# FAST AND FRUGAL CONFLICT EARLY WARNING IN SUB-SAHARAN AFRICA: THE ROLE OF INTELLIGENCE ANALYSIS

## **BRADLEY E. PERRY**

A Thesis

Submitted to the Faculty of Mercyhurst College

In Partial Fulfillment of the Requirements for

The Degree of

MASTER OF SCIENCE IN APPLIED INTELLIGENCE

DEPARTMENT OF INTELLIGENCE STUDIES MERCYHURST COLLEGE ERIE, PENNSYLVANIA AUGUST 2008

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> > Submitted By:

## **BRADLEY E. PERRY**

## **Certificate of Approval:**

Kristan Wheaton Assistant Professor Department of Intelligence Studies

Dawn Wozneak Instructor Department of Intelligence Studies

Phillip J. Belfiore Vice President Office of Academic Affairs

August 2008

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## ABSTRACT

Fast and Frugal Conflict Early Warning in Sub-Saharan Africa: The Role of Intelligence Analysis

By

Bradley E. Perry

Master of Science in Applied Intelligence Mercyhurst College, 2008 Professor Kristan J. Wheaton, Chair

Most conflict early warning systems rely on resource intensive methods. They often take years to develop, and are built on complicated algorithms that require vast amounts of data. Sub-Saharan Africa, a region where technologically advanced infrastructure and research dollars are not in abundance, arguably has the most pressing need for a quickly deployable conflict warning system.

This thesis presents information and analysis pertaining to the development of a fast and frugal analytical method, which would allow the analyst to make quick estimates without the burden of collecting large amounts of data and applying complicated mathematical formulas. Using simple correlation analysis, which drew from data on just three indicators of political freedom, ethnic homogeneity, and income inequality, a 'good enough' model produced results that necessitate a reassessment of the more complex warning systems in development today. An application of the model to Sub-Saharan Africa today revealed that twenty-three of its forty-seven countries are likely to face violent conflict. In order of ascending risk, they are Burundi, Comoros, Central African

Republic, Gabon, Kenya, Mozambique, Niger, Zambia, Madagascar, Chad, Guinea, Sudan, Cameroon, Cote d'Ivoire, Eritrea, Rwanda, Angola, Congo (Brazzaville), Congo (Kinshasa), Zimbabwe, Equatorial Guinea, Somalia, and Swaziland.

The research of this thesis is aimed at the erroneous assumption that conflict early warning is best engaged only by those who have unlimited budgets and operate outside of this alarmingly high-conflict region.

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## LIST OF ABBREVIATIONS

- AU Africa Union
- CEN-SAD Community of Sahelo Saharan States
- CEWARN Conflict Early Warning and Response Mechanism
- CIDCM Center for International Development and Conflict Management
- CIA Central Intelligence Agency
- COMESA Common Market for Eastern and Southern Africa
- CONIS Conflict Information System
- COSIMO Conflict Simulation Model
- DIA Defense Intelligence Agency
- DoD US Department of Defense
- EAC East African Community
- ECCAS Economic Community of Central African States
- ECOWAR ECOWAS Warning and Response Network
- ECOWAS Economic Community of West African States
- ELF Ethno-Linguistic Fractionalization Index
- EWS Early Warning System

HIIK	Heidelberg Institute for International Conflict Research	
IGAD	Intergovernmental Authority on Development	
IGO	Intergovernmental Organization	
I & W	Indications and Warning	
ISS	Institute for Security Studies (South Africa)	
MARAC	Central African Early Warning Mechanism	
NGO	Non Governmental Organization	
OAU	Organization of African Unity	
OMC	Observation and Monitoring Centre	
PITF	Political Instability Task Force (formerly the State Failure Task Force)	
REC	Regional Economic Community	
SADC	Southern Africa Development Community	
UN	United Nations	
WANEP	West African Network for Peace Building	

### INTRODUCTION

#### "Engaging in conflict prevention without an Early Warning system is like entering into a cave without a torch" William G Nhara<sup>1</sup>

Of the hundreds of conflicts the world faced during the second half of the 20<sup>th</sup> century, one in four originated in Sub-Saharan Africa.<sup>2</sup> Seventy percent of the crises escalated into violence that ranged from sporadic uses of force against the population to

full-scale war. While the face of conflict has changed since the Cold War from less frequent interstate to more frequent intrastate conflict (see Figure 1.1),<sup>3</sup> the scale of violence has not.<sup>4</sup> From 1989 to 2006, thirtynine armed conflicts



Figure 1.1. Center for Systemic Peace's Global Trends in Armed Conflict, 1946-2007. The graph illustrates the declining trend of interstate warfare amid substantially higher numbers of intrastate warfare.

<sup>&</sup>lt;sup>1</sup> William G. Nhara, "Early Warning and Conflict in Africa," Institute for Security Studies, http://www.iss.co.za/static/templates/tmpl html.php?node id=502&link id=3.

<sup>&</sup>lt;sup>2</sup> "COSIMO," Heidelberg Institute for International Conflict Research,

http://www.hiik.de/en/kosimo/index.html.

<sup>&</sup>lt;sup>3</sup> "Measuring Systemic Peace," Center for Systemic Peace, http://www.systemicpeace.org/conflict.htm. The indicators used by the center's assessment included security, governance, economic, and social dimensions of state performance.

<sup>&</sup>lt;sup>4</sup> John L. Davies and Ted R. Gurr, "Preventive Measures: An Overview," in *Preventive Measures: Building Risk Assessment and Crisis Early Warning Systems*, eds. John L. Davies and Ted R. Gurr (Lanham, MD: Rowman & Littlefield Publishers Inc., 1998), 2.

involved over half of the region's forty-seven states.<sup>5</sup> Today, nearly half of the world's internally displaced persons are in Africa.<sup>6</sup> There is major violence in the Democratic of the Congo, as well as in its neighbors. There is an ongoing border dispute between Ethiopia and Eritrea that is also hampering the resolution of fighting in Somalia. Genocide in the failed state of Sudan remains an intractable situation, while bordering Kenya, previously thought of as an island of stability, recently imploded following violence over disputed elections. The Center for Systemic Peace conducted an assessment of effectiveness and legitimacy indicators in 162 major countries to produce the State Fragility Index of 2007. The results, shown in Figure 1.2, illustrate the



Figure 1.2. Center for Systemic Peace's State Fragility Index 2007. This view of the world in 2007 shows a high concentration of extremely, highly, and seriously fragile states in Africa.

in all sectors.

<sup>&</sup>lt;sup>5</sup> Uppsala Conflict Database, Department of Peace and Conflict Research, Uppsala University, http://www.pcr.uu.se/database/index.php.

<sup>&</sup>lt;sup>6</sup> "Internal Displacement: Global Overview of Trends and Developments in 2006," Internal Displacement Monitoring Centre, http://www.internal-

displacement.org/8025708F004CFA06/(httpPublications)/6F9D5C47FA0DCCE2C12572BF002B9212?Op enDocument.

<sup>&</sup>lt;sup>7</sup> "Measuring Systemic Peace," Center for Systemic Peace, http://www.systemicpeace.org/conflict.htm.

Identifying opportunities to prevent or mitigate their disastrous effects is a greater challenge still. Such policies require an effective alert system based on both sound risk assessment and early warning.<sup>8</sup>

Preparation, if not prevention, necessitates the need to improve conflict early warning capabilities. Accurately estimating the onset of violent conflict is a great challenge for local conflict resolution and management mediators, as well as outside organizations involved in humanitarian and development initiatives. Early warning serves conflict resolution by enabling organizations to be proactive, thus allowing them to formulate more effective policy. Additionally, as they continue to work in areas otherwise insecure, there will be an increasing need to identify conflict before it threatens personnel. By reducing uncertainty through a timely alert methodology, conflict early warning serves any organization aiming to bring peace and development to this troubled region.

The analytic capability to accomplish this, however, is in question. Suzanne Verstegen, a research fellow at the Clingendael Security and Conflict Programme, claims that we still do not understand the mechanisms of conflict well enough to produce a viable indicators list.<sup>9</sup> The author of *Cowardly Lions: Missed Opportunities to Prevent Deadly Conflict and State Collapse*, I. William Zartman, claims that even when armed with a set of robust indicators, early warning systems often miscalculate their effects and warn of conflict that never materializes.<sup>10</sup> According to many, the considerable attention

<sup>&</sup>lt;sup>8</sup> Davies and Gurr, "Preventive Measures," 2.

<sup>&</sup>lt;sup>9</sup> Susanne Verstegen, "Conflict Prognostication: Towards a Tentative Framework for Conflict Assessment," Clingendael Institute, Netherlands Institute of International Relations, http://www.clingendael.nl/publications/papers/?volume=1999.

<sup>&</sup>lt;sup>10</sup> I. William Zartman, *Cowardly Lions: Missed Opportunities to Prevent Deadly Conflict and State Collapse* (Boulder: Lynne Rienner, 2005).

and effort on the part of analysts and policy makers has not resulted in substantial advances in this field.

The aim of this thesis is to build upon existing research in conflict analysis in order to identify new ways to assign levels of likelihood of emerging intrastate conflict in Sub-Saharan Africa (see Figure 1.3).<sup>11</sup> Ted R. Gurr, an architect of the Political Instability Task Force (PITF) and a leading authority on conflict analysis, points out that the task of early warning researchers is to assess risk, while the task of policy analysts is

to assess response.<sup>12</sup> As such, this thesis is not an exploration of policy options for which to counteract. manage, or suppress violent conflict, but rather a study of available tools for which to formulate those policies. In short, this thesis is about the torch for which to enter conflict the cave of



Figure 1.3. Sub-Saharan Africa. This study looks at those African countries south of the Sahara (highlighted in red).

prevention.

<sup>&</sup>lt;sup>11</sup> This study considers Sub Saharan Africa as an area distinct from that of North Africa. It is a region of 47 nation states, an area encompassing a diversity of environmental terrain, cultural identities and modes of political organization. Map taken from the Canadian International Development Agency, "Sub Saharan Africa," http://www.acdi-cida.gc.ca/CIDAWEB/acdicida.nsf/En/NIC-5595719-JDD.

<sup>&</sup>lt;sup>12</sup> Ted R. Gurr, "A Risk Assessment Model of Ethnopolitical Rebellion," in Preventive Measures: Building Risk Assessment and Crisis Early Warning Systems, eds. John L. Davies and Ted R. Gurr (Lanham, MD: Rowman & Littlefield Publishers Inc, 1998), 2.

#### LITERATURE REVIEW

In December 2006 organizations from across Sub-Saharan Africa assembled at the University of Cape Town in South Africa to discuss opportunities to enhance conflict early warning initiatives for the region. Participation came from many of the region's intergovernmental organizations including the Economic Community of Central African States (ECCAS), the Economic Community of West African States (ECOWAS), the Horn of Africa's Intergovernmental Authority on Development (IGAD), and the Southern African Development Community (SADC).<sup>13</sup> The workshop defined early warning as:

The systematic collection and analysis of information coming from areas of crises or potential crises for the purposes of anticipating the escalation of violent conflict; developing strategic responses to these crises; and presenting preventive or mitigating options to critical actors for the purposes of decision-making.<sup>14</sup>

They also described the tool for which to accomplish the task, a functional early warning system, which "relies on an information network and database that can predict, forecast and extrapolate on future conflict scenarios."<sup>15</sup>

This chapter will attempt to synthesize available information on conflict early warning theory and practice, as well as intelligence analysis. It will concentrate on research that focuses on early warning in the African context and on the application of real-world models. The general term early warning will refer to both conflict risk assessment and early warning, unless otherwise differentiated.

<sup>&</sup>lt;sup>13</sup> "Enhancing Conflict Early Warning Capacity and Training Methodologies in Africa" (workshop report of the Centre for Conflict Resolution conference, Johannesburg, South Africa, December 15-16 2006).
<sup>14</sup> Ibid.

<sup>&</sup>lt;sup>15</sup> Ibid

## Intelligence Early Warning

Perhaps unwittingly, the early warning workshop in South Africa described impossibility. It is safe to say no one has created a system that has the ability to predict; it is likely that no one ever will. In fact, if prediction were the goal in conflict early warning, the intelligence field would have little to offer. Former US government intelligence analyst and author of *Anticipating Surprise: Analysis for Strategic Warning* Cynthia Grabo gives this caveat:

Warning is not a fact, a tangible substance, a certainty, or a provable hypothesis. It is not something which the finest collection system should be expected to produce full blown or something which can be delivered to the policymaker with the statement, 'Here it is. We have it now.'<sup>16</sup>

Nevertheless, the field does strive to forecast or, as the intelligence community would call it, estimate. In the intelligence community, early warning is also known as "Indications and Warning" or simply, "I and W."<sup>17</sup> Like its parent field, intelligence early warning is interdisciplinary, drawing on the fields of political science, international relations, and geography among others. It also draws from many types of intelligence such as descriptive, explanatory and estimative.

According to Retired US Colonel Timothy M. Laur, the primary role of I & W and its accompanying systems is simply to aid the decision maker in avoiding surprise.<sup>18</sup> It is a definition that is reminiscent of intelligence itself.<sup>19</sup> Laur describes two types of

<sup>&</sup>lt;sup>16</sup> Cynthia M. Grabo, *Anticipating Surprise: Analysis for Strategic Warning* (Lanham, MD: University Press of America, Inc., 2004), 4.

<sup>&</sup>lt;sup>17</sup> Ibid.

<sup>&</sup>lt;sup>18</sup> Timothy M. Laur, "*Principles of Warning Intelligence*," in *The Military Intelligence Community*, eds. Gerald W. Hopple and Bruce W. Watson (Boulder: Westview Press, 1986), 151.

<sup>&</sup>lt;sup>19</sup> Robert M. Clark, *Intelligence Analysis: A Target-Centric Approach* (Washington: CQ Press, 2004), 13. Clark defines intelligence as reducing uncertainty in conflict, that of physical and non physical conflict of divergent interests. Grabo notes that there is seemingly little difference between warning intelligence and its parent field. The difference exists in the level of analytic intensity: that warning intelligence poses a unique complexity of difficulties including substantial knowledge inadequacies, the heightened need to

warning: that produced from the analytical process, and that which comes from the decision maker.<sup>20</sup> Warning for this study is concerned with that which results from an analysis of indications. To clarify, an indicator is an event not yet realized; an indication is one that has occurred. There is a subtle distinction between the two, largely based on timing; in other words, indicators are events or conditions that one would monitor in order to produce a warning statement. That same indicator becomes an indication once it has transpired and the analyst has observed it.

Intelligence early warning in the US first came about in the 1950's in response to the events of Pearl Harbor and the growing threat of the USSR, particularly the threat of nuclear war. It was an effort first taken on by the Department of Defense (DoD), who assigned the task to the US Air Force. In the 1960's, the Defense Intelligence Agency (DIA) took over as the lead coordinating agency and developed a network of early warning centers. These *early* warning initiatives were primarily a, "forecast of activities of potential enemies or of foreign governments inimical to US interests."<sup>21</sup>

Through the efforts of the US civilian and defense intelligence community, there are a vast collection of warning products that cover or covered immediate (the *Warning Memorandum, Warning Report,* and *Watch Condition Change*), weekly (the *Weekly Intelligence Forecast,* and *Weekly Warning Forecast*), monthly (the *Monthly Warning Report, The Warning Watchlist,* and *Quarterly Warning Forecast*) and yearly timeframes (the *Annual Warning Forecast*).<sup>22</sup> The warning systems that create these products today now consider all, "developments that could have sudden and deleterious effects on US

presume surprise, a larger set of possibly relevant information, greater demands for objectivity and realism, and the need to make immediate conclusions. Grabo, *Anticipating Surprise*, 32-42.

<sup>&</sup>lt;sup>20</sup> Laur, "Principles of Warning Intelligence," 150.

<sup>&</sup>lt;sup>21</sup> Ibid., 154.

