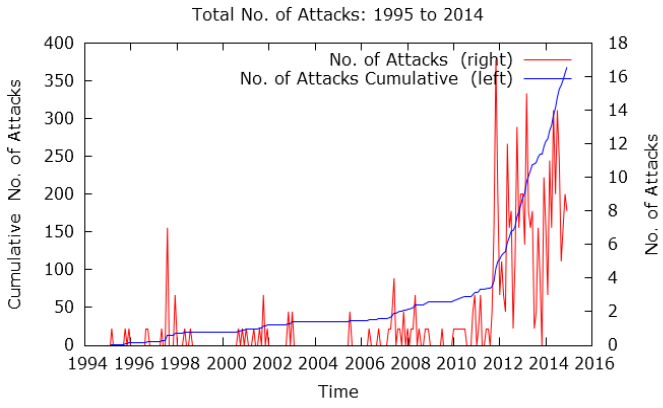
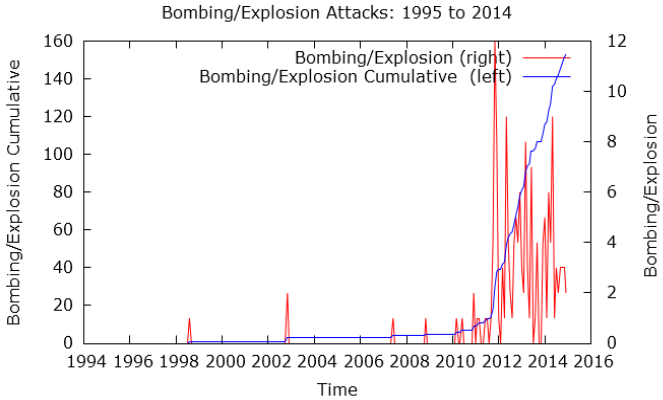


Figure 3: Fatalities from various types of terror attacks during1998 – 2013 (Source: Global Terrorism Database)









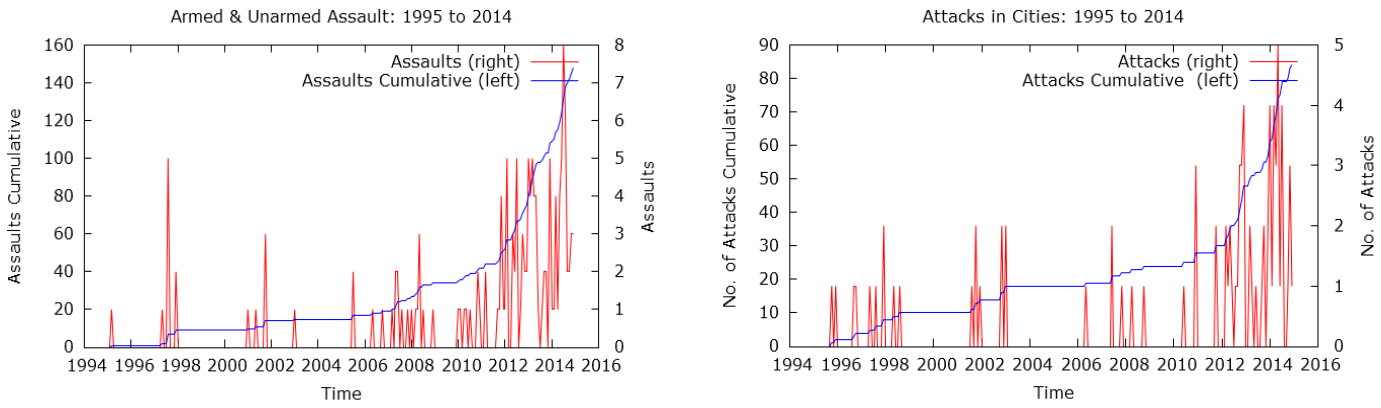


Figure 4: Statistics on terrorist attacks from 1995 to 2014(Source: Global Terrorism Database)

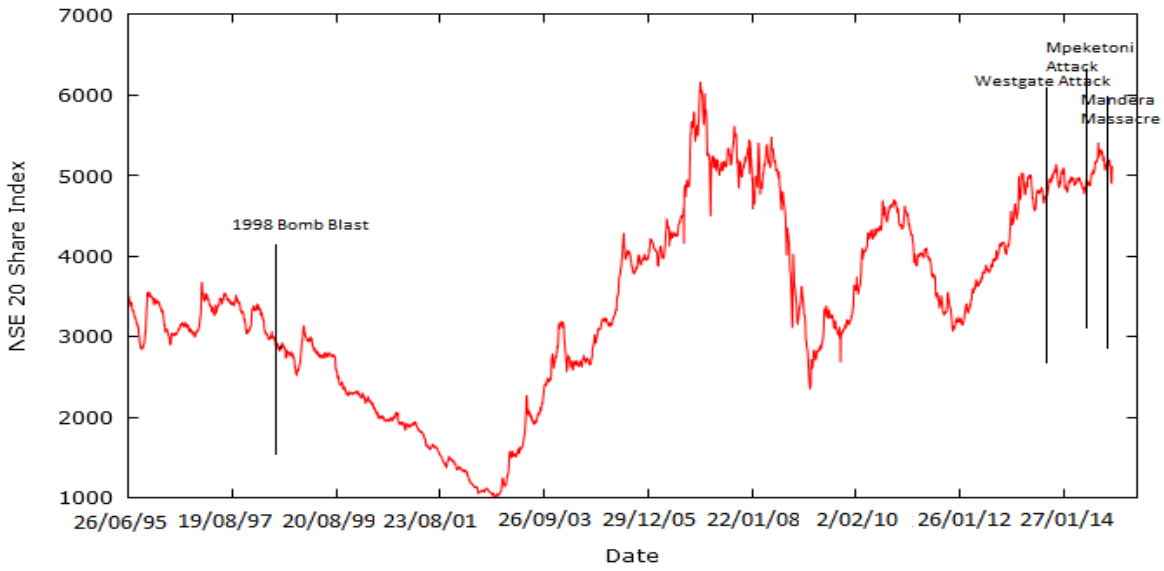


Figure 5:NSE20 Share Index History

3.3 Problem statement

Terrorism arguably affects the economy of a country. The Nairobi Securities Exchange is among the fastest growing exchanges in Africa with a total 3-year return of 97.8% as at 30 April 2015(Investing in Africa, 2015). Paramount to this growth is investment from foreign investors. This number stood at 22.4% as at September 2014, as per the latest filings from the Capital Markets Authority (Capital Markets Authority, 2015). Anecdotal evidence shows (see Figure 2)

shows that terrorist attacks have an effect on the performance of the stock market. It is not clear, however, if such effects are significant or the extent to which they affect investors' positions. It is thus important to establish exactly how recent attacks have affected the financial markets. Such knowledge will be beneficial to local and foreign investors who can use it to plan their investment responses to terrorist attacks. This research also investigates the effect of terrorist attacks on the performance of the foreign exchange market.

This paper carried out further on the effects of terrorism on African financial markets. The paper in particular, furthered the work done by Keitany & Lumumba (2013) who studied the effects of terrorism on the Kenyan market and used an event study methodology. The study found that significant short-term negative returns were present post-terrorist attacks. However, their study is deficient in that he only observed 3 events. In empirical design, this study was an improvement on Keitany & Lumumba (2013), because more events were observed and additionally an asset-pricing model was estimated. The study followed Eldor and Melnik (2004) who used an asset-pricing test to study the effects the type of target, type of attack, number of people killed and the location of the attack on both equity and currency returns on the Israeli stock market. The results of this study thus enabled a direct comparison between effects of terrorism in a young market with similar results in an emerging market (Israel) and, by extension, more developed markets.

3.4 Purpose of the study

This paper aimed to build on existing literature on the damaging effects on terrorism on a country's economy. Acts of terrorism are despicable acts that lead to loss of human life and while the economic effects obviously come secondary to this, they nonetheless need to be studied.

Critics of the Kenya government say that more needs to be invested to combat terrorism (Wangalwa, 2015). By presenting facts and figures on the effects of terrorism on Kenya's financial markets, the paper hopes to make the Kenyan government aware on how damaging terrorism is on several aspects of the Kenyan economy. Additionally, by understanding the effects of different types of terror attacks, the government will be able to formulate effective

policies to counter the economic and financial repercussions of terrorist attacks. As a result, the Capital Markets Authority (CMA, Kenya's financial markets regulatory agency) will also be more effective in its day-today governing the financial markets.

Another significant purpose of this study is to assist asset managers to protect their clients' assets against the financial impacts of terrorist attacks. By knowing the extent to which their portfolios react to different types of attacks, they are better placed to manage risk against future similar attacks by selecting the right assets to form properly hedged portfolios. They will also be able to pick the right terrorist insurance covers to further safeguard their portfolios.

Corporations with global operations also need to know the extent of terrorist attacks on their operations in frontier markets with high incidences of terrorism. The investors of these firms also need to know the effect of the terror attacks.

The results of the study will also on a larger scale assist in the comparison of frontier and emerging markets to more developed markets. This is essential because as previously mentioned; terrorism is a problem that affects many countries and a comparative understanding of its effects across developed and developing financial markets is useful for international portfolio diversification.

3.5 Objectives of the Study

In my attempt to successfully carry out this study, I hope to fulfill the following objectives: -

a. Determine the effect of terrorist attacks on stock and currency markets in Kenya.
b. Compare the effects of terrorism in Kenya's nascent financial markets to more developed financial markets e.g. Israel

3.6 Outline of the Report

The report has the following outline: -

i. Introduction
ii. Thematic Literature & Current Situation
iii. Research Methodology
iv. Analysis & Result
v. Conclusions and Recommendations

4. LITERATURE REVIEW

4.1 Introduction

This section will carry out an extensive review of previous studies carried out on the effects of terrorism on financial markets and draw lessons from those studies. The research gap that is expected to be filled will also be discussed.

4.2 Previous Studies of Terrorism in Kenya& Globally

Global financial markets today are highly interconnected. Most trades are conducted online and assets change hands at the simple click of a button. An event that occurs in one part of the globe can thus have a rippling effect on financial markets on the other side of the globe. This was seen in the 2008 financial crisis whereby all financial markets registered a slump following the collages of the US global markets. Furthermore, the larger countries have a much a larger effect on the smaller ones primarily due to the number of trading partners involved. Larger countries are less dependent on the smaller ones as compared to vice versa. Given this observation, Khumar and Liu (2013) studied the effects of terrorist attacks on various global markets. They concluded that larger economies create a greater spillover effect to smaller economies as compared to small economies that had a lesser spillover effect on larger ones. Additionally, large economies with large trading partners do not experience spillover effects to their financial markets. According to the study, "odds for smaller trading partners experiencing a negative abnormal stock return are 5.7 times greater". (Kumar & Liu, 2013)

Chesney, Reshetar Karaman (2011) studied the effects of terrorism not only on the stock markets, but also on the commodity and bond markets. The study used daily data from 25 countries over an 11-year period and employed three methodological approaches: GARCH-EVT, event study and non-parametric approaches. The results showed that terrorist attacks had a significant effect on global stock markets. The oil and gas, airline, financial and banking and

insurance sectors were tested. The insurance and airline industries were the most sensitive to terrorist attacks. On the other hand, the banking sector was the least sensitive. The underlying reason was that the insurance sector experienced increases in the number of claims. As for the banking sector, it was least affected due to a large bulk of revenue being obtained from banking operations (e.g. transaction costs), which are constant throughout. As regards the bonds and commodity markets, they found both significant positive and negative reactions to terrorist attacks. Another finding was that the US bond markets reacted to events occurring on the event day while others such as the gold markets the reaction was post event. As for other markets such as commodities, stocks, global and European bonds, they react both during and the event day and post event (Chesney, Reshetar Karaman, 2011).

Arin, Ciferri and Spagnolo (2008) investigated the effects of terrorism on stock market returns and volatility in6 countries; Indonesia, Israel, Spain, Thailand, Turkey and United Kingdom. They concluded that stock markets in Europe are generally the least affected by terrorist attacks.

Although the European countries studied have had quite a number of terrorist attacks (i.e. Spain and Turkey), these attacks are still fewer in number as compared to those in other markets (i.e. Indonesia and Israel). It would thus be argued that the few attacks that do take place should have a greater impact due to their infrequent occurrence. Going by this same trail of thought, countries such as Israel (Israel-Palestine conflict) on the other hand would be expected to have a smaller impact to attacks due to reduced sensitivity as a result of them taking place more frequently. The actual case however, may be that the European financial markets may view the attacks as one-off incidents while the countries such as Israel, and perhaps Kenya, where terror attacks are commonplace would have long impounded the possibility of such attacks in their financial asset prices. Any (small) effects of such attacks on the financial markets might therefore be insignificant and would be reversed quickly as was seen the case for US financial markets post 9/11 (NedelescuandJohnston, 2005).However, the more advanced European financial markets may have safeguards such as terrorism cover and derivatives such as options which shield investors from losses that might cause such attacks not to significantly affect the financial markets.

Johnston &Nedelescu (2005) also studied the ways in which financial markets react to the news of terror attacks. The paper also studied the ways in which governments react to them. The study

concluded that there were both direct and indirect costs associated with terrorism. Direct costs included loss of lives and destruction of property. Indirect costs included the loss of both consumer and investor confidence.

Direct costs can be measured while the number of lives can also be determined but obviously not to be looked at from a financial standpoint. For property however, damaged property can be appraised based on market values. Key to note is that this is mostly in the short term. As for the indirect costs, these can be somewhat difficult to determine. This means that they can be hard to measure outright and may have a longer unseen impact. For example, an investor who had a portfolio heavily weighted with US insurance stocks may be wary of investing again in the market if they lost huge sums of money as a result of terrorist attacks.

The paper analyzed 2 major terrorist attack events, the infamous 9/11 New York terror attacks that took place on September 11th2001 and the Madrid bombings which took place on March 11th 2004.The paper studied the returns on the Standard &Poors (S&P) 500index and the Dow Jones Euro Stock Index. The results also showed that the markets were highly efficient and absorbed the effects of the terrorist attacks in the end (Nedelescu& Johnston, 2005).

These results mirror those of the study carried out by Arin, Ciferri and Spagnolo (2008) who determined that developed financial markets (i.e. Spain and United Kingdom) are less affected by terrorist attacks. Enders & Sandler, (n.d.), performed a study and came to the conclusion that the effects of terrorist attacks are short term in nature and the recovery is usually quick, even from large scale attacks. Larger economies with more well developed financial systems generally recover quicker. The study also found that developed economies are able to offset the impacts of attacks through both monetary and fiscal policies (Enders& Sandler, n.d.).

