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Heterogeneous Effects of Land Acquisitions on Conflict in Africa

PRELIMINARY DRAFT
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Introduction

Since 2000, investors have acquired more than 40 million hectares of land in low- and middle-income countries across the globe, with Africa being the most targeted continent. Partly, these land acquisitions and the associated commercial farm projects target land that is currently used for example for smallholder agriculture. Many cases of protests and conflicts sparked by "land grabs" reach the media, highlighting the potential adverse social implications of the commercialization of agriculture and the resulting pressure on land resources.

Despite the high academic and policy interest in the socio-political consequences of large-scale land acquisitions (LSLA) we still know little on the relationship between large-scale land acquisitions (LSLA) and social conflict. Specifically, there is (a) no quantitative evidence on the effects of LSLA on hardly any rigorous evidence on the occurrence and intensity of riots, communal conflict and anti-state violence. Further, there is (b) no systematic inquiry into the socio-political conditions under which investments may foster or – possibly – mitigate conflict.

This paper seeks to generate evidence on the likely heterogeneous effects of land deals on social conflict. Its main contributions are the following: First, the paper sheds light on the extent to which conflicts coincide with investments on sub-national level in Sub-Sahara Africa. Second, by providing insights on risk factors that the paper seeks to inform policy debates on the potential socio-political consequences of LSLA.

Literature review and hypotheses

Economic opportunities and grievances matter for conflict (Collier and Hoeffler, 2004; Fearon and Laitin, 2003). Studies on the economic effects of large-scale land acquisitions have come to mixed results. Agricultural productivity will typically be higher on large-scale farms, and some studies have found important income effects through contract farming schemes and wage employment, for example Hermann (2017) for a project in Zambia. In general, land investments have the potential to create employment, foster or accelerate infrastructure development, and generate technology spillovers (Borras, Hall, Scoones, White, & Wolford, 2011). Yet, the majority of case studies highlights the negative economic effects of land deals. Case studies from Cambodia (Jiao, Smith-Hall, & Theilade, 2015) and Ghana (G. Schoneveld, German, & Nutakor, 2011) show that land acquisitions have negative income effects for the affected rural population. Furthermore, land acquisitions may limit access to land or lead to displacements and can negatively affect employment opportunities and threaten livelihoods (Baird, 2011; Nolte, Chamberlain, & Giger, 2016; Thondhlana, 2015).

Recent studies have claimed that effects tend to differ across social groups. Behrman et al. (2012) examine the differential effects of land deals on gender. They argue that unequal access to goods and opportunities due to the specific social roles assigned to men and women is enhanced by land acquisitions in affected populations (Behrman, Meinzen-Dick, & Quisumbing, 2012). Similarly, studies on land-related policy reforms, such as inheritance laws or tenure rights, show that gender sensitive solutions can impact women´s bargaining power, agricultural productivity and contribute to poverty reduction (Ali, Deininger, & Goldstein, 2014; Meinzen-Dick, Quisumbing, Doss, & Theis, 2019).

Further literature revolves around the capture of processes of land re-distribution by influential actors. While land reforms are acknowledged as an important tool to empower formerly disadvantaged groups, several authors describe opportunistic behavior of politicians (Boone, 2011), local elites (Goldstein & Udry, 2008; G. C. Schoneveld & German, 2014), and show that inadequate harmonization of national and regional legislation cause harm for the affected smallholders (Broegaard, Vongvisouk, & Mertz, 2017). Moreover, poorer smallholders often have less capacity to adapt to changing socio-economic conditions (Herrmann, 2017; Sulle, 2017).

