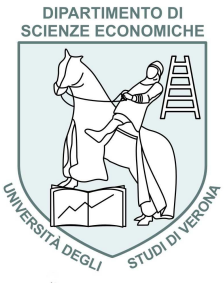

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Do UN troops secure crops? Evidence from South Sudan

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Abstract

This paper investigates the relationship between conflict and agricultural production. In particular, we focus on the effect of the deployment of United Nations Blue Helmets as a conflict-reducing device in South Sudan. This country offers a suitable testing ground for our study because the underdevelopment of the agricultural sector is worsened because of the persistence of civil conflicts. Since UN troops improve security, the conflict-related loss of crops is expected to decrease in those areas secured by the Blue Helmets. Hence, we predict a positive relationship between their presence and cereal production. We test our hypothesis using an original dataset including all the 78 South Sudanese counties over the period 2009-2011. The dependent variable is the net cereal production and the variable of interest is the number of Blue Helmets, both measured at the county level. In the estimation we control for the non-random assignment of UN troops through an Instrumental Variables approach that allows us also to interpret the coefficients as causal effects. Our empirical results and indicate a significant marginal effect of about 0.65%. In other words, if we assume a net cereal production of 10,000 tonnes and the presence of 100 Blue Helmets, a 10% increase in the size of the troop allows the production of additional 650 tonnes.

Keywords: United Nations, Blue helmets, South Sudan, cereal production, peacekeeping.
JEL Codes: C26; D74; F53.

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I. Introduction

South Sudan is the newest country in the World, established on 9 July, 2011. Independence was affirmed after a referendum, held in January 2011, which declared secession from Sudan. The two countries, divided by ethnic, religious and natural resources differences, share a common past of conflict. In the last sixty years they fought two civil wars, the first one from 1955 through 1972 and the second one from 1983 through 2005. Nowadays, the two countries are still involved in skirmishes along the border caused by land claims. Beside international threats to security, South Sudan suffers from internal instability, being the theatre of both inter-tribal conflicts (i.e., Murle vs. Lou Nuer) and intra-tribal ones (i.e., Lou Nuer vs. Jikany Nuer) (source: Small Arms Survey).

Violence interplays with technological underdevelopment, thwarting South Sudan's progress. Insecurity discourages the economic activity and has a negative impact on agricultural production. In 2005 the United Nations started a peacekeeping mission in South Sudan, named UNMIS, and since then Blue Helmets have been in the country. The primary goal of UN troops is to enforce peace among fighting groups. This is also expected to have a benign impact on productive activities because a lower degree of conflict entails the possibility of restarting production and invest.[1] Do really UN troops have a beneficial impact on agricultural production? In particular, do UN troops secure crops in South Sudan? This is the research question that the present analysis poses and that we attempt to answer empirically.

South Sudan is a suitable testing ground for our study, because it has been largely reported that the enduring conflict depressed its agricultural performance (FAO/WFP). From a geo-morphological point of view, the country is divided into six agro-ecological zones offering a diversity of agricultural potential (maize, sorghum, wheat, and so on), abundance of water resources as rainfall, lakes and rivers, and it is exposed to high solar radiations (about 10 hours per day). Despite this potential, the cereal production is still insufficient to meet the demand. The poor quality of productive inputs and support services, the low and inefficient technology, and eventually the lack of infrastructure constitute a severe limit to production and contribute to reduce the yield.

Furthermore, militia attacks often destroy the crop and the livestock. Farming households, are therefore discouraged because of the widespread insecurity and cultivate only the land close to their home (WFP/FAO). Currently, only less than 5% than the 30 million hectares of arable land in the country is harvested. In some areas the detrimental impact of conflict is clear: The city of Mangala, and about 20000 hectares of land in Melut, have been both abandoned due to the war (source: Ministry of Agriculture, 2011). The enduring dependence of the country from food imports is costly since its demand - and consequently the price - is particularly high in the Sub-Saharan region. The fiscal revenues of South Sudanese government depend almost totally on oil royalties (98%), thus making the state capacity interdependent with international oil prices which have proven to be volatile. Then, this lowers the aggregate income that could be eventually redistributed to the population, especially those parts living in extreme poverty. In fact, more than

[1] The economic effects of peacekeeping have received very little attention, Carnahan, Durch and Gilmore (2006). For a general overview see Bove and Smith (2011). Please see also the conceptual papers by Arrow (1994), Caruso (2010) and Brauer and Caruso (2013, forthcoming).

a third of South Sudanese in 2010 suffered from moderately or severely food insecurity; among them, severe child acute malnutrition is about 13% (source: FAO/WFP).

