



## Modeling Boko Haram: A Game Theoretical Approach

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### ABSTRACT

In contrast to previous elections in Nigeria, especially the much criticised 2007 elections, the 2011 elections (In which a Christian won the presidential seat) was reported in the media as having run smoothly with little voter fraud. Some observers view the election as the most transparent, free and fair in contemporary Nigerian history. Yet the post election violence that followed left about 1000 persons dead. This post election violence was principally perpetrated by members of the Boko Haram sect – an Islamic insurgency against western education and Christian influence. There have been predictions by experts that Nigeria will disintegrate between 2015 and 2030 with tribal and religious conflicts being a root cause. It is therefore important that adequate attention be paid to stopping insurgencies like the Boko Haram which at present is the chief pointer to the materialisation of this prediction.

In this paper, we modelled Boko Haram using a game theoretical approach. Results of simulation showed that if there is significant incentive to cease fire and the cost of Terrorism is significantly increased, then Boko Haram being a rational player will prefer to cease fire. We also showed that there is a tempting strategy for Home Zone states (Northern States) to enter into agreement with Boko Haram where the state, rather than confront, will choose to compromise while Boko Haram refrains from attacking within the state. We therefore suggested that besides increasing the cost of terrorism and providing incentives to cease fire, the federal government should make it impossible for any state to enter into such agreement.

**Keywords:** *Boko Haram, Dominant strategy, Game theory, Nash equilibrium, Payoff matrix.*

### 1. INTRODUCTION

The words terrorist and terrorism have been used and abused so much so that calling someone a terrorist could have a variety of meaning ranging from religious fanaticism to suicide bombing, mass killing, freedom fighting and indiscriminate destruction of lives and property. It has been used contextually as racial profiling or racism, stereotyping or simply an insult. Literatures abound on terrorism especially since the September 11<sup>th</sup> attack on the world trade center. Terrorism has attracted a lot of researchers from both the academia and the secular world. However, researchers, security professionals, politicians, jurists, and others have still not been able to agree upon its most fundamental component – what is terrorism? Moreover, and somewhat surprisingly, the only consensus these individuals have reached is that it might be impossible, or even unnecessary, to reach an internationally accepted definition of terrorism [1].

Each researcher has painstakingly tried to define terrorism and although they have failed to reach a general and internationally accepted definition, the word whenever it is defined has elements of violence, deaths, fear and attack. What makes it different from other plagues and why is it receiving equal and perhaps greater attention than malaria, HIV/AIDS and tuberculosis but it has caused fewer deaths than the three put together.

What constitute terrorism? Why was the US reluctant to define the attacks by contra rebels in Nicaragua as terrorism? In the same vain why were they (and even the Nigerian government) reluctant to define the Boko Haram activities ( which include bombing of the UN secretariat, mass killing of

students, bombing of churches to mention a few) as terrorism?

Lowe, 2002 as cited by Keet [2] indicates that: To start with a definition like ‘the intentional, indiscriminate killing of the innocent’ is to assume the immorality of terrorism, and would end any discussion of its morality or immorality before we start. Taking a cue from there and applying all subtlety and neutrality Keet therefore defined terrorism as: The use of physical and psychological violence as a means to achieve a political goal.

However Hudson [3] defines a terrorist action as the calculated use of unexpected, shocking, and unlawful violence against non-combatants (including, in addition to civilians, off-duty military and security personnel in peaceful situations) and other symbolic targets perpetrated by a clandestine member(s) of a sub national group or a clandestine agent(s) for the psychological purpose of publicizing a political or religious cause and/or intimidating or coercing a government(s) or civilian population into accepting demands on behalf of the cause.

Ganor [1] defines “Modern terrorism” as a form of psychological warfare intended to spread fear and anxiety among the target population. This fear, he states, is translated into political pressure on decision makers to change policies in such a manner that will serve the terrorist’s interests. And further states that: if an act is not violent, does not deliberately target civilians, or does not attempt to achieve a political goal, then it is not a terrorist attack.