<sup>&</sup>lt;sup>22</sup> Jeffrey T. Richelson, *The US Intelligence Community* (Boulder: Westview Press, 1999), 319.

security or policy,"<sup>23</sup> rather than focus solely on traditional state actors and the threat of interstate war. Grabo describes the new focus this way,

Warning could be said to be an almost unlimited responsibility of the intelligence system and to involve potentially almost any development anywhere in the world.<sup>24</sup>

### Differences Between Intelligence and Conflict Early Warning

Verstegen describes early warning as simply, "judging the probability that certain events will lead to violence or other crises."<sup>25</sup> The definitions of Laur and Robert M. Clark, a former US intelligence analyst, appear to apply here; however, theirs are not the only definition of intelligence. Kristan J. Wheaton and Michael T. Beerbower, of Mercyhurst College's Institute of Intelligence Studies, addressed the systemic inconsistency of how the US defines intelligence in "Towards a New Definition of Intelligence."<sup>26</sup> Their response is a new definition of intelligence as, "a process, focused externally and using information from all available sources, that is designed to reduce the level of uncertainty for a decision maker."<sup>27</sup> Though Susanne Schmeidl, a former senior analyst at the Swiss Peace Foundation's FAST unit,<sup>28</sup> concludes that intelligence and conflict early warning are functionally the same, her explanation suggests a different understanding. She believes that the former is about ensuring state security and the latter

<sup>&</sup>lt;sup>23</sup> Richelson, *The US Intelligence Community*, 319.

<sup>&</sup>lt;sup>24</sup> Grabo, Anticipating Surprise, 2.

<sup>&</sup>lt;sup>25</sup> Verstegen, "Conflict Prognostication," 3.

<sup>&</sup>lt;sup>26</sup> Kristan J. Wheaton and Michael T. Beerbower, "Towards a New Definition of Intelligence," *Stanford Law and Policy Review* 17 (2006): 319-330.

<sup>&</sup>lt;sup>27</sup> Ibid., 329.

<sup>&</sup>lt;sup>28</sup> "FAST International," Swiss Peace Foundation, http://www.swisspeace.ch/typo3/en/peace-conflictresearch/previous-projects/fast-international/index.html. FAST, which stood for Early Recognition of Tension and Fact Finding, was a pilot study in conflict early warning at the Swiss Peace Foundation from 1998-2008.

about human security.<sup>29</sup> Howard Adelman and Astri Suhrke, authors of "The International Response to Conflict and Genocide: Lessons from the Rwanda Experience," equally argue that, "early warning serves the common good and thus differs from traditional intelligence."<sup>30</sup>

The perception of intelligence as something that involves secrecy and national interest seems to be rather commonly held in many circles, both in and out of the government. The researcher finds this troubling. The misperception of intelligence as a process designed only for state security and competition seriously damages the universality of its utility. The use of intelligence by other types of organizations like NGOs, IGOs, aid agencies and humanitarian organizations is unfortunately still considered an alternative application that is, an un-traditional one. Those organizations that do practice it (nearly every organization has to plan with some degree of foreknowledge) often incorporate it into other functions, for example, research analysis, information analysis, investigative research, and strategic planning, among others. One would be hard pressed to ever hear it referred to as *intelligence*.<sup>31</sup> In support of intelligence as an appropriate term and tool for any organization that seeks to reduce uncertainty in its decision making, this thesis ascribes to Wheaton and Beerbower's definition.

Schmeidl goes on to argue finer differences inherent in the analytic processes of intelligence and traditional early warning. According to the author, information collected

<sup>&</sup>lt;sup>29</sup> Susanne Schmeidl, "Conflict Early Warning and Prevention: Toward a Coherent Terminology," in *Early Warning and Conflict Management in the Horn of Africa*, eds. Mwaûra Cirû and Susanne Schmeidl (Asmara, Eritrea: The Red Sea Press, Inc., 2002), 73.

<sup>&</sup>lt;sup>30</sup> Howard Adelman and Astri Suhrke, "The International Response to Conflict and Genocide: Lessons from the Rwanda Experience," (1996): quoted in Schmeidl, "Conflict Early Warning and Prevention," 75.

<sup>&</sup>lt;sup>31</sup> While the author does not have a long work history with NGOs, there have been enough meaningful professional experiences with environmental and humanitarian groups to make this observation. NGOs do practice intelligence; they just do not commonly refer to it as such.

for early warning tends to be available in the public arena, while information gathered in intelligence is often secret and protected.<sup>32</sup> This difference in turn leads to very different approaches in analysis and dissemination. According to the author, traditional intelligence analysts work in a closed environment, within a centralized post, whereas traditional early warning analysts work with a team of outsider experts or outsource the analysis all together. Early warning is decentralized and depends on the civilian sector for information and analysis. Also, traditional early warning is built upon coordination and facilitation rather than control of information. Schmeidl concludes that this type of early warning, "is best defined as a disinterested intelligence system, designed to serve human security in the region and not the narrow interests of states."<sup>33</sup> Henri Boshoff, a military analyst in the Africa Security Analysis Programme at the South African NGO Institute for Security Studies (ISS), presented the differences between early warning and traditional intelligence to the African Union (AU) Conference "Meeting the Challenge of Conflict Prevention in Africa - Towards the Operationalization of the Continental Early Warning System." He remarked that states' concerns over sovereignty have previously hampered the collection and analysis required of an effective early warning system. In order to gain acceptance of the methods employed by an early warning system, he argued that there must be a push for a broader view of security writ large.<sup>34</sup> Still, his views do not reflect the more comprehensive understanding of intelligence discussed above. His approach to intelligence, however arguably short-sighted, must be considered in any

<sup>&</sup>lt;sup>32</sup> Schmeidl, "Conflict Early Warning and Prevention," 74.

<sup>&</sup>lt;sup>33</sup> Schmeidl, "Conflict Early Warning and Prevention," 76.

<sup>&</sup>lt;sup>34</sup> Henri Boshoff, "Early Warning: Some Techniques and Other Thoughts" (presentation to the African Union conference "Meeting the Challenge of Conflict Prevention in Africa - Towards the Operationalization of the Continental Early Warning System" Addis Ababa Ethiopia October 30-31

Operationalization of the Continental Early Warning System," Addis Ababa, Ethiopia, October 30-31, 2003).

discussion of the application of intelligence methodologies outside its traditional community. If the majority of non-users have this view (see Table 2.1), it can be assumed that they will have a natural inclination against it. The adoption of intelligence analysis *per se* by the early warning field will no doubt require a mindset change.

Early Warning	Traditional Intelligence Systems
Depends on the collection and analysis of information, scenario-building and the presentation of recommendations to decision- makers	Depends also on the collection and analysis of information, scenario- building and the presentation of recommendations to decision- makers
Focuses on human security	Focuses on state security
Seeks to serve larger objectives than those of the state <i>stricto sensu</i>	Seeks to serve state interest
Depends on transparent methods and sharing of information	Rely on secrecy, situation rooms and encrypted communications of classified information
Transparency in information and analysis	Closed system
Decentralized and dependent upon other sources of information and analysis	Centralized and dependent on in- house information and analysis

Table 2.1 Boshoff's Differences Between Early Warning and Traditional Intelligence Systems

#### Fundamentals of Conflict Early Warning

Conflict early warning is part and parcel to conflict prevention; however, it differs from other conflict mitigation efforts because it applies to pre-conflict stages. While early action is important in peace building and conflict management, these applications apply only after conflict erupts, escalates, and subsides. The difference is important for Schmeidl, for if early warning initiatives become mixed with conflict management, there is a tendency to shape its analysis in favor of policy promotion.<sup>35</sup> Conflict prevention for Verstegen, the aim of what she calls conflict prognostication, can be approached in three main ways: the theoretical concern of predictability, regarding issues of reliability and

<sup>&</sup>lt;sup>35</sup> Schmeidl, "Conflict Early Warning and Prevention," 76.

validity in early warnings and risk assessments; the practical concern of action, regarding operational concerns of how to respond; and the concern of desirability, regarding political issues of sovereignty and non interference.<sup>36</sup> The approach in this research best follows Vertstegen's first concern, that of the potential for an alternatively built model to be reliable and valid.

#### Assigning Intensity of Conflict

Traditionally, intra-state conflict researchers have based their studies of the subject on the seminal project *Correlates of War* by political scientist and historian J. David Singer and Melvin Small.<sup>37</sup> They defined civil war as one that involves military action and the national government, incurs at least 1,000 battle deaths, and has an effective resistance.<sup>38</sup> Today there are an abundance of definitions, both in quantitative and qualitative terms. The Heidelberg Institute for International Conflict Research (HIIK) defines conflict simply as, "the clashing of overlapping interests around national values and issues," that must be, "of some duration and magnitude," and involve at least two parties, one of which is the state.<sup>39</sup> Conflict need not be violent and is indeed inherent in all politically organized entities. Such a definition includes varying degrees of intensity, such as *latent* (completely nonviolent), *crisis* (mostly nonviolent), *severe crisis* (sporadic, irregular use of force, 'war-in-sight' crisis), and *war* (systematic, collective use of force

<sup>&</sup>lt;sup>36</sup> Verstegen, "Conflict Prognostication," 2.

<sup>&</sup>lt;sup>37</sup> J. David Singer and Melvin Small, *The Correlates of War I: Research Origins and Rationale* (New York: Free Press, 1979).

<sup>&</sup>lt;sup>38</sup> Paul Collier and Anke Hoeffler, "Data Issues in the Study of Conflict" (paper prepared for the conference "Data Collection on Armed Conflict," Uppsala, Sweden, June 8-9, 2001.

<sup>&</sup>lt;sup>39</sup> "KOSIMO Manual," Facts on International Relations and Security Trends, http://first.sipri.org/www/kosimo.html#variables.

by regular troops).<sup>40</sup> The Uppsala Conflict Data Program assesses only armed conflicts, defined as being a, "contested incompatibility which concerns government and/or territory where the use of armed force between two parties, of which at least one is the government of a state, and results in at least 25 battle-related deaths."<sup>41</sup> The State Failure Task Force, now known as the Political Instability Task Force (PITF),<sup>42</sup> organizes instances of state failure, where severe political instability exists, into four event categories: revolutionary wars, ethnic wars, adverse regime changes, and genocides and politicides.<sup>43</sup>

For conflict early warning purposes, Verstegen says there is a weakness in focusing on specific types of conflict, such as ethnic, communal, state failure, genocide, politicide, and human rights violations, among others. The danger is that conflicts are rarely mono-causal.<sup>44</sup> Thus, is it difficult, if not impossible, to tailor an indicators list to only estimate a particular kind of conflict. Schmeidl describes the focus of conflict early warning practice in the Horn of Africa as simply violent conflict that can lead to, "destruction, instability and humanitarian disaster."<sup>45</sup> As such, the model proposed here is not aimed at estimating the outbreak of a particular kind of conflict; rather, its goal is to accurately estimate intrastate conflict, although loosely defined, as conflict that nevertheless involves some degree of systemic violence from severe crisis to war.

<sup>42</sup> "Political Instability Task Force Home Page," George Mason School of Public Policy, http://globalpolicy.gmu.edu/pitf/pitfdata.htm. The Political Instability Task Force (PITF) is a panel of scholars and methodologists whose objective is "to develop statistical models that can accurately assess countries' prospects for major political change and can identify key risk factors of interest to US policymakers." Their research is based on open sources.

<sup>&</sup>lt;sup>40</sup> "KOSIMO Manual," Facts on International Relations and Security Trends.

<sup>&</sup>lt;sup>41</sup> "Uppsala Conflict Database: Definitions," Department of Peace and Conflict Research, Uppsala University, http://www.pcr.uu.se/database/definitions\_all.htm.

<sup>&</sup>lt;sup>43</sup> Jack A. Goldstone, et al., "State Failure Task Force Report: Phase III Findings," Political Instability Task Force, George Mason School of Public Policy,

http://globalpolicy.gmu.edu/pitf/SFTF%20Phase%20III%20Report%20Final.pdf.

<sup>&</sup>lt;sup>44</sup> Verstegen, "Conflict Prognostication," 3.

<sup>&</sup>lt;sup>45</sup> Schmeidl, "Conflict Early Warning and Prevention," 70.

## Types of Models

Verstegen defines an early warning model as one that identifies, "a clear set of indicators that can be analyzed within a pre-specified framework, which should provide us with an assessment of the conflict potential and the chances of escalation into violent conflict."<sup>46</sup> When deciding how to go about constructing a model, Verstegen lists a number of questions to answer:

- What is the objective? (descriptive of the how and why, or anticipative, where apprehension is sufficient)
- Who will be the user? (internal use within an organization, or provided to the public in order to convince)
- What is the dependent variable (generic conflict, or specific to the type of conflict: intrastate, interstate)
- What are the independent variables? (in other words, the indicators chosen)
- What is the significance of each of the indicators? (the weight of the indicators chosen)
- Is the data quantitative or qualitative? (statistical, or a narrative description)
- What will be the coverage of the indicators? (indicator research focuses on generic conflict processes or case specific conflict)
- What will be the timing of the warning? (a remote and intermediate risk assessment, or an accelerator and trigger focused early warning)<sup>47</sup>

Table 2.2 outlines the main differences regarding the consideration of timing.<sup>48</sup>

Early Warning	Risk Assessment
Anticipates possible outcomes	Predicts probabilities
Dynamic	Static
Context-sensitive	Generalizable
Mostly qualitative analysis	Mostly quantitative analysis
Focuses on particulars	Focuses on general indicators
Traces narrative patterns	Analyses comparative patterns and trends

Table 2.2 Boshoff's Differences Between Early Warning and Risk Assessment

<sup>&</sup>lt;sup>46</sup> Verstegen, "Conflict Prognostication," 3.

<sup>&</sup>lt;sup>47</sup> Ibid., 3-4.

<sup>&</sup>lt;sup>48</sup> Boshoff, "Early Warning: Some Techniques and Other Thoughts."

John L. Davies, of the Center for International Development and Conflict Management (CIDCM), and Gurr outline three types of early warning models: correlation, sequential, and inductive. The first focuses on structural indicators (independent variables) that relate to conflict in a country (dependent variable), usually tested after the fact with multiple regression analysis. The second concentrates on the role triggers and accelerators have on understanding the sequential process of conflict escalation. The inductive model analyzes events and conditions to understand the complex patterns that precede the outbreak of conflict. It is a departure from understanding the *whys* and *hows* to focusing on the patterns of intensification.<sup>49</sup>

In an AU meeting to discuss the methodological issues of early warning, participants concluded that general risk models (Stage A Conflict Analysis) avoid the exact specification of complex and interactive risk factors in early warning models (Stage B & C).<sup>50</sup> They suggest a strong relationship between a country's poverty and the onset of violent conflict, saying that that such models are based on the premise that, "low development = high risk of negative conflict, and low conflict management capacity = high risk of instability onset." Stage A models are fairly good at identifying the states most likely to violent conflict, but not exactly when it will occur. They incorporate, "a broad and fairly comprehensive array of indicators" (see Figure 2.1 on the next page).<sup>51</sup>

<sup>&</sup>lt;sup>49</sup> Davies and Gurr, "Preventive Measures," 8-9.

<sup>&</sup>lt;sup>50</sup> "Meeting the Challenge of Conflict Prevention in Africa: Issue Paper No. 2: Proposal for an Indicators Module," African Union, http://www.africa-union.org/root/ua/Conferences/decembre/PSC/17-19%20dec/home-Eng.htm.

<sup>&</sup>lt;sup>51</sup> "Meeting the Challenge of Conflict Prevention in Africa: Background Paper No. 3," African Union, http://www.africa-union.org/root/ua/Conferences/decembre/PSC/17-19%20dec/home-Eng.htm.



Figure 2.1. The AU's Stages of Strategic Conflict Assessment.

