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MACROECONOMIC BENEFITS OF FARMER-PASTORALIST PEACE IN NIGERIA'S MIDDLE BELT STATES: AN INPUT-OUTPUT ANALYSIS APPROACH

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Abstract

This article reports on the potential macroeconomic benefits of peace stemming from a reduction in farmer-pastoralist violence in four Middle Belt states of Nigeria (Benue, Kaduna, Nasarawa, and Plateau). Farmers and pastoralists routinely clash over access to farmland, grazing areas, stock routes, and water points for both animals and households. Farmer-pastoralist violence in these states is a relatively low-intensity form of conflict, but it is regionally widespread and chronic, and its incidence is arguably increasing. Using estimates of potential income benefits of peace at the household-level derived from a related study, we herein derive macroeconomic benefits via an input-output model of the Nigerian economy. We estimate these benefits to amount to around 2.8 percent of the nominal Nigerian GDP (or around 0.8 percent of the total Nigerian GDP, inclusive of the informal sector), representing a major macroeconomic opportunity. We break out these benefits by sector, showing that the sectors that stand to gain most from peace are the crop production, food and beverage, livestock, and chemical and petroleum industries.

T his article reports on a study of potential macroeconomic benefits of peace subsequent to a hypothetical reduction in farmer-pastoralist violence in four Middle Belt states of Nigeria (Benue, Kaduna, Nasarawe, and Plateau). Estimates of potential income benefits of peace at the household-level, derived in a related study, are used here to compute the macroeconomic benefits—both in the aggregate as well as disaggregated by industrial sector—via an input-output model of the Nigerian economy. While somewhat experimental, this spreadsheet-based approach has the advantage of producing industry-by-industry estimates in a fairly parsimonious way.[1]

Other violent conflicts in Nigeria routinely capture media headlines and the attention of peace researchers, usually in regard to petroleum extraction-related conflict in the Niger delta region or in regard to violent extremism in the country's northeast. In contrast, we focus on Middle Belt states and demonstrate that addressing farmer-pastoralist violence, a low-intensity but pervasive form of conflict there as well as across the Sahel, is a major opportunity for macroeconomic improvement for Africa's largest economy. We break out the benefits by sector in an exercise that may help policymakers identify potential private sector partners in peacemaking. We find that the top sectoral beneficiaries are the food and beverage, agriculture, and the chemical and petroleum industries.[2]

Background

Nigeria's ethnically and religiously diverse Middle Belt has experienced recurrent eruptions of violence over the past several decades. Disputes between farmers and pastoralists arise from disagreements over access to farmland, grazing areas, stock routes, and water points for both animals and households. A range of factors underlie these disputes, including increased competition for land (potentially driven by desertification, climate change, and population growth), lack of clarity around the demarcation of pasture and stock routes, and the breakdown of traditional relationships and formal agreements between farmers and pastoralists. These conflicts undermine market development and economic growth by destroying productive assets, reducing production, preventing trade, deterring investment by private sector actors, and eroding social cohesion. Because livelihood strategies in Nigeria are closely tied to identity and because access to services and opportunities can vary across identity groups,

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many farmer-pastoralist conflicts take on ethnic and religious hues and are exacerbated along lines of identity.[3]

Prior literature

Effects on the economy as a whole

There have been numerous attempts to quantify and measure the economic costs of conflict at country and at cross-national levels. Of course, any estimate of the costs of conflict depends on the definition and scope of conflict itself. Some literature has sought to assess the economic burden of violence by aggregating the estimated costs of all violence globally, including collective violence such as civil wars, and criminal and interpersonal violence. One McKinsey Global Institute paper, for example, ranks the cost of armed violence, terrorism, and war as tied (with smoking) for the greatest social burden generated by human beings, representing 2.8 percent of global GDP. It is unclear, however, how this statistic is arrived at, and a number of indications suggest that it may dramatically underestimate the total cost of violence. For instance, the 2013 Global Peace Index reports that global spending on violence containment was approximately USD9.5 trillion, or roughly 13.1 percent of global GDP. Of these costs, roughly 40 percent were associated with a broad measure of military-related expenditure; a further 13 percent were associated with internal security; and just under 2 percent were associated with GDP losses from conflict. As for Nigeria, IEP estimated that the country spent approximately 6 percent of its GDP in 2012 on violence containment. Some authors, moreover, have disputed the usefulness of GDP as an indicator of the cost of conflict, in that it includes responses to insecurity (which may have some positive effects on GDP growth), while excluding the informal economy.[4]

Many studies distinguish between collective violent conflict and criminal and interpersonal violence. Of the former, a number focus on a relatively narrow definition of violent conflict—often, just on civil war—and do not address the costs of lower-intensity conflict, such as pastoralist-farmer conflict or other inter-communal conflicts. In the context of civil war, Paul Collier famously estimated the impact of civil war on the annual GDP growth rate at minus 2.2 percent. A survey of the economic performance of 24 low-income countries that experienced civil conflicts since 1970 contends that structural shifts in political, economic, and aid relations in the post-cold war period correspond to a reduction of real GDP per capita of 12.5 percent annually, with real GDP growth reduced by 12.3 percent below normal over the course of the entire conflict. The International Action Network on Small Arms (IANSA) estimated that armed conflict costs Africa around USD18 billion annually; with approximately USD300 billion lost by 23

This study demonstrates that addressing farmer-pastoralist violence, a low-intensity but pervasive form of conflict in the Middle Belt of Nigeria, constitutes a major opportunity for macroeconomic improvement for Africa's largest economy. Taking account of the size of the informal economy, we estimate that Nigeria's total GDP could be larger by 0.8 percentage points which, in economics, is a large-scale effect. We break out the potential benefits of peace by sector in an exercise that may help policymakers identify where they might look for peacebuilding partners in the private sector. In particular, we identify the top sectoral beneficiaries as the crop production, food and beverage, livestock, and chemical and petroleum industries.

countries (including Nigeria) since 1990, representing an average annual loss of 15 percent of GDP.[5]

Case study research has found similar, although hugely varying, costs of civil wars, ranging from GDP reduced by 8.3 percent in Nepal to 20 to 23 percent for Rwanda to133 percent for Sudan. Effects of war may differ based on the scale and morphology of violence as well as its geographic relationship to economically important activity. Sri Lanka may have continued to experience reasonable economic growth during its conflict due to the geographic concentration of unrest in the north, which left much of the rest of the country economically unaffected. It may also depend on whether boosting defense and security budgets precipitates a drop in education, health, and development spending.[6]