The U.S. Department of State (1998) as cited by Hudson [3] defines terrorism as “premeditated, politically motivated violence perpetrated against non-combatant targets by sub

national groups or clandestine agents, usually intended to influence an audience.”

Going by the last definition, one therefore need not have any reservation in branding the boko haram sect as a terrorist organisation as their attacks are (1) premeditated (2) politically motivated (3) targeted against non combatants (4) perpetrated by a sub national group (5) intended to influence an audience (Nigerians).

With Boko Haram as the focal point, We define terrorism as the intentional killing of innocent (non provocative) civilian(s) (including off duty combatants and combatants in peaceful situations), to instil fear in the minds of the general populace and either topple government or force government to change its policies for the selfish benefit of the perpetrator(s) who usually is/are not representative(s) of any legal government.

Generally, terrorist attack non-combatants. Their attacks are directed against civilians, politicians, Companies, institutions, or infrastructure. Unlike aggression in war, the main targets are not military objects and the aim is not a military defeat of the enemy. The target is a means and not the end. Most terrorist only (or desperately) want to prove a point, generate an audience and let them know that they (terrorist) have a greater philosophy, political agenda or that they are more religiously righteous. Terrorists want the populace to feel that the government have failed them, that the government is biased and that the government cannot protect them. They want their targeted audience to feel vulnerable and helpless and if that feeling is strong enough the audience can pressure government to change its policies in favour of the terrorist. Terrorist want to win a war – a psychological war and since they lack the man power and arsenal to fight their foe (the government), they pick on the easy prey (civilians).

The political goal of a terrorist is only achieved if sufficient audience is generated and fear is passed across. No media no effective terrorism. They heavily rely on the media to propagate their political opinion, but what if the terrorist goal is not political? What if the terrorist actions are carried out “in the name of Allah”? What if the terrorist believe suicide bombing is the only (or a sure) way to get to “paradise”? Then media (coverage) or no media, terrorism will continue, and then we have a bigger problem on our hands.

## 1.1 Terrorism Vs. Militancy

From a terrorists’ perspective, their acts are rational and just. There is also the popular line that one man’s terrorist is another man’s freedom fighter. Who is a terrorist and who is a freedom fighter? Both of them use violence to achieve their goal. An aggrieved group who felt deprived of certain rights may resort to violence if that will draw government attention to remedy their plight. Such group might not be morally frowned upon especially if they are fighting for the basic necessities of life and trying to live above poverty. They get the appellation of a freedom fighter, guerrilla, militant, revolutionaries or in the worst case scenarios they get to be called rebels. However, Keet [2] argued that aggrieved groups (terrorist or so called freedom fighters) use the *same method of working* (indirect means) which includes the use of

violence, to achieve their goal(s) and exploiting the features of a terrorist theatre by instilling fear as important strategy, therefore one should refer to the same process with one name – terrorism.

In trying to force a distinction between terrorists and freedom fighters, one may argue that freedom fighters do not target civilians (or non combatants) but Ganor [1] maintains that many freedom fighters in modern history committed crimes and purposely targeted innocent civilians. He then asserts that Terrorism is a means - a tool - for achieving an end, and that “end” can very well be liberating the homeland from the yoke of a foreign occupier. He explained that an organization can be, at the same time, both a national liberation movement (freedom fighters) and a terrorist group.