These mechanisms – related to gender or to the distribution and access to land – increase the risk of land deals exacerbating inequalities both within and between groups. As a result "horizontal inequalities"(F Stewart, 2002; Frances Stewart, 2000), i.e. the inequality between culturally formed sub-groups, may become more strongly pronounced. Some studies have highlighted the role of horizontal inequality of regional, ethnic, or religious groups for conflicts. They link ethno-political discrimination to the risk of armed anti-government opposition and separatist endeavors (Buhaug, Cederman, & Gleditsch, 2014), and combine geo-coded data on ethnic groups with spatial wealth estimates to show that both political and ethnic inequalities are conducive to conflict (Cederman, Gleditsch, & Buhaug, 2013; Cederman, Weidmann, & Gleditsch, 2011).

Most land-related peace research draws on the work by Homer-Dixon, according to which decreasing land availability can lead to violent distributional conflict (Homer-Dixon, 1994, 1991). Empirical studies have found mixed evidence on this direct association between land scarcity and conflict (Raleigh & Urdal, 2007; Urdal, 2008). More recent studies have combined the two strands of literature on horizontal inequalities and land-related peace research and stress that land scarcity can be an important driver of violence under the condition of horizontal inequality (Østby, Urdal, Tadjoeddin, Murshed, & Strand, 2011) and that horizontal land inequality increases conflict risks (Benjaminsen, 2008; Detges, 2012).

Land investments have been largely neglected in this literature despite theoretical reasons to believe that they are relevant in terms of social conflict – unlike longer-term developments, for example due to environmental changes, they produce immediate socio-economic effects that impede adaptation. Moreover, land-related grievances – as depicted above – are only likely to translate into conflict if people can attribute blame to clearly identifiable actors. Thus, despite clear indications that land acquisitions matter for social conflict, this relationship has remained under-studied.

Data

Our analysis relies on data from the Land Matrix that provides geo-located information on around 1500 investments in Africa since 2000. For data on political violence and protest we refer to the Armed Conflict Location & Event Data Project (ACLED), which covers the years 1997 – 2019. All data are merged on the grid-cells of the PRIO-grid openly available dataset with cells of the dimensions of 0.5 x 0.5 decimal degrees which corresponds (due to the projection) to between 2,500 and 3,000 square kilometres. Given the lack of information of the boundaries of most of the plantations, we use the point location together with information on the overall size to create circular buffers. Those are subsequently cut along the grid and assigned to the corresponding cells.

The extensive Land Matrix dataset is filtered to contain only deals with a size greater than 200 ha, to exclude oil or gas extraction, to exclude pure contract farming, to be transnational, to deals after the year 2000, and to exclude mining and forest concessions. Based on this we obtain information by year on the operational size of the plantations and on the size of the area under contract (typically leased).

Specification

We ran (for the current version of the paper) two types of regressions: a grid-cell cross-section and a grid-cell panel model. Both include a set of conventional control variables. In all specifications index *i* stands for grid cells and *t* for time in years.

$$conflict_i = \beta_0 + \beta_1 area\_ct_i + \beta_2\, pop\_gpw\_sum_i + \beta_3\ \text{nlights\_calib\_mean}_i + \beta_4\, gcp\_ppp_i + \beta_5\, excluded_i + \beta_6\, excluded_i * area\_ct_i + \beta_7\, ttime\_mean_i + \beta_8\, temp_i + \beta_9\, prec\_gpcc_i + \beta_{10}\, D_c + \mu_i \quad (1)$$

Equation (1) shows the cross-sectional model, where *conflict* is either the sum of all ACLED events of all types (battles, explosions/remote violence, strategic development, violence against civilians, protests, riots), or the second half of the set, or one of these three. For better interpretability we apply the inverse hyperbolic sine transformation to all conflict and area data (indicated by the *as* prefix), which can be interpreted like a log-log model. For the cross-section regression, *area_ct* is the area in hectares under contract. Country fixed effects are controlled for with D_c. The interaction term with β_6 is included only in one of the specifications.

$$conflict_{it} = \beta_0 + \beta_1 area_{it} + \beta_2\, pop\_gpw\_sum_{it} + \beta_3\ \text{nlights\_calib\_mean}_{it} + \beta_4\, gcp\_ppp_{it} + \beta_5\, excluded_{it} + \beta_6\, ttime\_mean_i + \beta_7\, temp_{it} + \beta_8\, prec\_gpcc_{it} + \beta_9\, D_c * D_y + \mu_{it} \quad (2)$$

The dynamic model (Equation (2)) is built in a parallel way. However, it only contains observations within countries that have any investment at all and therefore has a significantly smaller sample. All variables are time-variant except for *ttime_mean*. It also includes year-country fixed effects.