As noted, much of the existing literature focuses on a relatively narrow category of violent conflict: that of civil war. Moreover, this research generally suffers from a low degree of "data differentiation," particularly in regard to disaggregation among conflict types. In response to this, a smaller literature has focused on the costs associated with lower-intensity violence, in contrast to civil wars. In these lower-level internal conflicts, costs may be less directly associated with the same scale of property destruction, death and injury, and may have different geographic dynamics in that they are typically dispersed across a larger geographic area.[7]

One relevant study of the effects of violence in the Middle Belt states notes the particular paucity of sub-national data on economic activity in Nigeria. Instead, as a proxy for economic activity, the author proposes using satellite technology to detect the amount of light observed at night by satellite, a method with a precedent in the study of Somalia's pirate economy. He focuses on the effect of the Jos crisis (which began in 2001) on growth in Plateau state, concluding that since 2001, growth in that state has been slower than in other states in the Middle Belt region.[8]

In addition to the economic consequences of conflict during

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the course of conflict are those in the years following conflict. Paul Collier estimates that these are in part determined by the duration of war, with short wars exhibiting continued postwar economic decline—what he terms a "war overhead"—while long wars experience a phase of rapid economic growth in the subsequent period of peace.[9]

The means by which violence is perpetrated is the focus of some studies on the costs of conflict, with the import, availability, and use of small arms constituting a central focus in much of the research. A focus on the weaponry of violence illustrates differences in the nature of victimhood, with studies from Nigeria suggesting that male-to-female ratios for injuries sustained from gun violence ranged from 6:1 in case studies in northern Nigeria to 12.4:1 among the civilian population in central Nigeria. This suggests that there may be different economic costs of gun violence if victims are disproportionately engaged in gender-dominated economic activities. Technology may also have implications for the subsequent costs of treatment and rehabilitation from violent conflict, with studies from the United States suggesting that the average gunshot injury costs 50 times more than the average stabbing injury.[10]

Effects on sectors of the economy

A study on Nepal focuses on the overall GDP growth impact of its conflict and, as such, is not sector-specific. However, the authors' hypothesized mechanism works through the trade-off between military and development expenditure, finding that conflict exerts its effects via differentials in sector-specific multipliers. The development sector in particular stands to gain from a reduction in expenditure on security, dependent on greater peace nationally. In contrast, a study on Mozambique analyses the impact of its civil war on various sectors of the economy more directly. For example, its author estimates that by the cessation of hostilities in 1992, the recorded cattle stock was reduced to less than a fifth of its recorded 1980 level. Similarly, a study of the economic effect of the 1994 genocide in Rwanda estimates that between 50 to 80 percent of the country's cattle stock was lost in that year and, by 2002, had returned to under three-quarters of pre-crisis levels. These losses occurred through a combination of direct measures (such as the killing of cattle to spread fear, to exert economic pressure on communities, and to feed troops) and indirect measures (such as the shortage of feed and veterinary care, consumption needs of the population, and disruption to cattle markets). In some contexts, agricultural losses may also arise from security operations that compel households to abandon their livestock or land, with even temporary departures resulting in potential deterioration of assets. For Nigeria,

evidence on the effects of violence by sector is scarce. One author notes the particular impact of violent conflict in the Jos plateau—Plateau state—on livestock prices, given the centrality of herding to the economy, and spill-over effects from this instability on the cost of beef and milk in Jos and the surrounding area.[11]

Taken together, the literature highlights considerable gaps in measuring the effect of lower-intensity, but pervasive and chronic, conflicts beyond civil wars alone; this is in addition to the need to develop and refine sensitive methods which can estimate sector-specific costs of conflict. This article sets out to make a contribution addressing both of these gaps.

Methods

Input-output (I-O) analysis is a common economic analysis technique originally developed by Wassily Leontief to estimate the effects on the economy of a certain change in supply or demand within a particular industry. I-O tables contain static summary information of the industrial structure of an economy for a given period. There is a long tradition, dating back to Leontief himself, of using I-O analyses to examine the effects of military expenditure on the economy. Regional and sectoral economic studies have also made extensive use of I-O analysis.[12]

Employing I-O analysis in estimating the benefits of peace in the farmer-pastoralist conflict to the Nigerian economy is, in its simplest form, relatively straightforward. The benefits may be broken out into three categories: (a) direct, (b) indirect, and (c) induced. The direct impact includes the jobs, wages, and output of the increased economic activity. The indirect impact includes the jobs, wages, and output deriving from the production of intermediate goods serving as inputs to the sector in question. The induced benefits from the change in demand or supply are the ripple effects caused by the first two. I-O analysis deems the benefits of increases in the supply of a good to be a function of "forward linkages," while the benefits of increases in the demand of a good are a function of "backward linkages."

We constructed an I-O table by collapsing the 2010 Nigerian Supply-Use Table (SUT) into 46 basic industry types. (This is the same SUT used to rebase Nigerian GDP in 2013.) The inputs (rows) also include free-on-board (FOB) and cost, insurance, and freight (CIF) adjustments; direct purchases abroad by residents; domestic purchases by nonresidents; wages; production taxes; consumption of fixed capital; and net operating surplus. The outputs (columns) also include household consumption; nonprofit consumption; governmental consumption; gross fixed capital formation; inventory changes; and exports. For the purposes of the matrix operations

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described below, we estimate "closed" I-O analyses, meaning that the matrix is defined not only by the 46 industries, but also by household income (wages, as an additional row), and household consumption (as an additional column). Our I-O matrices therefore have the square dimensions of 47×47.[13]

Empirical strategy

I-O tables take the form of matrices where the columns are defined by the industries that are buying inputs, and the rows by the same industries selling outputs. An I-O matrix $M \ni m_{i,j}$ contains values of goods and services $m_{i,j}$ sold by industry i to industry j. Given this structure, matrices A and B may be created, defined as:

$$(1) \quad \begin{aligned} A \ni a_{i,j} = m_{i,j} / \sum_i m_{i,j} \\ B \ni b_{i,j} = m_{i,j} / \sum_j m_{i,j} \end{aligned}.$$

A then represents the matrix of backward linkages. One way of thinking about this is to say that for every \$1 rise in demand in industry j, that industry will have to purchase $a_{i,j}$ dollars of inputs from industry i. Conversely, B represents the matrix of forward linkages. For every \$1 increase in the supply from industry i, that industry may contribute $b_{i,j}$ dollars of inputs to the production of industry j. Direct backward and forward linkages are then given, respectively, as the column sum of the A matrix and the row sum of the B matrix. The total backward linkages (direct, indirect, and induced effects) may be calculated as the column sum of $T \equiv (I - A)^{-1}$, and the total forward linkages as the row sum thereof.[14]