In their paper, Kollias et al (2010) studied the effects of terrorist attacks on the London Stock Exchange (large market cap) and the Athens Stock Exchange (small market cap). An event study conditional volatility model was used. It was discovered that they both negatively react to attacks and the level of impact does not change over time. They both also react more significantly to larger attacks. They are however affected by the magnitude of the attacks as regards the significant political implications of the attack (Kollias et al 2010).

The fact that both markets react negatively to attacks was expected. Additionally, the level of impact did not change over time. This was also expected since attacks are infrequent in nature. If the attacks were more in number, desensitization would most likely occur in the markets. Additionally, the fact that the larger attacks are more greatly affected by terrorist attacks is the convention. Other studies such as Eldor and Melnick (2004) mirror this result.

Eldor, Hauser, Kroll &Shoukair (2002) studied the effects of the Israeli-Palestinian conflict on both Palestine's and Israel's financial markets. It was discovered that during the Intifada uprisings, both stock markets were severely affected.

These were 2 periods of intense Palestine and Israel violence. The first intifada took place from 1987 to 1993. An Israeli truck driver who lost control and smashed into a car containing four Palestinians (Sachar, 2015) caused it. The second intifada took place from 2000 to 2005. It was sparked a visit from the Israeli prime minister Ariel Sharon to a mosque in Jerusalem's old city. This was seen as a provocation. The resulting attacks were very large in magnitude (User, 2015). As has been seen in other studies, the attacks led to negative returns in the stock markets.

However, during other periods, the Israeli markets suffered much more than the Palestinian markets. It was also found that the greater the casualties, the greater the negative impact (Eldor, Hauser, Kroll &Shoukair, 2012).

One factor that may contribute to the Israeli market suffering largely is that Palestine has a greater occurrence of terrorist attacks. There are even extreme contingency plans that have been put in place in case the exchange itself is attacked. For example, there are no trading floors and in the event of an actual attack, the exchange can be fully run in another remote location (Topol, 2011).

Gul et al (2010) studied the impacts of terrorism on Pakistani's financial markets. This was done by studying the effects over a 2-year period from 2006 to 2008. An ordinary least squares method was used to analyze the daily data of the stock exchange, forex and interbank markets. It was discovered that the stock exchange was much more sensitive than the Forex and Interbank markets, where the impact was insignificant. The forex market was expected to be more volatile than the stock market but most likely, it did not react significantly due to intervention by the State Bank of Pakistan (SBP). The dip in the interbank market rates, albeit small, may have been

due to decreased short term lending since attacks have a negative effect on investment (Gul et al 2010).

Bashir, InamUlHaq Gillani (2013) also studied the effects of terrorist attacks on the Karachi stock exchange with daily yields from 2005 to 2010 and using the GARCH and GARCH-EVT approaches. As was expected, the main conclusion was that terrorist attacks were highly significant and led to lower returns (Bashir, InamUlHaq & Gillani, 2013).Pakistan has one of the highest incidences of terrorist attacks and this has grown worse in recent years. In 2003, there were 164 fatalities from terror attacks. This number rose to 3318 in 2009. This is attributed to the sectarian/religious violence between the Shia and Sunni Muslim groups (Peacekashmir.org, 2015). Despite the violence and terrorist attacks, the Karachi Stock Exchange (KSE) is one of the best performing exchanges in the world with equities registering a 26% annual return from 2009 till 2014 (The Express Tribune, 2015).

Cam (2007) studied the stock market efficiency as regards tenant firms on the World Trade Centre (WTC), the industry specific effects of different terrorist attacks and the effects of different local and foreign attacks on the US equity markets. It was found that there was a greater negative impact on tenant firms on the WTC and that different industries react to attacks differently. Some industries are more sensitive to attacks than others (Cam, 2007).

The fact that tenant firms on the WTC experienced a greater negative impact may point to the fact that some firm's headquarters were located in the building. Loss of key staff and administrative information may lead to significant problems in operation. Even if data backups were present, restoring the systems may prove problematic. The fact that some industries are more sensitive to terror attacks has already been proven (as stated earlier) by Chesney, Reshetar and Karaman (2011).

Tavor (2011) sought to find out the effects of terror attacks on the Israeli stock market. The first finding was that attacks do have a negative impact on the stock market. More specifically, the market has a significant negative reaction to events within the greenline and less to events outside it. The green line refers to a line that separates Israel from its Arab neighbours following the 1984 war of independence (Haaretz.com, 2015). Key to note is that the area outside is in constant disarray. Another finding was that for attacks within the greenline, location was

significant. Four areas within Israel were studied. These areas were Jerusalem, the Northern, Central and Southern district. The greatest impact was by attacks in the Central and Jerusalem, the major economic areas. These results are particularly interesting because this studying the effects per location will also be applied to this study. As will be seen later, attacks in the cities of Kenya (Nairobi, Mombasa & Kisumu) will be compared to attacks that take place in other locations. The effect of number of fatalities as well will also be looked at in this study.

Another finding was that attacks with fatalities had a greater negative abnormal return as compared to those without. Attacks that had a response by the Israeli Defense force (IDF) had a smaller negative abnormal return over successive days. This is when compared to those without (Tavor, 2011). This would most likely imply that the market views this as a representation of concern by authorities and chances of better security and responses in future.

Christofis et al (2010) studied the effects of the Istanbul terrorist attacks on the Istanbul stock market. These attacks took place in the years 1999, 2003 and 2008. An asset-pricing model was used to assess the data. It was discovered that stocks for the tourism sector were the most sensitive to attacks (Christofis et al, 2010).

In a study by Fathi and Shahraki (2011), they observed the effects of terrorist attacks on the Tehran Stock Exchange. The data was analyzed using a compare the means method. The results showed that attacks had a significant negative impact. This is in contrast to the results of this study. A comparison can be made ideally because the Tehran stock exchange is also a frontier market. In this study, we observe that some attack types had a positive impact while others had a negative impact.

In a paper by Jhandir (2014), the study concluded that terrorism leads to currency depreciation and negative abnormal returns on the Pakistan Stock market. Monthly data over a 10-yearperiod from 2003 to 2012 was analyzed using the ordinary least squares method and a correlation analysis was done (Jhandir, 2014).The results were as expected since it has already been proven with other studies that terrorist attacks lead to a depreciation of the currency. Key to note, according to the 2014 Global Terrorism Index Report (Institute for Economics and Peace, 2014), Pakistan was the third most affected country as regards terrorist attacks. In 2013 & 2014, the Pakistan rupee was also Asia's best performing currency over the previous 2-year period.

Suleman (n.d.) also studied Pakistan's financial markets but focused on Karachi. He intended to find the effect of global terrorist attacks on other international stock markets. He found that global terrorist attacks (e.g. 9/11 attacks) increased volatility in Karachi's financial markets.

Eldor and Melnick (2004) also studied how Israel's stock and foreign exchange markets react to terror. They however went further and broke down their study into number of people killed, number of attacks per day, location and target. They concluded that the effects of a suicide attacks are permanent while the other types are not. Similarly, they also found out that attacks on transport are transitory while those of the other types[1] are not. As regards location, this does not have an effect. The number of people killed, however, has a permanent effect. The number of attacks is transitory. More so, it was found that the markets are efficient and do not become desensitized. Another finding was that economic policies are not affected by terrorist attacks (Eldor and Melnick, 2004). The results of this study are very paramount since the model used in this paper was based off the one used in this study.

Karolyi (2006) attempted to summarize studies that have been carried out on terrorism. He was of the view that models that have been used to assess the effects of terrorism have had various limitations and have used limited data to make conclusions. The study also concluded that most of the research that has been studied has mostly focused the 9/11 attacks, at the expense of other attacks (Karolyi, 2006).The results of this study mirror that of Khumar& Liu (2013) where they concluded that terrorist attacks in larger economies create a greater spillover effect on smaller ones as compared to vice versa. This means that investors should keep track of attacks that take place in other countries. This is especially true for large trading partners, in order to safeguard their portfolios from attacks.

Kinyanjui (2014) studied the effects of terrorist attacks on Foreign Direct Investment (FDI) in Kenya. The study employed the use of a multiple regression model. The results showed that attacks led to a decrease in FDI. The study also discovered that political stability is the greatest factor affecting FDI (Kinyanjui, 2014).

The results effectively prove that terrorism is damaging to Kenya's economy. Similarly, as regards foreign inflows, one major sector that has really suffered is the country's tourism sector.

[1] Cold weapon,

Travel advisories issued by western nations have led to a huge decrease in tourist numbers. For example, in the January to May period of 2015, numbers dropped to 284,313 as compared to 381,278 in the same period last year (Businessdailyafrica.com, 2015c). This is worrying considering in 2014, tourism contributed to 11% of the country's GDP (CNBCAfrica.com, 2015). Furthermore, the sector is not expected to recover until 2018. The negative impacts of attacks will most likely spillover until into 2016 while 2017 will be an election year. Historically there have been low bookings during the election years (Morris, 2015).

Keitany & Lumumba (2013) studied the effects of local terrorist attacks on the Nairobi Securities Exchange. In particular, he studied three events. These were the 1998 US Embassy bombing, the 2002 Paradise Hotel Bombing and the 2011 tourist kidnappings using an event study methodology. The study discovered that there was significant short-term negative returns post terrorist attacks (Keitany & Lumumba, 2013).

This is effectively the only terrorism study that has been done as regards the Nairobi Securities Exchange. The study however only looked at three major events and this may not be enough to reach valid conclusions. This study on the other hand will observe 284 terrorist attacks over a 10 year, 2777 trading-day period. These results will hence be more robust.

Sifunjo et al (2008) studied the efficiency of the foreign exchange market in Kenya. The study examined the daily closing price of the KES to the USD over a 13-year period from 1994 to 2007. Run tests, root tests and the Ljung Box Q statistic was carried out. The study concluded that the markets were not efficient according to the Fama French hypothesis. There were seasonal patterns existent, (e.g. end of week, end of month), non-stationarity and the presence of autocorrelation in returns (Sifunjo et al, 2008).

The fact that there is reduced efficiency in Kenya's foreign exchange markets may bring into question the supposed impacts of terrorist attacks on them. Movements may be chalked up to inefficiencies already present within the market.

4.3 The Research Gap/Summary of the Literature Review

As can be seen, few studies have been carried out on the effects of terrorist attacks on African financial markets. Thus, more research needs to be carried out to have a better understanding of financial markets reaction to terrorist attacks as well as to actively compare the effects with other global attacks.

As regards the effects of terrorist attacks on Kenya, there is need to delve further on the specific aspects of the attacks. Furthermore, only the effects on the stock market have been analyzed. This study went further and analyzed the effects on the forex markets. Additionally, a different more accurate methodology will be used.

5. RESEARCH METHODOLOGY

5.1 Introduction

In this section, the methodologies used in this study will be highlighted. The hypothesis will be discussed, as well as the process used in the research design and modeling.

5.2 Research Design

The study was descriptive in nature in that it will seek to document the effects of terrorist attacks on Kenya's forex and stock markets. Secondary data from various sources will be utilized.

5.3 Data Description & Sources

The data was obtained from the Nairobi Securities Exchange, Bloomberg terminal and the Global terrorism database[2]. Stock prices and exchange rates were obtained directly from the Nairobi Securities Exchange or the Bloomberg terminal. The data on interest rates was also obtained from Bloomberg. As regards the attacks, the statistics were obtained from the Global terrorism database.

Data Type	Source(s)
Terrorism Data	Global Terrorism Database
NSE 20 Share Index	Bloomberg
MSCI Frontier Markets Africa Index ex SA	Bloomberg
Central Bank Rate (CBR)	Kenya Central Bank Website
91 Day T-Bill Kenya	Kenya Central Bank Website

[2]National Consortium for the Study of Terrorism and Responses to Terrorism (START). (2013). Global Terrorism Database [Data file]. Retrieved from http://www.start.umd.edu/gtd

91 Day T-Bill US	Bloomberg
USD Exchange Rate	Kenya Central Bank Website

Table 3: Summary of information sources

5.4 The Hypothesis

The null hypothesis was that terrorist attacks in Kenya have no effect on returns of listed stocks and the domestic currency. The alternative hypothesis was that terrorist attacks in Kenya affect stock and currency performance.

5.5 Data Analysis

The data was analyzed using Gretl[3] software. This is an open source statistical package used for analyzing data. Gretl was chosen primarily because it is relatively easy to use and it has a large variety of features. Any secondary analysis to be done was achieved with Microsoft Excel.

The research model used was a multiple regression analysis model with dummy variables. Multiple regression analysis refers to a regression model that uses a variety of factors to predict the value of a variable (Finance and Development | F&D, 2015).As for a dummy variable, 'it is a numeric stand-in for a qualitative fact or a logical proposition' (Garavaglia& Sharma, n.d.). They take values of 0 or 1. In our case, 1 could signify an attack within a major city while an attack taking place outside the city with 0.

The basic research model used was a terrorist's dummy-augmented asset pricing model.

The research also followed the methods of Eldor and Melnick (2004):

$$x_t = \alpha + \beta f_t + \gamma T_t + \varepsilon_t$$

[3] Gnu Regression, Econometrics and Time Series Library

x_t – NSE 20 Share Index returns and KES/USD Exchange Rate returns

α – Constant

β – The vector of factor loading

f_t – The vector of factors affecting stock market prices and the foreign exchange rate (i.e. MSCI Africa Frontier Market Return for the NSE& Interest Rate Differential for the ERY)

γ – The effect of terrorist attack on the price of interest (stocks or currency);

T_t– The dummy variable for the attack, takes the value1 or 0

e_t– Error value

N/B: The null hypothesis is that $\gamma = 0$ *while the alternative hypothesis is that* $\gamma \neq 0$

As regards the share prices, the model postulates a strong relationship between returns on the NSE 20 Share Index and returns on the MSCI[4] Frontier markets Index in which movements in the MSCI Frontier Index explains the NSE 20-share index movements. Figure 6 shows that there is a clear temporal relationship between the two indices.