Initial results

The descriptive statistics in Table 1 indicate a considerably higher incidence of violent events in grid cells with any area under contract for plantations. Taking this as a motivation, the cross-sectional regression results support the hypothesis whereas the panel regressions at this stage do not show robust results.

The cross-sectional regressions in table 2 corroborate the indicative descriptive statistics for the relationship between plantation area and conflict count. All seven specifications that use different types of violent events show a robust positive and highly significant effect of the LSLA on conflict. The results of column (1), for example, indicate that, ceteris paribus, a one percent increase in area under contract increases the amount of violent events by 0.05 percent within the area of a grid cell.

The results of the control variables are mostly in line with expectations. The population count is positively correlated with the number of violent events, economic performance negatively so. The results for nightlights are less robust and show a surprisingly positive correlation in most of the specifications, i.e. more nightlight is associated with more violent events. Reverse causality could be an issue here and is to be investigated further. Less populated and less well connected areas (*ttime_mean*) seem to be less violent.

While the number of excluded groups is not a statistically significant determinant of conflict in our regression, its interaction with LSLA (*excl_area_ct,* column (3)) turns out positive and highly statistically significant. We interpret this as an indication that LSLA may be particularly conducive to conflict when undertaken in places with a latent conflict potential. This aspect will receive particular attention in the next versions of this paper.

In Table 4we report the results of the panel regressions. These preliminary results show a number of specification issues, are not robust and therefore subject to further scrutiny for subsequent versions of this paper.

Overall, our initial results look promising to be able to add to the understanding of the link between large-scale land acquisitions and conflict. Further inquiry, particularly in case of the dynamic model, will be required.

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Appendix

Table 1: Descriptive Statistics for the sample without and with any agricultural investment area (based on contract data)

	(1) without investments				(2) with investments				(3) Difference	
	count	mean	sd	Var	count	mean	sd	Var	b	t
acled	1294990	0.06	2.29	5.26	1370	1.42	7.49	56.17	-1.36***	(-6.73)
acled_red	1283462	0.01	0.59	0.35	1097	0.20	2.78	7.72	-0.19*	(-2.28)
viol_civ	6078	3.67	8.70	75.61	136	4.13	7.77	60.38	-0.46	(-0.67)
protests	2868	3.26	5.95	35.39	116	4.34	6.02	36.28	-1.08	(-1.89)
riots	2543	2.50	4.16	17.34	112	3.09	4.16	17.34	-0.59	(-1.47)
pop_gpw_sum	259072	96067.59	372403.19	1.39e+11	200	282886.34	666462.62	4.44e+11	-186818.76***	(-3.96)
nlights_calib_mean	1123529	0.06	0.07	0.00	952	0.06	0.03	0.00	-0.00	(-0.81)
gcp_ppp	187563	0.72	4.24	18.00	59	0.29	0.39	0.16	0.43***	(8.26)
excluded	982196	0.47	0.60	0.36	979	0.26	0.56	0.32	0.21***	(11.84)
ttime_mean	1292970	1188.63	1690.89	2859109.67	1370	350.49	255.07	65058.39	838.15***	(118.89)
temp	1254426	10.24	13.99	195.80	1369	25.07	3.03	9.20	-14.83***	(-178.79)
prec_gpcc	1226775	187.16	192.59	37090.02	1157	318.91	178.92	32011.84	-131.75***	(-25.03)
Observations	1294990				1370				1296360	