For the purposes of this study, the potential benefits of peace at the household level are assumed to be the income losses due to farmer-pastoralist conflict as calculated in a microeconomic companion study from original data obtained by a cluster sample survey of rural households in the study states. These estimated benefits of farmer-pastoralist peace are fed into the I-O matrices described above. The economic boost in production, *PB*, driven by anticipated increased consumer spending (*cons*), may be obtained by summing (1) the products of the population-wide income gains, G_{cons}, also from the companion study, (2) a term representing the proportion of the gains spent (*1–s*, where *s* is the savings rate), and (3) $t_{i,j=cons}$ (where $t_{i,j} \in T$ over all affected input sectors i). These will be our effects due to "backward" linkages. The economic boost in consumption, *CB*, driven by anticipated increased agricultural (crop plus livestock) production, may be obtained by summing the product of population-wide production gains, G_{prod}, as determined below, by $t_{i=ag,j}$, across all output sectors j. These will be our effects due to "forward" linkages.

In sum:

$$(2) \quad \begin{aligned} PB = \sum_j (G_{cons} (1 - s) t_{i,j=cons}) \\ CB = \sum_i (G_{prod} t_{i=prod,j}) \end{aligned}.$$

These two parts can then be added together to derive the *total* economic benefit of peace to the Nigerian economy: *TB = PB + CB*. In our case, the survey-adjusted mean savings rate of 15.48 percent for the study states was used.[15]

To determine the *sectoral* benefits of peace, we use the same techniques. Again, we multiply population-wide income gains as determined in the companion study by the proportion of income spent, and again by $a_{i,cons}$ to obtain the direct backward linkage associated with each sector i in the Nigerian economy. Similarly, we multiply population-wide agricultural and livestock production gains by $b_{f,j}/b_{p,j}$, where f is farming (or agriculture) and p is pastoralism (or livestock), to obtain the direct forward linkage associated with each sector j in the Nigerian economy. Sector-specific total (direct, indirect, and induced) backward and forward linkages for consumption and production rises can be estimated by multiplying total consumption and production by $t_{i,j} \in T$.

We use the results of the companion study, as its survey instrument was specifically designed to estimate (a) income and (b) determine what proportion of that income is derived from crop and/or livestock production. In that paper, we estimate the size of the economic gains to peace that would translate into higher demand and revenues for private sector industries. These results can be used to calculate, respectively, the total backward linkages associated with increased consumer spending and the total forward linkages associated with increased rural productivity in a peaceful scenario.

Generating inputs

The specific estimates of total averted income losses by state in the hypothetical scenario that violence was reduced to near-zero levels are produced in the companion study. In that study, we also considered examining household expenditure instead of income, as expenditure could be argued to be the real motivating force behind any macroeconomic expansion as predicted in the present study. However, expenditure might rise in crises, when households may need to dip into savings or liquidate assets to offset potentially negative effects of conflict on their livelihoods. Such expenditure might then boost GDP in the short term, even as it represents a short-term coping mechanism in the face of financial stress. We thus use the abovementioned study's Model 4, as it is a controlled model

Table 1: Total income losses in the study states by sector and approximate percentage of contribution to the household income

Category	Approximate percentage of household income	Farming n=1,490	Pastoralism n=1,443	Trading/other n=1,409	Total
Panel A: Survey-adjusted proportions (95% confidence intervals in parentheses)					
1	10	0.075 (0.063; 0.088)	0.623 (0.597; 0.649)	0.697 (0.67, 0.724)	0.140
2	30	0.121 (0.103; 0.141)	0.159 (0.140; 0.180)	0.246 (0.223, 0.272)	0.158
3	50	0.064 (0.052; 0.079)	0.041 (0.031; 0.053)	0.046 (0.032, 0.066)	0.075
4	70	0.412 (0.385; 0.0439)	0.116 (0.098; 0.136)	0.008 (0.004, 0.013)	0.374
5	90	0.328 (0.304; 0.354)	0.062 (0.051; 0.074)	0.003 (0.001, 0.007)	0.354
Total		0.660	0.267	0.174	1.101
Panel B: Predicted proportions (adjustment coefficient = 0.84)					
1	10	0.068	0.607	0.562	0.124
2	30	0.110	0.155	0.199	0.139
3	50	0.059	0.039	0.037	0.067
4	70	0.374	0.112	0.006	0.345
5	90	0.298	0.060	0.002	0.325
Total		0.600	0.260	0.141	1.000

and yields the most conservative estimates produced. These hypothetical income gains then serve as inputs to the I-O model to calculate direct, indirect, and induced backward linkages, because these *backward linkages* will be modeled as a function of household consumption.

However, the inputs to calculate *forward linkages* must be broken out by sector. In this case, the income gains must be separated by farming, pastoralism, and trade/other so that the appropriate industry multipliers may be calculated. In order to do this, we first take the survey-adjusted proportions of the ordinal categorical variables indicating the proportion of household income derived from each of the above-mentioned sectors. We assume, initially, that the values of a 1 to 5 Likert scale (1=little to none; 2=a minority; 3=about half; 4=most; 5=about all) correspond to percentages (1=10%; 2=30%; 3=50%; 4=70%; 5=90%). The survey-adjusted proportions of each sector may be multiplied by the corresponding percentage of household income that the ordinal value represents, and then summed to obtain the total proportion of income derived in that sector. Table 1, Panel A displays the results.[16]

Note that the totals on the bottom line of Panel A do not sum to 1. Presumably due to the fact that the Likert scale does not force cumulative responses to sum to any particular number, one can retroactively multiply each proportion by some coefficient to satisfy that condition. At this point, Panel A is purely descriptive: Just because income is broken out in this fashion does not mean that economic losses due to violence are distributed in the same proportions. In fact, the companion study determined that pastoralist incomes would grow by 136 percent in the case of near-zero violence, with farmer and trader incomes growing by smaller percentages (respectively, by 127 percent and 112 percent). Therefore, we first multiply all proportions in Panel A by the growth factors for the corresponding sectors (dropping the 95% confidence intervals in the process) and then adjust the proportions in each cell by a coefficient that brings the sum of totals to 1. The result is displayed in Table 1, Panel B.