In recent times Nigeria has had the best of both worlds (what is called freedom fighting and terrorism). The country is plagued in the north by the Boko Haram sect and was (is) plagued in the south by the Niger delta militants. The motive of the Niger delta militants is clear to many Nigerians: They want a better life. They felt cheated and deprived by government actions and inactions being that they house the nation’s economic backbone (oil producing states). Their activities was drastically cut down (if not completely shut down) when president Yaradua introduced the amnesty programme (which implies a better life for the militants). Boko Haram on the other hand remain a plague in the country as they have no clearly defined objective (at least not one that is attainable or justifiable by the average Nigerian) and therefore made it impossible for the government to reason with them. Boko is a Hausa word meaning western (or non-Islamic) education while Haram is an Arabic word for “sin” or “forbidden”. Boko Haram literally translates into “western education is forbidden”. It is clearly not an attainable objective if what they are after is to purge Nigeria (and perhaps the world) of western education. Ekanem *et al* [4] hold the same opinion when they assert that there is no basis for comparison between Boko Haram and the Niger Delta militants. And that the Niger Delta militancy was premised on a “reasoned logic” as a result of the failure of the Nigerian state to positively and promptly response to its constitutional responsibility.

If one limits himself to the Nigerian scenario, then there is a clear distinction between a freedom fighter (militant) and a terrorist. The Niger delta militants have a cause that most rational human beings will sympathise with. Their attacks (or most of them) were targeted against combatants. We can call them freedom fighters. The Boko Haram sect have a haughty cause with which most rational human beings will not sympathise with. Their attacks (or most of it) were targeted against non-combatants. They have all the credentials to be called terrorists.

The foregoing argument is based on a “rational human being’s” point of view. But who is a rational human being? Who decides what is legitimate and what is not? For a struggle to be termed “terrorism” or “freedom fighting” will always lie in the eyes of the beholder because terrorists (and their supporters) being rational human beings will always see their cause as legitimate and themselves as freedom fighters.

## 1.2 Boko Haram

As previously stated, Boko Haram means “western education is forbidden”. The group opposes not only western education but modern sciences as well. The founder of the group Yusuf Mohamed in a 2009 BBC interview stated that the theory that rain comes from water evaporated by the sun along with Darwinism is against Islamic teachings and should be rejected. Yusuf also belief that the earth is not sphere. This is not entirely new. Keets [2] cited Yayha Harun who opined that “From an Islamic perspective, they are scholars who consider western society, which is based on Christian theology, as the main cause of terrorism, and social Darwinism and materialism in particular”.

The group has carried out series of attacks in Nigeria including the August 2011 bombing of the UN building in Abuja. Founded in 2002, Boko Haram has strongly opposed whatever is western be it education or lifestyle. The founder, Yusuf, before his death has reiterated that the group is poised to changing the education system in Nigeria and rejecting democracy. It’s ironical that Yusuf himself is highly educated and lived a lavished lifestyle.

## 2. GAME THEORY

Game theory is a branch of mathematical analysis that studies interactions between two or more players in conflict situation. The concepts of game theory provide a language to formulate structure, analyze, and understand strategic scenarios [5]. Game theory undertakes to build mathematical models and draw conclusions from these models in connection with interactive decision-making: situations in which a group of people not necessarily sharing the same interests are required to make a decision [6]. The ultimate goal of game theory is to find the optimum strategy in which all players involved maximizes their utility. This strategy though, might not be the preferred strategy for an individual player who is assumed to be rational. Game theory seeks to predict the strategy and hence give advice on how to play the game against rational opponents. The development of Game Theory is associated with names of John von Neumann and Oskar Morgenstern, and their work from 1928. The work focuses on theoretical foundations of game theory and also performed the proof of basic theorem of matrix games. As a mathematical tool for the decision-maker the strength of game theory is the methodology it provides for structuring and analyzing problems of strategic choice. The process of formally modelling a situation as a game requires the decision-maker to enumerate explicitly the players and their strategic options, and to consider their preferences and reactions [5]. A game theoretical model tries to capture the strategy of each player and the general outcome of the strategy given the other player’s strategy. Given any decision (chosen strategy), a players expected utility is dependent on the other player’s strategy.

A game theory concept apply when there is a conflict between two or more players (individuals, organisations, countries) as a result of different interest but the same resources or system. Game theoretic methods provide a structured way to examine

how two (or more) players will interact under various conflict scenarios.