Table 2: Variable descriptions

variable	source	description
acled	acled	total amount of acled events
acled_red	acled	amount of acled events of the types violence against civilians, riots and protests
viol_civ	acled	Violent events where an organised armed group deliberately inflicts violence upon unarmed non-combatants
riots	acled	Violent events where demonstrators or mobs engage in disruptive acts or disorganised acts of violence against property or people
protests	acled	A public demonstration against a political entity, government institution, policy or group in which the participants are not violent
area	landmatrix	area in hectares of LSLAs, operational
area_ct	landmatrix	area in hectares of LSLAs, under contract
pop_gpw_sum	prio-grid	the sum of original pixel values (number of persons) within the grid cell, taken from the Gridded Population of the World version 3
nlights_calib_mean	prio-grid	measures the average measured nighttime light emission from the DMSP-OLS Nighttime Lights Time Series Version 4 (Average Visible, Stable Lights, & Cloud Free Coverages). These data are calibrated for use in time-series analyses using calibration values from Elvidge et.al. (2014), and standardized to be between 0 and 1
gcp_ppp	prio-grid	the gross cell product, measured in USD using purchasing-power-parity, based on the G-Econ dataset v4.0
excluded	prio-grid	the number of excluded groups (discriminated or powerless) as defined in the GeoEPR/EPR data on the status and location of politically relevant ethnic groups settled in the grid cell for the given year, derived from the GeoEPR/EPR 2014 update 2 dataset
ttime_mean	prio-grid	an estimate of the average travel time to the nearest major city from an area within the cell, derived from a global high-resolution raster map of accessibility developed for the EU
temp	prio-grid	the yearly mean temperature (in degrees Celsius) in the cell, based on monthly meteorological statistics from GHCN/CAMS, developed at the Climate Prediction Center, NOAA/National Weather Service
prec_gpcc	prio-grid	the yearly total amount of precipitation (in millimeter) in the cell, based on monthly meteorological statistics from the Global Precipitation Climatology Centre

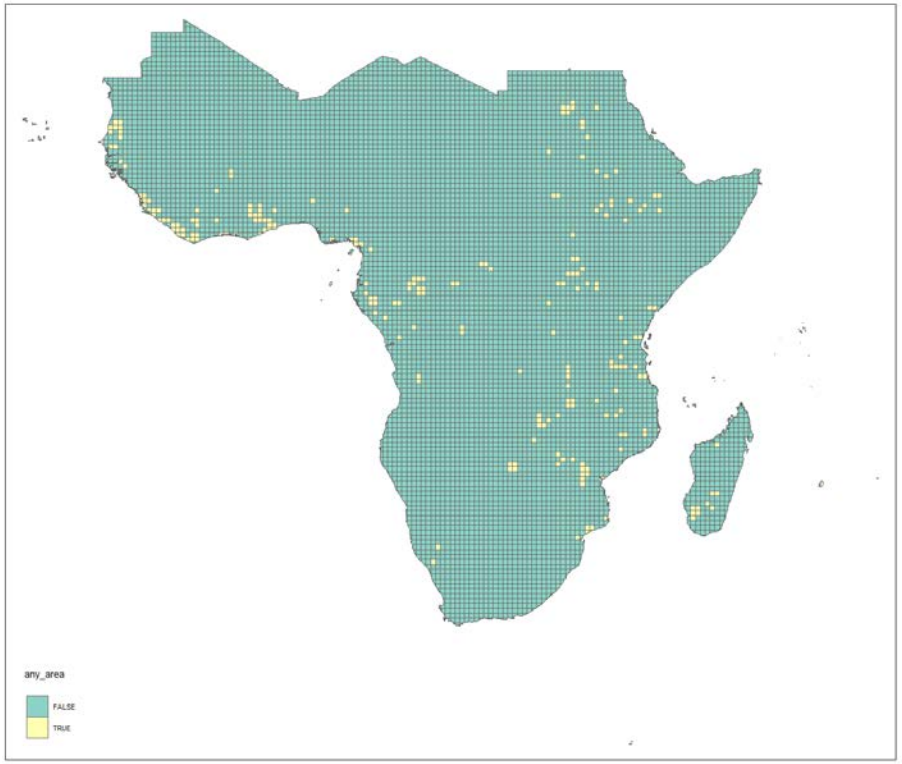

Figure 1:Map indicating grid cells that have ever had any area under agricultural investment