Table 1, Panel A represents proportional income losses for the entire study region. But in fact we estimated total income losses in Naira by repeating this process for each study state in

Table 2: Estimated income losses in all study states due to farmer-pastoralist violence (amounts in 1,000s of Naira)

Projected income change in sectors

State	Farming	Pastoralism	Trading/other	Total	Percentage
Benue	237,827,874	70,253,030	54,529,043	362,609,947	24%
Kaduna	231,752,901	119,446,304	50,415,695	401,614,900	27%
Nasarawa	77,308,368	52,274,046	24,045,341	153,627,754	10%
Plateau	359,776,445	146,966,324	86,053,433	592,796,202	39%
Total	906,665,588	388,939,704	215,043,511	1,510,648,803	
Percentage	60%	26%	14%	100%	100%

Source: McDougal, *et al.* (2015, Tables 7, 10, 13, 16).

Table 3: Total estimated macroeconomic benefits of farmer-pastoralist peace to Nigeria's economy (amounts in 1,000s of Naira)

Macroeconomic losses

Linkages	Types	Amount in 1,000s Naira	Amount in 1,000s USD	National GDP (2013)	Gains as %-age of official GDP	Gains as %-age of total economy*
Backward linkages	Direct	70,162,404	427,289	81,009,964,600	0.09%	0.02%
	Total	353,966,044	2,155,653	81,009,964,600	0.44%	0.13%
Forward linkages	Direct	286,814,612	1,746,701	81,009,964,600	0.35%	0.10%
	Total	1,902,917,447	11,588,767	81,009,964,600	2.35%	0.68%
All linkages	Direct	356,977,016	2,173,990	81,009,964,600	0.44%	0.13%
	Total	2,256,883,491	13,744,420	81,009,964,600	2.79%	0.80%

Note: * Assumes Ogbuador and Malaolu (2013) estimate of the informal economy as 71.18% of the total.

order to get column sums of income gain proportions for each sector. These income gain proportions may then be multiplied by the total income gain predicted for each state to obtain sectoral break outs. These detailed state-by-state tables are available upon request. The results are summarized in Table 2. The "total" row gives the I-O inputs for the forward linkage analysis by sector.[17]

Although we estimate that 60 percent of the total income losses accrue to the farming sector, this does not mean individual farming households would stand to gain twice as much as pastoralist households in a scenario of peace. Rather, it is likely that the population of farming households is greater than that of pastoralist households, and that a large proportion of cattle rearers also derive at least some income from crop farming (the reverse is not necessarily true), resulting in the farming sector incurring a greater share of total losses.[18]

Results

Total macroeconomic costs of farmer-pastoralist violence
The input-output analysis yields both direct and total (direct, indirect, and induced) macroeconomic gains to the Nigerian economy due to hypothetical farmer-pastoralist peace in the study states. Table 3 displays the calculated results, with the maximum attributable benefit totaling over USD13.7 billion annually. These gains represent a sizeable share of Nigerian GDP—up to 2.79 percent, if one uses officially reported GDP. At 0.8 percent, this toll is much smaller, percentage-wise, if one calculates an imputed "total economic product" of Nigeria, that is, inclusive of the informal economy, as 3.5 times the size of official GDP. Nonetheless, a 0.8 percent gain is substantial in macroeconomic terms.[19]

Sectoral benefits of peace
The industries with the most to gain from farmer-pastoralist peace as measured by direct (and total) gains from

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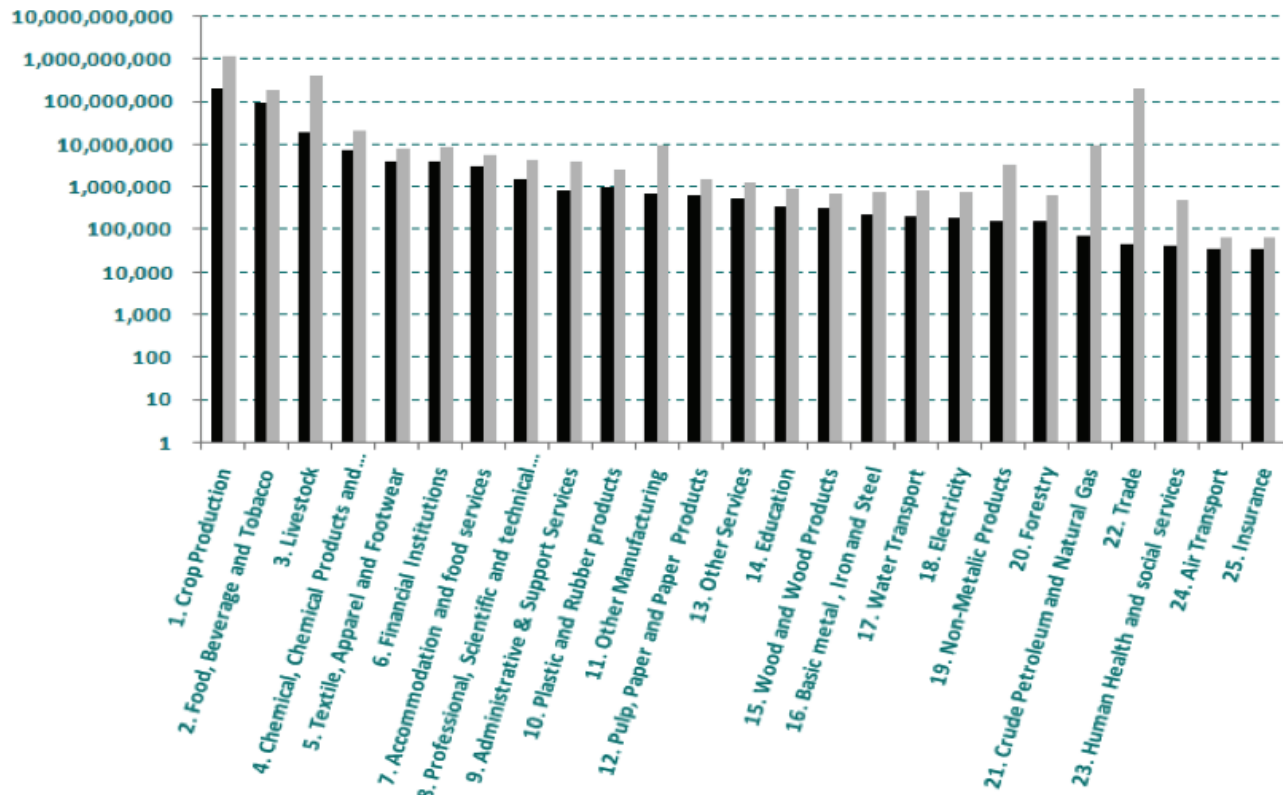Vol. 10, No. 1 (2015) | doi:10.15355/epsj.10.1.66