In this paper we empirically analyze the relationship between the deployment of United Nations Blue Helmets in South Sudan and cereal production in order to uncover a relation between these variables. The issue has not been tackled so far in the literature, and it is not a trivial one. First, Blue Helmets are expected to positively affect agricultural production, as their formal mission is 'consolidate peace and security' (art. 3 UN Resolution 1996, 2011). Once deployed in the country, however, Blue Helmets are also expected to purchase consumer goods so fuelling the local demand and eventually increasing the actual sales prices of many primary goods. The direction of the impact is an empirical matter that can only be tested with the data, and this is the aim of this work. Secondly, the UN troops' deployment may be non-random. The assignment of Blue Helmets to counties' headquarters reasonably follows a rationale. For example, the troops are sent where the largest number of conflict-related incidents had taken place. Alternatively, those areas where infrastructures are more developed and it is easier to get food are preferred to more peripheral and desolate counties. If the deployment scheme implemented is correlated with the output variable, i.e. cereal production, our estimates will be biased. To consider this issue we employ an Instrumental Variable approach, finding valid instruments for the size of the troop.

The results of the estimates verify our hypothesis: there exist a significant relationship between the deployment of UN troops and cereal production, and it is positive. The estimated marginal effect, robust to alternative specifications of the model, is about +0.65%.

The rest of the paper is structured as follows: Section II describes the history of South Sudan and the UN mandate for peacekeeping; Section III introduces the model and the data; in Section IV results are presented, and Section V concludes.

II. Peacekeeping in South Sudan

The United Nations Mission in Sudan (UNMIS) was deployed in 2005 after the signing of the Comprehensive Peace Agreement (CPA) between the Government of Sudan and the Sudan People's Liberation Movement (SPLM),[2] ending more than 20 years of war. The Naivasha Agreement established South Sudan as an autonomous region of Sudan, and the mandate of the CPA consisted of four main issues: implementation of ceasefire between North and South Sudan; facilitation of the delivery of humanitarian aid; assistance to demining, and protection of civilians and human rights, including a safe return of internally displaced peoples and refugees.[3] The military strength of UNMIS comprised of approximately 10,000 peacekeepers. The mission was decentralised in terms of its deployment locations and management structures. The strategic headquarters were based in Khartoum. The majority of staff (about 6,000 people) were deployed across the 10 States of South Sudan, including the county level as required (United Nations, 2011a). Table A.1 in the Appendix illustrates the administrative division of the country.

The peace process stopped in 2009, when the tensions between the ruling National Congress Party and the SLPM accompanied a wave of armed violence. Tribal conflict affected

[2] On the evolution of SPLM see Metelis (2004).
[3] See Security Council Resolution 1590.

mainly the Jonglei and Upper Nile states. The Government of South Sudan has been unable to restore security, and the politicization of the violence increased (McEvoy and LeBrun, 2010). The timing of the incidents followed the electoral timing: the executive elections in April 2010 have been preceded by tribal violence in Jonglei, Lakes, Upper Nile and Warrap states. Isolated cases of post-election violence were limited to a few states, such as Jonglei and Unity (CIGI Security Reform Monitor, 4/2011). The SPLM has been accused of undue influence for having mobilized security organs, including the army, to intimidate candidates. In this confused scenario several armed groups emerged (the Lord Resistance Army, the Joint Integrated Units, and others) and exerted pressure on the government. On January 2011 the independence of South Sudan was formalized with a referendum that obtained almost unanimous agreement: more than 98% of the voters chose to create a new state, separate from Sudan. On 9th July, after the culmination of a six-year peace process, South Sudan finally became a new nation.

Khartoum's government, once accepted the independence of South Sudan, withdrew its consent for UNMIS to continue. At the same time, the mission turned into the United Nations Mission in the Republic of South Sudan (UNMISS), with the adoption of resolution 1996(2011).[4] The Security Council authorized 7,000 military[5] and a 900 civilian police personnel force for UNMISS, now headquartered in Juba, from contributing countries such as India, China, Bangladesh, Kenya and Russia which were divided into three sectors I-III[6]; each sector having the same area of responsibility as it did during UNMIS.

UNMISS's mandate is to "support the Government of the Republic of South Sudan in exercising its responsibilities for conflict prevention, mitigation, and resolution and protect civilians".[7] The UNMISS peacekeepers, therefore, have been entrusted with two distinct responsibilities – firstly to consolidate peace in the nascent state as a pre-requisite for state building and economic development, and secondly to assist government authorities in exercising their responsibilities to prevent and mitigate armed conflict and protect civilians (William, 2011: 8). The Southern Sudanese government initially objected to a Chapter VII mandate, allowing UNMISS to undertake operations to protect civilians, because the government wanted the UN to focus more on the problems lying with the contested northern border rather than internal security problems. Nonetheless, conflict between South Sudanese groups is strong, yielding to some 2,500 killings and the displacement of 350 000 people (Mc Evoy and LeBrun, 2010). Moreover, security provided by the blue helmets is critical to long-term stability and economic development, not least because of the vast agricultural plains but also because of natural resources of oil, agricultural land, water, Gum Arabic, and minerals (Arenas-Garcia, 2010: 5).