### 2.1 Assumptions of Game Theory

Game theory models are built with the following assumptions:

- 1 The players are rational, that is, a player will always chose the alternative that will yield the greater pay off.
- 2 Players have a complete knowledge of the rules of the game, and during one game, the rules does not change.
- 3 The game terminates in finite number of steps no matter what was palyed.
- 4 The players are well aware of payoffs of other players, that is, they know the amount of gains and losses and the values in the game.

In summary, a game starts with players being presented with available choices. The players are rational and hence chose alternatives that give them the greatest gain. They know the rules of the game and what each player is expected to gain but do not know what the opponent will do. Whatever actions are taken, the game terminates in a finite number of steps.

### 2.2 Game Theory And Terrorism

The application of game theory to study terrorism depends on a basic but profound assumption: rational choice. Rationality implies that, rather than making choices at random and independent of any information or payoffs, people choose the best action available to them based on their information and constraints [7]. What may seem rational to a group however may be illogical and irrational to another group (or persons). Most people might see suicide bombing as irrational but if the bomber values the gains of suicide bombing and truly believes in it, rationality implies that he will chose to commit the act. A terrorist might be willing to sacrifice his life to achieve his goal but will do anything possible to escape arrest including abandoning the mission. This is fairly rational. When one considers the combination of resources and strategies employed, even if the goals seems irrational, terrorist themselves are rational.

Because the interaction between the victim and the terrorist is better studied interpedently and therefore cannot be analyzed separately game theory becomes an appropriate tool to research terrorism as it captures this interaction in interdependent steps.

According to Sandler and Arce [8] Game theory is a useful tool for research on terrorism because:

1. Game Theory captured terrorists and governments act as interdependent.
2. Government and the terrorists are rational actors who respond to opponents steps.
3. Government and terrorists behave so as to gain a strategic advantage.

4. Government and terrorists are trying to rationally maximize their benefits.
5. Government and terrorists make decisions on incomplete information.

Vickram [7] presented a simple game model of government-terrorist interaction where he hypothesized that aggressive action by a government immediately after a leadership change will have a greater deterrent effect to terrorist than aggressive action at other times. He then empirically tested this prediction using duration analysis. The results offer support for the hypothesis.

Sandler and Arce [8] presented some novel applications of Game theory in modelling terrorism such as government choice among alternative anti-terrorism policies, and government concessionary policy when terrorists are either hard-liners or moderates in their viewpoint. They also examined how game-theoretic analyses of terrorism have provided some policy insights that do not follow from nonstrategic analyses. Some new game-theoretic applications are indicated that concern terrorist targeting of businesses, officials, and the general public, where targets can work at cross-purposes as they attempt to deflect the attack.

### 3. SOLUTION CONCEPTS

A game is in strategic form when each player simultaneously (independently) makes their decisions from available choices and takes action. The resulting payoffs can then be presented in a table with a cell for each strategy combination (action choices). A game is said to be zero-sum if for any outcome, the sum of the payoffs to all players is zero. In a two-player zero-sum game, one player's gain is the other player's loss, so their interests are completely opposed.

For a strategic form game with  $n$  players,

Let  $N = \{1,2,3,\dots,n\}$  be the set of players

For every  $i$  let  $S_i = \{\text{All possible strategies for agent } i\}$

Then a strategy profile is an  $n$ -tuple  $S = (s_1, \dots, s_n)$ . That is, a set of strategies for all players which fully specifies all actions in a game. A strategy profile must include one and one strategy for every player.

For each  $i \in N$ , a utility function  $U_i$  describes the payoff:  $U_i(s_1, \dots, s_n)$  to player  $i$  under each combination of strategies. Player  $i$  will always prefer to maximize its own payoff.