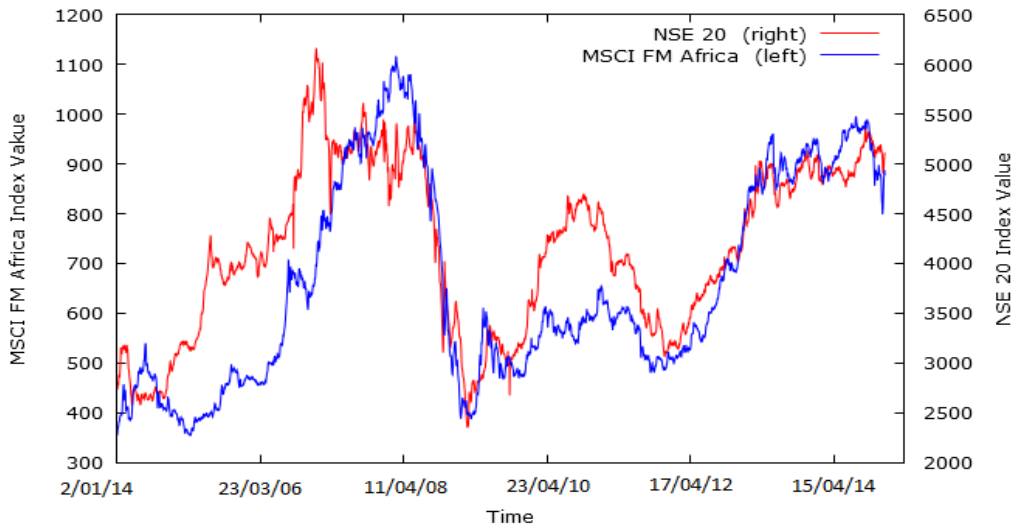


Figure 6: Chart Showing the History of the NSE 20 Share Index and the MSCI Frontier Markets Africa Index

[4]MSCI stands for 'Morgan Stanley Capital International'. It is an investment research firm known for its reliable indices. https://www.msci.com/our-story

The NSE 20 share index is a long-standing price weighted index used to represent the overall movement of the NSE. Waithaka (2013) studied the effectiveness of the NSE 20 Share Index and the Nairobi Securities Exchange All Share Index (NASI) in representing the market performance of companies listed on the NSE. The NSE 20 Share index had a higher correlation of 0.861 to market performance of the listed companies (Measured using the monthly ROE)as compared to the NASI which had a correlation of 0.822(Waithaka, 2013).

The MSCI Emerging Frontier Markets is a large and mid-capitalization free float-adjusted index composed of 35 companies from 5 frontier markets (i.e. Kenya, Mauritius, Morocco, Nigeria and Tunisia). This index is highly representative of the NSE 20 Share index and contains the shares of three large cap Kenyan companies: Safaricom (largest market cap on the NSE), Kenya Commercial Bank and East African Breweries Limited. The index has a yield correlation of 0.103 with the NSE as can be seen in table 4.

	Price - NSE 20	***Price - MSCI FM Africa***	***Price - MSCI Emerging***	***Price - MSCI World***
Price - NSE 20	1			
Price - MSCI FM Africa	0.8171	1		
Price - MSCI Emerging	0.6395	0.6715	1	
Price - MSCI World	0.8378	0.8190	0.6524	1

Table 4: Correlation of the price between different Indices

	Yield - NSE 20	***Yield - MSCI FM Africa***	***Yield - MSCI Emerging***	***Yield - MSCI World***
Yield - NSE 20	1			
Yield - MSCI FM Africa	0.1031	1		
Yield - MSCI Emerging	0.0766	0.0394	1	
Yield - MSCI World	0.04320	0.0135	0.7302	1

Table5: Correlation of the yield between different Indices

As regards the foreign exchange yield, the model postulates that there is a linear relationship between the yield on the exchange rate and the interest rate differential (spread between foreign rates and the local rates). This argument is rooted in the interest rate parity principle. This is the

view that the return of similar assets in different markets is the same after the effect of the currency denomination is removed (Levich, 2011).

The interest rate yield will be calculated by obtaining the difference between the daily yields on a 91-day US T-bill and that of a similar 91-day Kenyan T-bill. The US dollar currency was selected for use in the model because it is the basis for most international trade in the world and is as viewed as being relatively stable (Goldberg, n.d.).

The study covered data from January 2 2004 until December 3 2014; this was 2777 daily observations. A 10-year period was considered sufficient to take into account different economic cycles that might affect stock and currency markets performance.

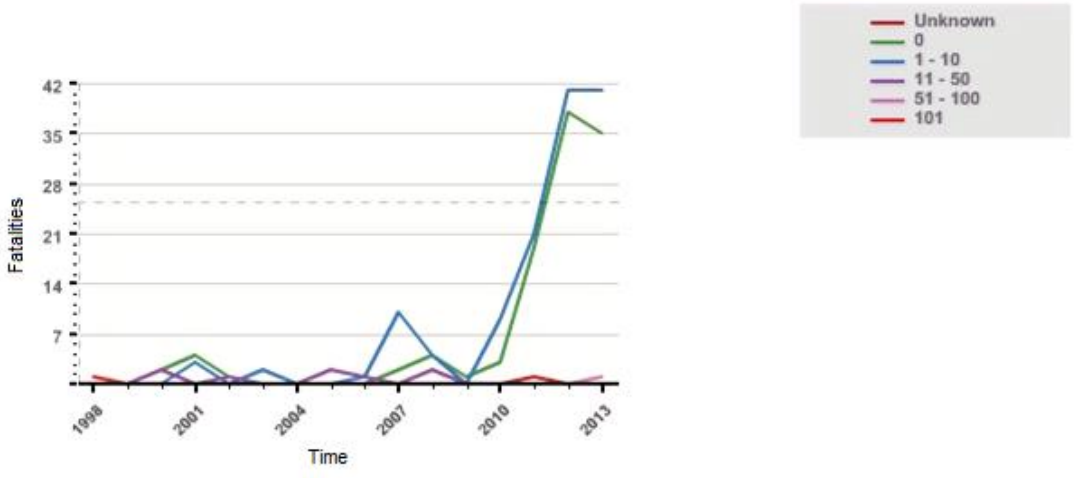


Figure 7: Chart showing Kenyan terrorism fatalities from 1998 – 2013 (Obtained from Global Terrorism Database) N/B: The vertical axis represents number of attacks

5.6 Assumptions

The major assumptions made in the study are:-

i. Terrorist attacks with unknown injuries and fatalities are assumed to have zero injuries and fatalities.

ii. There is an interest rate parity and lack of arbitrage within the currency market. This is justified by Kenya's free-floating exchange rate system.

5.7 Conclusions

A multiple regression analysis method with dummy variables will be used for this study. This study will mirror the methods used by Eldor & Melnick (2004).

6. ANALYSIS & RESULTS

6.1 Introduction

In this section, the results of the research model will be presented in a table format and discussed. The coefficient values of the different terror attack variables will also be provided along with the levels of significance.

6.2 Discussion of the Findings

Before going through Eldor & Melnick's (2004) approach, whereby attacks are looked at according to different characteristics, a simple event study can be carried out to determine whether terrorist attacks in general have an effect on both Kenya's stock and forex market.

This preliminary analysis was carried out based on 282 terrorist attacks that took place. The analysis was first carried out on the stock exchange and then on the exchange rate yield. A mean market adjusted analysis method was used. The cumulative average abnormal return was calculated over a window period starting from 5 days before the attack until 5 days after the attack. The cumulative average abnormal market return (CAAMR) is the sum of the averages of the abnormal returns over a period.

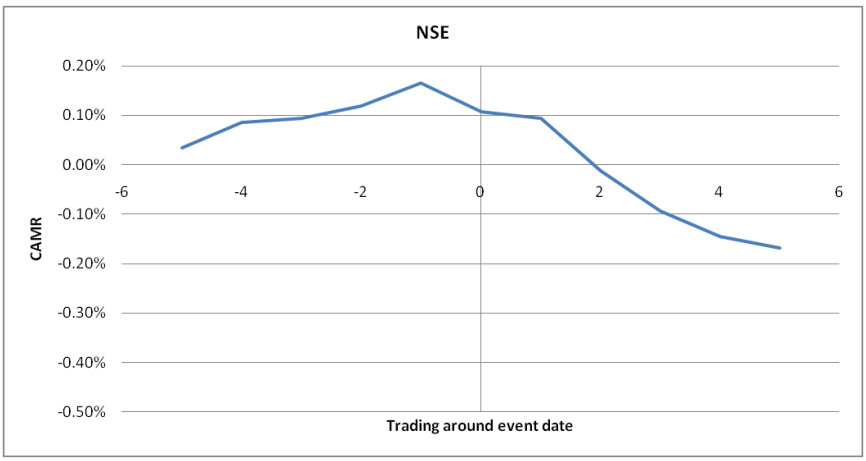


Figure 8: The behavior of CAAMR for all the events – NSE Yield

The results in figure 8 show that the CAAMR decreases post terrorist attack. It sharply declines the first day after the attack.

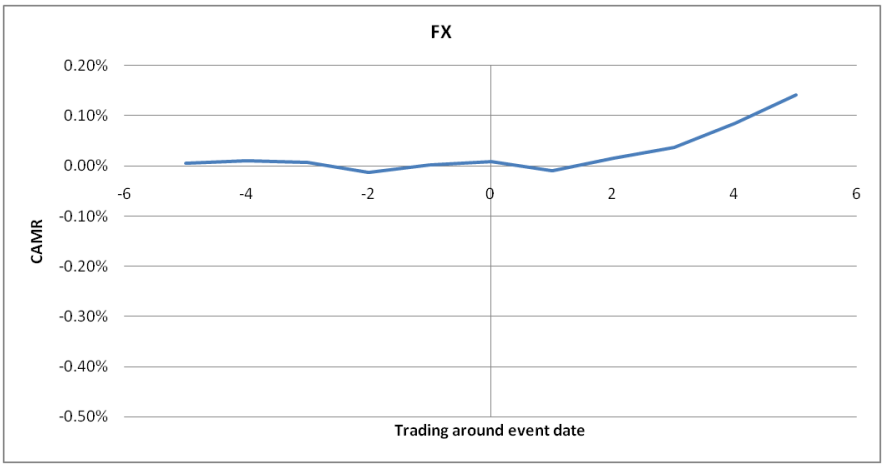


Figure 9: The behavior of CAAMR for all the events – Exchange Rate Yield

The shilling is stable before the terrorist attack but depreciates gradually after the attack. The impact as can be seen is that terrorist attacks have an adverse impact on the domestic currency.

As can be seen, terrorist attacks do have an impact on the exchange rate yield. Knowing this, we can explore this further by now studying the impacts of different types of attacks on these same markets. One key thing to note, is that the for all attacks, t values are close to zero, implying there is a high significance

As per Eldor and Melnick (2004), the model used has four coefficients for observation. (Table 6) The first coefficient ($\gamma 0$) represents the impact of attacks on market returns on the same trading day. The second ($\gamma 1$) and third ($\gamma 2$) coefficients represent the effects of attacks a day after and two days after the attacks took place respectively. The fourth coefficient ($\gamma 3$) is a combination variable of the first three coefficients i.e. the original and the two lagged variables.

Interpretation	Co-efficient			
	γ_0	γ_1	γ_2	γ_3
No Information	-	-	-	-
Transitory Information & Efficient	+	+	-	-
Permanent Information & Efficient	+	+	-	+
Transitory Information with a lag present	+	+	+	-
Permanent Information with a lag present	+	+	+	+

'+' denotes that the coefficient is statistically different from zero while '-' denotes that it is not

Table 6: Interpreting the news of a terror attack

An attack that has a coefficient statistically different from zero has an impact on the markets. A statistically significant $\gamma 0$ means that the market is efficient in incorporating the news of a new attack while statistically significant lagged coefficients mean that there is a delay for the market to incorporate the news of an attack. If the combined coefficient $\gamma 3$ (a combination of the variable in question together with a first and second) is statistically different from zero, this means that the impact of the attack is permanent. If this coefficient is not statistically different from zero, this means that the effects of the attack are transitory in nature and the market will revert to its previous state.

		onstant	MSCI	γ_0	γ_1	γ_2	γ_3	R^2	Sample Size
Attack Type	**Assassination**	0.0162	0.1101	−0.2377	−0.0465	−0.0698	−0.1181	0.0111	9
		0.5125	0.0008 ***	0.4228	0.6700	0.5972	0.3114		
	Armed & Unarmed Assault	0.0136	0.1103	0.0518	−0.0460	0.0365	0.0139	0.0111	89
		0.5989	0.0007 ***	0.5193	0.5603	0.0365	0.8004		

	Bombing /Explosion	0.0103	0.1100	0.0281	0.0232	0.1098	0.0539	0.0113	77
		0.6890	0.0008 ***	0.7247	0.7406	0.1051	0.3268		
	Hijacking& Hostage Taking	0.0132	0.1100	−0.0908	0.2473	0.1432	0.1052	0.0114	16
		0.5943	0.0008 ***	0.4256	0.1514	0.2181	0.1856		
	Facility/Infrastructure	0.0188	0.1091	−0.7984	−0.1392	−1.6141	−0.8507	0.0160	4
		0.4344	0.0008 ***	0.0000 ***	0.8860	0.0016 ***	0.0116 **		
	Unknown	0.0155	0.1104	0.0228	−0.0654	−0.2470	−0.0965	0.0110	5
		0.5279	0.0007 ***	0.9465	0.6981	0.3692	0.6473		
Target Type	**Business**	0.0157	0.1101	−0.0791	0.0761	−0.0592	−0.0219	0.0110	29
		0.5314	0.0008 ***	0.3990	0.6139	0.5666	0.7478		
	Government	0.0104	0.1100	0.0056	0.0483	0.0896	0.0478	0.0112	85
		0.6848	0.0008 ***	0.9523	0.5459	0.1995	0.3754		
	Other	0.0130	0.1101	0.1379	0.1486	−0.0265	0.0867	0.0112	20
		0.6007	0.0008 ***	0.3387	0.1447	0.7754	0.2421		
	Private Citizens	0.0151	0.1102	−0.0222	−0.0781	0.0906	−0.0044	0.0111	42
		0.5477	0.0008 ***	0.8250	0.3912	0.3431	0.9478		
	Religious Figures/Institutions	0.0169	0.1100	0.1707	−0.3640	−0.1775	−0.1289	0.0119	14

		0.4931	0.0008 ***	0.2148	0.0021 ***	0.3752	0.1830		
	Transportation/ Communication	0.0157	0.1104	−0.1810	0.0073	−0.0132	−0.0623	0.0110	10
		0.5180	0.0007 ***	0.3363	0.9823	0.9615	0.7898		
Weapon Type	**Firearms**	0.0167	0.1102	0.0204	−0.0570	−0.0137	−0.0174	0.0110	90
		0.5177	0.0007 ***	0.7996	0.4456	0.8621	0.7306		
	Explosives/Bombs/ Dynamite	0.0061	0.1096	0.0604	0.0493	0.1572	0.0894	0.0120	89
		0.8154	0.0008 ***	0.4007	0.4498	0.0266 **	0.0774 *		
	Incendiary	0.0189	0.1087	−0.7451	−0.0077	−1.3194	−0.6908	0.0154	5
		0.4333	0.0008 ***	0.0000 ***	0.9922	0.0066 ***	0.0221 **		
	Melee	0.0152	0.1101	−0.2543	0.0240	0.1519	−0.0261	0.0112	9
		0.5360	0.0008 ***	0.4552	0.9271	0.1759	0.8737		
	Other	0.0151	0.1101	−0.0709	0.1850	−0.1668	−0.0176	0.0110	7
		0.5393	0.0008 ***	0.7771	0.4026	0.4862	0.9197		
Location	**Cities**	0.0147	0.1105	−0.0363	−0.0746	0.1261	0.0039	0.0112	40
		0.5540	0.0007 ***	0.6135	0.4254	0.1929	0.9468		
	Other	0.0125	0.1101	0.0124	0.0243	0.0054	0.0142	0.0109	160
		0.6419	0.0008 ***	0.8473	0.6727	0.9224	0.7155		
Perpetrator	**Al-Shabaab**	0.0118	0.1100	0.0308	0.0157	0.0261	0.0241	0.0110	118

	0.6523	0.0008 ***	0.6583	0.7908	0.6185	0.5205		
Other	0.0160	0.1102	−0.0401	−0.0198	0.0275	−0.0110	0.0109	82
	0.5291	0.0008 ***	0.5944	0.8147	0.7523	0.8422		
Fatalities	0.0152	0.1104	0.0102	−0.0058	−0.0056	−0.0007	0.0112	200
	0.5421	0.0007 ***	0.2170	0.6034	0.7360	0.8676		
Injuries	0.0157	0.1103	0.0030	−0.0060	0.0002	−0.0009	0.0111	200
	0.5291	0.0007 ***	0.3876	0.0819 *	0.9534	0.6288		

1. The coefficient values are in the 1st row of each category while the P values are in the 2nd row
2. The coefficients that are highlighted in gray are statistically different from zero. One * represents a 90% confidence level, ** represents a 95% confidence level, and *** represents a 99% confidence level.
3. Key: R^2- Adjusted R-Squared, MSCI - Morgan Stanley Capital International Africa Index

Table 7: The impact of terrorist attacks on the Nairobi Securities Exchange

As was expected, the MSCI Africa ex SA Index returns had a high predictability for the NSE returns. It was statistically significant for all the regressions that were run.