Figure 1: Direct backward and forward linkages for the top-25 conflict-affected industries by direct gains from farmer-pastoralist peace, log scale (in 1,000s of Naira). Total gains (direct, indirect, and induced) are shown in grey.

farmer-pastoralist peace are shown in Figure 1. (The detailed tables for all sectoral multipliers and effects are available upon request.) Direct gains reflect the wages and output of each industry hypothetically increased by heightened economic activity in the context of farmer-pastoralist peace (that is, the increased supply of each industry's product and the increase in each industry's demand in input and labor markets). Total gains include direct gains, as well as indirect and induced gains. In addition to the crop production, livestock, and trade sectors, total gains accrue most to the food and beverage industries, wage-earners, chemical products manufacturing, petroleum products industries, manufacturing, financial services, and textiles. That significant gains accrue to industries that conflict-affected households are likely to have minimal participation in, such as financial services, indicates that farmer-pastoralist conflict has far-reaching effects throughout the Nigerian economy.[20]

Discussion

This study contributes to the literature in four ways. First, it applies I-O analysis to a question that has not often been

addressed with similar methods. Second, it derives not the costs of conflict to the Nigerian economy, but rather the benefits of peace—a distinction that is not often made. Third, it uniquely examines farmer-pastoralist conflict. Fourth, to our knowledge, it is among the first efforts to understand the effect of peace and conflict dynamics on all sectors of an economy.

We estimate that the potential benefit of farmer-pastoralist peace in the Middle Belt states amounts to around 2.8 percent of the official Nigerian GDP, or around 0.8 percent of total Nigerian GDP, inclusive of the informal sector. These numbers are substantial in size and suggest a major macroeconomic opportunity for the country. We separate these potential benefits by sector, showing that, overall, those who stand to gain the most are the crop production, food and beverage, livestock, and chemical and petroleum industries.

In the context of our study, at least four weaknesses of I-O analysis may apply. First, an I-O table is based on a static snapshot of the economy. It does not account for elasticities of demand or supply. While it is able to identify the proportion of inputs to outputs across sectors at a given point in time, it is unable to say whether each marginal dollar of output will entail

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those same proportions of inputs, for instance. Older input-output studies on the effect of military expenditure on employment, such as those by Jacques Aben, showcase this deficiency in that they assume that input factors (in his case, labor) are uniform with constant prices. For this reason, most modern regional economic models, while using I-O tables as their central engine, come with extensive modifications that include marginal effects. We did not have access to such sophisticated models for Nigeria.[21]

Second, the Nigerian I-O we used to generate our estimates is now five years old. Given the rapid growth of the Nigerian economy, it is reasonable to assume that the structure of the economy has changed. That said, annually-updated I-O's are a luxury that most of the developing world cannot and does not afford. Indeed, the previous I-O for Nigeria dates to 1990. The current I-O takes into account a number of fundamental changes in macroeconomic structure that have occurred since then: For instance, telecommunications has grown hugely from a small number of land lines to 115 million cellular phone accounts, manufacturing has grown from 2 percent to 7 percent of GDP, and film making ("Nollywood") has grown from a minuscule industry to around 1.4 percent of GDP. One may debate whether the best available is good enough but, at a minimum, our estimates are indicative of the size of the potential benefit Nigeria could reap from peace in its Middle Belt states.[22]

Third, an I-O table is a picture of the formal economy only. Even in developed nations, the informal economy may be quite sizeable. In Nigeria, the I-O industries likely represent an even smaller subset of the total economic sectors that will benefit from increased consumption and production. Of course, advocacy for peacebuilding might very well be targeted precisely to formal private sector actors, so it is useful to have them singled out in the I-O table. But to make our predictions realistic, we will have to account for the fact that much of the so-called peace dividend, whether demand or supply driven, will go to the informal, rather than the formal economy.[23]

Fourth, this I-O's level of analysis is that of the nation as a whole, and it is not intended for sub-national modeling. The consumption patterns and inter-industry linkages modeled are based on country-wide averages, not necessarily on hypothetical average residents of the study area states. To the extent that the country as a whole is more urbanized than is the Middle Belt and that urban residents might be expected to exhibit more linkages with formal sector industries—whether backward via consumption or forward via employment—it could be argued that the direct and indirect effects reported here are biased upward, that is, overestimated. Moreover, the benefits we calculate based on the I-O will not necessarily be contained to the study area states, but rather ripple throughout the entire economy.[24]

A deeper question, though, concerns the use of hypothetically averted microeconomic income losses as inputs, and the implicit equivalency between the microeconomic cost of conflict and the benefits of peace. This approach relies on the idea that the relationship between economic output and violence can be described mathematically by a function; that is, whether levels of violence are rising or falling, there is exactly one possible economic output at the given level of violence. Dynamic mathematical models of economic performance would indicate otherwise, implying that the benefits of peace may not entirely erase the cost of conflict in the short term. It may be that there are different possible economic outcomes for the same level of violence, depending upon the recent history of both violence and the economy. On the basis of these considerations, it could be argued that this study actually produces estimates on the macroeconomic cost of conflict, rather than of the benefits of peace. The nuances of dynamic models notwithstanding, equating the benefits of peace to the cost of conflict makes the research question much more tractable.[25]

The most useful output of this study may be the sectoral break-out of peace benefits. From the point of view of policy advocacy for peacebuilding and conflict resolution programs in Nigeria's north-central states (and potentially across the Sahel), the industries identified as standing to gain the most from peace constitute a potential private sector coalition that could advocate for improved long-term policy. In the wake of Nigeria's ascendancy to the position of Africa's largest economy, convincing diverse private sector actors that they have a large stake in farmer-pastoralist conflict amounts to a strategically important gambit.

Notes

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1. This study derives from research undertaken as part of a UK Department for International Development (DFID)-funded Mercy Corps project entitled "Conciliation in Nigeria through Community-Based Conflict Management and Cooperative Use of Resources" (CONCUR). That project also examined the effects of farmer-pastoralist violence on household wealth, income, and welfare, in addition to its effect on state-level internally generated revenue. The related study is McDougal, *et al.* (2015).