A zero sum game in a strategic form game is one in which for all

$$s = (s_1, \dots, s_n) \in S, \\ U_1(s) + U_2(s) + \dots + U_n(s) = 0$$

For a 2 – person zero sum game we have  $i \in \{1,2\}$  and  $s = (s_1, s_2) \in S$ ,

$$\text{So that } U_1(s) + U_2(s) = 0 \text{ and,} \\ U_1(s) = - U_2(s)$$

Since all players are assumed to be rational, they seek to maximize their payoff at all times, given what their opponents do. A player may have two strategies  $s_i$  and  $s'_i$  so that, given any combination of strategies of the other players, the outcome resulting from  $s_i$  is better than the outcome resulting from  $s'_i$ . Then strategy  $s_i$  is said to strongly dominate strategy  $s'_i$ .

$$\text{For all } s_1, \dots, s_{i-1}, s_{i+1}, \dots, s_n, \\ U_i(s_1, \dots, s_{i-1}, s_i, s_{i+1}, \dots, s_n) > U_i(s_1, \dots, s_{i-1}, s'_i, s_{i+1}, \dots, s_n)$$

$s_i$  is said to weakly dominates  $s'_i$  if it's always at least as good

$$\text{For all } s_1, \dots, s_{i-1}, s_{i+1}, \dots, s_n, \\ U_i(s_1, \dots, s_i, \dots) \geq U_i(s_1, \dots, s'_i, \dots)$$

And there exist

$$U_i(s_1, \dots, s_i, \dots) > U_i(s_1, \dots, s'_i, \dots)$$

Given a profile of pure strategies  $s_i = (s_1, s_2, \dots, s_n) \in S$

$$\text{Let } s_{-i} = (s_1, s_2, \dots, s_{i-1}, \text{empty}, s_{i+1}, \dots, s_n)$$

That is,  $s_{-i}$  denotes everybody's strategy except that of player  $i$ .

Let  $y_i$  be any strategy available to player  $i$

$$\text{Then } (y_i; s_{-i}) = (s_1, s_2, \dots, s_{i-1}, y_i, s_{i+1}, \dots, s_n)$$

Hence  $(y_i; s_{-i}) \in S$

In other words,  $(y_i; s_{-i})$  is a new profile where everybody's strategy remains the same as in  $s$ , except for player  $i$ , who switches from strategy  $s_i$ , to strategy  $y_i$ .

$s_i$  is said to be a best response to  $s_{-i}$  if

$$U_i(s_i, s_{-i}) \geq U_i(y_i, s_{-i}) \text{ for every strategy } y_i \text{ available to player } i$$

$s_i$  is unique best response to  $s_{-i}$  if

$$U_i(s_i, s_{-i}) > U_i(y_i, s_{-i}) \text{ for every } y_i \neq s_i$$

Since the players are rational, a player will always want to change his strategy to a best response if he has knowledge of what others has played. But in strategic form games, this knowledge is not available as all players choose their strategies simultaneously.

If however a situation exists such that all the players have played a best response to each other, even if they were given opportunity to change strategy after revealing what others have played, they will be no incentive for any player to change strategy. This strategy profile  $s_i = (s_1, s_2, \dots, s_n) \in S$  is said to be stable ( in equilibrium) and it is called the *Nash Equilibrium*.

In other words a Nash equilibrium exist if the strategy profile  $s_i = (s_1, s_2, \dots, s_n) \in S$

has the property that no player can benefit by deviating from it while the other players keep stick to it.

A game in strategic form does not always have a Nash equilibrium in which each player deterministically chooses one of his strategies. However, players may instead randomly select from among these pure strategies with certain probabilities. This is known as *mixed strategy*; an assignment of a probability to each pure strategy. i.e a mixed or randomized strategy  $x_i$  for Player  $i$ , with

$S_i = \{1, \dots, m_i\}$ , is a probability distribution over  $S_i$ . In other words, it is a vector  $x_i = (x_i(1), \dots, x_i(m_i))$ , such that  $x_i(j) \geq 0$  for  $1 \leq j \leq m_i$ , and

$$x_i(1) + x_i(2) + \dots + x_i(m_i) = 1$$

This allows for a player to randomly select a pure strategy. Since probabilities are continuous, there are infinitely many mixed strategies available to a player, even if their strategy set is finite.