On the day of the attack, attacks on facilities/infrastructure and attacks perpetrated by incendiaries led to a decrease in share prices.

The decrease in the share price is attributable to the decrease in investor panic sales. This decrease primarily occurs because of expected increased uncertainty (Markets, 2015). Decreases have been observed in various other studies such as Kollas et al (2010), Barros & Gil-Alana (2009), Eldor et al (2002) and Gul et al (2010). The immediate response can mainly be attributed to uninformed investors who quickly react to the new information. Such investors historically even react to non-informative events, as discovered by Lin (2009).

Attacks on religious figures/institutions and number of people injured led to a decrease of share prices on the NSE, a day after the attacks.

Key to note is that most of these attacks took place in the Coastal and North Eastern regions of the country. These are areas with a predominantly Muslim population and hence a large number of mosques. Some of these mosques have become breeding grounds for radical Muslim fundamentalists (Aljazeera.com, 2014b). One major reason for the lag could be due to the trading hours on the NSE. The trading hours are from Monday to Friday, 9am to 3pm and many attacks take place outside these times (Nairobi Securities Exchange, 2015). These effects may thus be felt a day after the attack when the stock market reopens.

Attacks carried out on facilities/infrastructure and using incendiaries led to a decrease in share prices on the NSE while explosives led to an increase in share prices, two days after the attacks.

An incendiary is a weapon that leads to damage through starting a fire. Most attacks targeted private citizens and property and had no casualties. Interesting to note, explosives are the most common type of weapon used, this is primarily because the attack can be carried out at a distance and thus less likely to kill the perpetrator. Al-Shabaab in particular favors this weapon of attack.

The two-day delay may be attributed to some investors taking their time to analyze the possible impacts of the attacks. These are the informed investors and those who may be waiting for more detailed reports on the market from financial analysts.

As regards stock price appreciation following a terror attack, one possible explanation is due to the increase in attractiveness of defense stocks. These are the stocks of companies that provide military support, mainly in the form of provision of weapons. For example, following the Paris gunmen attack that took place on 13 November 2015, the stocks of companies such as Lockheed Martin and General Dynamics increased (The Anti-Media, 2015).

At a closer look, this however is not the case with the Kenyan stock market since defense companies are not listed. The increase may most likely instead be attributed to an avoidance of investing in other financial markets that are traditionally viewed as being more volatile. For example, forex markets (and money markets in general) have a greater level of perceived volatility. This is primarily because the forex market is more influenced by macroeconomic data i.e. currencies focus on 'the big story'. This is as compared to the equity markets where the focus is mostly on sectors and individual stocks (Marketoracle.co.uk, 2014). Thus, on the day (or a day

after) a terror attack, investors may liquidate their money market holdings to finance equity purchases.

Another possible explanation for the appreciation would be that investors hold the view that the government will do more in future to combat terrorism. In such situations, investors actually increase their portfolios contrary to what would be expected. For example, in France, the CAC 40 Index[5] dropped by only 0.08% on the Monday following the attack (USA TODAY, 2016). This was peculiar considering the scale of the attack and casualties involved.

Facility/infrastructure attacks and incendiaries led to a permanent decrease in share prices on the NSE. Explosives led to a permanent increase in share prices on the NSE.

As regards this permanent impact, historically several stock markets may have initial decreases that occur but are not long lasting. For example, Nedelescu and John (2005) found that US stock markets reversed quickly post 9/11. The NYSE took 13 days to rebound. Interesting, however, is that other international markets however took a longer time to rebound, with the Norway and Johannesburg stock exchanges taking longer than 100 days. Similarly, according to a study carried out by Enders and Sander (n.d.) the Euro Stock Index quickly rebound following the Madrid train bombings.

In this study, we can observe that the variable that represents the permanent effect is positive. This however should be taken to mean that the market will take a long time to revert to its mean level, and not that it has permanently shifted because of the attack. This is primarily because as has already been discussed, other studies (e.g. Nedelescu and John, 2005; Enders and Sander, n.d.) have discovered the effects of terrorist attacks are seldom permanent in nature. That being said, investors may be overly pessimistic or optimistic at times before realizing the shocks were temporary in nature. This could be why the market takes so long to revert to normal.

[5] This measures the performance of the 40 largest equities listed in France, measured by free-float market-capitalization and liquidity

		Constant	IRD	γ_0	γ_1	γ_2	γ_3	R^2	Sample Size
Attack Type	**Assassination**	0.0001	0.0000	0.0012	0.0006	0.0006	0.0008	-0.0012	9
		0.6592	0.7418	0.1959	0.2596	0.6189	0.2719		
	Armed & Unarmed Assault	0.0001	0.0001	0.0006	0.0007	− 0.0018	−0.0001	0.0008	89
		0.6278	0.7346	0.2787	0.1741	0.3585	0.8212		
	Bombing/Explosion	0.0001	0.0000	−0.0004	−0.0004	0.0008	0.0000	-0.0009	77
		0.6532	0.7364	0.4455	0.4678	0.1949	0.9998		
	Hijacking& Hostage Taking	0.0001	0.0000	0.0009	0.0001	0.0004	0.0004	-0.0013	16
		0.6697	0.7509	0.5834	0.8254	0.6618	0.6096		
	Facility/Infrastructure	0.0001	0.0000	0.0034	−0.0059	−0.0042	−0.0022	0.0003	4
		0.5916	0.7285	0.1734	0.2324	0.2548	0.3051		
	Unknown	0.0001	0.0000	−0.0005	−0.0010	0.0013	0.0001	-0.0013	5
		0.6241	0.7309	0.2023	0.2483	0.1288	0.8437		
Target Type	**Business**	0.0001	0.0000	0.0000	0.0003	−0.0004	0.0000	-0.0013	29
		0.6330	0.7318	0.9816	0.5917	0.5171	0.9703		
	Government	0.0001	0.0000	−0.0001	0.0003	0.0004	0.0002	-0.0012	85
		0.7440	0.7743	0.8386	0.4853	0.5872	0.5493		
	Other	0.0001	0.0000	0.0018	0.0008	0.0010	0.0012	-0.0008	20
		0.7522	0.7835	0.1785	0.1924	0.2571	0.1549		
	Private Citizens	0.0002	0.0001	0.0004	−0.0004	−0.0027	−0.0009	0.0007	42

		0.5293	0.7022	0.6713	0.6702	0.4882	0.5026		
	Religious Figures/Institutions	0.0001	0.0000	0.0005	0.0001	0.0006	0.0004	-0.0013	14
		0.6553	0.7400	0.3988	0.7284	0.3926	0.3625		
	Transportation/ Communication	0.0001	0.0001	−0.0006	−0.0025	−0.0025	−0.0019	-0.0005	10
		0.5562	0.7199	0.7480	0.3046	0.1251	0.0519 *		
Weapon Type	**Firearms**	0.0000	0.0000	0.0009	0.0005	0.0007	0.0007	-0.0003	90
		0.9475	0.8396	0.1256	0.2742	0.1142	0.0238 **		
	Explosives/Bombs/Dynamite	0.0001	0.0001	−0.0005	−0.0003	0.0003	−0.0002	-0.0011	89
		0.5991	0.7075	0.3619	0.5743	0.6933	0.6728		
	Incendiary	0.0001	0.0000	0.0033	−0.0045	−0.0047	−0.0020	0.0004	5
		0.5904	0.7305	0.1000 *	0.2755	0.1188	0.2700		
	Melee	0.0002	0.0000	−0.0004	−0.0002	−0.0178	−0.0061	0.0174	9
		0.4884	0.7333	0.5261	0.5795	0.2735	0.2443		
	Other	0.0001	0.0000	−0.0006	−0.0003	0.0008	0.0000	-0.0013	7
		0.6267	0.7314	0.1302	0.7611	0.2110	0.9820		
Location	**Cities**	0.0002	0.0001	−0.0007	−0.0006	−0.0004	−0.0006	-0.0010	40
		0.5361	0.6926	0.2601	0.4696	0.5070	0.1005		
	Other	0.0001	0.0000	0.0006	0.0002	−0.0005	0.0001	-0.0007	160
		0.7666	0.7890	0.1965	0.5383	0.6766	0.7746		
Perpetrator	**Al-Shabaab**	0.0001	0.0000	0.0004	0.0002	0.0000	0.0002	-0.0012	118

	0.7640	0.7887	0.5410	0.5733	0.9752	0.5228		
Other	0.0002	0.0001	0.0001	−0.0002	−0.0012	−0.0004	-0.0006	82
	0.5551	0.7149	0.7098	0.7822	0.5617	0.5418		
Fatalities	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0012	200
	0.6775	0.7399	0.3795	0.9097	0.4878	0.2180		
Injuries	0.0001	0.0001	−0.0001	0.0000	−1.9760 4e-05	0.0000	-0.0010	200
	0.5496	0.6993	0.0699 *	0.4738	0.4576	0.0558 *		

1. The coefficient values are in the 1st row of each category while P values are in the 2nd row
2. The coefficients highlighted in gray are statistically different from zero. One * represents a 90% confidence level, ** represents a 95% confidence level, and *** represents a 99% confidence level.
3. Key: R^2- Adjusted R-Squared, MSCI - Morgan Stanley Capital International Africa Index

Table 8: the impact of terrorist attacks on Kenya's Forex Markets

The first major observation that can be made is that the Interest Rate differential did not have a high predictability for the exchange rate yield. This is consistent with several studies (Obstefeldand Rogoff, 2003; Love and Payne, 2008; Thomas, 2012; Khairnar & Chinchwadkar, n.d.) that indicate that macroeconomic factors cannot predict foreign exchange rates and that market microstructure variables, such as order flows perform better (Evans and Lyons, 2007; Love and Payne,2008; Li & Yin, n.d.). Microstructure data for Kenya are unavailable and could not therefore be used for this study.

On the day of the attacks, incendiaries led to a depreciation of the local currency relative to the USD while number of people injured led to an appreciation.

An important observation that can be made is that the effects of terrorist attacks on the forex market are not lagged in nature. The effects are typically observed on the day of the attack. This is most likely due to the presence of more active day traders in the forex markets as compared to the stock market (Dailyfx.com, 2015). Day traders are constantly observing their portfolios and

making adjustments as they see fit. The forex market is available 24 hours a day. As for long-term investors, they tend to ride out fluctuations and are in it for the long term. (Forexblog.org, 2007)

As regards the depreciation, this has been observed in a large number of other studies. These include Eldor and Melnick (2004) and Gul et al (2010). As occurs with the stock market, terrorist attacks lead to uncertainty and this translates to reduced investment in the local forex market. This in turn leads to reduced yields.

As for the currency appreciation, although this is not the norm, it does occur at times. This can be seen in the fact that incendiaries led to an appreciation of the KES. This may occur because the fundamentals in support of the KES are so strong that they outweigh the temporary effect of an attack. For instance, if the government recently announced an increase in interest rates or a trade surplus, or a major discovery of a resource (e.g. viable oil deposits) this would most likely lead to an appreciation. Another reason may be that investors anticipate the government will act appropriately to tackle the terrorism threat. Investors thus go long on the KES. This is similar in case to what happens in the equity markets. As a side note however, this has not been observed in other literature. Interesting as well is that this is the opposite of what incendiaries led to in the stock market, which had a significant negative yield.

Attacks on transport and number of people injured had a permanent negative impact on the KES while firearms had a permanent positive effect on the KES. Firearms were the second most used weapons.

As was the case with the equity markets, the permanent nature should be taken to mean that the market would take longer to revert. Investors may misjudge the impact of the terrorist attacks and thus they may take a long time to realize and hence reevaluate their position as required.

Overall, the results were different from what was initially expected. There were terrorist attacks that led to an appreciation of the local currency relative to the USD. Depreciation was the expected result because of anticipated reduction in investor appetite for domestic assets.

In the study by Eldor and Melnick (2004), they observed attacks according to the similar four major criteria, these were location, attack type, target type, location and number of people

injured and killed. We can thus compare the results that were obtained in that study to those in this study. It thus enables the comparison of the impact of attacks in frontier markets (Kenya) to emerging markets (Israel).

Attacks in Haifa had the only significant negative impact on the Israeli Stock Exchange as regards location. This was also only on the day of the attack. Attacks on transport and suicide attacks had a negative impact a day after the attack. Suicide attacks had additionally had a permanent negative impact on the stock market. The number of attacks, number of people killed and injured had a negative a day after the attack. There was also a permanent negative impact.

As for the forex, market attacks in Haifa had a delayed negative impact two days after the attack. Those carried out in Tel Aviv led to a depreciation beginning on the day of the attack.