Figure 1 maps the diffusion of Blue helmets in the country. UN troops are present in only fourteen counties over 78, and their deployment does not follow any clear spatial pattern. The Blue Helmets are both in the north (e.g. Melut) and in the south (e.g. Yei), in large counties (e.g. Raga) and in smaller ones (e.g. Rumbek Centre), in coastal (e.g. Yambio) and internal areas (e.g. Bor South). Apparently, there is not any spatial clustering explaining the deployment of the troops.

[4] United Nations (2011b).
[5] As of December 2011, the number of blue helmets is just under 5,000 (UNMISS, 2011b).
[6] Sector III seems to be the most high risk area in terms of threats. Sector III has three active RMG (rebel militia groups). RMG Mattew Pul Jang in Unity, RMG Ogat and Olony in Upper Nile and South Sudan Democratic Movement (SSDM) under Lt Gen Chol Awan in Jonglei (UNMISS, 2011b).
[7] For details on UNMISS mandates, see official UNMISS (2011a).

[Figure 1 about here]

Figure 2 provide details on the size of the county troops and their evolution in time. First, one must note that the deployment of Blue Helmets in a country is a permanent policy: during the period 2007-2011 we do not observe changes in the deployment of the troops. This is an expected pattern, because once the headquarter is established, it is costly to remove it or move it somewhere else; fixed costs, communication networks and infrastructures contribute to reduce the mobility of the troops. The largest share of the Blue Helmets is deployed in the three regional capitals: Juba, that is also the national capital, Wau and Malakal. At the same time, we do not observe any diffusion of the presence of troops across counties, and their size is quite stable. The only significant variation is observed in the last two years, when a reorganization of the troops occurred. Figure 2 indicates a reduction of Blue Helmets in some counties (e.g. Wau and Malakal) counterbalanced by an increase in others counties (e.g. Raja and Bor South). A plausible motivation for this reshuffle is that rising violence was expected in 2011, due to the approaching of the referendum. Instead of establishing new headquarters, it seems that the command rationalized the composition of the troops.

[Figure 2 about here]

III. The dataset and the model

This work exploits an original dataset consisting of all the 78 counties of South Sudan for the period 2008-2011. For the purpose of estimating a cereal production function, we collected data from institutional sources (e.g. National Bureau of Statistics) and international organizations (e.g. OCHA in Juba). All these information compose a panel dataset for the period 2008-2011, made of 312 observations. The variables included refer to demographic, socio-economic and geographical characteristics of the country, beside the already mentioned information on the location and the size of UN troops.

Our dependent variable is the net cereal production measured in tonnes (*Cereal*). The data is calculated by the South Sudan National Bureau of Statistics (NBS) for the years 2008-2011 and it is available at the county level. The explanatory variables refer to the input of the production. First, we include the surface of the harvested land (*Total cereal area*), measured in hectares. The source is again NBS Statistical Yearbook. We expect that the wider is the cultivated area, the greater is the output we observe. Unfortunately, information on the amount of physical capital and fertilizers is not available, but it seems they play a marginal role in agricultural production. FAO/WFP reports that "farmers commonly use their own seed saved from the previous year's harvest, and virtually no commercial fertilizers, pesticides or herbicides are used" (FAO/WFP Crop and food security assessment mission to South Sudan - Special Report 2012, pag. 9). Technology is highly underdeveloped and all operations from sowing to harvesting are done manually. Land preparation exploits some mechanized processes, but the dominance of very low skilled workers prevents the introduction of advanced tools as modern ploughs. Therefore, the second main input for cereal production is human labor. Since smallholder farming dominates agricultural sector in South Sudan (Oakland Institute, 2011), we include the total number of

households (*Households*) and the share of farming households in the county in the dataset. We expect that, *ceteris paribus*, more households are able to produce a larger amount of output. Nonetheless, the soil is a good subject to rivalry in consumption, and when the farming households' density increases, congestion and excessive exploitation could reduce the yield.

A key assumption of our analysis is that security affects productivity. To illustrate this point we consider two farming households, H1 and H2, endowed with two identical pieces of land, the same skills, the same ploughs and the same fertilizers. If H1 experiences a shock to the security of his piece of land, his output decreases. The reduction could be either direct (as an example a militia attack that destroys part of the crops), or indirect (cattle raids, physical violence and destruction of the ploughs that discourage the farming activity). Following this line of reasoning, conflict-reducing devices as the deployment of UN troops should reduce the security gap between H1 and H2, constraining the detrimental impact of the conflict on the agricultural production. This effect is captured by our variable of interest, *UN*, which measures the number of Blue Helmets headquartered in a county. Finally, we include some control variables: a dummy indicating the presence of a dominating ethnic group in the county[8] (E_t), civil-war related killings per thousands of individuals (K_{it}), and the total area devoted to cereal production (L_{it}),. Table 1 summarizes data description and sources, whereas Table 2 provides summary statistics.