The presence of "Stage A" type models versus more specified ones suggests that the early warning field clearly distinguishes between that of risk assessment and early warning. Again, the distinction is one of timing. Closely mirroring the AU's classification model, Davies and Gurr outline three broad stages in the evolution of a crisis: structural tensions, escalation, and crisis. An analyst may track a crisis at its earliest stage through the identification of background conditions, or structural tensions. Such conditions might be, "a history of state repression, exclusionary ideologies, lack of democratic experience, high cohesion and external support for aggrieved groups, land desertification, and increasing population pressures."<sup>52</sup> An estimation of conflict in this stage would be one that looks forward several years and is generally referred to as a *risk assessment*. An analyst seeking to estimate the escalation of a crisis that will likely occur in months or weeks would consider conflict accelerators, which include, "arms acquisitions, incidents of aggressive posturing or low-intensity violence, new

<sup>&</sup>lt;sup>52</sup> Davies and Gurr, "Preventive Measures," 4.

discriminatory and repressive policies, crop failures, and major currency devaluations."<sup>53</sup> Davies and Gurr refer to this as *dynamic early warning*. An analysis of the last stage of a crisis would consider trigger events such as, "a coup attempt, assassination, external intervention or declared state of emergency." Davies and Gurr call this timing *late warning*, where it is often too late for proactive policymaking.<sup>54</sup> Barbara Harff, Professor Emeritus of Political Science at the US Naval Academy, describes these levels with the analogy of fire; a match (trigger) thrown on a gasoline (accelerator) soaked pile of logs (background conditions) produces conflict.<sup>55</sup>

#### Early Warning Practice in Africa

In 1990, the Organization for Africa Unity (OAU) rededicated itself, "to work together towards the peaceful and speedy resolution of all conflicts."<sup>56</sup> Out of this agreement came the plan to develop and implement a continental-wide early warning system for its member states, the Secretary General of the OAU, the central organ and partner non-governmental organizations (NGOs).<sup>57</sup> However, not all these consumers were convinced of its merits. When the OAU began exploring the viability of an early warning system, some member states expressed fears that the warnings would be criticized or even repressed by defensive governments not open to perceived external criticism.<sup>58</sup> The OAU itself cast doubt on how it might realize and effective early warning

<sup>&</sup>lt;sup>53</sup> Davies and Gurr, "Preventive Measures," 4.

<sup>&</sup>lt;sup>54</sup> Ibid., 5.

 <sup>&</sup>lt;sup>55</sup> Barbara Harff, "Early Warning of Humanitarian Crises: Sequential Models and the Role of Accelerators," in *Preventive Measures: Building Risk Assessment and Crisis Early Warning Systems*, eds. John L. Davies and Ted R. Gurr (Lanham, MD: Rowman & Littlefield Publishers Inc, 1998), 73.
 <sup>56</sup> Jannie Malan, *Conflict Resolution Wisdom From Africa* (Durban, South Africa: ACCORD, 1997), 80.

<sup>&</sup>lt;sup>57</sup> Nhara, "Early Warning and Conflict in Africa".

<sup>58</sup> Ibid.

system, for its charter stated a commitment to non-interference in the internal affairs of its members.<sup>59</sup>

The OAU would eventually give way to the creation the African Union, established at the Durban Summit in 2002.<sup>60</sup> In December 2003, the AU member states established the Peace and Security Council and mandated it to be able to "anticipate and prevent conflicts" through a functioning continental-wide early warning system (EWS). Article 12 of the protocol describes this EWS as consisting of a monitoring center (called "The Situation Room") where staff would collect and analyze "political, economic, social, military and humanitarian" indicators. The Situation Room would also link with the efforts of regional bodies tasked with similar responsibilities.<sup>61</sup> In July 2005, an AU commission drafted an implementation roadmap that covered areas of data collection, analysis, and the development of an indicators module, along with the production of early warning reports and coordination with decision-makers: the AU, Regional Economic Communities (RECs), and other stakeholders.<sup>62</sup>

There are several RECs on the continent that have also attempted to establish their own early warning mechanism. Below is a brief summary of these initiatives. In 1999 the *Economic Community of West African States (ECOWAS)* agreed on a protocol to establish an Observation and Monitoring Centre (OMC), which would collect, process and analyze data, and produce reports on its fifteen member states for the Executive

http://www.uneca.org/eca\_resources/Speeches/2002\_speeches/030702prof\_maria.htm.

<sup>&</sup>lt;sup>59</sup> Mario Nzomo, "The Architecture and Capacity of the African Union," (paper presented at the AU/ADF III Symposium, Addis Ababa, Ethiopia, March 3-8, 2002),

<sup>&</sup>lt;sup>60</sup> "African Union In A Nutshell," African Union, http://www.africa-union.org/root/au/AboutAu/ au\_in\_a\_nutshell\_en.htm.

<sup>&</sup>lt;sup>61</sup> "Protocol Relating to the Establishment of the Peace and Security Council of the African Union," African Union, http://www.africa-union.org/rule\_prot/PROTOCOL-%20PEACE%20AND%20SECURITY %20COUNCIL%20OF%20THE%20AFRICAN%20UNION.pdf.

<sup>&</sup>lt;sup>62</sup> "Meeting the Challenge of Conflict Prevention in Africa: Concept paper," African Union, http://www.africa-union.org/root/ua/Conferences/decembre/PSC/17-19%20dec/home-Eng.htm.

Secretary.<sup>63</sup> Working with the West African Network for Peace Building (WANEP), it is now trying to make operational the ECOWAS Warning and Response Network (ECOWARN).<sup>64</sup>

The *Economic Community of Central African States (ECCAS)* is still in the process of creating the Central African Early Warning Mechanism (*Mécanisme d'Alerte Rapide en Afrique Centrale-MARAC*). Its protocol calls for a network of offices, a staff of inter-disciplinary experts, and a situation room for, "data collection and analysis in order to prevent crises and conflicts."<sup>65</sup>

The Intergovernmental Authority on Development (IGAD) established the Conflict Early Warning and Response Mechanism (CEWARN) to focus on violent conflict that ranges in scale from low level violence (such as that which occurs in pastoral areas and along borders) to that of intra- and inter-state war.<sup>66</sup> Its tasks are similar to the other REC initiatives.

Other RECs, such as the East African Community (EAC), the Common Market for Eastern and Southern Africa (COMESA), Community of Sahelo Saharan States (CEN-SAD), and the Southern Africa Development Community (SADC) do not yet have an agreed upon functioning system or are finishing the development of one.

In April 2006, a workshop made several recommendations for the practice of early warning at the regional and continental levels. Some of those recommendations were to generate more primary data from civil society, universities, and research

<sup>&</sup>lt;sup>63</sup> "ECOWAS Newsletter, Issue 2 March 2007," ECOWAS,

http://www.ecowas.int/publications/en/newsletter/ECOWAS\_Newsletter\_Issue2-eng.pdf.

 <sup>&</sup>lt;sup>64</sup> "WANEP Renews Partnership with ECOWAS," WANEP, http://www.wanep.org/news\_releases.htm
 <sup>65</sup> Jakkie Cilliers, "Towards a Continental Early Warning System for Africa," Institute for Security Studies, April 2005, http://www.iss.co.za/pubs/papers/102/Paper102.htm.

<sup>&</sup>lt;sup>66</sup> Schmeidl, "Conflict Early Warning and Prevention," 70.

institutions; make use of automatic public news clipping systems; develop a system of grading sources and reports to diminish information overflow and to increase work efficiency; make more efficient use of IT technology to foster the development of compressed products for end-users; develop a systematic framework of analysis; define a limited number of easy-to-monitor conflict- or case-specific indicators; link indicators to the standards approved by the Assembly of Heads of State and Government, in July 2002; focus on both immediate threats to human security and on underlying structural causes of conflict; strengthen analytical capacities to adjust country-specific analyses; and develop a continental framework of information gathering and analysis which is supplementary to the RECs (for the complete list of recommendations, see Appendix A).<sup>67</sup>

William G. Nhara, a former advocate for the establishment of an early warning system for the OAU, suggests that an early warning system for the African context should be based on a number of methodologies; rather than detail how their incorporation into one system might appear however, he merely lists general sources of information to include: historical surveys and analyses of events, analyses of the content of documents and reports, comparative analyses of relevant information, physical inspections and field visits, statistical sampling and inference, operations research techniques, economic and econometric analysis, and modeling and remote sensing.<sup>68</sup> This enumeration offers little explanation as to how the analyst might process the information, except to say that the responsible agency should store it in a database.

<sup>&</sup>lt;sup>67</sup> "Meeting the Challenge of Conflict Prevention in Africa: Concept paper".

<sup>&</sup>lt;sup>68</sup> Nhara, "Early Warning and Conflict in Africa".

At an AU appointed commission meeting on conflict early warning, delegates proposed the creation of an indicators module that drew from a set of documents that outlined issues affecting state, regional and international security, principles of democratic governance, and commonly accepted norms on human rights and the establishment of a strong civil society (see Figure 2.2).<sup>69</sup> True to their "generic" classification, the list ran the gamut of background, trigger, and accelerator type indicators (see Appendix B), for which an indicators-based model would serve the creation a continental-wide early warning system.



Figure 2.2. AU Proposal for an Indicators Module.

The organization's efforts are not the first of its kind in Africa, but mark an important change as the region's decision makers seek to no longer rely on the outside

<sup>&</sup>lt;sup>69</sup> "Meeting the Challenge of Conflict Prevention in Africa: Proposal for an Indicators Module".

world to foresee its own internal threats. Regarding the AU's Peace and Security Council early warning initiative, Dr. Annie B. Chikwanha, a senior Research Fellow at the ISS's African Human Security Initiative, says that the body is hampered with political concerns due in part to its leadership by African politicians who cannot and/or will not initiate real progress. In particular, she said that information sharing is an incredible challenge for the organization that lacks resources and the analytical ability of those with technical knowhow (A.B. Chikwanha, pers. comm.). Robert Mudida, a professor of International Conflict Management at the University of Nairobi, described the AU's "Situation Room" as merely one set up with CNN TV. According to him, it is not proving to be an effective institution in regards to prediction (R. Mudida, pers. comm.).

#### Indicator Selection

The premise behind traditional warning indicator lists comes from a reasoning that a nation will undertake certain measures (military, political, and economic) to prepare for war. Indicator lists for traditional intelligence purposes tend to be substantial because the analyst considers factors relating not only to the mobilization of forces, but also to a large variety of other preparations a country may take prior to initiating hostilities. In deciding which factors to include, Grabo explains that the analyst can draw from three sources of knowledge: logic of longtime historical precedent, specific knowledge of the state's practices, and lessons learned from a recent war or crisis.<sup>70</sup>

Verstegen says the issue of which indicators to apply to a conflict warning model is not one that is heavily debated.<sup>71</sup> Indicator lists vary from one model to the next,

<sup>&</sup>lt;sup>70</sup> Grabo, Anticipating Surprise, 25.

<sup>&</sup>lt;sup>71</sup> Verstegen, "Conflict Prognostication," 3.

depending on the model's theoretical and methodological considerations. In a meeting on early warning and conflict prevention for the African Union, attendees agreed that since available data on conflict is largely based on inter-state rather than intrastate violent conflict, there is no comprehensive list of the kind of conflict most common to the region for which to generate an adequate list of universal early warning indicators. Their findings claim that it is easier to find indicators for a specific type of conflict, for example, ethnic or pre-electoral conflicts, than to find common indicators between different cases. Nevertheless, one observer argued that, "there is no strong evidence that any of the indicators they (other early warning systems) propose are truly conflict early warning indicators."<sup>72</sup>

Mudida cautions conflict researchers on the tendency to assign greater importance to certain factors of a particular type of conflict. For example, a popular idea in the study of the role resource abundance and scarcity has on conflict, an area receiving great attention from the media and policy makers, is that competition over natural resources in African states is its leading cause. Mudida proposes that the presence of natural resources alone does not suggest a high likelihood for conflict; rather, a more important factor is the additional presence of anomalous structures, such as poor governance, which produce structural violence.<sup>73</sup> The Collier-Hoeffler model proposes that there are three significant factors: level of income per capita, rate of economic growth, and dependency on primary

<sup>&</sup>lt;sup>72</sup> "Meeting the Challenge of Conflict Prevention in Africa: Proposal for an Indicators Module".

<sup>&</sup>lt;sup>73</sup> Robert M. Mudida, "The Nature of Africa's Resource Conflicts," (paper presented at conference *Cursed by Riches: Resources and Conflicts in Africa*, Nairobi, Kenya, December 6-8, 2007. Mudida defines structural violence as the condition "in which human beings are unable to realize their full potential: where their somatic and mental realizations are below their potential realizations."

commodity exports.<sup>74</sup> Also important are ethnic dominance (where one group accounts for 45-90 percent of the population) and whether a country has seen civil war in the past (risk reduces about 1 percentage point a year).<sup>75</sup>

John Katunga, a Catholic Relief Services Regional Office Director in Nairobi, agrees with Mudida in that where there is natural resource based conflict, other ingredients must be present. On the one hand, weak or collapsed state institutions where the government is unable to control the territory, is unable or unwilling to collect taxes (case of the *rentier state*), and has rampant systemic fraud and corruption increases the likelihood of resource based conflict. On the other hand, a strong government can increase the likelihood where it restricts basic freedoms, provides no entity for public control, enjoys little legitimacy, and intimidates the populace. Such a government embarks on exploitative extraction and does not distribute resources or revenues from the sales of resources equitably.<sup>76</sup> Although there is still much debate as to whether natural resources are causative or merely correlative to internal conflict, there is general agreement that if one resource were especially important, it would be oil. Though skeptical of the causative theory, UCLA Associate Professor Dr. Michael Ross concedes that oil increases the likelihood of conflict.<sup>77</sup> In Resource Wars, author Michael Klare underscores its importance, saying that of the most vital resources (water, minerals,

<sup>&</sup>lt;sup>74</sup> Paul Collier and Anke Hoeffler, "Aid, Policy, and Peace," (2004): quoted in Paul Collier and Ian Bannon, "Natural Resources and Conflict: What We Can Do," in *Natural Resources and Violent Conflict: Options and Actions* (Washington: World Bank, 2003), 2.

<sup>&</sup>lt;sup>75</sup> Ian Bannon and Paul Collier, "Natural Resources and Conflict: What We Can Do" in *Natural Resources and Violent Conflict: Options and Actions*, eds. Ian Bannon and Paul Collier (Washington: World Bank, 2003), 2-3.

<sup>&</sup>lt;sup>76</sup> John Katunga, "Citizenship, Rights and Resource Conflicts in Africa," presentation at conference *Cursed* by *Riches: Resources and Conflicts in Africa* Nairobi, Kenya, December 8, 2007.

<sup>&</sup>lt;sup>77</sup> Michael Ross, "What Do We Know About Natural Resources and Civil War?" *Journal of Peace Research*, Vol. 41, No. 3, May 2004: quoted in Robert Mudida, "The Nature of Africa's Resource Conflicts" Paper presented at conference *Cursed by Riches: Resources and Conflicts in Africa* Nairobi, Kenya, December 6-8, 2007.

energy, and timber) none is more likely to produce conflict than oil between states. However, he too places the role in context, saying that, "the political and strategic environment in which decisions over resources are made," affects the frequency and character of conflict.<sup>78</sup>

In regards to methodological considerations, distinctions in indicator choice are based mostly on whether the analyst chooses a structural level or dynamic level of analysis.<sup>79</sup> However, intelligence practice argues a different approach. At one time, the warning field thought it desirable to divide indicator lists by time phase (long, intermediate, and short range) because past research suggested that certain preparations took longer than others, which might be reasonably expected to occur in shorter time frames. This thinking however, according to Grabo, can be, "misleading, or even dangerous," because it is very difficult to ascertain how long a group will take to initiate action after a preparation has been made. Most indicator lists today have dropped this distinction and consider together all indicators that may point to a probability of conflict preparation.<sup>80</sup>

Another methodological consideration is whether to design the indicators quantitatively or qualitatively. Quantitative models rely on raw data that is processed through computer based algorithms and formulas. These models usually rely on enormous amounts of what is called "events data" that can be automatically pulled and

<sup>&</sup>lt;sup>78</sup> Michael T. Klare, *Resource Wars* (New York: Henry Holt and Company: 2000), 27.

<sup>&</sup>lt;sup>79</sup> Verstegen, "Conflict Prognostication," 3.