Attacks on facilities led to a depreciation two days after the attack. Suicide attacks however led to depreciation day after the attack and there was a permanent negative impact. Those that were carried out using cold weapons[6] however led to an appreciation two days after the attack. The no. of people killed and injured both led to a permanent appreciation. The number of people injured however, a transitory negative impact a day after the attack had. The no. of attacks had a transitory impact, two days after the attack.

The major observation is that all but one significant variable had the expected signs in the Eldor and Melnick (2004) paper. Attacks led to a negative return on the stock market and a depreciation of the local currency. As has been seen, in the Kenyan markets, this was not the case. This may be a sign of inefficiency in both Kenya's equity and forex markets.

Another additional test that was run was the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) models. The GARCH model assists in studying the effects of attacks on the volatility of the financial markets (Quantum Financier, 2010).

The results showed that terrorist attacks did not lead to an increase in volatility in both financial markets (Figures 7 and 8). This is in accordance with the results of the linear regression model whereby most terrorist attacks had a limited impact on the markets. This however is in

[6] E.g. knives and machetes

opposition to other studies that discovered terrorist attacks led to an increase in volatility in financial markets (e.g. Arin, Ciferri & Spagnolo, 2008; Kollias et al, 2010).

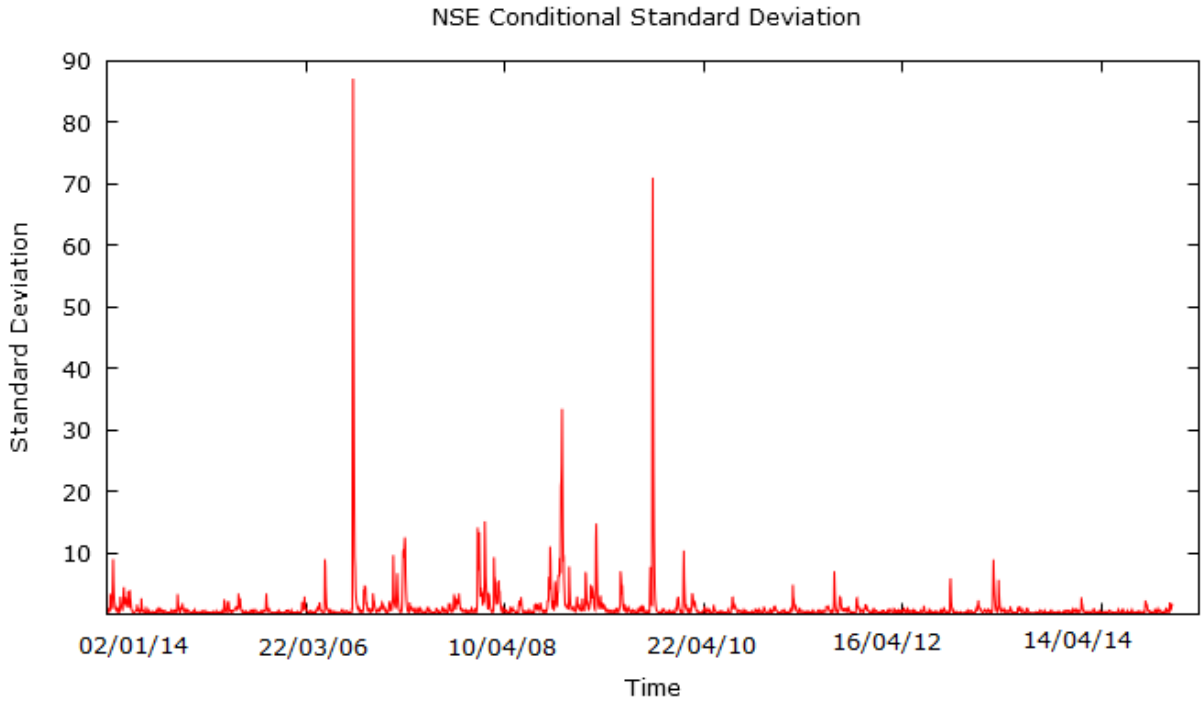


Figure 10: GARCH test for the NSE 20 Share index Yield

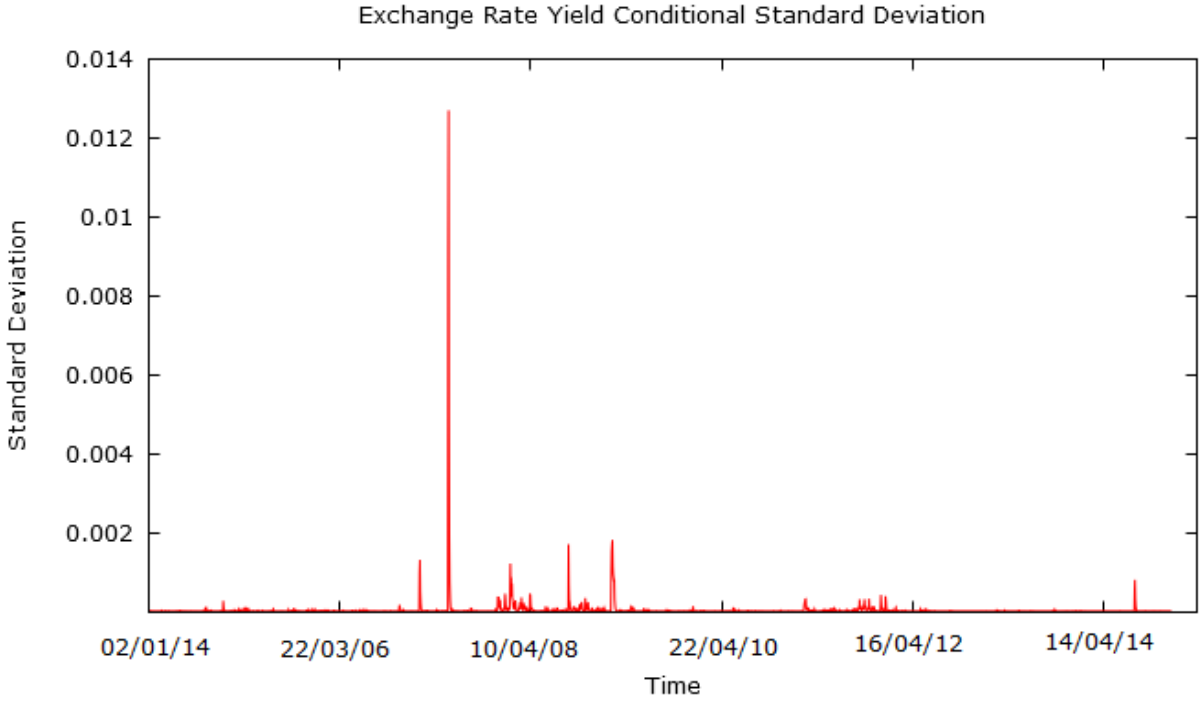


Figure 11: GARCH test for the Exchange Rate Yield

6.3 Summary

The results showed that facility/infrastructure attacks led to a decrease in share prices on the day of the attack and two days after the attack. There was also a permanent negative impact. Attacks on religious figures/institutions and number of people injured led to a decrease a day after the attack. Incendiaries led to a decrease on the day after the attack. There was also a negative impact two days after the attack and after that; there was a permanent negative impact. Explosives however led to an increase in share prices on the day after the attack.

Attacks on transport led to a permanent appreciation of the local currency. Injuries as well also had a permanent positive impact on the forex market, this however begun on the day of the attack. Firearms as well had a permanent impact; however, this was depreciation instead. Incendiaries also led to depreciation but this was only on the day of the attack.

7. CONCLUSIONS & RECOMMENDATIONS

7.1 Introduction

This section will provide a valid conclusion to the study. Also included are recommendations to major parties affected by terrorism, the limitations of the study and advice on areas that require further research.

7.2 Concluding Remarks

From the research that was carried out, it was determined that terrorist attacks broadly have an impact on Kenya's NSE and Forex markets. Different types of attacks led to not only negative changes but also surprisingly positive changes, as can be evidenced by reactions of the forex market to these events.

As regards the equity market, attacks that were highly significant were the attacks on facilities/infrastructure, religious figures/institutions and attacks carried out using incendiaries. These were all significant at a 99% significance level. As for the forex market, firearms had the highest significance at a 95% significance level. It can also be seen that the forex market is more efficient in incorporating news of a terror attacks as compared to the equity market. This can be seen in the fact that the impact of most attacks is felt a day or two after the date of the attack.

7.3 Recommendations

As can be deduced from the research findings, attacks have an impact on the forex and equity markets. Investors thus need to be educated on the impact of these attacks on their portfolios so that they are able to prepare themselves adequately. This is primarily because terrorist attacks seem like a problem that is here to stay. In 2011, 30 attacks occurred, in 2012, 65 attacks took place, while in 2013 and 2014 there were 62 and 89 attacks that took place respectively.

Asset managers as well should be more prudent and safeguard their client's investments to ensure there is confidence in the financial markets. This should be done by selecting the right assets for their client's portfolios. Terrorism insurance covers can also be taken out to cover potential losses. Other financial instruments such as futures and options can be utilized. Kenya recently launched a derivatives market and this will greatly assist in risk diversification (Businessdailyafrica.com, 2015b). One interesting fact to note is that in the international markets, many individuals have gone so far as to say that insider trading has been carried out in order to profit from terrorism. They say this can be evidenced from the large number of put options purchased a few days before the infamous 9/11 attacks (Global Research, 2015).

The government also needs to avail more resources to fight this problem of terrorism. This will lead to more stable financial markets and attract more investment, which will lead to greater economic growth within the country.

7.4 Limitations of the Study

The first major limitation in this research study was that when two or more attacks take place in one day, only the greater attack is considered. This means that even if multiple attacks take place, they will simply not be factored into the analysis. This disregards the fact that multiple attacks may have a greater impact even if there are a lesser number of combined casualties as compared to one major attack. In the study conducted by Eldor and Melnick (2004), the results showed that the number of attacks per day had a transitory effect on both the stock and forex markets a day and two days after the attack consecutively.

There were limited samples for some attacks. For example, there were only two attacks that had more than 50 fatalities for both fatalities and injuries. There were only four attacks that had more than 50 injuries. This may lead to less reliable results.

Another major limitation is that attacks that took place during the weekends were not considered. For example, the second largest attack that has taken place occurred on a weekend. This infamous Westgate attack took place on Saturday 21 September 2013.

Similarly, attacks occur at different times of the day. The NSE opens at 9am and closes at 3pm. Some attacks occur past 3 pm and if there is an impact this will only be represented a day after the attack took place. This may lead to a misconception that there is a lag in the stock market assimilating the information, which is not the actual case.

Another major limitation is that major events such as the 2008 post-election violence may skew the results. The post-election violence slowed down economic growth to 2-2.5% in 2008 as compared to 7.1% in 2007 (En.people.cn, 2016).

The study also grouped together some categories of attacks for simplicity (Appendix 4). For example, government, government (diplomatic), police and military have been grouped together under one category as government.

7.5 Further Study

The effects of terrorist attacks on other frontier emerging markets should also be studied. Another country that would be a good candidate for a similar study is Nigeria. The country has lost nearly 17,000 lives to the infamous terror group Boko Haram that pledges an allegiance to ISIS (Amnesty.org, 2015, the Guardian, 2015b). Other potential markets for study include Libya, Egypt and Mali.

Other methodologies can also be utilized to determine the effects of terrorist attacks. This includes methods such as an event study methodology. This would add to the robustness of the findings.

Additionally, a longer period of study could be utilized. This would include attacks such as the 1998 Nairobi US Embassy bomb blast. This is the largest attack that has taken place on Kenyan soil. 224 people lost their lives while at least 4000 more were injured (Africaanswerman.com, 2010).

The effects of terrorist attacks on other types of financial markets can also be studied. This includes spot markets, bond markets, derivative markets and over the counter markets.

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9. APPENDICES

Appendix 1 - History of Al-Shabaab

Al-Shabaab was originally formed as the youth group of the Islamic Courts Union (ICU).The ICU was a system of judicial courts whose main mandate was to bring stability to Somalia. It was able to get widespread support and even managed to re-open the Mogadishu International Airport[7], which frequently halted operations due to the ongoing civil war (The Guardian, 2013; Cassman, 2015).

The group however clashed with the transitional Somali government that was backed by Ethiopia. Talks were held at Khartoum but no agreement was arrived at. Ethiopia later invaded Somalia to help the transitional government retain power. The ICU was defeated and raised the white flag but Al-Shabaab continued to operate. It grew over time and as of April 2015, has between to be 7000 to 9000 fighters with reports of foreign jihadists joining in from various countries across the world (BBC News, 2015f).

Al-Shabaab still maintains and controls a few towns in Somalia but has lost control of two major strategic locations i.e. Mogadishu (the Somalia capital) and the port of Kismayo. This was as result of the offensive by the African Union Mission to Somalia (AMISOM). This was a peacekeeping mission launched by the African Union (AU). Al-Shabaab has in recent years recruited young Kenyans through luring them with money. Most of the newly recruited come from slums in Nairobi where they have no access to jobs (BBC News, 2015g).

The group is also allegedly recruiting through mosques along the coastal towns of the country. This has been made easier by the country's extremely porous borders, which has hence encouraged the spillover of firearms. In November 2014, the Kenya Police conducted raids and found explosives in two major mosques in Mombasa. Al-Shabaab flags were also discovered (Aljazeera.com, 2014b).Foreign fighters are also recruited through the internet. Al-Shabaab has accounts on social media sites such as twitter, Facebook and regularly posts propaganda clips to video sharing sites such as YouTube. (Ungerleider, 2013)

[7] Now known as the Aden Adde International Airport

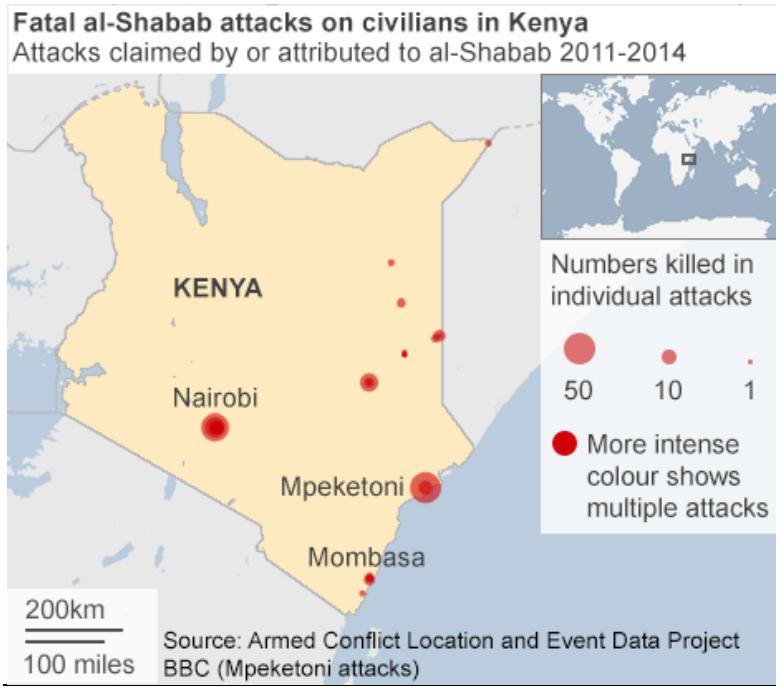

Chart showing the distribution of Al-Shabaab attacks between 2011 to 2014 (Obtained from Global Terrorism Database)

The fate of Al-Shabaab is unknown. It is however facing a few major challenges. It is lacking sufficient funding for its operations since it lost two strategic locations providing a bulk of its revenue. These are Mogadishu and Kismayo. Additionally, it is still fighting the AMISOM and losing more and more of its territory (AllAfrica.com, 2015).