[Table 1 about here]

[Table 2 about here]

Then, we estimate the following model:

$$[1]\ Cereal_{it} = \alpha_1 + \alpha_2 UN_{it} + \alpha_3 \mathbf{D}_{it} + \alpha_4 E_i + \alpha_5 L_{it} + \alpha_6 K_{it} + \varepsilon_{it}$$

where the subscript i=1,...,78 indicates the county, t: 2008,...,2011 indicates the year, $\mathbf{D}_{it}$ is a vector of demographic variables (*Households* and *Share of farming households*), and ε_{it} is a random error.

We suspect that the troops deployment is non-randomly chosen, therefore UN_{it} induces endogeneity in the specification. We tackle this issue by estimating an Instrumental Variable model. In particular, we exploit two instruments for UN_{it}. The first one is *Rain*, a proxy for the feasibility of human settlements; in fact, seasonal flooding of large areas along the Nile river improve the fertility of the soil but hampers the deployment of troops. At the same time, rainfalls do not properly predict agricultural production because rivers, lakes or artificial sources of irrigation are used in less rainy areas. Finally, some cereal species, as the sorghum, are specific to arid lands. The second instrument we employ is an interactive term *State capital dummy*Distance*, a proxy for the easiness of communications and mobility, where *Distance* measures how far is in km the State capital from the country capital, Juba. This variable is equal to zero for non-state capital counties, and equal to a positive number otherwise. The larger the value of this interactive term, the more distant the state capital county is from Juba. The rationale for this instrument is twofold: first, a state capital is the core of local administration, providing

[8] Dinka is the dominant ethnic group in South Sudan, we experimented with a dummy equal to one when this group account for more than 40% of the population in a given province (and zero otherwise) but it was never significant.

the headquarter with some already existing networks that facilitate the execution of the mission; secondly, infrastructures and international communication networks are more developed in Juba, therefore it is easier to transfer and manage troops around its area.

Figures 3 to 6 maps the distribution of our dependent variable, cereal production. The reference point is the group dark yellow, which indicates the median counties: 50% of counties produce more than them, and 50% produce less. Accordingly, for example, the light green group has 10% of counties producing less than them and 90% of counties performing better than them. The interpretation of the other groups is similar. The figures show that that cereal production is quite erratic over the years; the median production level experiences a dramatic fall in 2009 (-38%), followed by a recovery in 2010 (+25%) and again a decrease in 2011 (-20%). Furthermore, it is difficult to identify areas that are systematically more productive than others.

[Figure 3 about here]

[Figure 4 about here]

[Figure 5 about here]

[Figure 6 about here]

IV. Results

Table 3 presents the results from the IV estimation of Equation 1. Continuous variables are expressed in logs; therefore the coefficients are interpreted as marginal effects. Moreover, all the specifications include dummies for the ten states to control for unobserved heterogeneity, and year dummies to capture the effect of time. The fit of the models is always very high, with a R^2 of about 0.92 and an F test always significant at the 0.01% level. The number of observations is limited to 233 because of missing data.

[Table 3 about here]

Before commenting the results, it is important to notice that the IV diagnostics support our specification. In particular, the endogeneity test of Blue Helmets confirms our suspects and rejects the exogeneity of our variable of interest. Both under-identification[9] and over-identification[10] are always rejected; the Anderson-Rubin test rejects the weakness of our instruments, both when expressed as F test and as χ^2; the Stock-Wright LM test provides similar suggestions. All in all, diagnostics indicate that we are using a suitable specification and that our instruments are valid.

The coefficients of Table 3 are consistent across the six models, and the main result is that, *ceteris paribus*, we find a significantly positive effect of the UN troops on cereal production.

[9] The null hypothesis of the Kleibergen-Paap rk LM statistic is that the model is under-identified.
[10] The null hypothesis of the Hansen J test is that the model is not over-identified.

The coefficient indicates that a 1% increase in the ratio brings about an increase of cereal production of about 0.65%. In other words, if we assume a net cereal production of 10,000 tonnes and the presence of 100 Blue Helmets, a 10% increase in the size of the troop allows the production of additional 650 tonnes. The coefficient associated to labour-related variables, the number of households and the share of farming households, is always negative as expected. As the number of farmers increases, keeping the harvested surface constant, the less fertile becomes the land, and the less efficient is the use of the soil. The fact that the number of farming households is significant, while the share is not, reinforces this argument. An increase (decrease) of the cultivated land, on the other hand, increases (decreases) the output by a factor larger than one, verifying the predictions. Interestingly, the results find increasing returns to scale in the use of land in our dataset.