2. Niger delta: Hazen and Horner (2007); Hunt (2006); Obi (2010); Watts (2007). Northeast: Aghedo and Osumah (2012); Onuoha (2010). Pervasive violence in the Middle Belt and across the Sahara: Aghedo and Osumah (2012); Onuoha (2010); Benjaminsen, Alinon, Buhaug, and Buseth (2012); Hendrix and Glaser (2007); Odoh and Chigozie (2012); Sayne (2011).

3. Range of factors: Benjaminsen, *et al.* (2012); Blench (2010); Hendrix and Glaser (2007); Odoh and Chigozie (2012); Sayne (2011).

4. McKinsey paper: Dobbs, *et al.* (2014). Global Peace Index: IEP (2013, p0. 56, 57, 60). Roughly 40 percent: IEP uses a more comprehensive (and inclusive) measure of military expenditure than the principal international data authority, the Stockholm International Peace Research Institute (SIPRI). IEP's decision is based in part on the work of Brauer (2007).Questioned usefulness of GDP: Brauer and Dunne (2010).

5. Do not address lower-level conflict: As noted by Brück, de Groot, and Bozzoli (2012). Inter-communal conflict: See, e.g., Higazi (2013). Collier: Collier (1999). A survey of 24 countries: Staines (2004, pp. 13-14). IANSA: IANSA (2007, pp. 9, 26).

6. Nepal: Ra and Singh (2005). Rwanda: Lopez and Wodon (2005, p. 591). Sudan: Frontier Economics (2010). Sri Lanka geography of conflict: Skaperdas, Soares, Willman, and Miller (2009). Boosting defense and security budgets: Ali (2011, p. 16); Lai and Thyne (2007); Ra and Singh (2005).

7. Low degree of data differentiation: As noted by Brück, de Groot, and Bozzoli (2012). Disaggregation of conflict: Serneels and Verpoorten (2012). Different geographic dynamics: Skaperdas, *et al.* (2009).

8. One relevant study: Obiliki (2014). The author proposes: Following Jerven (2013). Somalia: Christopoulou, Makatsuris, and Shortland (2013). Slower growth in Plateau state: Obiliki (2014, p. 9).

9. The years following conflict: Brück, de Groot, Bozzoli (2012). Collier: Collier (1999, p. 176).

10. Small arms: See, e.g., Berman, Krause, LeBrun, and McDonald (2011); IANSA (2007). Male-female injury ratios in Nigeria: IANSA (2007, p. 33). United States: IANSA (2007, p. 14).

11. Nepal: Ra and Singh (2005). Mozambique: Brück (1997, pp. 36-37). Rwanda: Verpoorten (2009). Direct and indirect: Brück (1997); Verpoorten (2009). Even temporary departures: CRSS (2010). Nigeria: Mohammed (undated, p. 6).

12. I-O analysis: Leontief (1936). Static information: Kula (2008). Military expenditure: Leontief and Duchin (1983). In addition, see, e.g., Dunne (1991); Molas-Gallart (1992). Regional: See, e.g., Acharya and Hazari (1971); Fujita, Krugman, and Venables (1999, p. 286); Isard (1951; 1960); Isard, *et al.* (1998); Nimoyina (1987). Sectoral: See, e.g., Bon (1988); Bon and Minami (1986); Panchamukhi (1975); Polenske and McMichael (2002); Polenske and Sivitanides (1990).

13. Rebased Nigerian GDP: See Economist (2014).

14. Other matrix formulae have been used in various contexts to assess a change in one sector on the economy in terms of its (a) power of dispersion, (b) sensitivity of dispersion, (c) coefficient of variation (for backward and forward linkages), (d) employment backward and forward linkage indices, and others. For an overview on various approaches and their calculations, see Polenske and Sivitanides (1990).

15. The savings rate can be derived from the corresponding question in the survey administered for the study by McDougal, *et al.* (2015). For the sake of parsimony, the outcome is described here as deriving from a single "agricultural" sector. In reality, this is the sum of three separate sectors of the I-O table, corresponding to the main rural livelihoods: crop production, livestock production, and trade.

16. The survey included four questions to determine the sources of a household's income: (1) "What portion of your household income comes from crop farming?"; (2) "What portion of your household income comes from raising livestock/ pastoralism?"; (3) "What portion of your household income comes from trading?" and (4) "What other sources of income do you have?" The response choices for the first three questions were given as a Likert scale as opposed to percentages because, after piloting the survey, Mercy Corps staff found that the Likert scale was more easily understood by survey respondents.

17. We take this approach rather than using adjusted predictions of the regression models because the household livelihood variable in the dataset used to estimate the microeconomic costs of violence at the household level does not sum to 1, either, causing the analysis to fail.

18. Reverse not necessarily true: As discussed in McDougal, *et al.* (2015), survey sampling frames typically have an inherent bias toward sedentary and semisedentary respondents, often underrepresenting nomadic peoples. Our survey was no exception: While we strove to maintain rough parity in response numbers, sampling weights were likely negatively biased by an inability to find nomadic communities—probably especially those most affected by conflict. Farming sector incurring a greater share of losses: Furthermore, the survey sampling weight used in our original survey accounts for

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relative populations of farmers and pastoralists, alleviating any bias that would result from surveying a greater number of farming households. However, our sampling weight is derived from imperfect relative population estimates at the cluster level. Better population data, disaggregated by livelihood and adequately accounting for nomadic and seminomadic households, would make our estimates more precise.

19. Size of informal economy taken from Ogbuabor and Malaolu (2013).

20. Wage earners: Wage-earners appear as an industry because backward linkages were calculated in a "closed" matrix, including wages as inputs and household consumption as outputs. They represent the fifth-most benefitted "sector" by total gains, but do not appear in Figure 1 because none of their gains are direct.

21. Older studies: See Molas-Gallart (1992, pp. 11-15) who refers to Aben (1992). Extensive modifications: Fujita, *et al.* (1999, p. 286); Treyz (1993, pp. 291-322).

22. Film making: Economist (2014).

23. I-O industry represent small subset: Ogbuabor and Malaolu (2013) have estimated the size of the informal economy in Nigeria as 71.18% of the total in 2010. This exceeds the sizes of informal economies across Latin America as a proportion of the total economy as calculated by Vuletin (2008)), whose estimates range from around just 15 percent in the Bahamas to over 65 percent in Paraguay.

24. Nigeria more urbanized than its Middle Belt: According to the 2013 National Demographic and Health Survey (Nigeria National Population Commission, 2013, p. 9), the population of Nigeria is 57.9 percent rural, while the rural population percentages in the four study states are 81.4 in Benue, 65.5 in Kaduna, 81.3 in Nasarawa, and 65.28 in Plateau.