#### 4. GAME SIMULATIONS

##### 4.1 The Game between Boko Haram and Home Zone states

By home zone states, I am referring to the Boko Haram origin state, Borno and all the other Muslim dominated states in Northern Nigeria which incidentally have recorded most if not all the Boko Haram activities.

In March 2012 about twelve public schools were set ablaze in Maiduguri, on Christmas day in 2011, several bombs were simultaneously detonated in Niger, Plateau and Yobe. In January 2012 three groups of gunmen and suicide bombers coordinated attacks on three government buildings in Kano—the police headquarters, the office of the immigration service, and the State Security Service. More than two hundred people were killed. While it might not be uncommon to find people in these states who share the same political and religious goals with members of Boko Haram (preachers loyal to the organization openly gather people to preach Yusuf’s teachings in the streets of Kano [9]). It may be uncommon to find people who believe in their methods of operation. In these states resides the supporters of Boko Haram yet these states have suffered the most in terms of attacks. Boko Haram members need to fulfil the aims of their supporters, they therefore need to find a strategy that maximises the fulfilment of their aims, minimizes their costs and ensures the support from their home zone states. More often than not terrorist groups can not generate enough funds to keep themselves in operation, they therefore depend on support from home zone government. Even if terrorist groups do not depend on direct support by home zone governments and can rely on other external support (e.g it is believed that Yusuf received funds from salafists contacts in Saudi Arabia), they depend on the inattention of their government when receiving this external support. Their method of operation determines whether their government will support them.

**Model 1:** We now model the game between Boko Haram and the Home zone states. The pay off matrix is presented below.

**Table 1: Payoff matrix for model 1**

		Boko Haram	
		Terroriz e	Ceas e
Home Zone	Combat	- 3, 3	- 2, - 2
	Compromis e	- 5, 5	0, 0

The model allocates only two strategies to both players. Boko Haram can choose between terrorize and cease fire while the Home zone state can either Combat or Compromise. The model is a zero sum game where the terrorize strategy gives a utility of 5 to Boko Haram which implies a utility of - 5 to Home zone state. Assuming a Combat strategy diminishes Boko Haram utility by 2, then if the Home zone state chooses Combat and Boko Haram chooses Terrorize the payoff becomes - 3 (i. e - 5 +2) and 3 (i.e 5 - 2 ) for Home zone state and Boko Haram respectively. If the Home zone state chooses Combat and Boko Haram chooses Cease Fire then the payoff becomes - 2 and - 2 ( i.e 0 - 2 ) for Home zone and Boko Haram respectively. If Home zone chooses to compromise while Boko Haram Terrorize then Boko Haram will have a payoff of 5. The combination of Compromise and Cease Fire leaves both players with a utility of 0.

Considering all strategies, the Home Zone state will always prefer Boko Haram to cease fire but the dominant strategy for Boko Haram is Terrorize therefore the best response for Home zone state is Combat. The payoff matrix contains two Nash equilibria Combat – Terrorize and Compromise – Cease fire. Boko Haram being rational human beings will always prefer to play the dominant strategy and the state will be better off only if it play the best response.

**Model 2A:** What happens if the Home Zone states increase the cost of terrorism and provide incentives for a cease fire? Research on terrorist organizations suggests three lines of thinking that might help sharpen policy responses. The first is that terrorist organizations are rational in the sense economists’ use that term, namely they respond to incentives and are constrained by their access to resources. Terrorist groups behave as if they are cost constrained, and therefore choose tactics they believe to be cost-effective. If the relative costs of one avenue of action are raised, or the perceived benefits change, timing and tactics can also change in response [10].