The ethnicity dummy is not significant, but always negative. The sign means that, *ceteris paribus*, a majority of Dinka in the county does not affect the cereal production. Although the Dinka tribe is devoted to agriculture and sheep farming, it is the dominant ethnic group in the country and this 'governmental' status might generate tension with the other groups, negatively affecting the harvest.

The *Killings* variable is not significant as well, and negative as expected. A larger number of conflict-related victims increases insecurity and discourages the agricultural activity. Nonetheless, we must note that the incidence of killings is very limited, ranging from 0 to 3.6 per thousands of inhabitants, reducing the significance of its coefficient. Furthermore, insecurity is affected also by armed raids that cause injured, refugees, loss of livestock and dwellings destruction, whose impact is not captured by *killing*. Finally, the year dummies are highly significant an, consistently with official data from NBS, indicate that if compared to 2009, production increased in 2010 and decreased in 2011.

V. Conclusions

This paper empirically tested the hypothesis that UN troops contributed to secure crop in South Sudan during the period 2009-2011. We use an original dataset including all the 78 South Sudanese counties and estimate a cereal production function including the Blue Helmets as an independent variable. We control for the non-random assignment of UN troops through an Instrumental Variables approach, and find the expected beneficial effect of the deployment of UN troops on agricultural output. The coefficient associated to the variable of interest in fact indicates a marginal effect of about 0.65%. In other words, if we assume a net cereal production of 10,000 tonnes and the presence of 100 Blue Helmets, a 10% increase in the size of the troop allows the production of additional 650 tonnes. This effect is non negligible in the light of the widespread food insecurity that strikes the country and the dependence from food imports of the whole region.

The analysis developed in this short paper, is the first empirical evaluation of the performance of UN troops in South Sudan, and the results have a low external validity. Future research is called to test the same hypothesis in different environments and answer to the more general question: do conflict-reducing policies actually improve the economic performance of a country afflicted by violence and insecurity?

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Table 1 - Data description and sources

	Description	*Source*
Cereal	Net cereal production in tonnes	Statistical Yearbook, NBS. Years 2009-2011
Blue Helmets	Number of UN soldiers physically stationed in the county	OCHA in Juba
Households	Number of households in the county	Statistical Yearbook, NBS. Years 2009-2011
Share farming households	Share of farming households on the total number of households	Statistical Yearbook, NBS. Years 2009-2011
Total cereal area	Harvested area in hectares	Statistical Yearbook, NBS. Years 2009-2011
Ethnicity	Dummy=1 if the county is multi-ethnical, dummy=0 otherwise	OCHA in Juba
Killing	Number of conflict-related deaths per thousands of individuals	OCHA in Juba, and *www.sudantribune.com*
Population	Population size	Statistical Yearbook, NBS. Years 2009-2011
2010 dummy	Dummy=1 if year==2010, dummy=0 otherwise	Own calculations
2011 dummy	Dummy=1 if year==2011, dummy=0 otherwise	Own calculations
Rain	Average rainfall	World Food Program (WFP) and NBS
State capital dummy	Dummy=1 if the county is a state capital, dummy=0 otherwise	Statistical Yearbook, NBS. Years 2009-2011
Distance from Juba	Km distance from the county capital to the state capital	Statistical Yearbook, NBS. Years 2009-2011
State capital dummy *distance from Juba	Interaction of the two variables	Own calculations

Note: OCHA= Office of Coordination of Humanitarian Affairs; NBS=South Sudan National Bureau of Statistics; WFP=World Food Program.