25. Dynamic models: See, e.g., Fujita, *et al.* (1999, pp. 27-28).

References

Aben, J. 1992. *Economie politique de la défense*. Paris: Editions Cujas.

Acharya, S.N. and B.R. Hazari. 1971. "Linkages and Imports: A Comparative Study of India and Pakistan." *Journal of Development Studies*. Vol. 8, No. 1, pp. 107-115. http://dx.doi.org/10.1080/00220387108421391

Aghedo, I. and O. Osumah. 2012. "The Boko Haram Uprising: How Should Nigeria Respond? *Third World Quarterly*. Vol. 33, No. 5, pp. 853-869. http://dx.doi.org/10.1080/01436597.2012.674701

Ali, H. 2011. "Estimate of the Economic Cost of Armed Conflict: A Case Study from Darfur." Doha: Al Jazeera Centre for Studies.

Benjaminsen, T.A., K. Alinon, H. Buhaug, and J.T. Buseth. 2012. "Does Climate Change Drive Land-Use Conflicts in the Sahel?" *Journal of Peace Research*. Vol. 49, No. 1, pp. 97-111. http://dx.doi.org/10.1177/0022343311427343

Blench, R. 2010. "Conflict Between Pastoralists and Cultivators in Nigeria." Review paper. Department for International Development, UK. www.rogerblench.info/ [accessed 20 March 2015].

Berman, E., K. Krause, E. LeBrun, and G. McDonald, eds. 2011. *Small Arms Survey 2011: States of Security*. Geneva: Cambridge University Press.

Bon, R. 1988. "Direct and Indirect Resource Utilization by the Construction Sector: The Case of the United States since World War II." *Habitat International*. Vol. 12, No. 1, pp. 49-74. http://dx.doi.org/10.1016/0197-3975(88)90039-2

Bon, R. and K. Minami. 1986. "The Role of Construction in the National Economy: A Comparison of the Fundamental Structure of the U.S. and Japanese Input-Output Tables Since World War II." *Habitat International*. Vol. 10, No. 4, pp. 93-99. http://dx.doi.org/10.1016/0197-3975(86)90073-1

Brauer, J. 2007. "Data, Models, Coefficients: The Case of United States Military Expenditure." *Conflict Management and Peace Science*. Vol. 24, No. 1, pp. 55-64. http://dx.doi.org/10.1080/07388940601102845

Brauer, J. and J.P. Dunne. 2010. "On the Cost of Violence and the Benefits of Peace." *Peace Economics, Peace Science, and Public Policy*. Vol. 16, No. 2, Article 6.

Brück, T. 1997. "Macroeconomic Effects of the War in Mozambique." QEH Working Paper Series. Oxford, UK: Oxford University.

Brück, T., O.J. de Groot, and C. Bozzoli. 2012. "How Many Bucks in a Bang: On the Estimation of the Economic Costs of Conflict," in M.R. Garfinkel and S. Skaperdas, eds. *The Oxford Handbook of the Economics of Peace and Conflict*. Oxford, UK: Oxford University Press. http://dx.doi.org/10.1093/oxfordhb/9780195392777.013.0012

Christopoulou, K., C. Makatsuris, and A. Shortland. 2013. "War and Famine, Peace and Light? The Economic Dynamics of Conflict in Somalia." Paper presented at the American Economic Association, Annual Meeting, San Diego, CA.

Collier, P. 1999. "On the Economic Consequences of Civil War." *Oxford Economic Papers*. Vol. 51, No. 1, pp. 168-183. http://dx.doi.org/10.1093/oep/51.1.168

[CRSS]. Center for Research and Security Studies. 2010. "The Cost of Conflict in Pakistan." Islamabad: CRSS.

Dobbs, R.S., C. Sawers, F. Thompson, J. Manyika, J. Woetzel, P. Child, S. McKenna, and A. Spatharou. 2014. "Overcoming Obesity: An Initial Economic Analysis. Discussion Papers: McKinsey Global Institute.

Dunne, J.P. 1991. "Quantifying the Relation of Defence Expenditure to Employment," pp. 11-26 in L. Paukert and P. Richards, eds. *Defence Expenditure, Industrial Conversion, and Local Employment*. Geneva: International Labour Office.

[Economist] 2014. "Step Change: Revised Figures Show that Nigeria is Africa's Largest Economy." *The Economist*. 12

THE ECONOMICS OF PEACE AND SECURITY JOURNAL

Vol. 10, No. 1 (2015) | doi:10.15355/epsj.10.1.66

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April 2014.

Frontier Economics. 2010. "The Cost of Future Conflict in Sudan." London: Frontier Economics.

Fujita, M., P. Krugman, and A.J. Venables. 1999. *The Spatial Economy: Cities, Regions, and International Trade*. Cambridge, MA: MIT Press.

Hazen, J.M. and J. Horner. 2007. "Small Arms, Armed Violence, and Insecurity in Nigeria: The Niger Delta in Perspective." Occasional Papers No. 20. Geneva: Small Arms Survey.

Hendrix, C.S. and S.M. Glaser. 2007. "Trends and Triggers: Climate, Climate Change and Civil Conflict in Sub-Saharan Africa." *Political Geography*. Vol. 26, No. 6, pp. 695-715. http://dx.doi.org/10.1016/j.polgeo.2007.06.006

Higazi, A. 2013. "Rural Insecurity on the Jos Plateau, Nigeria: Livelihoods, Land, and Religious Reform among the Berom, Fulani, and Hausa." Oxford, UK: Nigeria Research Network.

Hunt, J.T. 2006. *The Politics of Bones: Dr. Owens Wiwa and the Struggle for Nigeria's Oil*. Toronto: McClelland & Stewart.

[IEP] Institute for Economics and Peace (2013). *Global Peace Index 2013: Measuring the State of Global Peace*. Sydney & New York: IEP.

[IANSA] International Action Network on Small Arms. 2007. "Africa's Missing Billions: International Arms Flows and the Cost of Conflict." Briefing Papers: Oxfam International and Saferworld.

Isard, W. 1951. "Interregional and Regional Input-Output Analysis: A Model of a Space Economy." *The Review of Economics and Statistics*. Vol. 33, No. 1, pp. 318-328. http://dx.doi.org/10.2307/1926459

Isard, W. 1960. *Methods of Regional Analysis: An Introduction to Regional Science*. Cambridge, MA: MIT Press.