<sup>&</sup>lt;sup>80</sup> Grabo, Anticipating Surprise, 27-28.

coded from a variety of sources. The trend now appears to be in favor of employing computer-coded systems that can process the data more quickly than human coders.<sup>81</sup>

In theoretical practice, the majority of models rely on a quantitative approach.<sup>82</sup> In actual practice, however, George Mason Professor of Public Policy Jack A. Goldstone argues that policy and intelligence professionals are still in favor of a qualitative approach.<sup>83</sup> This kind of analysis draws from sources such as news and media reporting, open-source data (which may be quantitative), and other analytical findings. What the qualitative approach loses in efficiency it makes up in ability to assess more critical factors such as intention, history, culture, and, "contingent events of specific countries or communities."<sup>84</sup> Verstegen claims that qualitative analysis may be a more suitable approach for understanding why conflicts do not turn violent when analysis moves beyond the structural stage, and for evaluating the effects of accelerators and de-accelerators. Goldstone's *Using Quantitative and Qualitative Models to Forecast Instability* addresses the weakness in quantitative forecasting models, writing that they are predominately based on assessing average outcomes, which make it difficult to consider every variable that might increase or decrease instability.<sup>85</sup>

For Goldstone, the pros and cons of each system seemingly creates a dilemma for the analyst and policy organization, where one must choose between the two models; however, instead of choosing he proposes that the best approach is to use both as long as they are independent of each other. Ensuring that each method draws from different

<sup>&</sup>lt;sup>81</sup> Gary King and Will Lowe, "An Automated Information Extraction Tool for International Conflict Data with Performance as Good as Human Coders: A Rare Events Evaluation Design," *International Organization* 57 (2003): 2.

<sup>&</sup>lt;sup>82</sup> Verstegen, "Conflict Prognostication," 8.

<sup>&</sup>lt;sup>83</sup> Jack A. Goldstone, "Using Quantitative and Qualitative Models to Forecast Instability," United States Institute of Peace, http://www.usip.org/pubs/specialreports/sr204.pdf.

<sup>&</sup>lt;sup>84</sup> Goldstone, "Using Quantitative and Qualitative Models to Forecast Instability."

<sup>&</sup>lt;sup>85</sup> Ibid.
source data will help to avoid compounding errors and inaccuracies. Indeed, a model that takes advantage of the strengths of both quantitative and qualitative analysis seems to be a reasonable approach. Given the weaknesses of each, it appears counterproductive, and perhaps dangerous, to rely on one or the other.

# Limiting the Indicators

There are a whole host of variables that an analyst can find associated with conflict including political freedom, ethnic homogeneity, religious diversity, income distribution, quality of life, economic growth, population growth, and military expenditure, among others. Given the multitude of potentially viable indicators to choose from then, is it possible to narrow down the list to just one or two explanatory variables? In *The Determinants of Internal Conflict in the Third World* Troy University Associate Professor of International Relations Hae S. Kim takes issue with theories that seek to identify a sole predictor. He contends that such theories, which argue the strength of one variable, for example, poverty, natural resource abundance, corruption, do not really assess their "pure effect" to produce conflict.<sup>86</sup> Kim employed a multivariate analysis to determine the true effect of a set of variables often argued to be the most important.<sup>87</sup> By weighting each in terms of their own predictive power, he identified three variables (political freedom, ethnic composition, and income distribution), that were the most statistically significant to affect the likelihood of internal conflict.

<sup>&</sup>lt;sup>86</sup> Hae S. Kim, "The Determinants of Internal Conflict in the Third World," *The Whitehead Journal of Diplomacy and International Relations* (2006): 94.

<sup>&</sup>lt;sup>87</sup> Ibid. Kim considered the variables political freedom, ethnic homogeneity, religious diversity, income distribution, quality of life, economic growth, population growth, and military expenditure.

As for political freedoms, states with a totalitarian political system (defined as having little or no political freedom) scored highest. Kim was able to conclude that totalitarian countries in the third world are more likely to experience internal conflict. Concerning ethnic composition, the next most significant factor, he found that countries with a homogenous population were less likely to experience conflict. Lastly, he discovered that the more unequal a country's income distribution the less likely the country will experience internal conflict. This last variable may seem to go against conventional wisdom, but his data indicates, "that the most equally distributed countries document higher scores of internal conflict than the most disparate countries."<sup>88</sup> One explanation may be in a developing country's transition to a more equitably distributed society, where those that are moving in this direction are more likely to experience internal conflict than those countries with a more static unequal distribution (Kim, pers. comm.).

## Fast and Frugal Analysis

Indicator-based methodologies, such as those used in traditional warning, are usually based on a large set of indicators.<sup>89</sup> Computer databases allow the analyst to efficiently manage hundreds or even thousands of indicators, essentially as many as the analyst chooses to include. For example, the UN Humanitarian Early Warning System (HEWS), said to be the only early warning system in actual operation, uses 100+

<sup>&</sup>lt;sup>88</sup> Kim, "The Determinants of Internal Conflict in the Third World," 102.

<sup>&</sup>lt;sup>89</sup> Sean Costigan, et al., "Emerging Threats in the 21<sup>st</sup> Century: Strategic Foresight and Warning Seminar Series Final Report," Center for Security Studies, http://www.isn.ethz.ch/pubs/ph/details.cfm?id=47160.

indicators in its database to assess present and future conditions.<sup>90</sup> Yet Grabo reminds us that warning analysis is different from conventional analysis in that inductive reasoning often reigns over deductive reasoning. Because of the nature of crisis, which often develops fast and is full of surprise, warning analysts do not have the luxury of drawing particular conclusions from general, large amounts of evidence. In such times, the analyst must consider that a mere sampling of data may be all that is available for which to come to more general and immediate conclusions.<sup>91</sup> Grabo accepts that every analyst realizes how easy it is to collect large amounts of information in a very short amount of time and often does. Unfortunately, this can result in an information overload that is very difficult to organize, let alone analyze. The problem, according to Grabo, has no real solutions or at least none have been found.<sup>92</sup>

Drawing from the results of a study on the accuracy of method in traditional heart attack diagnosis, Malcolm Gladwell, author of *Blink: The Power of Thinking Without Thinking*, concludes that more information about a problem may not necessarily be better.<sup>93</sup> A study in heart attack diagnosis illustrates this point.<sup>94</sup> Although there are tests that can, with accuracy, determine whether or not a patient is having a heart attack, the long waiting time for this diagnostic tool is often unpractical. Instead, doctors traditionally gather as much information as possible and then estimate a diagnosis. A study of trained medical personnel faced with the task of assessing case histories of people with chest pain showed that their estimations varied considerably. This, along

<sup>&</sup>lt;sup>90</sup> Verstegen, "Conflict Prognostication," 10-11. HEWS draws from a mix of qualitative and quantitative information; its focus is more risk assessment than early warning.

<sup>&</sup>lt;sup>91</sup> Grabo, Anticipating Surprise, 43-44.

<sup>&</sup>lt;sup>92</sup> Ibid., 29-30.

<sup>&</sup>lt;sup>93</sup> Malcolm Gladwell, *Blink*, (New York: Little, Brown and Company, 2005), 125-136.

<sup>&</sup>lt;sup>94</sup> Brendan M. Reilly, et al., "Impact of a Clinical Decision Rule on Hospital Triage of Patients With Suspected Acute Cardiac Ischemia in the Emergency Department," *Journal of the American Medical Association* 288, no. 3 (2002): 342-350.

with the general lack of accuracy in real world diagnosis, prompted Cook County Hospital to facilitate research in alternative diagnostic methods. The results created a very simple decision tree, based on electrocardiogram evidence of acute myocardial infarction, acute ischemia, and other urgent factors present in the lungs, blood pressure, and presence of heart disease.<sup>95</sup> There have been other studies on this subject of making fast judgments in hospital settings, particularly among heart attack patients. Figure 2.3 illustrates a similar tree (but without the recommended decision), which came out of a 1996 paper on emergency room triage by Lee Goldman, Dean of the Faculties of Health Sciences and Medicine at Columbia University, et al.<sup>96</sup>



Figure 2.3. Goldman's Derivation of the Four Initial Risk Groups on the Basis of Data Available at the Time of Presentation in the Emergency Department.

<sup>&</sup>lt;sup>95</sup> Reilly, et al., "Impact of a Clinical Decision Rule."

<sup>&</sup>lt;sup>96</sup> Lee Goldman, et al., "Prediction of the Need for Intensive Care in Patients Who Come to Emergency Departments with Acute Chest Pain," *New England Journal of Medicine* 334, no. 23 (1996): 1502.

Also interested in the subject of making faster judgments is Gerd Gigerenzer, a German psychologist interested in the study of heuristics in decision making. He finds that when there is high uncertainty, simple models tend be more accurate than more complicated ones involving many calculations.<sup>97</sup> In addition, he suggests that if a heavily researched and developed instrument is successful in one area, it does not necessarily follow that it will be applicable in other areas, however similar the problem. For example, a diagnostic instrument that works well for New England cancer patients may not be effective for Michigan cancer patients. If time and resources were available, one could test the several thousand patients needed for a new study and apply it to each case, but this luxury is often not an option.<sup>98</sup> If true, Gigerenzer's finding damages the promise of universal application of conflict early warning systems that have been heavily researched and require large inputs of data and complicated algorithms. Could these systems, though found to be highly accurate in some cases, not prove useful for Africa's crises?

There are three important rules involved in the process of fast and frugal decision making, involving only simple yes or no questions: the search rule, the stopping rule and the decision rule.<sup>99</sup> It first works by putting the most important factor on top and then proceeds to place the factors in order of importance. Second, it allows the decision to stop quickly if an indicator allows for it (the *fast* part). And last, it either gives a policy prescription for action (an element that is perhaps the most important for early warning practitioners) or marks the most appropriate time for one.

<sup>&</sup>lt;sup>97</sup> Gerd Gigerenzer, *Gut Feelings: The Intelligence of the Unconscious* (New York: Penguin Group, 2007), 172.

<sup>98</sup> Gigerenzer, Gut Feelings, 173.

<sup>&</sup>lt;sup>99</sup> Ibid., 176.

#### A Good Enough Model?

Indigenous organizations, those with the most responsibility and the greatest chance for success in conflict early warning, are spending precious, yet scant, resources in research, development, and implementation of these models. However, if it is accurately feasible to avoid the complex set of indicators that accompany most warning models and skip altogether the danger of having otherwise accurate systems fall short in applicability, then the identification of a "good enough" model is worth pursuing.

From the literature reviewed above, this study concludes that the type of conflict of chief concern is violent conflict because it has the greatest capacity to threaten security (both human *and* state). This includes a wide range of conflict types and intensities. Furthermore, the early warning process involves three elements: anticipation, prevention, and mitigation. The principles of intelligence analysis serve first and foremost anticipation. Therefore, this study concentrates on the first element, acknowledging that it in itself provides no real service without the formulation of a response policy. Finally, this study hypothesizes that a fast and frugal warning model, based on a limited set of indicators, identified from Kim's three most important indicators of internal conflict in the developing world, will provide a "good enough" likelihood assessment of non specific intrastate violent conflict in the Sub-Saharan region.

Risk assessments are based on an analysis of remote and intermediate conditions and early warning intelligence focuses on short-term developments or events that are likely to accelerate or trigger rapid escalation of conflict. Indicators that assess a state's condition of economic and political development can be a first step gauge for future stability and, conversely instability.<sup>100</sup> Essentially, a "watch list" provides for a more efficient analytical process.

Like Gigerenzer and Todd's adapted model for classifying incoming heart attack patients, where three highly indicative conditions not only accurately estimate the risk of a heart attack, but also recommend next steps, it is hypothesized that a similarly simple fast and frugal early warning model can accurately estimate those areas with the highest likelihood of intrastate conflict, thus identifying a more manageable list of countries for which to apply other more targeted tests, such as a qualitative analysis. Those indicators deemed the most appropriate to incorporate into a fast and frugal type model are Kim's top three predictor variables of conflict: type of government, ethnic composition, and income distribution. The researcher chose these variables from the great range of other possible indicators (Kim's initial list included many of the major culprits: degree of political freedom, ethnic homogeneity, religious homogeneity, income distribution, quality of life, economic growth, population growth, and defense spending), so as to build from research that had already advanced the great debate in what drives countries to internally collide. Kim's logistic regression methodology set out to truly test the predictive power of each of the above variables. This is an advance from models, however well-intentioned to simplify the process of conflict prediction, which attempt to find a rather unrealistic holy grail - the sole deterministic variable of conflict. We are getting somewhere with this thinking, but alas, it is an extreme response to methods that lump a large set of variables together without knowing what each has to offer in the final outcome: conflict or the absence of conflict.

<sup>&</sup>lt;sup>100</sup> Goldstone, "Using Quantitative and Qualitative Models to Forecast Instability."

The intent of such a model is not to estimate exactly when a country will face internal conflict, but rather to accurately narrow down the large set of countries (Sub-Saharan Africa has forty-seven) so that a more discernible qualitative assessment can be assigned to monitor the trigger and accelerator indicators of at risk states. However, this is not to say that such a model cannot, on its own, accurately estimate that conflict will likely occur. In this sense, it is hypothesized to be a "good enough" forecasting tool as well as a triage tool for where more attention should be placed.

#### METHODOLOGY

To test the hypothesis that a conflict early warning model can be accurate with only three variables, the researcher employed what is most akin to the model described by Davies and Gurr,<sup>101</sup> using correlation analysis of the summation of the scores of three variables to produce a hypothesized conflict score and the actual conflict intensity score of a set of twenty past conflicts, violent and non violent, in Sub-Saharan Africa. The variables and their associated risk factors used for this test comes from the findings of Kim's study of "The Determinants of Internal Conflict in the Third World", in which he found the most critical variables using logistical regression analysis.<sup>102</sup> The methodology was not meant to replicate what Kim's study had already shown, but rather to test the combined "true effect" of the three significant variables.

Logistic regression is used to describe the relationship between one or more risk factors (for example, political freedom, ethnic homogeneity and income distribution) and an outcome (for example, conflict).<sup>103</sup> The outcome can have only two possible values: conflict or no conflict. Each of the coefficient values that Kim found, describe the size of the risk factor, where political freedom is 2.04, ethnic homogeneity is -.026 and income distribution is -.064. The political freedom variable's value increases the risk of conflict, while the values of the other two serve to decrease the risk. The larger the positive regression coefficient, the more affect it has on the outcome. Conversely, the farther a negative value is from zero the more affect it has to decrease the probability, in other

<sup>&</sup>lt;sup>101</sup> Davies and Gurr, *Preventive Measures*, 8-9.

<sup>&</sup>lt;sup>102</sup> Kim, "The Determinants of Internal Conflict in the Third World," 94.

<sup>&</sup>lt;sup>103</sup> "Logistic regression," Wikipedia, http://en.wikipedia.org/wiki/Logistic\_regression.

words while ethnic homogeneity serves to decrease the risk, income distribution decreases it more.

## Political Freedom

Kim classifies the variable political freedom into three categories: "not free" (totalitarian), "partly free" (authoritarian), and "free" (democratic).<sup>104</sup> Kim showed that those states which had a totalitarian regime were more likely to face conflict than countries which had more political freedoms. To classify the countries in this study, the researcher first consulted the CIA's World Factbook, appropriate to year in which the conflict began.<sup>105</sup> While Kim relied on this source for his methodology, which consisted of more recent and presumably more accurate country information, the utility for this study was found to be rather limited.

In the 2005 edition of the World Factbook, the CIA used twenty-six different classifications of government type, each with their own definition. In the 2008 edition, there are thirty-one different classifications, each with a definition. But in 2000, there is neither a list of terms nor a definition of each. It is unclear how Kim used this classification system to generate degree of freedom for each country's political value. While descriptors like "Democratic Republic" and "Totalitarian" seem rather easy to parse into "free/not free" categories, where would one place a "Confederacy" or a "Theocracy"? These terms merely serve to fit a particular country into a neatly precategorized system. Indeed, the CIA provides other political information such as the conditions of suffrage and the state of the legal system; it is however, difficult to

<sup>&</sup>lt;sup>104</sup> Kim, "The Determinants of Internal Conflict in the Third World," 95.

<sup>&</sup>lt;sup>105</sup> Old editions of the CIA World Factbook are archived in numerous locations. See specific conflict for edition used.

determine how this factual data alone could translate into degrees of political freedom. Kim also cites the use of the *Britannica Book of the Year*, nevertheless the information from these two sources alone did not satisfy the demands of this study.

