Extended Abstract

Paper Title	**Analysing the effects of armed conflict on agricultural land use using spatial regression techniques**

Abstract prepared for presentation at the 98th Annual Conference of The Agricultural Economics Society will be held at The University of Edinburgh, UK, 18th - 20th March 2024.

Abstract	*200 words max*

Agriculture is critical to the rural economies of West Africa. However, it is not clear how small-scale agricultural land use in this region is affected by armed conflict that crosses country borders. In this paper, we explore the relationship between armed conflict and agricultural land use based on household data from West Africa. In contrast to previous studies that focused on a single country, our study encompasses five neighboring countries in West Africa and hence, also their border regions which experience some of the highest conflict intensities. We employ a cross-sectional spatial approach incorporating data from Benin, Burkina Faso, Mali, Niger, and Nigeria. In our cross-country analysis, we find an ambiguous relationship between conflict and land use. By differentiating conflicts by distance, some effects observed for conflicts close to a household might mitigate or even reverse when considering conflicts in larger distances. Against findings from previous, single-country studies, we therefore argue that the impact of conflict on land use is too heterogeneous to aggregate to a clear linear relationship.

Keywords	Land use, Armed conflict, Smallholder, Spatial analysis
JEL Code	Q15, D74

Introduction	*100 – 250 words*

In West Africa, agriculture is the backbone of the rural economy. Reliable land access for agricultural activity is critical to short-term livelihoods and long-term economic transformation. From 2010 onwards, certain regions in West Africa experienced a severe increase in violent conflict. Increasingly, incidents of armed conflicts are committed by non-stated actors (Marc et al. 2015) and intentionally target civilians (OECD/SWAC 2020). Thereby, they also affect the agricultural sector. Analyzing the interplay of conflict and agriculture is crucial to grasp the impact of the increase in conflict on livelihood of farmers in the region.

Several previous studies find clear effects of conflict on land use. Land that was formerly used for agricultural is for example found to be increasingly left fallow or abandoned (e.g. Adelaja and George 2019, Baumann et al 2015, Suthakar and Bui 2008, Wilson and Wilson 2013). Typically, these studies rely on satellite imagery or use data from household surveys. Country borders impose artificial boundaries to the study areas and exclude conflict events that happen just across the border. This is particularly problematic in West Africa where border regions are specifically targeted by armed non-state actors (OECD/SWAC 2020). Against this background, we want to verify whether previous relationships persist when using a multi-national dataset from West Africa.

We aim at answering the following questions: what is the effect of conflict on land use when including border regions? Is the effect of conflict on land use consistent across various distances between the conflict incident and the household?

Methodology | *100 – 250 words*

We fit a cross-sectional regression model to nationally representative data from five neighboring countries and consequently also their border regions. We use data for Benin, Burkina Faso, Mali and Niger from the Harmonized Survey on Households Living Standards 2018-2019 (HSHLS) jointly conducted by the World Bank and the West Africa Economic Monetary Union. For Nigeria, we rely on the General Household Survey from 2018 which resembles the questions of the HSHLS.

In contrast to previous studies that used household survey data, we cannot rely on panel data in this setting. This makes abstracting from the effects of unobserved household heterogeneity more difficult. To cope with this problem, we use spatial smoothing splines to control for spatially distributed unobserved variables. The spatial smoothing splines also absorb spatial autocorrelation in the dependent variables. Thereby, we reduce possible bias in both the coefficient estimators and the variance estimators.

The model is characterized by
$$y_{is} = \beta_1 \, confl_{s,0-25} + \beta_2 \, confl_{s,25-50} + \beta_3 \, confl_{s,50-100} + \gamma \, X_i + f(s_i) + \epsilon_{is}$$
where y_{is} is the value of the respective dependent variable of household i at location s. For the dependent variable, we consider total land owned, number of plots owned, and the percentage of land acquired for free. $confl_{s,r}$ are aggregated conflict fatalities for a specified radius r (0 to 25 km, 25 to 50 km, or 50 to 100 km) around the household at location s and X_i is a set of household control variables. s_i is the location given in coordinates of household i and f is the smoothing function. ϵ_{is} denotes the error term.

Results | *100 – 250 words*

Descriptive results show that nearly all surveyed households in Burkina Faso and Nigeria were exposed to armed conflict in the year prior to the data collection. While the intensity was uniformly low in Burkina Faso, it was high in central and eastern parts of Nigeria. In terms of border regions, Niger's southern border to Nigeria was particularly affected. In Mali, the households closer to the border with Burkina Faso experienced a higher conflict intensity than those further away.

With regard to our dependent variables we find a weak to medium positive spatial autocorrelation but the exact extend depends strongly on the neighborhood structure. All variables show considerable deviations from the total average when considering only Nigeria. Particularly, average fatalities in the surroundings of the sample households are larger in Nigeria. Therefore, we also run all subsequent models twice, first including and then excluding Nigeria.

The regression results show that local conflict statistically significantly decreases the number of plots owned by a household, whilst conflict farther away increases them. However, the effects are small in magnitude and do not hold when we exclude Nigeria from the analysis.

The same direction of effects is observed when looking at total land owned, but the results are not statistically significant. For the percentage of land acquired for free we find a negative effect of conflict incidents that happened in a 25-100km range. For local conflict, this effect reverses. These heterogenous findings contradict the clear, uni-directional findings from previous single-country studies.

Discussion and Conclusion	*100 – 250 words*

The data visualization emphasized the need for a transnational study and yet, its results reflect a high ambiguity in the relation between conflict and land use. Our exploratory data analysis yields no reliable results on the relation between conflict and land use. Too many confounding factors affect the land use decisions of households to draw a clear picture from bivariate considerations only. By means of transnational regression analysis, we gained more insights, but the emerging picture is still heterogeneous. We assume that the heterogeneity in our results is driven by substantial differences in the spatial and temporal extends of conflict incidents and by different coping strategies across households.

With regards to our first research question, there is no evidence for a linear positive or negative effect of conflict on agricultural land use in this multi-national setting. Particularly disturbing is the dramatic change in results when excluding Nigeria from the analysis. This shows that including border regions is likely to be important when conflict spans several countries. We further show that effects of armed conflict on land use are not consistent with increasing distance between a household and an incident which answers our second research question.

For future analysis, we suggest to not only differentiate conflict across distances but also across time. Analyzing impact pathways instead of focusing on the outcome may also help to gain a better understanding of armed conflict on land use (e.g. emigration as a potential reason for land abandonment).

References

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