Isard, W., I.J. Azis, M.P. Drennan, R.E. Miller, S. Saltzman, and E. Thorbecke. 1998. *Methods of Interregional and Regional Analysis*. Aldershot, UK: Ashgate Publishing.

Jerven, M. 2013. *Poor Numbers: How We are Misled by African Development Statistics and What to Do About It*. Ithaca, NY: Cornell University Press.

Kula, M. 2008. "Supply-Use and Input-Output Tables: Backward and Forward Linkages of the Turkish Economy." Paper presented at the the 16th Inforum World Conference in Northern Cyprus.

Lai, B. and C. Thyne. 2007. "The Effect of Civil War on Education, 1980-97". *Journal of Peace Research*. Vol. 44, No. 3, pp. 277-292. http://dx.doi.org/10.1177/0022343307076631

Leontief, W. 1936. "Quantitative Input and Output Relations in the Economic System of the United States." *The Review of Economics and Statistics*. Vol. 18, No. 3, pp. 105-125. http://dx.doi.org/10.2307/1927837

Leontief, W. and F. Duchin. 1983. *World Military Spending*. Oxford, UK: Oxford University Press

Lopez, H. and Q.T. Wodon. 2005. "The Economic Impact of Armed Conflict in Rwanda." *Journal of African Economies*. Vol. 14, No. 4, pp. 586-602. http://dx.doi.org/10.1093/jae/eji021

McDougal, T.L., T. Hagerty, L. Inks, C.-L. Ugo-Ike, C. Dowd, S. Conroy, and D. Ogabiela. 2015. "The Effect of Farmer-Pastoralist Violence on Income: New Survey Evidence from Nigeria's Middle Belt States." *The Economics of Peace & Security Journal*. Vol. 10, No. 1, pp. 54-65. http://dx.doi.org/10.15355/epsj.10.1.54

Mohammed, A.S. Undated. "The Impacts of Conflict on the Economy: The Case of Plateau State of Nigeria." London: Overseas Development Institute.

Molas-Gallart, J. 1992. *Military Production and Innovation in Spain*. Victoria, Australia: Harwood Academic Publishers.

Nigeria National Population Commission. 2013. "Nigeria Demographic and Health Survey Preliminary Report," in Measures DHS, ed. *DHS Preliminary Reports*. Calverton, MD: ICF International.

Nimoyina, S. 1987. "An Interindustrial Analysis of the Thai Economy: Industrial Structure and Structural Change," in E. Mitsuo, ed. *Development Planning and Policies in Asian Countries*. Kyoto, Japan: Center for Southeast Asian Studies.

Obi, C.I. 2010. "Oil Extraction, Dispossession, Resistance, and Conflict in Nigeria's Oil-Rich Niger Delta." *Canadian Journal of Development Studies*. Vol. 30, Nos. 1-2, pp. 219-236. http://dx.doi.org/10.1080/02255189.2010.9669289

Obiliki, N. 2014. "An Examination of Subnational Growth in Nigeria: 1999-2012." ERSA Working Paper Series. Claremont, South Africa: Economic Research Southern Africa (ERSA).

Odoh, S.I. and C.F. Chigozie. 2012. "Climate Change and Conflict in Nigeria: A Theoretical and Empirical Examination of the Worsening Incidence of Conflict Between Fulani Herdsmen and Farmers in Northern Nigeria." *Arabian Journal of Business and Management Review*. Vol. 2, No. 1, pp. 110-124.

Ogbuabor, J.E. and V.A. Malaolu. 2013. "Size and Causes of the Informal Sector of the Nigerian Economy: Evidence From Error Correction Mimic Model." *Journal of Economics and Sustainable Development*. Vol. 4, No. 1, pp. 85-103.

Onuoha, F.C. 2010. "The Islamist Challenge: Nigeria's Boko Haram Crisis Explained." *African Security Review*. Vol. 19, No. 2, pp. 54-67. http://dx.doi.org/10.1080/10246029.2010.503061

Panchamukhi, V. R. (1975). Linkages in industrialization: a study of selected developing countries in Asia. Journal of Development Planning, 8, 121-165.

Polenske, K.R. and F.C. McMichael. 2002. "A Chinese Cokemaking Process-Flow Model for Energy and Environmental Analyses." *Energy Policy*. Vol. 30, No. 10, pp. 865-883. http://dx.doi.org/10.1016/S0301-4215(01)00147-1

Polenske, K.R. and P. Sivitanides. 1990. "Linkages in the

THE ECONOMICS OF PEACE AND SECURITY JOURNAL
Vol. 10, No. 1 (2015) | doi:10.15355/epsj.10.1.66

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Construction Sector." *The Annals of Regional Science*. Vol. 24, No. 2, pp. 147-161.
http://dx.doi.org/10.1007/BF01579729

Ra, S. and B. Singh. 2005. "Measuring the Economic Costs of Conflict." Nepal Resident Mission Working Papers. Manila: Asian Development Bank.

Sayne, A. 2011. "Climate Change Adaptation and Conflict in Nigeria. Special Reports (Vol. 274). Washington, D.C.: U.S. Institute of Peace.

Serneels, P. and M. Verpoorten. 2012. "The Impact of Armed Conflict on Economic Performance: Evidence from Rwanda." CSAE Working Papers. Oxford, UK: Center for the Study of African Economies.

Skaperdas, S., R. Soares, A. Willman, and S.C. Miller. 2009. *The Costs of Violence*. Conflict, Crime and Violence Team. Social Development Department. Washington, D.C.: World Bank.

Staines, N. 2004. "Economic Performance Over the Conflict Cycle." IMF Working Paper Series. Washington, D.C.: International Monetary Fund.

Treyz, G.I. 1993. *Regional Economic Modeling: A Systematic Approach to Economic Forecasting and Policy Analysis*. Boston: Kluwer Academic Publishers.
http://dx.doi.org/10.1007/978-94-017-2874-4

Verpoorten, M. 2009. "Household Coping in War- and Peacetime: Cattle Sales in Rwanda, 1991-2001." *Journal of Development Economics*. Vol. 88, No. 1, pp. 67-87.
http://dx.doi.org/10.1016/j.jdeveco.2008.01.003

Vuletin, G. 2008. "Measuring the Informal Economy in Latin America and the Caribbean." IMF Working Papers. Washington, D.C.: International Monetary Fund.

Watts, M. 2007. "Petro-Insurgency or Criminal Syndicate? Conflict and Violence in the Niger Delta." *Review of African Political Economy*. Vol. 34, No. 114, pp. 637-660.
http://dx.doi.org/10.1080/03056240701819517