Table 2 - Descriptive statistics

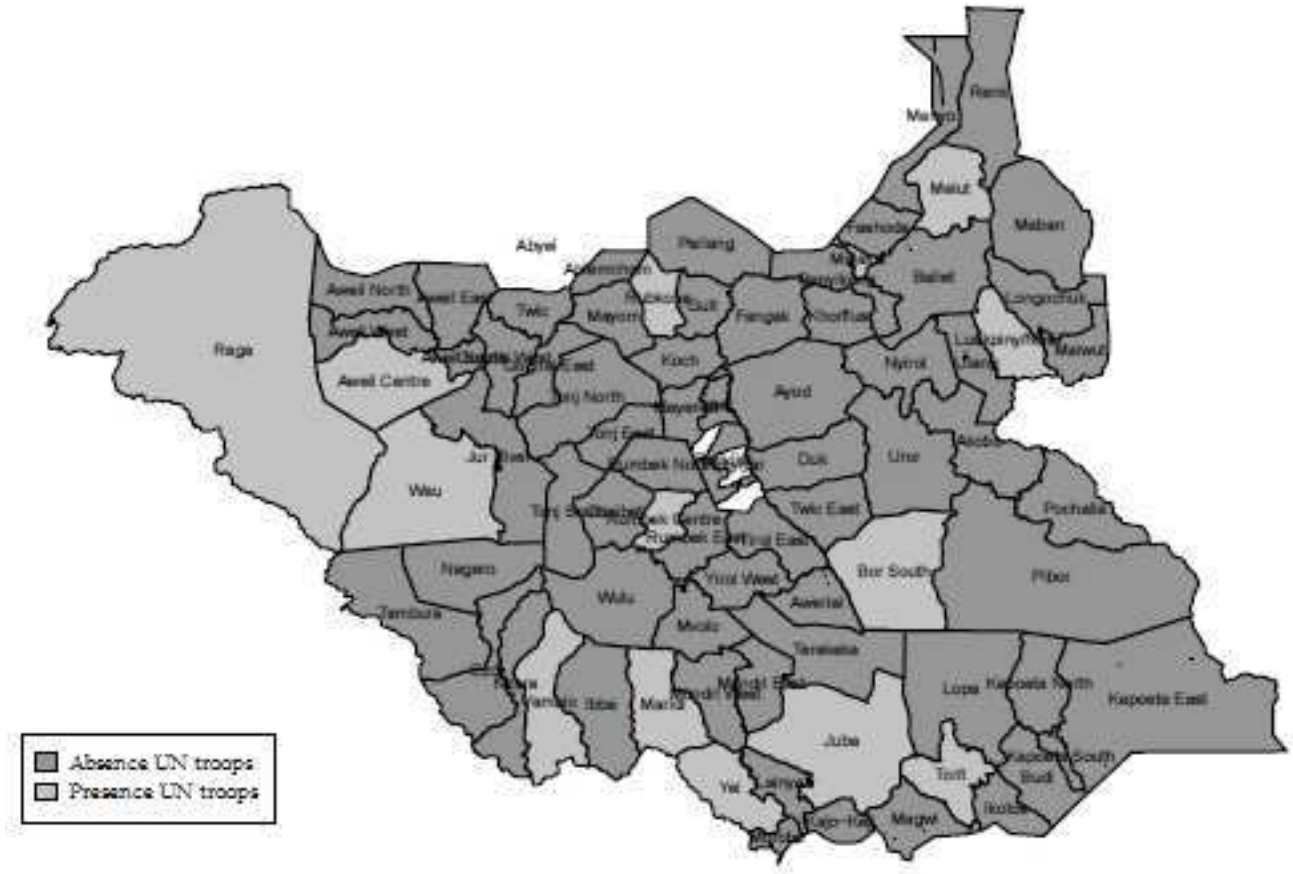
	Obs.	Mean	Std. Dev.	Min	Max
Cereal	312	9016.429	9176.51	0	79976
Blue Helmets	390	64.392	223.432	0	1271
Households	312	17208.7	11332.97	1720	62376
Share farming households	312	79.5	16.012	30	95
Total cereal area	234	10986.31	7412.51	681	33908
Ethnicity dummy	390	1	0	0	1
Killing (per thousands of individuals)	311	0.204	0.513	0	3.632
Population	386	107199.4	65991.4	10077	397594
2010 dummy	390	0	0	0	1
2011 dummy	390	0	0	0	1
Rain	312	8.571	2.169	4	13
State capital dummy	390	0	0	0	1
Distance from Juba	390	560.54	265.15	0	1070
State capital dummy*distance from Juba	390	61.65	189.27	0	834

Table 3 - IV estimation of Equation 1

	(1)	(2)	(3)	(4)	(5)	(6)
ln Blue Helmets	0.008**	0.005	0.008**	0.005**	0.008***	0.007**
	(0.014)	(0.102)	(0.012)	(0.069)	(0.010)	(0.028)
ln Households	-0.251**		-0.201**		-0.243**	-0.236**
	(0.025)		(0.014)		(0.028)	(0.027)
Share farming households	-0.003	-0.001			-0.002	-0.003*
	(0.138)	(0.518)			(0.183)	(0.087)
ln Total cereal area	1.248***	1.054***	1.196***	1.053***	1.243***	1.239***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ethnicity dummy	-0.035	-0.015	-0.014	-0.009		-0.035
	(0.441)	(0.729)	(0.757)	(0.845)		(0.432)
Killing (per thousands of individuals)						-0.066
						(0.170)
2010 dummy	0.135***	0.154***	0.142***	0.155***	0.137***	0.134***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
2011 dummy	-0.131**	-0.146***	-0.130**	-0.146***	-0.131**	-0.119**
	(0.014)	(0.007)	(0.015)	(0.007)	(0.013)	(0.024)
Constant	0.265	-0.576*	0.087	-0.621**	0.190	0.212
	(0.563)	(0.055)	(0.841)	(0.036)	(0.667)	(0.629)
Observations	233	233	233	233	233	233
F test	303.95***	279.89***	317.48***	297.37***	312.58***	301.60***
R^2	0.918	0.918	0.917	0.918	0.918	0.920
Underidentification test						
Kleibergen-Paap rk LM statistic†	0.003	0.005	0.004	0.013	0.003	0.003
Weak-instrument-robust inference						
Anderson-Rubin Wald test (F version)†	0.005	0.017	0.017	0.036	0.004	0.011
Anderson-Rubin Wald test (χ^2 version)†	0.002	0.010	0.009	0.023	0.002	0.005
Stock-Wright LM†	0.045	0.109	0.054	0.105	0.046	0.073
Overidentification test of all instruments						
Hansen J test†	0.087	0.065	0.375	0.157	0.115	0.100
Endogeneity test of endogenous regressor						
Ln Blue Helmets†	0.027	0.081	0.035	0.082	0.024	0.040