In 1988, the CIA referred to Somalia as a republic. If one were to apply the 2008 definition, Somalia would have been, "a representative democracy in which the people's elected deputies (representatives), not the people themselves, vote on legislation."<sup>106</sup> This seemingly matches the classification of "free," or at the least "partly free." However, if one were to consult Freedom House, an NGO that produces the annual "Freedom in the

World" survey, Somalia is classified as "not free"; it has not been for at least 35 years.<sup>107</sup>

While Kim did not use Freedom House scores to evaluate political freedom, the group uses similar definitions to his own regarding the three



Figure 3.1. Freedom House Map of Freedom 2007 (adapted)

freedom categories, for example, Free, Partly Free, and Not Free (see Figure 3.1).<sup>108</sup>

https://www.cia.gov/library/publications/the-world-factbook/docs/notesanddefs.html#2128.

<sup>&</sup>lt;sup>106</sup> "2008 CIA World Factbook: Notes and Definitions," US Central Intelligence Agency,

<sup>&</sup>lt;sup>107</sup> "Freedom in the World: "Comparative scores for all countries from 1973 to 2008," Freedom House, http://www.freedomhouse.org/uploads/FIWAllScores.xls. Freedom House describes the study as a "comparative assessment of global political rights and civil liberties" consisting of survey ratings and narrative reports "in order to monitor trends in democracy and track improvements and setbacks in freedom worldwide." In free countries, "citizens enjoy a high degree of political and civil freedom," while partly free countries have "some restrictions on political rights and civil liberties, often in a context of corruption, weak rule of law, ethnic strife, or civil war" and not free countries have a "tightly controlled" political process that denies basic freedoms.

Kim found political freedom to have the largest regression coefficient (2.04),<sup>109</sup> The researcher weighted this variable with a multiplier equal to this value (see Table 3.1). Table 3.1 Scoring Political Freedom

Political Freedom Value	Score	Multiplier	Weighted Score
Totalitarian	3	2.04	6.12
Authoritarian	2	2.04	4.08
Non Totalitarian	1	2.04	2.04

# Ethnic Homogeneity

In Kim's study, ethnic homogeneity of a country is measured by the percentage of the dominant ethnic-racial group within a nation.<sup>110</sup> Kim showed that countries which are ethnically homogenous are less likely to face conflict. Again, because he did not state explicitly his scoring criteria, it is difficult to replicate his assessment; therefore, the researcher used a different source with which to classify the countries. Data on this variable come from the Ethno-Linguistic Fractionalization (ELF) Index, which reflects the likelihood that two people chosen at random will be from different ethnic groups.<sup>111</sup>

From Kim's median ethnic homogeneity values, conflict countries were 35.5% or more heterogeneous and non-conflict countries were 26.81% or less heterogeneous. This study's methodology classified conflict countries as those with an ELF score greater than or equal to .355; these countries scored a 3. The middle countries with an ELF score less than .355 but more than .2681, scored a 2, and non-conflict countries with an ELF score of .2681 or less, scored a 1. The multiplier used was -.026, its regression coefficient value (see Table 3.2).

<sup>&</sup>lt;sup>108</sup> Ibid.

<sup>&</sup>lt;sup>109</sup> Kim, "The Determinants of Internal Conflict," 99.

<sup>&</sup>lt;sup>110</sup> Ibid., 95.

<sup>&</sup>lt;sup>111</sup> Daniel Posner, "Measuring Ethnic Fractionalization in Africa," *American Journal of Political Science*, 48 (2004): 856.

Ethnic Homogeneity	ELF Value	Score	Multiplier	Weighted Score
Low	> .355	3	026	078
Middle	.3542681	2	026	052
High	≤.2681	1	026	026

Table 3.2 Scoring Ethnic Homogeneity

## Income Inequality

Income Distribution is marked by the country's Gini coefficient, a measure of the degree of inequality in the distribution of family income. The coefficient ranges from 0 (perfect equality) to 1 (complete inequality). Data on this variable comes from the World Income Inequality Database.<sup>112</sup> Interestingly, Kim found that those countries with the most equal distribution of income had higher scores of internal conflict than the most unequal ones. Contact with the author, confirmed this unconventional finding that "those countries with 'established' inequality among diverse segments of ethnic community are less likely to stir internal conflict" (pers. comm.). Specifically, conflict countries with a Gini coefficient of 41.63 or less. Therefore, countries with a Gini coefficient less than or equal to 41.63 score a 3. Countries with a coefficient greater than 47.24 scored a 1, and countries with a coefficient from 47.24 - 41.64 scored a 2. The multiplier used was -.064, its regression coefficient value (see Table 3.3).

Table	3.3	Scoring	Income	Inequa	lity
	0.0	Section B			··· · · ·

Income Inequality	Gini Value	Score	Multiplier	Weighted Score
Low	≤ 41.63	3	064	-0.192
Middle	47.24 - 41.64	2	064	-0.128
High	> 47.24	1	064	-0.064

<sup>&</sup>lt;sup>112</sup>UNU-WIDER World Income Inequality Database, Version 2.0c, May 2008. World Institute for Development Economics Research, http://www.wier.unu.edu/research/Database/en\_GB/database/.

#### The Conflict Data Set

The University of Heidelberg's Institute for International Conflict Research (HIIK) is a non-profit research organization that keeps up-to-date the Conflict Simulation Model (KOSIMO, also COSIMO), a project started in 1991.<sup>113</sup> The work is based off a substantial databank that has information on conflicts from 1945 to present. The first version, COSIMO I, includes information on conflicts from 1945-1998. This dataset is publicly available on their website, and for reasons of availability was the data that this thesis drew from. The latest version COSIMO II (now renamed the Conflict Information System, or CONIS) remains unpublished.

COSIMO defines conflict qualitatively. Such a definition classifies conflict by the amount of violence observed, not the number of fatalities. Conflict that, "encompasses clashes of interest concerning national values," falls into different levels of intensity measured by its duration and frequency. These intensities include latent conflict (totally non-violent), crisis (predominantly non-violent), severe crisis (sporadic, irregular use of violence), and war (systematic and collective use of violence and regular fighting troops).<sup>114</sup>

The dataset only includes conflicts where at least one of the parties is the state. This is not an entirely inclusive approach for Africa, however, as Cliffe and White include community level conflict for IGAD's CEWARN model where the state is either

<sup>&</sup>lt;sup>113</sup> "COSIMO," Heidelberg Institute for International Conflict Research, http://www.hiik.de/en/kosimo/index.html.

<sup>&</sup>lt;sup>114</sup> "COSIMO I: Code Manual to Excel Data Bank Kosimo1b," Heidelberg Institute for International Conflict Research, http://www.hiik.de/en/kosimo/data/codemanual\_kosimo1b.pdf.

neutral or uninvolved.<sup>115</sup> HIIK has expanded the unpublished CONIS dataset to include conflict where there was no state among the parties.

One feature of the COSIMO dataset, which is of great importance, is the inclusion of both violent and non-violent conflict. This is important when one must assess what factors turn a conflict violent, as indeed violent conflicts must first come from nonviolent ones.<sup>116</sup> HIIK notes two other advantages of this consideration. First, by monitoring a conflict that is no longer conducted with violence one may check whether the end of a violent dispute actually means the end of the conflict. Second, "by restricting oneself to researching violent conflicts alone means losing sight of conflicts solved peacefully."<sup>117</sup> Table 3.4 shows the dataset for the study.

Table 3.4 Total Conflict Data Set 1988-1998

				Duration	
	Conflict Name	Start	End	(Years)	Intensity
1	Burundi II (Hutu)	1988	1988	0	4
2	Somalia (Civil War I)	1988	1991	3	4
3	Liberia (Civil War)	1989	1995	6	4
4	Sudan (Civil War III)	1989	1999	10	4
5	Mali (Tuareg III)	1990	1999	9	3
6	Niger (Tuareg II)	1990	1995	5	3
7	South Africa (ANC-Inkatha)	1990	1994	4	3
8	Rwanda (Civil War)	1990	1994	4	4
9	Angola (Secession of Cabinda)	1991	1999	8	2
10	Ethiopia (Oromo II)	1991	1999	8	2
11	Zaire (Autonomy of Shaba IV)	1991	1998	7	2
12	Chad VI	1991	1999	8	3
13	Djibouti (Afar-Issas II)	1991	1994	3	3
14	Kenya (Rift Valley)	1991	1995	4	3
15	Somalia (Somaliland/Secession)	1991	1999	8	3
16	Togo (Regime Crisis)	1991	1994	3	3
17	Zaire (Regime Crisis)	1991	1999	8	3
18	Sudan (SPLA Split-up)	1991	1994	3	3

<sup>&</sup>lt;sup>115</sup> Lionel Cliffe and Philip White, "Conflict Management and Resolution in the Horn of Africa," in *Early* Warning and Conflict Management in the Horn of Africa eds. Mwaûra Cirû and Susanne Schmeidl

<sup>(</sup>Asmara, Eritrea: The Red Sea Press, 2002), 49. <sup>116</sup> "Methodological Approach up to 2002," Heidelberg Institute for International Conflict Research, http://www.hiik.de/en/methodik/methodik\_bis\_2002.html.

				Duration	
	Conflict Name	Start	End	(Years)	Intensity
19	Sierra Leone (Civil War)	1991	1999	8	4
20	Somalia (Civil War II)	1991	1999	8	4
21	Angola (Civil War III)	1992	1994	2	3
22	Chad (Autonomy of Southern Provinces)	1992	1999	7	3
23	Zanzibar (Autonomy)	1993	1999	6	2
24	Congo (Regime Crisis)	1993	1995	2	3
25	Nigeria (Ogoni)	1993	1999	6	3
26	Burundi III (Civil War)	1993	1999	6	4
27	Ethiopia (Ogaden II)	1994	1999	5	2
28	Ghana (Konkomba)	1994	1999	5	3
29	Rwanda (Hutu Refugees)	1994	1999	5	3
30	Kenya (Unrest)	1995	1999	4	2
31	Comoros (Secession Anjouan, Moheli)	1995	1995	0	3
32	Zaire-AFDL (Kabila)	1996	1998	2	4
33	Central Africa (unrest)	1997	1999	2	2
34	Comoros (Secession Anjouan, Moheli)	1997	1999	2	2
35	Sierra Leone (Civil War Aftermath)	1997	1999	2	3
36	Angola (Civil War)	1997	1999	2	4
37	Congo (Brazzaville, Regime Crisis)	1997	1997	0	4
38	Namibia (Caprivi Strip)	1998	1999	1	1
39	Lesotho (Unrest)	1998	1998	0	2
40	Guinea-Bissau (Civil War)	1998	1999	1	4
41	Zaire (Kabila)-RCD	1998	1999	1	4

Ten of the above conflicts with an intensity score of 3 and 4 were chosen using freeware random number generator software.<sup>118</sup> The remaining ten were selected based on their having an intensity score of 1 and 2. Table 3.5 shows results of the 20 selected conflicts.

Table 3.5 Conflicts Randomly and Selectively Chosen for Study

				Duration	
	Conflict Name	Start	End	(Years)	Intensity
1	Burundi II (Hutu)	1988	1988	0	4
2	Somalia (Civil War I)	1988	1991	3	4
3	Liberia (Civil War)	1989	1995	6	4
4	Sudan (Civil War III)	1989	1999	10	4
5	Angola (Secession of Cabinda)	1991	1999	8	2
6	Ethiopia (Oromo II)	1991	1999	8	2
7	Zaire (Autonomy of Shaba IV)	1991	1998	7	2

<sup>&</sup>lt;sup>118</sup> R.S. Pateman, "Random Name Selector Java Applet, Demo 4," Northeastern Illinois University, http://www.neiu.edu/~rspatema/randapp/randapp4.html.

				Duration	
	Conflict Name	Start	End	(Years)	Intensity
8	Togo (Regime Crisis)	1991	1994	3	3
9	Sudan (SPLA Split-up)	1991	1994	3	3
10	Somalia (Civil War II)	1991	1999	8	4
11	Zanzibar (Autonomy)	1993	1999	6	2
12	Ethiopia (Ogaden II)	1994	1999	5	2
13	Kenya (Unrest)	1995	1999	4	2
14	Comoros (Secession Anjouan, Moheli)	1995	1995	0	3
15	Zaire-AFDL (Kabila)	1996	1998	2	4
16	Central Africa (unrest)	1997	1999	2	2
17	Comoros (Secession Anjouan, Moheli)	1997	1999	2	2
18	Sierra Leone (Civil War Aftermath)	1997	1999	2	3
19	Namibia (Caprivi Strip)	1998	1999	1	1
20	Lesotho (Unrest)	1998	1998	0	2

Using the classification system described above, which categorizes the three most important predictor variables (political freedom, ethnic homogeneity and income inequality), each of the 20 conflicts received three individual scores. The researcher then summed each of these scores to get a total conflict score (see an example of this in Table 3.6).

Table 3.6 Generating the Total Conflict Score

Name	Political Freedom Score	Ethnic Homogeneity Score	Income Inequality Score	Total Conflict Score
Country A	5	3	1	9
Country B	2	6	3	11
Country C	4	4	1	9

Essentially, this model presupposes that a country's macro-structural conditions (political, demographic, and economic) will affect the way its population interacts with the government and/or itself. It is important to note that the logic behind the hypothesized total conflict score is a deviation from what Kim set out to find. While Kim's regression coefficients expressed the risk factor inherent in each of the three variables to produce conflict or not, this methodology attempted to push their effects a bit further.

The researcher tasked this methodology to determine not only the likelihood of violent conflict occurring, but also the degree of the resulting intensity. The last step involved applying the generated total conflict score to the actual conflict intensity score, as set forth by the COSIMO project, to determine this relationship. The researcher use Excel's standard formula to determine the correlation coefficient (see Figure 3.2) of the two columns: Predicted Conflict Score and Actual Conflict Score.

$$Correl(X,Y) = \frac{\sum (x-\overline{x})(y-\overline{y})}{\sqrt{\sum (x-\overline{x})^2 \sum (y-\overline{y})^2}}$$

Figure 3.2. Formula for Determining Correlation Coefficient

#### FINDINGS

The generated conflict scores produced a variety of values that were hypothesized to represent the total effect. The possible range was from 1.77, the lowest conflict score, to 6.03, the highest. The pre-set range of possible values for conflict intensity was from 1 to 4, where 1 equals latent conflict, completely nonviolent with verbal claims; 2 equals a nonviolent crisis with more intensive claims; 3 equals a severe crisis with the sporadic irregular use of force, blockade, or threat; and 4 equals war and the organized continuing use of force.<sup>119</sup> Presumably, any conflict score below that of 3.9 (the median value) would not result in violent conflict; any score above 3.9 would result in violent conflict.

The validity of the claim was tested with correlation coefficient analysis in order to measure the degree of a linear relationship between the two scores. A correlation coefficient can be any value between -1 and 1. A positive value portrays a positive relationship, in other words as one variable increases in value, so too does the other, or if the variable decreases, so too does the other. A negative value portrays a negative relationship; for example, as one variable either decreases or increases in value, the other variable does the opposite.

The correlation coefficient of the two scores was 0.643885365 (r). The squared correlation coefficient ( $r^2$ ) was .4145. This is the proportion of variance in one variable that can be accounted for by knowing another, in this case, the variance of the intensity score from that of the total conflict score.  $R^2$  tells us that 41 percent of the intensity score is accounted for in the hypothesized conflict score. A correlation coefficient value of .64 is a moderately strong relationship (see Figure 4.1 on the next page).

<sup>&</sup>lt;sup>119</sup> "COSIMO I: Code Manual to Excel Data Bank Kosimo1b."



Figure 4.1. Strength of Conflict Score and Intensity Relationship. Twenty data points are plotted a trend line that helps to show the strength of the relationship between the predicted and actual conflict scores. Because of the predicted scores' close proximity, each point's value (seen touching the four gridlines of the X-axis) is labeled to the right with its predicted conflict score.