On 1 September 2014, its leader, Ahmed Abdi Godane, died in a US drone strike (BBC News, 2015b). A successor was appointed but there was sharp opposition from within. The terror group is also allegedly considering its allegiance from Al-Qaeda to the Islamic State in Iraq & Syria (ISIS), also known as the Islamic State in Iraq & the Levant (ISIL). ISIS is gaining global support from other jihadist movements such as Boko Haram in Nigeria (Future, 2015).

The Kenyan government is facing intense criticism from its citizens. There is little faith in the actions that is has taken to curb the attacks. The campaign by the government with the message "Security starts with you" was highly criticized (Higgins& Garissa, 2015). The Italian Prime Minister, Matteo Renzi, wore a bulletproof vest when he met the president at State House,

further highlighting the perception of insecurity (McKenzie, 2015). Obama's recent trip to the capital also raised a number of security concerns for the country (Starr, 2015).As can be seen in the chart below, searches of the key terms terrorism and Kenya have also risen through the years.

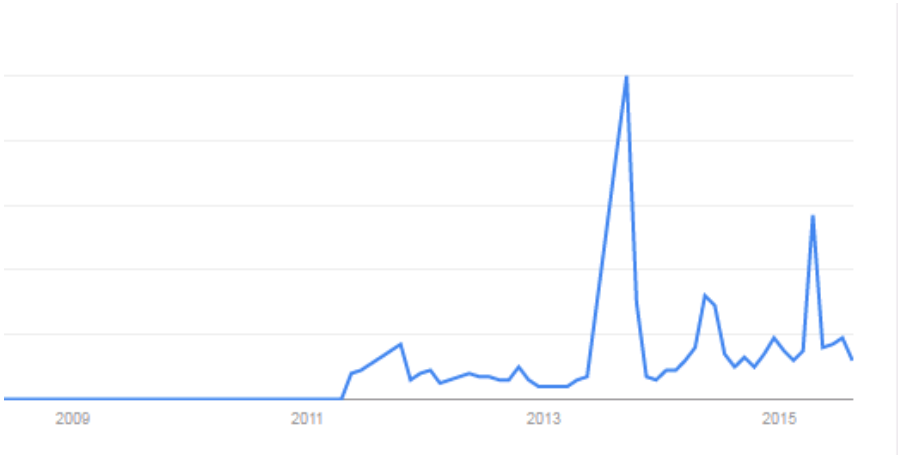

Chart showing increase of searches related to 'Terrorism' and 'Kenya' from 2009 to 2015(Obtained from Google Trends)

Appendix 2 - History of the Nairobi Stock Exchange

The Nairobi Securities Exchange was launched in 1954 as a voluntary association of brokers. It was formed to assist in the development of the local securities market. Up to the time was still an over the counter market with no actual trading floors. It was launched as an extension of the London stock Exchange since the country was still under the British colonial rule. (Nse.co.ke, 2015)

Soon after the country gained independence, the new government tried its best to transfer a level of control to the locals. Key to note, the exchange listed a few Ugandan and Tanzanian Securities. However, after the collapse of the East African Community, these securities were delisted. (Nse.co.ke, 2015)

The NSE's overseer, the Capital Markets Authority (CMA) was founded in 1989 and its main mandate was to ensure that there is efficiency within the capital markets. Due to proper regulation coupled with attractive investment opportunities in the country, the NSE has become one of the most profitable exchanges within the continent (Investing in Africa, 2015).Fast forward to the most recent years; the decline of the KES to the USD has favored foreign direct investment in the securities exchange. On the other side however, terrorist attacks have set back the exchange. This is similar to the Nigerian Stock Exchange that has already registered a -41.8% dollar adjusted return over the first half of the year (Businessdayonline.com, 2015). This decline is because of the terrorist organization Boko Haram. According to Amnesty International, it has killed at least 17,000 people in Northern Nigeria (Amnesty.org, 2015).

Chart showing the 10-year history of the NSE 20 Share Index (Obtained from investing.com)

STOCK MARKET	1M	1Y	3Y	5Y	YTD
S&P500	2.00%	9.00%	52.50%	91.00%	2.20%
BRVM	6.70%	4.20%	88.10%	78.80%	6.80%
Namibian Stock Exchange	-0.60%	8.10%	19.90%	66.70%	5.60%
Dar es Salaam Stock Exchange	-3.80%	-15.40%	31.30%	57.70%	-17.40%
Lusaka Stock Exchange	-1.00%	-23.90%	-0.50%	29.80%	-20.70%
Nairobi Securities Exchange	-12.50%	-15.90%	45.30%	25.30%	-19.30%
Uganda Securities Exchange	-10.60%	-19.00%	25.20%	16.10%	-19.40%
Zimbabwe Stock Exchange	-2.10%	-22.70%	9.40%	11.00%	-10.70%
Johannesburg Stock Exchange	-4.80%	-9.90%	-3.40%	6.70%	-3.90%
Stock Exchange of Mauritius	0.20%	-17.40%	0.00%	3.60%	-13.60%
Botswana Stock Exchange	-0.10%	3.10%	13.60%	-0.10%	7.70%
Nigerian Stock Exchange	-9.80%	-41.80%	5.70%	-11.00%	-19.70%
Ghana Stock Exchange	6.30%	-14.60%	9.20%	N/A	-18.10%
Malawi Stock Exchange	-3.80%	2.40%	58.30%	N/A	10.70%
Rwanda Stock Exchange	-1.60%	-21.70%	N/A	N/A	-13.30%

Table showing the US Dollar-Adjusted Total Return as of July 31, 2015(Obtained from Investing in Africa)

Appendix 3 - History of the Foreign Exchange Market

The Kenya Shilling (KES) was first introduced in 1966. This was 2 years after the country gained independence on 1 June 1963. It was the successor to the East African Shilling (EAS) that had been in use since 1922. The new currency had the portrait of the first president, one of the founding fathers of the nation, Mzee Jomo Kenyatta. It heralded a new beginning of financial independence and prosperity for the country. (Centralbank.go.ke, 2015)

Fast forward to the last decade, Kenya's GDP has been steadily rising and the KES has stayed resilient and relatively stable. Between the years of 2003 & 2010, it averaged between KES 74 – 78 to the US Dollar (Branch, 2011). A year later, the Kenya Shilling slumped to an all-time low of 106.75 to the US Dollar. This was primarily due to a huge imbalance of trade. The exports far exceeded the imports. The agricultural sector also suffered that year due to unreliable rainfall and there was heavy importation of oil-by-oil marketers and technological equipment by telecommunication firms. The Kenya government helped to boost domestic food production and this assisted in the stabilization of the shilling, if only for a while (Ombok, 2011).



Chart showing the 10-year history of the USD/KES Exchange rate (Obtained from www.xe.com)

The shilling somewhat recovered intermittently, in 2015 however, it shot back to a low of 103 to the US Dollar. This was partly driven by the ever-continuing increase in demand of products by

the telecommunications and energy sectors. This was also partly due to reduced tourist numbers because of travel advisories issued by many Western nations especially after terror attacks. This is in response to the terror attacks launched by Al-Shabaab within the country (Businessdailyafrica.com, 2015a).

Appendix 4 - Category Groupings

	Grouping	Sub-Grouping (If Available)
Attack Type	**Assassination**	
	Armed & Unarmed Assault	Armed Assault, Unarmed Assault
	Bombing/Explosion	
	Hijacking& Hostage Taking	Hijacking, Hostage Taking - Barricade Incident, Hostage Taking - Kidnapping
	Facility/Infrastructure	
	Unknown	
Weapon Type	**Firearms**	
	Explosives/Bombs/Dynamite	
	Incendiary	
	Melee	
	Other	Other, Unknown, Biological
Target Type	**Business**	
	Government	Government, Police, Military, Government (Diplomatic)
	Other	Educational Institution, Others (e.g. Refugee camps), Tourists, Terrorists/Non-State Militia, Unknown, Food or water Supply, Journalists and Media, NGO, Utilities
	Private Citizens	
	Religious Figures/Institutions	
	Transportation/Communication	Transportation, Airports & Aircraft, Maritime, Telecommunication
Location	**Cities**	Nairobi, Mombasa, Kisumu
	Other	
Perpetrator	**Al-Shabaab**	

	Other
Fatalities	**N/A**
Injuries	**N/A**

Appendix 5 – Event Study Additional Data

All Attacks

Day	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**
CAAMR	0.0007	0.0012	0.0011	0.0015	0.0020	0.0021	0.0022	0.0025	0.0024	0.0022	0.0021
Variance	0.0001	0.0001	0.0002	0.0003	0.0004	0.0004	0.0005	0.0006	0.0008	0.0010	0.0012
Standard Deviation	0.0071	0.0115	0.0145	0.0169	0.0188	0.0206	0.0232	0.0251	0.0281	0.0312	0.0341
T Statistic	0.1003	0.1072	0.0792	0.0866	0.1062	0.1016	0.0953	0.1004	0.0842	0.0701	0.0606

Assassinations

Day	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**
CAAMR	0.0049	0.0050	0.0061	0.0070	0.0094	0.0070	0.0066	0.0059	0.0079	0.0060	0.0062
Variance	0.0001	0.0001	0.0002	0.0003	0.0003	0.0003	0.0003	0.0004	0.0004	0.0005	0.0004
Standard Deviation	0.0093	0.0116	0.0142	0.0160	0.0181	0.0179	0.0180	0.0206	0.0204	0.0220	0.0206
T Statistic	0.5282	0.4291	0.4290	0.4414	0.5183	0.3912	0.3646	0.2845	0.3861	0.2745	0.2988

Armed and Unarmed Assaults

Day	-5	-4	-3	-2	-1	0	1	2	3	4	5
CAAMR	0.0007	0.0013	0.0019	0.0030	0.0034	0.0040	0.0037	0.0041	0.0036	0.0026	0.0013
Variance	0.0001	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007	0.0008	0.0010	0.0012
Standard Deviation	0.0073	0.0123	0.0153	0.0184	0.0201	0.0227	0.0253	0.0266	0.0288	0.0317	0.0346
T Statistic	0.0991	0.1061	0.1252	0.1606	0.1703	0.1775	0.1471	0.1537	0.1242	0.0810	0.0364

Bombing & Explosions

Day	-5	-4	-3	-2	-1	0	1	2	3	4	5
CAAMR	0.0006	0.0009	-0.0005	-0.0011	-0.0006	-0.0002	0.0001	0.0012	0.0013	0.0024	0.0034
Variance	0.0000	0.0001	0.0002	0.0002	0.0003	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010
Standard Deviation	0.0065	0.0100	0.0132	0.0149	0.0168	0.0185	0.0203	0.0228	0.0255	0.0286	0.0311
T Statistic	0.0990	0.0892	-0.0366	-0.0716	-0.0328	-0.0100	0.0053	0.0529	0.0508	0.0855	0.1106

Hijacking & Hostage Taking

Day	-5	-4	-3	-2	-1	0	1	2	3	4	5
CAAMR	0.0004	0.0018	0.0026	0.0029	0.0038	0.0032	0.0057	0.0074	0.0103	0.0107	0.0132
Variance	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0003	0.0004
Standard Deviation	0.0050	0.0062	0.0065	0.0071	0.0073	0.0080	0.0113	0.0128	0.0138	0.0168	0.0196
T Statistic	0.0824	0.2865	0.4007	0.4099	0.5217	0.4010	0.5039	0.5826	0.7472	0.6399	0.6709

Facility/Infrastructure

Day	-5	-4	-3	-2	-1	0	1	2	3	4	5
CAAMR	-0.0045	-0.0105	-0.0105	-0.0109	-0.0165	-0.0244	-0.0257	-0.0418	-0.0563	-0.0645	-0.0705
Variance	0.0002	0.0004	0.0006	0.0006	0.0007	0.0008	0.0023	0.0020	0.0033	0.0047	0.0061
Standard Deviation	0.0127	0.0206	0.0238	0.0248	0.0264	0.0287	0.0475	0.0442	0.0572	0.0682	0.0780
T Statistic	-0.3562	-0.5098	-0.4402	-0.4407	-0.6222	-0.8515	-0.5424	-0.9464	-0.9842	-0.9450	-0.9039

Unknown Attack

Day	-5	-4	-3	-2	-1	0	1	2	3	4	5
CAAMR	-0.0006	0.0059	0.0083	0.0088	0.0111	0.0114	0.0107	0.0083	0.0084	0.0105	0.0108
Variance	0.0001	0.0004	0.0007	0.0009	0.0011	0.0008	0.0009	0.0007	0.0007	0.0005	0.0005
Standard Deviation	0.0107	0.0194	0.0258	0.0305	0.0334	0.0282	0.0298	0.0273	0.0263	0.0233	0.0234
T Statistic	-0.0580	0.3035	0.3201	0.2875	0.3341	0.4041	0.3604	0.3025	0.3208	0.4502	0.4616

Business

Day	-5	-4	-3	-2	-1	0	1	2	3	4	5
CAAMR	0.0022	0.0043	0.0055	0.0051	0.0055	0.0047	0.0054	0.0048	0.0061	0.0081	0.0098
Variance	0.0000	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0006	0.0005	0.0007	0.0009
Standard Deviation	0.0055	0.0107	0.0126	0.0183	0.0209	0.0232	0.0245	0.0241	0.0233	0.0260	0.0298
T Statistic	0.4005	0.4062	0.4382	0.2804	0.2609	0.2011	0.2213	0.1992	0.2596	0.3132	0.3291

Government (General)