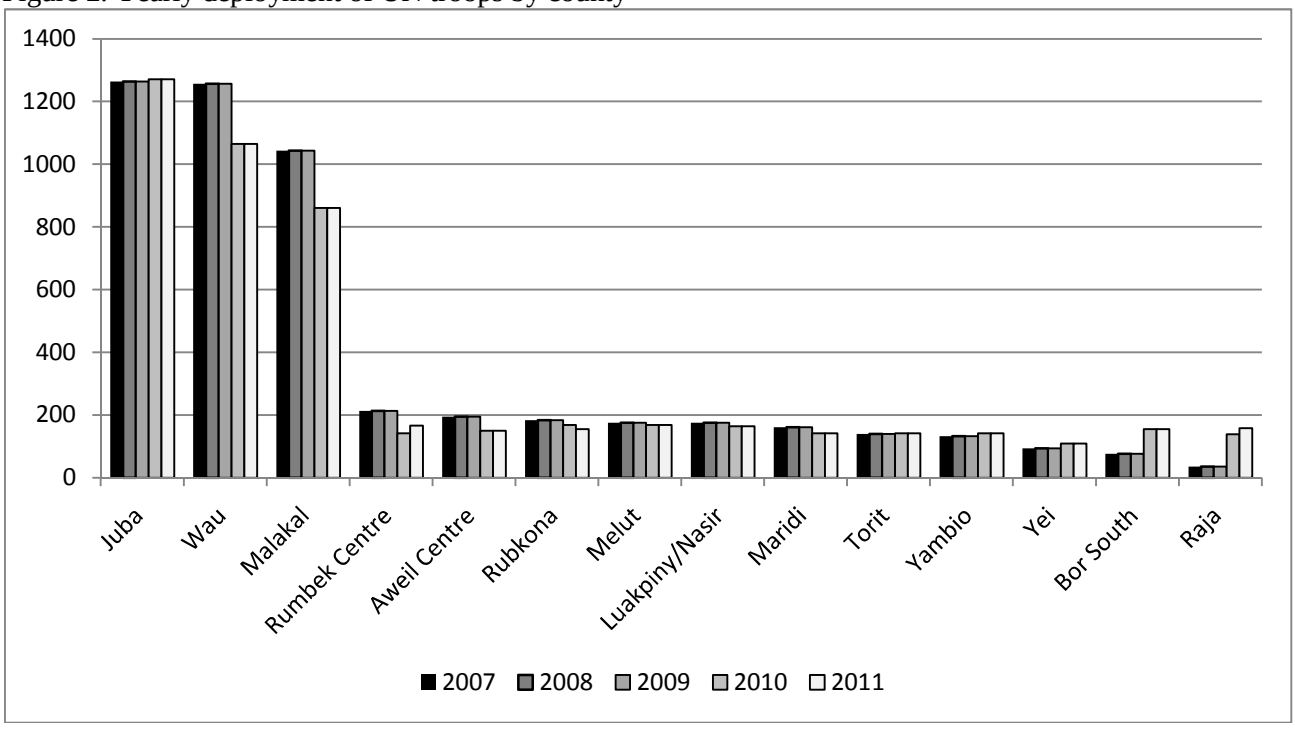
Notes: Estimates with cluster(id) option. All estimations include a set of State dummies. Significance level: *** 1%, ** 5%, * 10%. P-values in parentheses; † denotes a p-value.