From foregoing one can reason that if government can make it impossible for Boko Haram to access funds by tightening measures against money laundering and cash transfer, they

then become financially constrained. Also the government can increase the cost of terrorism by significantly improving upon the traditional crime fighting strategies (Police effectiveness). And on the other hand, the government can make terrorism less attractive by providing incentives for a cease fire.

We now assume a utility of 3 to the Terror strategy and a utility of 2 to the Cease fire strategy. The Combat strategy still diminishes the Terrorist’s strategy by 2; the payoff matrix is presented in the table below.

**Table 2: Payoff matrix for model 2A**

		Boko Haram	
		Terrorize	Cease Fire
Home Zone	Combat	- 1, 1	- 2, 0
	Compromise	- 3, 3	0, 2

The solution concepts are similar to that of Model 1. Terrorize remain the dominant strategy for Boko Haram and Combat is the best response for the state. The counter terrorism approach has reduced the payoff for Boko Haram but not enough to deter terrorism.

**Model 2B:** For the counter terrorism approach to be effective, the cost of terrorism have to be increased significantly, this in turn will force the expected utility to be relatively low. The cease fire incentive also needs to be raised appreciatively. I now assume a utility 2 for Terrorize and a utility of 3 for Cease fire. The Combat strategy diminishes the Terrorist’s strategy by 2 as in previous games. The payoff matrix is presented below.

**Table 3: Payoff matrix for model 2B**

		Boko Haram	
		Terrorize	Cease Fire
Home Zone	Combat	0, 0	1, 1
	Compromise	- 2, 2	0, 3

The dominant strategy for Boko Haram now becomes Cease Fire. The dominant strategy for the state is Combat but the state is likely not play this strategy since it undermines the incentive for Cease Fire and therefore reduces the game to model 2A or even Model 1.

**Model 3:** What happens if Boko Haram enters into a binding agreement with a Home Zone state (Not necessarily written or formal but could be a mutual understanding) such that Boko

Haram refrains from carrying out terrorist activities within the Home Zone state but takes its operation to other states of the country ( Be it another Home Zone state or not). The Home Zone state that enters into such agreement no longer suffer from Boko Haram attack ( and hence no negative utility from Terrorize strategy), in exchange it provides support (Directly or indirectly) to Boko Haram. Assuming Terrorize gives a utility of 5 to Boko Haram, then it will give a utility of 0 to the Home Zone state and we have a payoff matrix as in the table below.

		Boko Haram	
		Terrorize	Cease Fire
Home Zone	Combat	- 2, 3	- 2, - 2
	Compromise	0, 5	0, 0

Note that the game is not a zero sum game since the state does not incur negative utility from Boko Haram attack. Compromise is the dominant strategy for the state while Terrorize is once again a dominant strategy for Boko Haram.

**5. CONCLUSION**

Although the simulations are fictional, they can easily translate into the real problem at hand. We see from Model 1 that if there is no incentive to Cease Fire and the cost of Terrorism is not increased then Boko Haram will always prefer to Terrorize while the state is forced to Combat. This is the present situation.

Model 2A and 2B shows that if there is significant incentive to cease fire and the cost of Terrorism is significantly increased, then Boko Haram being rational will prefer to cease fire. Model 3 shows that if a Home Zone state should enter into an agreement with Boko Haram, then the state will be better off by not suffering from the insurgency in exchange for support to the sect. This support might be as trivial as turning a blind eye when Boko Haram receives foreign aid and when they import arms. This is a very tempting strategy since the Home Zone states have lots of Boko Haram sympathizers. We therefore suggest that:

The Federal Government of Nigeria should,

- 1      Significantly increase the cost of terrorism
- 2      Provide a significant incentive for Cease Fire
- 3      Make it impossible for any Home Zone state to enter into a binding agreement with Boko Haram.

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