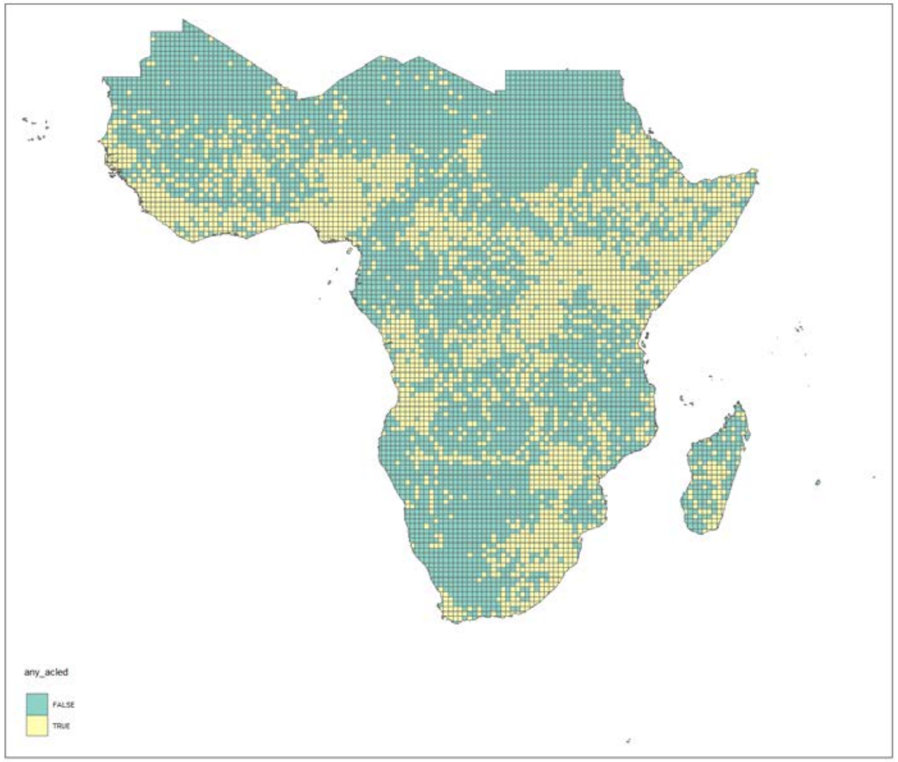

Figure 2: Map indicating grid cells that have ever had any acled event

Table 3: Cross-section regression results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	OLS asacled	OLS asacled_red	OLS asacled_red	OLS asviol_civ	OLS asviol_civ	OLS asprotests	OLS asriots
asarea_ct	0.0546***	0.0112***	0.00744***	0.0348***	0.0119***	0.0326***	0.0272***
	(14.58)	(8.66)	(4.94)	(13.40)	(5.58)	(15.12)	(13.83)
pop_gpw_sum	0.000000108***	2.46e-08***	2.47e-08***	7.13e-08***	7.93e-09	8.69e-08***	7.91e-08***
	(14.61)	(9.65)	(9.69)	(13.97)	(1.88)	(20.51)	(20.40)
nlights_calib_mean	0.140***	0.0155	0.0149	0.0975***	-0.000148	0.147***	0.110***
	(3.43)	(1.10)	(1.05)	(3.44)	(-0.01)	(6.23)	(5.09)
gcp_ppp	-0.00400***	-0.000991***	-0.000990***	-0.00282***	-0.000429	-0.00345***	-0.00282***
	(-6.26)	(-4.49)	(-4.48)	(-6.36)	(-1.18)	(-9.37)	(-8.38)
excluded	0.00149	0.00224	0.00199	0.000528	-0.00207	0.00469*	0.00217
	(0.39)	(1.71)	(1.52)	(0.20)	(-0.96)	(2.15)	(1.09)
ttime_mean	-0.0000129***	-0.000000800	-0.000000795	-0.00000603***	-0.00000235*	-0.00000519***	-0.00000444***
	(-7.31)	(-1.31)	(-1.30)	(-4.92)	(-2.33)	(-5.11)	(-4.78)
temp	-0.00407***	-0.000289*	-0.000292*	-0.00222***	-0.000226	-0.00280***	-0.00242***
	(-9.67)	(-1.99)	(-2.01)	(-7.60)	(-0.94)	(-11.58)	(-10.91)
prec_gpcc	0.000144***	0.000000908	0.000000736	0.0000749***	-0.00000821	0.000119***	0.0000988***
	(7.94)	(0.15)	(0.12)	(5.98)	(-0.80)	(11.46)	(10.40)
excl_area_ct			0.00963***				
			(4.89)				
asprotests					0.374***		
					(55.57)		
asriots					0.391***		
					(53.14)		