Day	-5	-4	-3	-2	-1	0	1	2	3	4	5
CAAMR	0.0007	0.0011	0.0018	0.0021	0.0022	0.0025	0.0031	0.0040	0.0037	0.0025	0.0022
Variance	0.0001	0.0001	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0009	0.0012
Standard Deviation	0.0073	0.0101	0.0128	0.0155	0.0177	0.0205	0.0227	0.0248	0.0280	0.0308	0.0345
T Statistic	0.0903	0.1115	0.1379	0.1327	0.1225	0.1205	0.1356	0.1613	0.1313	0.0814	0.0627

Other

Day	-5	-4	-3	-2	-1	0	1	2	3	4	5
CAAMR	0.0008	-0.0008	-0.0023	-0.0015	0.0000	0.0016	0.0038	0.0042	0.0044	0.0051	0.0059
Variance	0.0001	0.0002	0.0004	0.0005	0.0005	0.0005	0.0007	0.0008	0.0007	0.0006	0.0006
Standard Deviation	0.0072	0.0150	0.0195	0.0227	0.0231	0.0229	0.0264	0.0276	0.0256	0.0252	0.0238
T Statistic	0.1097	-0.0549	-0.1164	-0.0674	0.0019	0.0694	0.1438	0.1509	0.1716	0.2038	0.2470

Private Citizen

Day	-5	-4	-3	-2	-1	0	1	2	3	4	5
CAAMR	-0.0006	0.0006	-0.0013	-0.0012	-0.0002	-0.0004	-0.0012	-0.0003	-0.0018	-0.0011	-0.0015
Variance	0.0000	0.0001	0.0002	0.0002	0.0002	0.0002	0.0003	0.0004	0.0006	0.0009	0.0010
Standard Deviation	0.0066	0.0116	0.0149	0.0146	0.0146	0.0145	0.0170	0.0198	0.0245	0.0302	0.0323
T Statistic	-0.0928	0.0554	-0.0887	-0.0821	-0.0131	-0.0309	-0.0705	-0.0164	-0.0740	-0.0360	-0.0477

Religious Figures/Institutions

Day	-5	-4	-3	-2	-1	0	1	2	3	4	5
CAAMR	0.0031	0.0028	0.0040	0.0053	0.0050	0.0065	0.0028	0.0008	0.0016	0.0002	-0.0001
Variance	0.0001	0.0001	0.0002	0.0003	0.0005	0.0006	0.0007	0.0007	0.0008	0.0008	0.0008
Standard Deviation	0.0088	0.0119	0.0154	0.0175	0.0230	0.0255	0.0263	0.0263	0.0282	0.0284	0.0283
T Statistic	0.3527	0.2365	0.2566	0.3059	0.2171	0.2534	0.1074	0.0308	0.0581	0.0087	-0.0050

Transportation/Communication

Day	-5	-4	-3	-2	-1	0	1	2	3	4	5
CAAMR	0.0005	0.0006	0.0007	0.0009	0.0004	0.0005	0.0007	0.0011	0.0007	-0.0001	-0.0001
Variance	0.0001	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007	0.0009	0.0011	0.0013
Standard Deviation	0.0081	0.0114	0.0138	0.0168	0.0187	0.0216	0.0247	0.0271	0.0302	0.0328	0.0361
T Statistic	0.0562	0.0567	0.0487	0.0514	0.0240	0.0240	0.0264	0.0422	0.0232	-0.0018	-0.0037

Firearms

	-5	-4	-3	-2	-1	0	1	2	3	4	5
CAAMR	0.0014	0.0018	0.0027	0.0037	0.0037	0.0040	0.0035	0.0034	0.0030	0.0016	0.0003
Variance	0.0001	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007	0.0008	0.0009	0.0011
Standard Deviation	0.0075	0.0125	0.0157	0.0183	0.0205	0.0231	0.0253	0.0266	0.0284	0.0306	0.0331
T Statistic	0.1809	0.1452	0.1738	0.1991	0.1816	0.1720	0.1396	0.1268	0.1048	0.0509	0.0088

Explosives/Bombs/Dynamite

Day	-5	-4	-3	-2	-1	0	1	2	3	4	5
CAAMR	0.0007	0.0009	0.0000	-0.0002	0.0004	0.0011	0.0017	0.0032	0.0039	0.0054	0.0064
Variance	0.0000	0.0001	0.0001	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0009
Standard Deviation	0.0062	0.0095	0.0121	0.0144	0.0157	0.0171	0.0196	0.0220	0.0248	0.0278	0.0303
T Statistic	0.1098	0.0988	-0.0029	-0.0138	0.0261	0.0652	0.0852	0.1477	0.1555	0.1926	0.2122

Incendiary

Day	-5	-4	-3	-2	-1	0	1	2	3	4	5
CAAMR	-0.0048	-0.0107	-0.0108	-0.0120	-0.0158	-0.0232	-0.0233	-0.0364	-0.0491	-0.0564	-0.0608
Variance	0.0001	0.0003	0.0004	0.0005	0.0005	0.0006	0.0017	0.0016	0.0027	0.0038	0.0050
Standard Deviation	0.0111	0.0178	0.0207	0.0216	0.0229	0.0250	0.0415	0.0402	0.0520	0.0618	0.0710
T Statistic	-0.4319	-0.6002	-0.5230	-0.5566	-0.6900	-0.9315	-0.5610	-0.9067	-0.9442	-0.9134	-0.8562

Melee

Day	-5	-4	-3	-2	-1	0	1	2	3	4	5
CAAMR	-0.0018	0.0016	-0.0006	-0.0008	0.0047	0.0022	0.0024	0.0039	0.0048	0.0036	0.0044
Variance	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0003	0.0003	0.0004	0.0008	0.0011
Standard Deviation	0.0083	0.0082	0.0118	0.0124	0.0136	0.0129	0.0158	0.0178	0.0195	0.0283	0.0333
T Statistic	-0.2153	0.1929	-0.0514	-0.0619	0.3459	0.1683	0.1519	0.2211	0.2485	0.1283	0.1318

Other Weapon

Day	-5	-4	-3	-2	-1	0	1	2	3	4	5
CAAMR	-0.0006	0.0059	0.0083	0.0088	0.0111	0.0114	0.0107	0.0083	0.0084	0.0105	0.0108
Variance	0.0001	0.0004	0.0007	0.0009	0.0011	0.0008	0.0009	0.0007	0.0007	0.0005	0.0005
Standard Deviation	0.0107	0.0194	0.0258	0.0305	0.0334	0.0282	0.0298	0.0273	0.0263	0.0233	0.0234
T Statistic	-0.0580	0.3035	0.3201	0.2875	0.3341	0.4041	0.3604	0.3025	0.3208	0.4502	0.4616

Zero Fatalities

Day	-5	-4	-3	-2	-1	0	1	2	3	4	5
CAAMR	-0.0004	0.0003	-0.0003	0.0001	0.0002	0.0002	0.0006	0.0007	-0.0003	0.0009	0.0023
Variance	0.0000	0.0002	0.0002	0.0003	0.0003	0.0004	0.0005	0.0006	0.0008	0.0011	0.0013
Standard Deviation	0.0065	0.0123	0.0145	0.0162	0.0179	0.0197	0.0220	0.0245	0.0280	0.0327	0.0361
T Statistic	-0.0601	0.0242	-0.0214	0.0053	0.0103	0.0095	0.0256	0.0286	-0.0108	0.0276	0.0642

1 - 10 Fatalities

Day	-5	-4	-3	-2	-1	0	1	2	3	4	5
CAAMR	0.0015	0.0018	0.0021	0.0021	0.0026	0.0028	0.0028	0.0036	0.0043	0.0034	0.0022
Variance	0.0001	0.0001	0.0002	0.0003	0.0004	0.0004	0.0006	0.0007	0.0008	0.0010	0.0011
Standard Deviation	0.0075	0.0109	0.0144	0.0173	0.0192	0.0209	0.0239	0.0260	0.0288	0.0312	0.0339
T Statistic	0.2003	0.1648	0.1430	0.1193	0.1371	0.1350	0.1186	0.1386	0.1494	0.1077	0.0642

11 - 50 Fatalities

Day	-5	-4	-3	-2	-1	0	1	2	3	4	5
CAAMR	0.0012	0.0030	0.0034	0.0073	0.0116	0.0116	0.0104	0.0062	0.0027	-0.0009	-0.0020
Variance	0.0001	0.0001	0.0002	0.0004	0.0004	0.0007	0.0006	0.0004	0.0002	0.0002	0.0001
Standard Deviation	0.0083	0.0118	0.0156	0.0191	0.0199	0.0257	0.0248	0.0192	0.0133	0.0124	0.0119
T Statistic	0.1492	0.2516	0.2195	0.3805	0.5846	0.4533	0.4170	0.3219	0.2000	-0.0701	-0.1696

Zero Injuries

Day	-5	-4	-3	-2	-1	0	1	2	3	4	5
CAAMR	0.0004	0.0015	0.0013	0.0021	0.0040	0.0041	0.0045	0.0045	0.0035	0.0024	0.0019
Variance	0.0000	0.0001	0.0003	0.0003	0.0004	0.0005	0.0005	0.0006	0.0007	0.0008	0.0009
Standard Deviation	0.0069	0.0116	0.0158	0.0179	0.0191	0.0212	0.0233	0.0244	0.0259	0.0280	0.0300
T Statistic	0.0586	0.1253	0.0821	0.1200	0.2084	0.1951	0.1956	0.1830	0.1341	0.0862	0.0638

1 - 10 Injuries

Day	-5	-4	-3	-2	-1	0	1	2	3	4	5
CAAMR	0.0011	0.0013	0.0012	0.0014	0.0010	0.0011	0.0012	0.0021	0.0025	0.0029	0.0030
Variance	0.0001	0.0001	0.0002	0.0003	0.0004	0.0004	0.0006	0.0007	0.0009	0.0012	0.0015
Standard Deviation	0.0076	0.0117	0.0137	0.0166	0.0187	0.0206	0.0236	0.0263	0.0307	0.0348	0.0382
T Statistic	0.1443	0.1148	0.0888	0.0843	0.0550	0.0541	0.0515	0.0784	0.0812	0.0824	0.0797

11 - 50 Injuries

Day	-5	-4	-3	-2	-1	0	1	2	3	4	5
CAAMR	0.0000	-0.0015	-0.0012	-0.0042	-0.0080	-0.0086	-0.0108	-0.0116	-0.0088	-0.0056	-0.0052
Variance	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0004	0.0007	0.0011
Standard Deviation	0.0060	0.0074	0.0079	0.0087	0.0119	0.0117	0.0139	0.0157	0.0208	0.0271	0.0336
T Statistic	0.0081	-0.2085	-0.1484	-0.4768	-0.6701	-0.7387	-0.7785	-0.7367	-0.4207	-0.2073	-0.1544

Cities

Day	-5	-4	-3	-2	-1	0	1	2	3	4	5
CAAMR	-0.0004	-0.0006	-0.0009	-0.0020	-0.0020	-0.0024	-0.0030	-0.0019	-0.0011	0.0003	0.0014
Variance	0.0000	0.0001	0.0001	0.0002	0.0003	0.0004	0.0005	0.0007	0.0010	0.0013	0.0016
Standard Deviation	0.0059	0.0102	0.0120	0.0146	0.0177	0.0192	0.0233	0.0267	0.0310	0.0355	0.0401
T Statistic	-0.0740	-0.0597	-0.0779	-0.1368	-0.1145	-0.1248	-0.1301	-0.0709	-0.0367	0.0087	0.0336

Other Location

Day	-5	-4	-3	-2	-1	0	1	2	3	4	5
CAAMR	0.0010	0.0017	0.0017	0.0023	0.0030	0.0032	0.0035	0.0036	0.0032	0.0027	0.0022
Variance	0.0001	0.0001	0.0002	0.0003	0.0004	0.0004	0.0005	0.0006	0.0007	0.0009	0.0011
Standard Deviation	0.0074	0.0117	0.0150	0.0174	0.0189	0.0209	0.0230	0.0246	0.0273	0.0302	0.0326
T Statistic	0.1356	0.1436	0.1109	0.1337	0.1582	0.1539	0.1525	0.1468	0.1183	0.0880	0.0689

Al-Shabaab

Day	-5	-4	-3	-2	-1	0	1	2	3	4	5
CAAMR	0.0009	0.0013	0.0016	0.0018	0.0021	0.0024	0.0027	0.0030	0.0031	0.0033	0.0037
Variance	0.0000	0.0001	0.0001	0.0002	0.0003	0.0004	0.0005	0.0005	0.0006	0.0006	0.0007
Standard Deviation	0.0066	0.0096	0.0121	0.0145	0.0167	0.0193	0.0215	0.0230	0.0245	0.0252	0.0267
T Statistic	0.1407	0.1404	0.1356	0.1265	0.1230	0.1254	0.1252	0.1312	0.1249	0.1324	0.1399

Other Perpetrator

Day	-5	-4	-3	-2	-1	0	1	2	3	4	5
CAAMR	0.0004	0.0011	0.0004	0.0009	0.0019	0.0016	0.0015	0.0018	0.0014	0.0006	-0.0003
Variance	0.0001	0.0002	0.0003	0.0004	0.0005	0.0005	0.0007	0.0008	0.0011	0.0015	0.0018

Standard Deviation	0.0079	0.0138	0.0174	0.0200	0.0214	0.0225	0.0256	0.0280	0.0326	0.0384	0.0426
T Statistic	0.0528	0.0774	0.0257	0.0474	0.0887	0.0727	0.0600	0.0649	0.0421	0.0146	-0.0069

NSE Yield

All Attacks

Day	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**
CAAMR	0.0003	0.0005	0.0004	0.0003	0.0004	0.0005	0.0007	0.0010	0.0008	0.0012	0.0016
Variance	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0003
Standard Deviation	0.0038	0.0057	0.0082	0.0089	0.0097	0.0111	0.0119	0.0134	0.0144	0.0156	0.0164
T Statistic	0.0790	0.0819	0.0437	0.0370	0.0396	0.0452	0.0628	0.0738	0.0570	0.0796	0.0957

Assasinations

Day	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**
CAAMR	0.0018	0.0018	0.0000	-0.0007	-0.0002	0.0001	0.0012	0.0002	-0.0007	-0.0016	-0.0006
Variance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001
Standard Deviation	0.0031	0.0054	0.0057	0.0045	0.0050	0.0067	0.0092	0.0115	0.0089	0.0100	0.0116
T Statistic	0.5773	0.3227	-0.0025	-0.1626	-0.0457	0.0202	0.1292	0.0188	-0.0783	-0.1564	-0.0555