In addition to looking at the strength of the correlation coefficient between the hypothesized and actual score, if one applies the presumption noted above: conditions right for conflict = Total Conflict Score > 3.9; conditions not right for conflict = Total Conflict Score  $\leq$  3.9, the success rate was 65%, or 13 out of the 20 predicted scores accurately reflected the actual outcome of violent or non-violent conflict. Three of the seven countries that were predicted to have conflict, but which did not experience it, had a conflict score that deviated .038 or less from the threshold. For example, Angola (3.938), the Central African Republic (3.938) and the Comoros (3.926) all had intensity scores of 2. Although the overall success rate was less than what other, more complex models have been able to achieve,<sup>120</sup> it would be remiss to not look more closely at its individual successes and failures. For example, one should first ask, how well did the model predict conflict when actual conflict was the result? Equally, how well did the model predict no conflict when no conflict was the actual result? Understandably, these successes represent the model's greatest utility. However, the failures should not be treated so equally, for a model which predicts conflict that does not materialize is not nearly as harmful as a model that does not warn of conflict which does.



Figure 4.2. When Was the Model Accurate? This matrix depiction distinguishes more precisely when the model was accurate and when it was not. Importantly, the model never ignored conflict that actually occurred.

<sup>&</sup>lt;sup>120</sup> Goldman, "Using Quantitative and Qualitative Models to Forecast Instability." Goldman notes that all known forecasting models will have errors that do not allow them to be than 80 to 85% accurate.

The model was successful in that it had no instances of missing the occurrence of conflict. However, like many models that use quantitative data, especially statistical data on economic and political conditions, there is a strong likelihood of error. Goldman says that such data is often, "incomplete, missing or biased," and that even US statisticians will occasionally revise GDP figures a year after they are reported.<sup>121</sup> Data from less sophisticated reporting offices, where lack of infrastructure hampers the collection and analysis capability, are even more likely to include error. When one considers the potential of misrepresentation and deception, perhaps stemming from restrictive regimes, the potential of error increases substantially. Goldman suggests that a 5 percent error should be expected, yet cautions that models which use several variables have the potential to compound this error rate much more.<sup>122</sup> One can imagine the potential for error in a model that relies on substantial amounts of data from a wide range of data sources.

The tables in Appendix C show the final scores for each of the three variables: political freedom (Table C.1), ethnic homogeneity (Table C.2), and income inequality (Table C.3). Table 4.1 on the next page presents the final predicted conflict scores (a summation of three final variable scores) against the actual intensity scores derived from the COSIMO database.

<sup>&</sup>lt;sup>121</sup> Goldman, "Using Quantitative and Qualitative Models to Forecast Instability."

<sup>&</sup>lt;sup>122</sup> Goldman, "Using Quantitative and Qualitative Models to Forecast Instability."

N	N	Political Freedom	Ethnic Homogeneity	GINI Coefficient	Predicted Conflict	Actual Conflict
Year	Name	Score	Score	Score	Score	Score
1988	Burundi	6.12	-0.026	-0.192	5.902	4
1988	Somalia	6.12	-0.026	-0.064	6.03	4
1989	Liberia	6.12	-0.078	-0.128	5.914	4
1989	Sudan	6.12	-0.078	-0.192	5.85	4
1991	Angola	4.08	-0.078	-0.064	3.938	2
1991	Ethiopia	4.08	-0.078	-0.192	3.81	2
1991	Zaire	6.12	-0.078	-0.128	5.914	2
1991	Togo	6.12	-0.078	-0.192	5.85	3
1991	Sudan	6.12	-0.078	-0.192	5.85	3
1991	Somalia	6.12	-0.026	-0.064	6.03	4
1993	Zanzibar	6.12	-0.078	-0.064	5.978	2
1994	Ethiopia	6.12	-0.078	-0.192	5.85	2
1995	Kenya	6.12	-0.078	-0.128	5.914	2
1995	Comoros	4.08	-0.026	-0.128	3.926	3
1996	Zaire	6.12	-0.078	-0.128	5.914	4
1997	Central Africa	4.08	-0.078	-0.064	3.938	2
1997	Comoros	4.08	-0.026	-0.128	3.926	2
1997	Sierra-Leone	6.12	-0.078	-0.064	5.978	3
1998	Namibia	2.04	-0.078	-0.064	1.898	1
1998	Lesotho	4.08	-0.026	-0.192	3.862	2
					<b>Correlation Coefficient</b>	0.643885365

Table 4.1 Comparison of Generated Conflict Score and Intensity

Bolded rows are countries with conflict scores that reflect the actual intensity score.

This model was also applied to all forty-seven Sub-Saharan countries with, as much as possible, data on current conditions. Research could not gather complete data on Cape Verde and Sao Tome and Principe, thus a complete assessment of these states is not possible within the limits of the study. The final results showed that nearly half of the region is at risk for violent conflict. The twenty three countries, found to have an overall conflict score above 3.9, include Angola, Burundi, Cameroon, Central African Republic, Chad, Comoros, Congo (Brazzaville), Congo (Kinshasa), Cote d'Ivoire, Equatorial Guinea, Eritrea, Gabon, Guinea, Kenya, Madagascar, Mozambique, Niger, Rwanda, Somalia, Sudan, Swaziland, Zambia, and Zimbabwe (for the data, see Appendix C).

Political freedom data revealed that a majority of the countries existed somewhere between free and not free levels of political freedom, where fourteen of the countries were not free, twenty-two were partly free, and eleven were free (see Figure 4.3).<sup>123</sup>



Figure 4.3. Political Freedom in Sub-Saharan Africa. Most countries in Sub-Saharan Africa face some amount of restrictions on political rights and civil liberties. Contributing conditions could include corruption, a weak rule of law, and some level of ethnic or civil strife.

<sup>&</sup>lt;sup>123</sup> "Freedom in the World: "Comparative scores for all countries from 1973 to 2008," Freedom House, http://www.freedomhouse.org/template.cfm?page=15.

A collection of data on ethnic homogeneity revealed that a substantial majority of Sub-Saharan Africa is ethnically fractionalized. Data on Sao Tome and Principe's ethnic homogeneity could not be found (see Figure 4.4).



Figure 4.4. Ethnic Fractionalization in Sub-Saharan Africa. Sub-Saharan Africa is largely ethnically heterogeneous.

Collection of current and reliable Gini indices was the most challenging. Some of the scores were out-dated, and presumably inaccurate. No data were found on Cape Verde and Sao Tome and Principe, thus no indicator of income inequality could be derived.



Figure 4.5. Income Inequality in Sub-Saharan Africa. The countries were largely equally divided between the three levels of income inequality.

After a final analysis of the three conditions illustrated above, results confirmed what much of the literature has already revealed, that the region of Sub-Saharan Africa faces substantial instability. The model estimated that forty-nine percent of the region is likely to face violent intrastate conflict. From the results of the historical application, the model predicted conflict seven times when conflict did not occur, this suggests that it may over-predict. In order to account for this propensity, the set of states that were predicted to experience violent conflict today was further sub-divided based on their predicted conflict scores. Those states with a predicted conflict score from 3.9 to 4.97 are said to have a low conflict intensity score. In other words, they are estimated to be at most risk for violent conflict with an intensity of a severe crisis with the sporadic irregular use of force, blockades, or threats. Those states with a predicted conflict score from 4.98 to 6.03 are said to have a high conflict intensity score. In other words, they are estimated to be at most risk for violence with an intensity of war and the organized continued use of force.

Only three states, Gabon (3.938), Swaziland (6.03) and Zambia (3.938), determined *conflict likely* had not faced an internal war of at least twenty-five battle deaths in the last sixty-two years.<sup>124</sup> Countries that were not identified as *conflict likely*, but which have faced serious internal conflict in the past include Ethiopia (various conflicts 1969-present), Liberia (1989-2003), Nigeria (2003-2004), Sierra Leone (1991-2000), and Uganda (1987-1991). They had conflict scores of 3.81, 3.874, 3.874, 3.874, and 3.874, respectively. While a history of violence does increase a country's chances,

<sup>&</sup>lt;sup>124</sup> Uppsala Conflict Database. Department of Peace and Conflict Research, Uppsala University. http://www.pcr.uu.se/database/index.php. Conflict countries were compared to the UCDP Armed Conflict Dataset, which included conflicts in Africa from 1946-2006.

the variable alone is not a predetermination for conflict. Collier suggests that the risk of a renewed civil war decreases approximately 1 percentage point a year.<sup>125</sup>



Figure 4.6. Percentage of Conflict Likelihood in Sub-Saharan Africa. Final scores for the region suggest an extremely high conflict-prone area, vulnerable to a multitude a possible conflict triggers and accelerators, as well as potentially responsive to conflict inhibitors and de-accelerators, that further qualitative analysis could reveal. All things being equal, nearly 30% of the region is at risk of experiencing conflict of high intensity.

<sup>&</sup>lt;sup>125</sup> Paul Collier and Ian Bannon, "Natural Resources and Conflict: What We Can Do," in *Natural Resources and Violent Conflict: Options and Actions* (Washington: World Bank, 2003), 3.

Where an analyst would have to choose where to concentrate further analysis, the final results of the model suggests that Swaziland, Somalia, Equatorial Guinea, Angola, Congo (Brazzaville), Congo (Kinshasha), Zimbabwe, Rwanda, Cameroon, Cote d'Ivoire, Eritrea, Chad, Guinea, Sudan, and Madagascar are the most conflict critical states. Figure 4.7 highlights these states at most risk for high intensity conflict.



Figure 4.7. Map of Conflict Risk in Sub-Saharan Africa. The states highlighted in red were found to have a high conflict intensity score (4.98 - 6.03). The states in highlighted in yellow were found to have a low conflict intensity score (3.9 - 4.97).

	<b>Political Freedom</b>	Ethnic Homogeneity		Total Conflict	
Country	Score	Score	GINI Coefficient Score	Variable Score	Outcome
Cape Verde	2.04	-0.078	0	0	Data Incomplete
Sao Tome and Principe	2.04	0	0	0	Data Incomplete
Swaziland	6.12	-0.026	-0.064	6.03 - High Intensity	Conflict Likely
Somalia	6.12	-0.026	-0.064	6.03 - High Intensity	Conflict Likely
Equatorial Guinea	6.12	-0.052	-0.064	6.004 - High Intensity	<b>Conflict</b> Likely
Angola	6.12	-0.078	-0.064	5.978 - High Intensity	Conflict Likely
Congo (Brazzaville)	6.12	-0.078	-0.064	5.978 - High Intensity	<b>Conflict</b> Likely
Congo (Kinshasha)	6.12	-0.078	-0.064	5.978 - High Intensity	<b>Conflict</b> Likely
Zimbabwe	6.12	-0.078	-0.064	5.978 - High Intensity	<b>Conflict</b> Likely
Rwanda	6.12	-0.026	-0.128	5.966 - High Intensity	<b>Conflict</b> Likely
Cameroon	6.12	-0.078	-0.128	5.914 - High Intensity	<b>Conflict</b> Likely
Cote d'Ivoire	6.12	-0.078	-0.128	5.914 - High Intensity	<b>Conflict</b> Likely
Eritrea	6.12	-0.078	-0.128	5.914 - High Intensity	<b>Conflict</b> Likely
Chad	6.12	-0.078	-0.192	5.85 - High Intensity	<b>Conflict</b> Likely
Guinea	6.12	-0.078	-0.192	5.85 - High Intensity	<b>Conflict</b> Likely
Sudan	6.12	-0.078	-0.192	5.85 - High Intensity	<b>Conflict</b> Likely
Madagascar	4.08	-0.026	-0.064	3.99 - Low Intensity	<b>Conflict</b> Likely
<b>Central African Republic</b>	4.08	-0.078	-0.064	3.938 - Low Intensity	<b>Conflict Likely</b>
Gabon	4.08	-0.078	-0.064	3.938 - Low Intensity	<b>Conflict</b> Likely
Kenya	4.08	-0.078	-0.064	3.938 - Low Intensity	<b>Conflict</b> Likely
Mozambique	4.08	-0.078	-0.064	3.938 - Low Intensity	Conflict Likely
Niger	4.08	-0.078	-0.064	3.938 - Low Intensity	Conflict Likely
Zambia	4.08	-0.078	-0.064	3.938 - Low Intensity	Conflict Likely
Burundi	4.08	-0.026	-0.128	3.926 - Low Intensity	Conflict Likely
Comoros	4.08	-0.026	-0.128	3.926 - Low Intensity	Conflict Likely
Seychelles	4.08	-0.052	-0.128	3.9	Conflict Unlikely

Table 4.2 Conflict Risk in Sub-Saharan Africa

	Political Freedom	Ethnic Homogeneity		Total Conflict	Outcome
Country	Score	Score	<b>GINI Coefficient Score</b>	Variable Score	
Gambia, The	4.08	-0.078	-0.128	3.874	Conflict Unlikely
Guinea-Bissau	4.08	-0.078	-0.128	3.874	Conflict Unlikely
Liberia	4.08	-0.078	-0.128	3.874	Conflict Unlikely
Nigeria	4.08	-0.078	-0.128	3.874	Conflict Unlikely
Uganda	4.08	-0.078	-0.128	3.874	Conflict Unlikely
Burkina Faso	4.08	-0.078	-0.192	3.81	Conflict Unlikely
Djibouti	4.08	-0.078	-0.192	3.81	Conflict Unlikely
Ethiopia	4.08	-0.078	-0.192	3.81	Conflict Unlikely
Malawi	4.08	-0.078	-0.192	3.81	Conflict Unlikely
Sierra Leone	4.08	-0.078	-0.192	3.81	Conflict Unlikely
Tanzania	4.08	-0.078	-0.192	3.81	Conflict Unlikely
Тодо	4.08	-0.078	-0.192	3.81	Conflict Unlikely
Lesotho	2.04	-0.026	-0.064	1.95	Conflict Unlikely
Botswana	2.04	-0.078	-0.064	1.898	Conflict Unlikely
Namibia	2.04	-0.078	-0.064	1.898	Conflict Unlikely
South Africa	2.04	-0.078	-0.064	1.898	Conflict Unlikely
Benin	2.04	-0.078	-0.192	1.77	Conflict Unlikely
Ghana	2.04	-0.078	-0.192	1.77	Conflict Unlikely
Mali	2.04	-0.078	-0.192	1.77	Conflict Unlikely
Mauritius	2.04	-0.078	-0.192	1.77	Conflict Unlikely
Senegal	2.04	-0.078	-0.192	1.77	Conflict Unlikely

Bolded rows are countries that are likely to experience violent conflict.

### CONCLUSION

Prospects for conflict de-escalation in Sub-Saharan Africa sadly look grim. Its instability is marked not only by the thousands of refugee camps dotted throughout the region, but also by the seemingly unending coups and attempted takeovers. Where conflict is avoided in one country, it rapidly escalates in another. The aim of this thesis was first and foremost to assess our ability to foresee impending crisis before it erupts into violence. There is an apparent contradiction in this field. Even though some models tout 80% and 90% accuracy rates, early warning experts say that we still do not understand the actual indicators of conflict well enough to estimate its arrival. Attempts have been made to build better qualitative methods, better quantitative methods, and hybrid models of the two approaches, yet most seem to accept without question that a good model requires a multitude of data. When evaluating a model's weakness, two questions come to mind: Is the model's methodology wrong? Or are the indicators they are built upon wrong?

The results from the 'good enough' model are in fact good enough to reconsider the inclination of the conflict early warning field to construct data intensive methodologies. To be fair, the correlation coefficient was not strong enough to argue that the model in this thesis should be used solely to estimate which countries will face conflict; again, this was not the original purpose. The results do argue that both the conflict early warning and intelligence communities should consider the value of fast and frugal analysis. This thesis did not set out to build the perfect indicator list, though it did question whether certain ones are relied upon too heavily (for example, the role of natural resources in conflict). Nor did the thesis set out to design the perfect formula for which to process these indicators, though it did question the utility of relying on formulas that only computers could efficiently manage.

What this thesis did set out to do was to test whether one really needs to collect a lot of data. Previous research revealed three factors that are most suited to predict to internal fighting in the developing world. To advance this finding, the research here tested the combined effect of political freedom, ethnic diversity, and income distribution to produce conflict. A comparison of this effect with what actually occurred in twenty crisis situations showed that the three variables could reasonably estimate violent conflict. Indeed, the method's results were not conclusive enough to be employed solely as a predictive tool, but they were 'good enough' to show the value of fast and simple analysis.