_cons	-0.000844	-0.000286	0.0000171	-0.00202	0.00682	-0.0143**	-0.00897
	(-0.09)	(-0.09)	(0.01)	(-0.33)	(1.34)	(-2.78)	(-1.91)
country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	50951	50951	50951	50951	50951	50951	50951

t statistics in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Dynamic regression results

	(1)	(2)	(3)	(4)	(5)	(6)
	FE	FE	FE	FE	FE	LPM
	asacled_red	asviol_civ	asviol_civ	asprotests	asriots	any_acled
asarea	-0.000368	-0.0160	-0.0138	-0.00564*	-0.00350*	-0.00589
	(-1.49)	(-0.70)	(-0.62)	(-2.55)	(-2.10)	(-0.40)
pop_gpw_sum	1.55e-08	0.00000163***	0.000000993***	0.00000150***	0.00000112***	0.00000149***
	(0.63)	(7.86)	(5.10)	(6.34)	(4.95)	(8.13)
nlights_calib_mean	0.0655	0.949	1.179	-0.681	-0.302	0.395
	(0.59)	(0.80)	(1.08)	(-0.55)	(-0.52)	(0.40)
gcp_ppp	0.0236	-0.166*	-0.117	-0.0104	-0.162**	-0.127*
	(0.87)	(-2.29)	(-1.80)	(-0.13)	(-2.88)	(-1.97)
excluded	-0.00151	-0.0399**	-0.0436**	0.0150	0.00218	-0.0455***
	(-0.41)	(-2.70)	(-3.05)	(1.77)	(0.31)	(-3.66)
ttime_mean	0	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)	(.)
temp	0.000223	0.000778	-0.00214	0.00632*	0.00552*	-0.00831*
	(0.25)	(0.21)	(-0.60)	(1.98)	(2.19)	(-2.30)
prec_gpcc	0.0000308*	-0.0000568	-0.0000627	0.0000381	-0.00000743	-0.000118**
	(2.54)	(-1.06)	(-1.19)	(1.32)	(-0.31)	(-2.63)
asprotests			0.209***			
			(4.49)			
asriots			0.289***			
			(4.87)			
_cons	-0.0346	-1.666	-2.325**	2.416**	0.530	-6.117***
	(-0.25)	(-1.88)	(-2.81)	(3.09)	(0.74)	(-7.00)
country-yearFE	Yes	Yes	Yes	Yes	Yes	Yes
N	14262	14262	14262	14262	14262	14262

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$