Armed and Unarmed Assaults

Day	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**
CAAMR	0.0002	0.0010	0.0011	0.0010	0.0012	0.0015	0.0018	0.0017	0.0015	0.0018	0.0024
Variance	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002
Standard Deviation	0.0040	0.0056	0.0070	0.0070	0.0080	0.0091	0.0098	0.0111	0.0126	0.0142	0.0151

T Statistic	0.0608	0.1877	0.1546	0.1369	0.1458	0.1646	0.1816	0.1491	0.1181	0.1267	0.1556

Bombing & Explosions

Day	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**
CAAMR	0.0005	0.0002	0.0004	0.0004	0.0001	-0.0002	0.0002	0.0011	0.0007	0.0013	0.0012
Variance	0.0000	0.0000	0.0001	0.0001	0.0002	0.0002	0.0002	0.0003	0.0003	0.0003	0.0003
Standard Deviation	0.0038	0.0061	0.0095	0.0110	0.0125	0.0141	0.0146	0.0163	0.0173	0.0180	0.0182
T Statistic	0.1211	0.0331	0.0388	0.0402	0.0087	-0.0134	0.0129	0.0664	0.0422	0.0745	0.0679

Hijacking & Hostage Taking

Day	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**
CAAMR	-0.0001	-0.0004	-0.0026	-0.0020	-0.0015	-0.0007	-0.0006	-0.0009	-0.0015	-0.0011	-0.0015
Variance	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001
Standard Deviation	0.0031	0.0051	0.0106	0.0059	0.0043	0.0067	0.0078	0.0074	0.0086	0.0085	0.0090
T Statistic	-0.0259	-0.0873	-0.2485	-0.3427	-0.3506	-0.1012	-0.0763	-0.1251	-0.1680	-0.1352	-0.1691

Facility/Infrastructure

Day	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**
CAAMR	-0.0006	-0.0036	-0.0029	-0.0071	-0.0042	-0.0045	-0.0090	-0.0104	-0.0100	-0.0109	-0.0108
Variance	0.0000	0.0000	0.0000	0.0002	0.0001	0.0001	0.0003	0.0005	0.0004	0.0006	0.0005
Standard Deviation	0.0007	0.0049	0.0043	0.0155	0.0096	0.0097	0.0181	0.0233	0.0207	0.0235	0.0228
T Statistic	-0.8680	-0.7412	-0.6743	-0.4597	-0.4409	-0.4648	-0.4960	-0.4491	-0.4810	-0.4663	-0.4747

Unknown Attack

Day	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**
CAAMR	-0.0020	-0.0020	-0.0001	0.0027	0.0015	0.0016	0.0021	0.0041	0.0089	0.0122	0.0164
Variance	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0003	0.0006
Standard Deviation	0.0029	0.0027	0.0047	0.0117	0.0105	0.0098	0.0102	0.0098	0.0138	0.0182	0.0248
T Statistic	-0.6955	-0.7631	-0.0116	0.2280	0.1448	0.1588	0.2047	0.4227	0.6423	0.6720	0.6631

Business

Day	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**
CAAMR	0.0000	0.0003	0.0000	0.0008	0.0016	0.0009	0.0012	0.0019	0.0017	0.0025	0.0031
Variance	0.0000	0.0000	0.0000	0.0001	0.0002	0.0002	0.0002	0.0003	0.0003	0.0003	0.0003
Standard Deviation	0.0031	0.0046	0.0055	0.0075	0.0131	0.0146	0.0153	0.0161	0.0160	0.0169	0.0179
T Statistic	0.0000	0.0637	-0.0017	0.0999	0.1182	0.0607	0.0758	0.1179	0.1064	0.1455	0.1746

Government (General)

Day	-5	-4	-3	-2	-1	0	1	2	3	4	5
CAAMR	0.0005	0.0012	0.0018	0.0022	0.0022	0.0023	0.0030	0.0035	0.0032	0.0037	0.0040
Variance	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0003	0.0003	0.0003
Standard Deviation	0.0032	0.0061	0.0093	0.0102	0.0109	0.0115	0.0128	0.0148	0.0167	0.0180	0.0183
T Statistic	0.1676	0.1909	0.1981	0.2158	0.2043	0.1996	0.2334	0.2362	0.1928	0.2053	0.2172

Other

Day	-5	-4	-3	-2	-1	0	1	2	3	4	5
CAAMR	-0.0003	-0.0017	-0.0026	-0.0024	-0.0010	-0.0001	0.0006	0.0001	0.0003	0.0003	0.0002
Variance	0.0000	0.0000	0.0001	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Standard Deviation	0.0034	0.0048	0.0104	0.0067	0.0055	0.0074	0.0100	0.0102	0.0114	0.0112	0.0115
T Statistic	-0.1008	-0.3475	-0.2501	-0.3547	-0.1876	-0.0086	0.0617	0.0093	0.0282	0.0264	0.0207

Private Citizen

Day	-5	-4	-3	-2	-1	0	1	2	3	4	5
CAAMR	0.0006	0.0007	0.0001	-0.0009	-0.0019	-0.0015	-0.0019	-0.0019	-0.0022	-0.0016	-0.0011
Variance	0.0000	0.0000	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002
Standard Deviation	0.0056	0.0063	0.0075	0.0079	0.0066	0.0104	0.0080	0.0088	0.0099	0.0121	0.0146
T Statistic	0.1019	0.1122	0.0099	-0.1128	-0.2823	-0.1486	-0.2404	-0.2125	-0.2212	-0.1300	-0.0735

Religious Figures/Institutions

Day	-5	-4	-3	-2	-1	0	1	2	3	4	5
CAAMR	0.0002	-0.0001	-0.0014	-0.0019	-0.0018	-0.0013	-0.0010	-0.0011	-0.0009	-0.0005	0.0000
Variance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001
Standard Deviation	0.0033	0.0051	0.0047	0.0038	0.0047	0.0057	0.0077	0.0092	0.0083	0.0091	0.0104
T Statistic	0.0590	-0.0243	-0.3086	-0.5093	-0.3777	-0.2260	-0.1338	-0.1183	-0.1129	-0.0558	-0.0015

Transportation/Communication

Day	-5	-4	-3	-2	-1	0	1	2	3	4	5
CAAMR	0.0005	0.0012	0.0014	0.0014	0.0015	0.0013	0.0010	0.0011	0.0007	0.0009	0.0014
Variance	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0003	0.0003
Standard Deviation	0.0024	0.0058	0.0086	0.0107	0.0111	0.0116	0.0127	0.0144	0.0158	0.0168	0.0169
T Statistic	0.2068	0.2009	0.1619	0.1289	0.1363	0.1111	0.0807	0.0782	0.0466	0.0542	0.0808

Firearms

Day	-5	-4	-3	-2	-1	0	1	2	3	4	5

CAAMR	0.0006	0.0010	0.0006	0.0006	0.0011	0.0017	0.0021	0.0019	0.0017	0.0020	0.0027
Variance	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0003
Standard Deviation	0.0040	0.0060	0.0083	0.0074	0.0087	0.0098	0.0105	0.0120	0.0133	0.0149	0.0161
T Statistic	0.1409	0.1635	0.0727	0.0800	0.1274	0.1694	0.1962	0.1608	0.1298	0.1373	0.1647

Explosives/Bombs/Dynamite

Day	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**
CAAMR	0.0004	0.0001	0.0001	0.0001	-0.0004	-0.0006	-0.0002	0.0005	0.0001	0.0005	0.0004
Variance	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0003	0.0003	0.0003
Standard Deviation	0.0035	0.0056	0.0089	0.0101	0.0112	0.0128	0.0134	0.0149	0.0160	0.0165	0.0165
T Statistic	0.1060	0.0153	0.0139	0.0105	-0.0323	-0.0474	-0.0149	0.0306	0.0061	0.0299	0.0219

Incendiary

Day	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**
CAAMR	-0.0029	-0.0040	-0.0036	-0.0062	-0.0034	-0.0043	-0.0099	-0.0101	-0.0083	-0.0089	-0.0087
Variance	0.0000	0.0000	0.0000	0.0002	0.0001	0.0001	0.0003	0.0004	0.0003	0.0004	0.0004
Standard Deviation	0.0051	0.0043	0.0040	0.0136	0.0085	0.0084	0.0159	0.0202	0.0183	0.0208	0.0203
T Statistic	-0.5693	-0.9282	-0.8921	-0.4554	-0.3983	-0.5069	-0.6265	-0.5028	-0.4533	-0.4291	-0.4310

Melee

Day	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**
CAAMR	0.0000	0.0027	0.0030	0.0025	0.0021	0.0023	0.0024	0.0018	0.0004	0.0014	0.0018
Variance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001
Standard Deviation	0.0029	0.0042	0.0053	0.0060	0.0056	0.0058	0.0069	0.0069	0.0060	0.0067	0.0075
T Statistic	0.0054	0.6548	0.5655	0.4151	0.3664	0.3950	0.3455	0.2553	0.0594	0.2120	0.2412

Other Weapon

Day	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**
CAAMR	-0.0020	-0.0020	-0.0001	0.0027	0.0015	0.0016	0.0021	0.0041	0.0089	0.0122	0.0164
Variance	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0003	0.0006
Standard Deviation	0.0029	0.0027	0.0047	0.0117	0.0105	0.0098	0.0102	0.0098	0.0138	0.0182	0.0248
T Statistic	-0.6955	-0.7631	-0.0116	0.2280	0.1448	0.1588	0.2047	0.4227	0.6423	0.6720	0.6631

Zero Fatalities

Day	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**
CAAMR	0.0001	0.0002	0.0002	0.0002	0.0007	0.0003	0.0006	0.0009	0.0008	0.0011	0.0007

Variance	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0003	0.0003	0.0003
Standard Deviation	0.0034	0.0058	0.0093	0.0092	0.0111	0.0128	0.0142	0.0157	0.0167	0.0187	0.0187
T Statistic	0.0400	0.0308	0.0186	0.0210	0.0614	0.0265	0.0418	0.0589	0.0473	0.0601	0.0390

1 - 10 Fatalities

Day	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**
CAAMR	0.0005	0.0007	0.0005	0.0005	0.0002	0.0007	0.0011	0.0012	0.0010	0.0015	0.0024
Variance	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002
Standard Deviation	0.0040	0.0058	0.0077	0.0090	0.0089	0.0100	0.0103	0.0118	0.0131	0.0136	0.0151
T Statistic	0.1273	0.1222	0.0660	0.0562	0.0253	0.0692	0.1031	0.1051	0.0747	0.1122	0.1599

11 - 50 Fatalities

Day	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**
CAAMR	-0.0009	0.0001	0.0002	-0.0007	-0.0005	-0.0005	-0.0020	-0.0020	-0.0010	-0.0014	-0.0015
Variance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Standard Deviation	0.0048	0.0033	0.0042	0.0035	0.0043	0.0049	0.0065	0.0053	0.0044	0.0059	0.0062
T Statistic	-0.1958	0.0344	0.0550	-0.2040	-0.1063	-0.1102	-0.3068	-0.3724	-0.2339	-0.2361	-0.2466

Zero Injuries

Day	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**
CAAMR	-0.0001	0.0002	-0.0002	0.0002	0.0007	0.0006	0.0010	0.0011	0.0009	0.0017	0.0021
Variance	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0003
Standard Deviation	0.0041	0.0058	0.0081	0.0078	0.0079	0.0097	0.0101	0.0116	0.0137	0.0150	0.0165
T Statistic	-0.0237	0.0304	-0.0239	0.0276	0.0922	0.0655	0.0977	0.0961	0.0678	0.1137	0.1297

1 - 10 Injuries

Day	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**
CAAMR	0.0005	0.0006	0.0006	0.0003	0.0001	0.0005	0.0007	0.0008	0.0007	0.0007	0.0010
Variance	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003
Standard Deviation	0.0033	0.0056	0.0082	0.0099	0.0114	0.0125	0.0136	0.0151	0.0154	0.0167	0.0168
T Statistic	0.1556	0.0995	0.0716	0.0277	0.0085	0.0380	0.0517	0.0525	0.0442	0.0422	0.0577

11 - 50 Injuries

Day	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**
CAAMR	0.0022	0.0028	0.0041	0.0025	0.0005	0.0002	-0.0003	0.0027	0.0023	0.0031	0.0033
Variance	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0001	0.0002
Standard Deviation	0.0048	0.0060	0.0106	0.0087	0.0089	0.0102	0.0116	0.0124	0.0129	0.0116	0.0125

T Statistic	0.4616	0.4576	0.3922	0.2892	0.0509	0.0225	-0.0222	0.2179	0.1815	0.2723	0.2622

Cities

Day	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**
CAAMR	0.0005	0.0000	-0.0005	-0.0013	-0.0016	-0.0022	-0.0024	-0.0024	-0.0029	-0.0029	-0.0025
Variance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001
Standard Deviation	0.0027	0.0041	0.0046	0.0067	0.0059	0.0063	0.0090	0.0106	0.0100	0.0108	0.0114
T Statistic	0.1836	0.0049	-0.1135	-0.1879	-0.2620	-0.3432	-0.2676	-0.2245	-0.2866	-0.2644	-0.2183

Other Location

Day	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**
CAAMR	0.0003	0.0006	0.0006	0.0007	0.0009	0.0012	0.0015	0.0018	0.0017	0.0023	0.0026
Variance	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0003	0.0003
Standard Deviation	0.0040	0.0060	0.0089	0.0093	0.0104	0.0119	0.0124	0.0139	0.0152	0.0165	0.0173
T Statistic	0.0626	0.0958	0.0650	0.0773	0.0831	0.0977	0.1230	0.1315	0.1140	0.1373	0.1488

Al-Shabaab

Day	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**
CAAMR	0.0002	0.0003	0.0006	0.0009	0.0011	0.0011	0.0015	0.0021	0.0019	0.0022	0.0022
Variance	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0003	0.0003
Standard Deviation	0.0032	0.0054	0.0087	0.0092	0.0109	0.0119	0.0128	0.0140	0.0150	0.0161	0.0169
T Statistic	0.0595	0.0631	0.0702	0.0953	0.1008	0.0959	0.1140	0.1473	0.1272	0.1357	0.1321

Other Perpetrator

Day	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**
CAAMR	0.0004	0.0006	0.0000	-0.0004	-0.0006	-0.0004	-0.0003	-0.0005	-0.0007	-0.0001	0.0006
Variance	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002
Standard Deviation	0.0045	0.0061	0.0077	0.0085	0.0077	0.0097	0.0105	0.0123	0.0135	0.0149	0.0157
T Statistic	0.1008	0.1057	0.0013	-0.0521	-0.0829	-0.0428	-0.0249	-0.0440	-0.0538	-0.0067	0.0400

Exchange Rate Yield