A final application of the model in today's Sub-Saharan Africa revealed that nearly half of the region will likely face violent conflict. In regards to the most important variable of internal conflict in the developing world, it was shown that one in three countries have little or no political freedom. They are governed by authoritarian-like regimes, which hamper political participation and civic freedom that presumably increases feelings of hostility toward the government. Further, nearly 80% of Sub-Saharan African countries are ethnically fractionalized, that is, the vast majority of them encompass large numbers of people who speak different languages and follow different cultural norms. In those regimes that are incapable of managing this great diversity, such divisions have, and will continue, to result in a competition that threatens state stability in places such as Rwanda, the Sudan, and Kenya.

As Gurr pointed out, the task of an early warning researcher is to assess risk; the task of a policy analyst is to assess response.<sup>126</sup> Intelligence analysts do not typically engage in policy analysis, but in order for this or any early warning methodology to be useful, there must be some kind of response. Though it is outside the purview of intelligence analysis to drive this, the situation in Sub-Saharan Africa (as well as other conflict troubled zones), require further exploration of policy options for which to counteract, manage, and suppress violent conflict. Like the Goldman tree, which assessed risk, but did not include a decision rule (in other words, what the practitioner should do in light of the results), the model discussed here did not suggest what to do. Suffice to say, however, that in a real world application, those countries identified as conflict likely would require a further assessment, such as a qualitative risk analysis, of how well it could cope with its predisposition.

The model tested in this thesis was far from perfect. Data collection on ethnic homogeneity required that the researcher consult two different sources, each with a slightly different interpretation of how to assess ethnic fractionalization. This hurt the validity of the final weighted scores. While the formula which determines a country's Gini coefficient, and subsequently the equality of its income distribution, is more widely agreed upon (one standard formula appears to be used in most assessments), the availability of data on this variable was spotty at best. Some institutions, such as the UN, do not have Gini indices on all countries in Sub-Saharan Africa. Though some private organizations, such as the Economist Intelligence Unit, have performed their own test of

<sup>&</sup>lt;sup>126</sup> Gurr, "A Risk Assessment Model of Ethnopolitical Rebellion," 2.

the Gini formula on the countries not covered by others, their data is often expensive. The resources of this research did not allow the use of statistics that were not freely available. Thus, some of the data used in the model was outdated and incomplete. There is no doubt that such inaccurate statistics contributed to the final outcomes. Finally, given more time, a comparison of each of the final outcomes derived from the model could have been compared with the outcomes generated from a traditional (more complex) logistic test. There is indeed a danger of having the opportunities of money and time to collect better data, assess them more completely, and apply more rigid mathematical tests to potentially erode the fast and frugal element. Nevertheless, it is likely that the model proposed can be improved in order to produce more accurate results.

The methodology of this thesis was predominately a quantitative one that largely ignored the narrative-based analysis found in most conflict risk assessments. Based on the literature and the findings, the most comprehensive methodology would require a mix of the two; therefore, it is recommended that a similarly simple, fast and frugal model, based beyond that of structural conditions and focused more on the triggers and accelerators (as well as the inhibitors and de-accelerators) of conflict, be designed to concentrate on the countries this first step has indentified. As Goldman noted, the strengths of each model combined can effectively counteract the weaknesses each has in isolation.

At the Africa Peace Point conference *Cursed by Riches: Resources and Conflicts in Africa*, time and time again participants agreed that the most important factor of what drives African countries to conflict is how poorly the government administers its duties.<sup>127</sup> This anecdotal evidence is akin to Kim's own conclusion that political freedom is the most important variable in estimating internal conflict. Mudida apparently agrees, saying that conflict is dependent on what he calls structural violence, the presence of anomalous structures that comes from poor governance.<sup>128</sup> Since Kim, as well as others, assign so much significance to this variable, more attention should be placed on understanding it as an indicator of conflict. The index used in this study came from a survey-based instrument that drew from several factors of political rights and civil liberties. Admittedly, this index required information from many variables. Therefore, to strengthen the argument that a fast and frugal method works, another recommended way forward is to consider more critically how the variable political freedom is determined. Perhaps there is a variable 'within the variable' that can be segregated and assessed in isolation more effectively.

Intelligence and conflict analysts alike have great challenges ahead in the area of conflict prognostication. The pursuit of a workable simplistic model is not only rife with development hurdles, but marketing ones as well. It is the simplicity itself, however accurate, that will no doubt trouble policy makers who have grown accustomed to complex solutions which require large amounts of funding and vast resources.

Admittedly, the identification of an analytical tool that can estimate conflict accurately and efficiently and be easily replicable is a secondary or even tertiary development in the field of conflict management. Indeed, we must question *why* conflict occurs, not simply *what* indicates it.

<sup>&</sup>lt;sup>127</sup> Author's unpublished collection plan and trip report on the conference *Cursed by Riches: Resources and Conflicts in Africa* an International Conference on Resources and Conflicts in Africa, Nairobi, Kenya, December 6-8, 2007.

<sup>&</sup>lt;sup>128</sup> Mudida, "The Nature of Africa's Resource Conflicts."

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## APPENDICES

#### APPENDIX A - AU Recommendations for an Early Warning System<sup>129</sup>

#### Consultative Workshop on Early Warning

1. In order to take stock of the initiatives taken both at continental and regional level, the Commission organized, from 25 to 27 April 2006, a consultative workshop on early warning, which included participants from the RECs, United Nations agencies and other key stakeholders. The workshop made, among others, the following recommendations:

- (a) <u>Data collection:</u>
  - generate primary data beyond African Union and its Field Mission's sources, including civil society, universities, and research institutions;
  - develop a system of trend-tracking;
  - make use of automatic public news clipping systems;
  - develop a system of grading sources and reports to diminish information overflow and to increase work efficiency in the Early Warning Unit;
  - make more efficient use of IT technology to foster the development of compressed products (briefs, reports, etc.) for end-users;
  - rationalize the work of early warning systems focusing on different issues (conflict prevention, food security i.e.) to avoid duplications (especially in the establishment of data-bases).
- (b) <u>Strategic Analysis</u>:
  - develop a systematic framework of analysis;
  - define a limited number of easy-to-monitor conflict- or case-specific indicators (through country-specific analyses);
  - link indicators to the standards agreed upon in the context of the African Peer Review Mechanism and the Memorandum of Understanding (MoU) of the Conference on Security, Stability, Development and Cooperation in Africa (CSSDCA), as approved by the Assembly of Heads of State and Government, in July 2002;
  - focus on both immediate threats to human security and on underlying structural causes of conflict;
  - strengthen analytical capacities to re-contextualise and to adjust country-specific analyses;
  - enhance capacity building to ensure quality control (tailored trainings for different levels of staff within the Early Warning Unit).

<sup>&</sup>lt;sup>129</sup> "Meeting the Challenge of Conflict Prevention in Africa: Concept paper," African Union, Dec. 17-19, 2006, http://www.africa-union.org/root/ua/Conferences/decembre/PSC/17-19%20dec/home-Eng.htm (accessed February 24, 2008).

#### (c) <u>Comparative Indicators of the AU CEWS and the RECs</u>:

- do not replace efforts already accomplished by the RECs in their conflict early warning initiatives;
- develop a continental framework of information gathering and analysis which is supplementary to the RECs.

## (d) <u>Coordination & Collaboration between the AU CEWS and the RECs</u>:

- agree on a division of labor concerning sub-national data with RECs assisting in adding information on AU's secure website ;
- ensure regular and secure exchange of selected early warning briefs and reports ;
- hold annual early warning meetings with rotating hosts (RECs), facilitated through AU Commission;
- continue the exchange of personnel with RECs and other early warning systems ;
- initiate joint trainings / capacity building for RECs / AUC personnel;
- establish focal points on early warning systems within AUC, every REC and at national level ;
- develop a system on how to treat classified information;
- integrate key workshop recommendations into the Memorandum of Understanding between the RECs and the AUC;
- ensure interaction of RECs and African Union with key partners in civil society, UN institutions, universities, research institutions, etc.

#### (e) <u>Early Warning Reports, Engagement with decision-makers and response options</u>:

- engage information gathering personnel with decision-makers;
- enhance the diversity of information provided to decision-makers: reports, personal briefings, etc;
- broaden the process of engagement with decision makers to include other groups such as civil society and research institutions, to raise critical points otherwise too sensitive to be brought in;
- in addition to country reports, provide reports on security situations in the five regions (this will make it possible to include situations of potential conflict, which are not yet visible, as well as related issues);
- develop a generic list of policy options ;
- integrate policy initiatives and recommendations coming from the Panel of the Wise, the Pan-African Parliament and the African Commission on Human and People's Rights.

Objectives	Documents adopted by the	Generic early warning
-	OAU and the AU	indicators
Prevention and reduction of intra- and inter-state conflicts	<ul> <li>Cairo Declaration on the Mechanism for Conflict Prevention, Management and Resolution AHG/ Decl. 3 (XXIX), 1993</li> <li>Tunis Declaration on Code of Conduct for Inter- African Relations, 1994</li> <li>OAU Convention on the Prevention and Combating of Terrorism, 1994</li> </ul>	<ul> <li>horizontal (intra-state) or vertical (inter-state) escalation of violent conflict</li> <li>increase in human rights violations in a polity</li> <li>sessionist agendas</li> <li>proliferation of small arms and light weapons</li> <li>armed insurrections</li> </ul>
	<ul> <li>Yaoundé Declaration on Drug Control, Abuse and Illicit Drug Trafficking in Africa, 1996</li> <li>African Nuclear Weapon- Free Zone Treaty, 1996</li> <li>Constitutive Act of the African Union, 2000</li> <li>NEPAD Framework Document, 2001</li> <li>Declaration on the Framework for an OAU Response to</li> </ul>	<ul> <li>territorial disputes</li> <li>border conflict</li> <li>cross-border movements of small arms and light weapons</li> <li>border skirmishes</li> <li>occasional or regular cross-border raids</li> <li>preparation of an insurgency from a neighbouring country</li> <li>expulsion of identity groups</li> </ul>
	<ul> <li>Unconstitutional Changes of Government, 2000</li> <li>Memorandum of Understanding on the Conference on Security, Stability, Development and Co-operation in Africa (CSSDCA), OAU/Civil Society.3 (II), Annex, 2002</li> <li>Decision on the CSSDCA, AHG/Dec. 175 (XXXVIII), 2002</li> <li>AU Plan of Action on the Prevention and Combating of Terrorism, 2002</li> <li>Durban Declaration on the</li> </ul>	

 <sup>&</sup>lt;sup>130</sup> Taken from "Meeting the Challenge of Conflict Prevention in Africa: Proposal for an Indicators Module," African Union, Dec. 17-19, 2006, http://www.africa-union.org/root/ua/Conferences/decembre/PSC/17-19%20dec/home-Eng.htm (accessed February 24, 2008).

Objectives	Documents adopted by the	Generic early warning	
	OAU and the AU	indicators	
	<ul> <li>Control of Illicit Drug Trafficking and Abuse, 2002</li> <li>Objectives, Standards, Criteria and Indicators for the African Peer Review Mechanism, 2003</li> <li>Solemn Declaration on a Common African Defence and Security Policy, 2004</li> <li>The African Union Non- Aggression and Common Defence Pact, 2005</li> </ul>		
Constitutional democracy,	African (Banjul) Charter	• gross human rights	
including periodic political	on Human and Peoples'	violations by state or non-	
competition and opportunity	Rights, 1981	state actors	
citizen rights and supremacy	Framework for an OAU	<ul> <li>suspension of a</li> </ul>	
of the Constitution	Response to	constitution	
	of Government 2000	<ul> <li>limitation of constitutional rights</li> </ul>	
	<ul> <li>Coup d'Etats in Africa,</li> </ul>	<ul> <li>cancellation or rigging of</li> </ul>	
	AHG/Dec. 142 (XXXV),	elections	
	<ul><li>Constitutive Act of the</li></ul>	• public or private hate talk in or by the media	
	African Union, 2000		
	Document, 2001		
	• OAU Declaration on the		
	Principles Governing Democratic Elections in		
	Africa, AHG/Decl.1		
	(XXXVIII), 2002		
	<ul> <li>NEPAD Declaration on Democracy, Political,</li> </ul>		
	Economic and Corporate		
	Governance AHG/235		
	<ul> <li>Objectives, Standards,</li> </ul>		
	Criteria and Indicators for		
	the African Peer Review Mechanism, 2003		
Promotion and protection of	African Charter on Human	• restrictions of individual or	
economic, social and cultural	and Peoples' Rights, 1981	collective economic, social	
as enshrined in African and	<ul> <li>African Charter of Popular Participation in</li> </ul>	state or non-state actors	
international human rights	Development, 1990	<ul> <li>policies of economic,</li> </ul>	
instruments	Resolution on the African	social and cultural	

Objectives	Documents adopted by the	Generic early warning		
	<ul> <li>OAU and the AU</li> <li>Commission on Human and Peoples' Rights, AHG/Res.230 (XXX), 1994</li> <li>Constitutive Act of the African Union, 2000</li> <li>NEPAD Framework Document, 2001</li> <li>Objectives, Standards, Criteria and Indicators for the African Peer Review Machanism, 2003</li> </ul>	<ul> <li>indicators</li> <li>exclusion</li> <li>gross human rights violations</li> <li>major changes of the ecological balance</li> <li>environmental stress (e.g. through natural desaster or climate change)</li> </ul>		
Uphold the separation of powers, including the protection of the independence of the judiciary and of an effective legislature	<ul> <li>Constitutive Act of the African Union, 2000</li> <li>NEPAD Framework Document 2001</li> <li>Solemn Declaration on a Common African Defence and Security Policy, 2004</li> <li>Objectives, Standards, Criteria and Indicators for the African Peer Review Mechanism, 2003</li> </ul>	<ul> <li>violations of the separation of powers</li> <li>passing over the judiciary</li> <li>intruding into parliament's rights</li> </ul>		
Ensure accountable, efficient and effective public office holders and civil servants	<ul> <li>NEPAD Framework Document, 2001</li> <li>African Convention on Preventing and Combating Corruption, 2003</li> <li>Objectives, Standards, Criteria and Indicators for the African Peer Review Mechanism, 2003</li> <li>Solemn Declaration on a Common African Defence and Security Policy, 2004</li> </ul>	<ul> <li>active steps to prevent accountability</li> <li>widespread corruption in the public service</li> </ul>		
Fighting corruption in the political sphere	<ul> <li>NEPAD Framework Document, 2001</li> <li>African Convention on Preventing and Combating Corruption, 2003</li> <li>Objectives, Standards, Criteria and Indicators for the African Peer Review Mechanism, 2003</li> <li>Solemn Declaration on a Common African Defence and Security Policy, 2004</li> </ul>	<ul> <li>widespread corruption among the political class</li> <li>misappropriation of funds</li> </ul>		

Objectives	Documents adopted by the	Generic early warning
Durant in an damate stimula	OAU and the AU	indicators
Promotion and protection of the rights of women	<ul> <li>OAU and the AU</li> <li>African Charter on Human and Peoples' Rights, 1981</li> <li>Protocol to the African Charter on Human ad Peoples' Rights on the Rights of Women in Africa, 1995</li> <li>Decision on the 15<sup>th</sup> Annual Activity Report of the African Commission on Human Rights and Peoples' Rights, AHG/Dec. 171 (XXXVIII), 2002</li> <li>Objectives, Standards, Criteria and Indicators for</li> </ul>	<ul> <li>indicators</li> <li>violations of women's rights</li> </ul>
	the African Peer Review	
	Mechanism, 2003	
Promotion and protection of the rights of children and young persons	<ul> <li>African Charter on Human and Peoples' Rights, 1981</li> <li>African Charter on the Rights and Welfare of the Child, 1990</li> <li>Decision on the 15<sup>th</sup> Annual Activity Report of the African Commission on Human Rights and Peoples' Rights, AHG/Dec. 171 (XXXVIII), 2002</li> <li>Decision on the Report of the African Committee on the Rights and Welfare of the Chid, AHG/Dec. 172 (XXXVIII), 2002</li> <li>Objectives, Standards, Criteria and Indicators for the African Peer Review</li> </ul>	• violations of children's and young person's rights
Dromotion and protection -f	Mechanism, 2003	
Promotion and protection of the rights of vulnerable groups including internally displaced persons and refugees	<ul> <li>Convention Governing Specific Aspects of Refugee Problems in Africa, 1969</li> <li>African Charter on Human and Peoples' Rights, 1981</li> <li>Decision on the 15<sup>th</sup> Annual Activity Report of the African Commission</li> </ul>	<ul> <li>violations of the rights of IDPs and refugees</li> <li>forced displacement (IDPs and refugees)</li> </ul>

Objectives	Documents adopted by the	Generic early warning
	OAU and the AU	indicators
	on Human Rights and	
	Peoples' Rights,	
	AHG/Dec. 171	
	(XXXVIII), 2002	
	• Objectives, Standards,	
	Criteria and Indicators for	
	the African Peer Review	
	Mechanism, 2003	

## APPENDIX C - Data Results from the Predictive Model

Year	Name	CIA World Factbook Political Regime Type Classification	Freedom House Political Freedom Value	Political Freedom Score	Multiplier	Political Freedom Weighted Score
1988	Burundi	Republic	NF	3	2.04	6.12
1988	Somalia	Republic	NF	3	2.04	6.12
1989	Liberia	Republic	NF	3	2.04	6.12
1989	Sudan	Republic	NF	3	2.04	6.12
1991	Angola	In Transition	PF	2	2.04	4.08
1991	Ethiopia	In Transition	PF	2	2.04	4.08
1991	Zaire	Republic with a Strong Presidential System	NF	3	2.04	6.12
1991	Togo	Republic; One-party Presidential Regime	NF	3	2.04	6.12
1991	Sudan	Military	NF	3	2.04	6.12
1991	Somalia	Republic	NF	3	2.04	6.12
1993	Zanzibar	Republic	NF	3	2.04	6.12
1994	Ethiopia	Transitional Government	NF	3	2.04	6.12
1995	Kenya	Republic	NF	3	2.04	6.12
1995	Comoros	Independent Republic	PF	2	2.04	4.08
1996	Zaire	Republic with a Strong Presidential System	NF	3	2.04	6.12
1997	Central Africa	Republic	PF	2	2.04	4.08
1997	Comoros	Independent Republic	PF	2	2.04	4.08
1997	Sierra Leone	Constitutional Democracy	NF	3	2.04	6.12
1998	Namibia	Republic	F	1	2.04	2.04
1998	Lesotho	Parliamentary Constitutional Monarchy	PF	2	2.04	4.08

#### Table C.1 Results for Political Freedom Variable

Vear	Name	ELF Index	Ethnic Homogeneity	Multinlier	Ethnic Homogeneity Weighted Score
1988	Burundi	0.04	1	-0.026	-0.026
1988	Somalia	0.08	1	-0.026	-0.026
1989	Liberia	0.83	3	-0.026	-0.078
1989	Sudan	0.73	3	-0.026	-0.078
1991	Angola	0.78	3	-0.026	-0.078
1991	Ethiopia	0.69	3	-0.026	-0.078
1991	Zaire	0.9	3	-0.026	-0.078
1991	Togo	0.71	3	-0.026	-0.078
1991	Sudan	0.73	3	-0.026	-0.078
1991	Somalia	0.08	1	-0.026	-0.026
1993	Zanzibar	0.93	3	-0.026	-0.078
1994	Ethiopia	0.69	3	-0.026	-0.078
1995	Kenya	0.83	3	-0.026	-0.078
1995	Comoros*	0.13	1	-0.026	-0.026
1996	Zaire	0.9	3	-0.026	-0.078
1997	Central Africa	0.69	3	-0.026	-0.078
1997	Comoros*	0.13	1	-0.026	-0.026
1997	Sierra Leone	0.77	3	-0.026	-0.078
1998	Namibia	0.68	3	-0.026	-0.078
1998	Lesotho	0.22	1	-0.026	-0.026

Table C.2 Results for Ethnic Homogeneity Variable

\*ELF index calculated from Scarritt and Mozaffar.<sup>131</sup>

<sup>&</sup>lt;sup>131</sup> James R. Scarritt and Shaheen Mozaffar, "The Specification of Ethnic Cleavages and Ethnopolitical Groups for the Analysis of Democratic Competition in Africa," *Nationalism and Ethnic Politics* 5 (1999): 82-117.

		Gini				Income
		Coefficient	Data	Gini		Inequality
Year	Name	Value	Year	Score	Multiplier	Weighted Score
1988	Burundi	33.3	1992	3	-0.064	-0.192
1988	Somalia	47.4	2002	1	-0.064	-0.064
1989	Liberia	43	1974	2	-0.064	-0.128
1989	Sudan	39.3	1969	3	-0.064	-0.192
1991	Angola*	62	2008	1	-0.064	-0.064
1991	Ethiopia	32.7	1995	3	-0.064	-0.192
1991	Zaire	41.9	1958	2	-0.064	-0.128
1991	Togo	33.8	1957	3	-0.064	-0.192
1991	Sudan	39.3	1969	3	-0.064	-0.192
1991	Somalia	47.4	2002	1	-0.064	-0.064
1993	Zanzibar	47.7	1993	1	-0.064	-0.064
1994	Ethiopia	32.7	1995	3	-0.064	-0.192
1995	Kenya	44.3	1994	2	-0.064	-0.128
1995	Comoros**	44.3	1995	2	-0.064	-0.128
1996	Zaire	41.9	1958	2	-0.064	-0.128
1997	Central Africa	64.9	1992	1	-0.064	-0.064
1997	Comoros**	44.3	1995	2	-0.064	-0.128
1997	Sierra Leone	63.7	1989	1	-0.064	-0.064
1998	Namibia	73.9	1993	1	-0.064	-0.064
1998	Lesotho	24.8	1990	3	-0.064	-0.192

Table C.3 Results for Income Inequality Variable

\* Gini Coefficient Value gathered from the Global Peace Index.<sup>132</sup> \*\* Gini Coefficient Value gathered from the World Food Programme.<sup>133</sup>

<sup>&</sup>lt;sup>132</sup> "Global Peace Index 2008," Global Peace Index,
http://www.visionofhumanity.org/gpi/results/rankings/2008/.
<sup>133</sup> "Comoros: Comprehensive Food Security and Vulnerability Analysis," Vulnerability Analysis and Mapping Branch, World Food Programme,

http://documents.wfp.org/stellent/groups/public/documents/ena/wfp085419.pdf.

# APPENDIX D - Model Applied to Sub-Saharan Africa Today

	Political			Political
	Freedom	Political		Freedom
Country	Value	Freedom Score	Multiplier	Weighted Score
Angola	NF	3	2.04	6.12
Benin	F	1	2.04	2.04
Botswana	F	1	2.04	2.04
Burkina Faso	PF	2	2.04	4.08
Burundi	PF	2	2.04	4.08
Cameroon	NF	3	2.04	6.12
Cape Verde	F	1	2.04	2.04
Central African Republic	PF	2	2.04	4.08
Chad	NF	3	2.04	6.12
Comoros	PF	2	2.04	4.08
Congo (Brazzaville)	NF	3	2.04	6.12
Congo (Kinshasha)	NF	3	2.04	6.12
Cote d'Ivoire	NF	3	2.04	6.12
Djibouti	PF	2	2.04	4.08
Equatorial Guinea	NF	3	2.04	6.12
Eritrea	NF	3	2.04	6.12
Ethiopia	PF	2	2.04	4.08
Gabon	PF	2	2.04	4.08
Gambia, The	PF	2	2.04	4.08
Ghana	F	1	2.04	2.04
Guinea	NF	3	2.04	6.12
Guinea-Bissau	PF	2	2.04	4.08
Kenya	PF	2	2.04	4.08
Lesotho	F	1	2.04	2.04
Liberia	PF	2	2.04	4.08
Madagascar	PF	2	2.04	4.08
Malawi	PF	2	2.04	4.08
Mali	F	1	2.04	2.04
Mauritius	F	1	2.04	2.04
Mozambique	PF	2	2.04	4.08
Namibia	F	1	2.04	2.04
Niger	PF	2	2.04	4.08
Nigeria	PF	2	2.04	4.08
Rwanda	NF	3	2.04	6.12
Sao Tome and Principe	F	1	2.04	2.04
Senegal	F	1	2.04	2.04
Seychelles	PF	2	2.04	4.08
Sierra Leone	PF	2	2.04	4.08
Somalia	NF	3	2.04	6.12
South Africa	F	1	2.04	2.04
Sudan	NF	3	2.04	6.12
Swaziland	NF	3	2.04	6.12

#### Table D.1 Political Freedom in Sub-Saharan Africa

	Political			Political
	Freedom	Political		Freedom
Country	Value	Freedom Score	Multiplier	Weighted Score
Tanzania	PF	2	2.04	4.08
Togo	PF	2	2.04	4.08
Uganda	PF	2	2.04	4.08
Zambia	PF	2	2.04	4.08
Zimbabwe	NF	3	2.04	6.12

				Ethnic
	ELF	Ethnic Homogeneity		Homogeneity
Country	Index	Score	Multiplier	Weighted Score
Angola	0.78	3	-0.026	-0.078
Benin	0.62	3	-0.026	-0.078
Botswana	0.51	3	-0.026	-0.078
Burkina Faso	0.68	3	-0.026	-0.078
Burundi	0.04	1	-0.026	-0.026
Cameroon	0.89	3	-0.026	-0.078
Cape Verde*	0.4174	3	-0.026	-0.078
Central African Republic	0.69	3	-0.026	-0.078
Chad	0.83	3	-0.026	-0.078
Comoros**	0.13	1	-0.026	-0.026
Congo (Brazzaville)	0.66	3	-0.026	-0.078
Congo (Kinshasha)	0.9	3	-0.026	-0.078
Cote d'Ivoire	0.86	3	-0.026	-0.078
Djibouti**	0.49	3	-0.026	-0.078
Equatorial Guinea	0.3	2	-0.026	-0.052
Eritrea	0.653	3	-0.026	-0.078
Ethiopia	0.69	3	-0.026	-0.078
Gabon	0.69	3	-0.026	-0.078
Gambia, The	0.73	3	-0.026	-0.078
Ghana	0.71	3	-0.026	-0.078
Guinea	0.75	3	-0.026	-0.078
Guinea-Bissau	0.8	3	-0.026	-0.078
Kenya	0.83	3	-0.026	-0.078
Lesotho	0.22	1	-0.026	-0.026
Liberia	0.83	3	-0.026	-0.078
Madagascar	0.06	1	-0.026	-0.026
Malawi	0.62	3	-0.026	-0.078
Mali	0.78	3	-0.026	-0.078
Mauritius	0.58	3	-0.026	-0.078
Mozambique	0.65	3	-0.026	-0.078
Namibia	0.68	3	-0.026	-0.078
Niger	0.73	3	-0.026	-0.078
Nigeria	0.87	3	-0.026	-0.078
Rwanda	0.26	1	-0.026	-0.026
Sao Tome and Principe	No Data	0	-0.026	0
Senegal	0.72	3	-0.026	-0.078
Sevchelles	0.33	2	-0.026	-0.052
Sierra Leone	0.77	3	-0.026	-0.078
Somalia	0.08	1	-0.026	-0.026
South Africa	0.88	3	-0.026	-0.078
Sudan	0.73	3	-0.026	-0.078
Swaziland	0	1	-0.026	-0.026

Table D.2 Ethnic Fractionalization in Sub-Saharan Africa

				Ethnic
	ELF	Ethnic Homogeneity		Homogeneity
Country	Index	Score	Multiplier	Weighted Score
Tanzania	0.93	3	-0.026	-0.078
Togo	0.71	3	-0.026	-0.078
Uganda	0.9	3	-0.026	-0.078
Zambia	0.82	3	-0.026	-0.078
Zimbabwe	0.54	3	-0.026	-0.078

\* ELF index calculated from Alesina, et al.<sup>134</sup> \*\* ELF index calculated from Scarritt and Mozaffar<sup>135</sup>

 <sup>&</sup>lt;sup>134</sup> Alberto Alesina, et al., "Fractionalization." *Journal of Economic Growth* 8 (2003): 185.
 <sup>135</sup> James R. Scarritt and Shaheen Mozaffar, "The Specification of Ethnic Cleavages and Ethnopolitical Groups for the Analysis of Democratic Competition in Africa," *Nationalism and Ethnic Politics* 5 (1999): 82-117.

	~				Income
	Gini Gast <b>f</b> aisset	D-4-	Circi		Inequality
Country	Value	Data Vear	GINI Score	Multinlier	Score
Angola	62	2008	1	-0.064	-0.064
Renin	36.5	2003	3	-0.064	-0.192
Botswana	53.9	1994	1	-0.064	-0.064
Burkina Faso	39.5	2003	3	-0.064	-0.192
Burundi	41.8	1998	2	-0.064	-0.128
Cameroon	44	2001	2	-0.064	-0.128
Cape Verde	No Data	2001	0	-0.064	0
Central African Republic	64.9	1992	1	-0.064	-0.064
Chad	29.6	1958	3	-0.064	-0.192
Comoros	44.3	1995	2	-0.064	-0.128
Congo (Brazzaville)*	56.2		1	-0.064	-0.064
Congo (Kinshasha)*	55		1	-0.064	-0.064
Cote d'Ivoire	44.5	2002	2	-0.064	-0.128
Diibouti	40.9	2002	3	-0.064	-0.192
Equatorial Guinea*	65		1	-0.064	-0.064
Eritrea**	45		2	-0.064	-0.128
Ethiopia	29.5	2000	3	-0.064	-0.192
Gabon	63	1977	1	-0.064	-0.064
Gambia. The	47.1	1998	2	-0.064	-0.128
Ghana	40.7	1999	3	-0.064	-0.192
Guinea	38.6	2003	3	-0.064	-0.192
Guinea-Bissau	44.3	1994	2	-0.064	-0.128
Kenya	62.5	1999	1	-0.064	-0.064
Lesotho	60	1999	1	-0.064	-0.064
Liberia	43	1974	2	-0.064	-0.128
Madagascar	47.4	2001	1	-0.064	-0.064
Malawi	39	2004	3	-0.064	-0.192
Mali	40.1	2001	3	-0.064	-0.192
Mauritius	37.1	2001	3	-0.064	-0.192
Mozambique	47.3	2002	1	-0.064	-0.064
Namibia	73.9	1993	1	-0.064	-0.064
Niger	50.6	1995	1	-0.064	-0.064
Nigeria	43.7	2003	2	-0.064	-0.128
Rwanda	45.4	2000	2	-0.064	-0.128
Sao Tome and Principe	No Data		0	-0.064	0
Senegal	41.3	2001	3	-0.064	-0.192
Seychelles	46	1978	2	-0.064	-0.128
Sierra Leone	39	2003	3	-0.064	-0.192
Somalia	47.4	2002	1	-0.064	-0.064
South Africa	56.5	2000	1	-0.064	-0.064
Sudan	39.3	1969	3	-0.064	-0.192
Swaziland	50.4	2001	1	-0.064	-0.064

Table D.3 Income Inequality in Sub-Saharan Africa

Country	Gini Coefficient Value	Data Year	Gini Score	Multiplier	Income Inequality Weighted Score
Tanzania	36.7	2001	3	-0.064	-0.192
Тодо	33.8	1957	3	-0.064	-0.192
Uganda	45.7	2002	2	-0.064	-0.128
Zambia	50.8	2004	1	-0.064	-0.064
Zimbabwe	73.3	1995	1	-0.064	-0.064

\* Gini Coefficient Value gathered from the Global Peace Index.<sup>136</sup> \*\* Gini Coefficient Value gathered from Food and Agriculture Organization.<sup>137</sup>

 <sup>&</sup>lt;sup>136</sup> Global Peace Index, http://www.visionofhumanity.org/gpi/home.php.
 <sup>137</sup> "Special Report: FAO/WFP Crop and Food Supply Assessment Mission to Eritrea," Food and Agriculture Organization, http://www.fao.org/docrep/007/j3959e/j3959e00.HTM.