Figure 1. Presence of UN troops by county



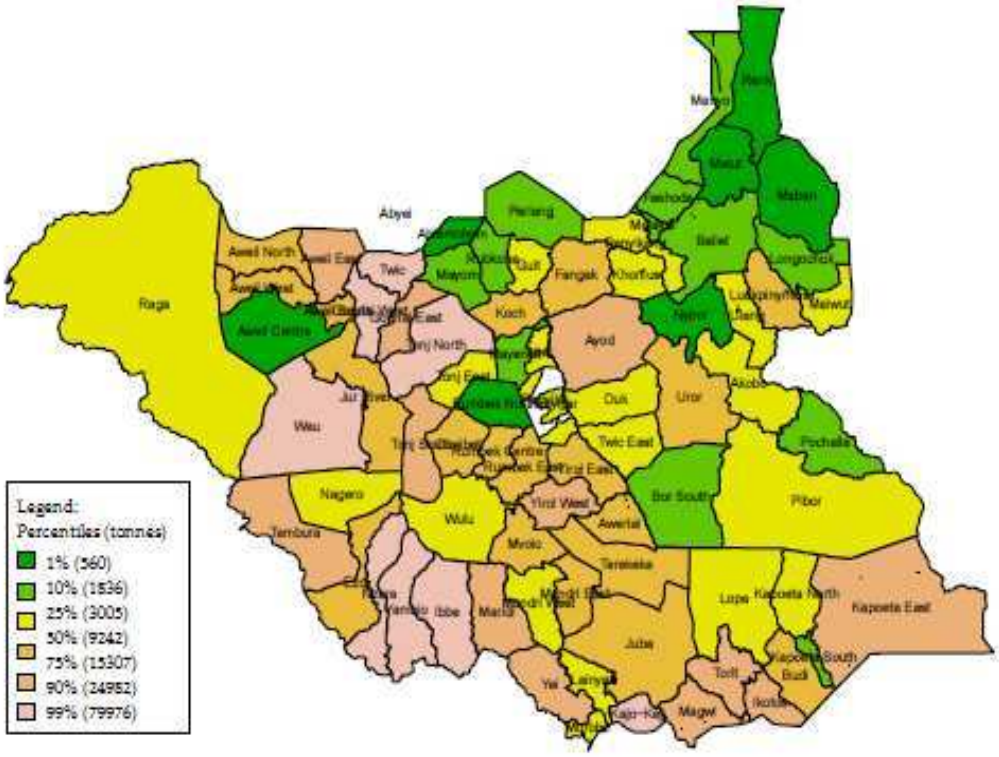
Source: Office of Coordination of Humanitarian Affairs (OCHA) in Juba.

Figure 2. Yearly deployment of UN troops by county



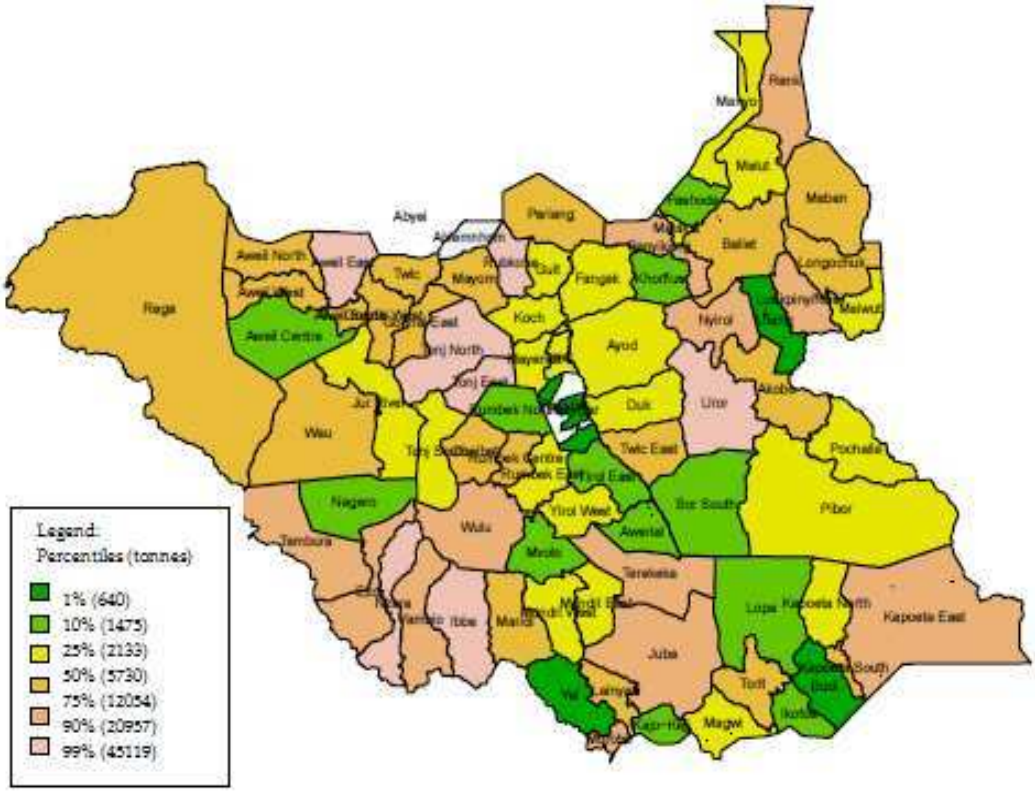
Source: Office of Coordination of Humanitarian Affairs (OCHA) in Juba.

Figure 3 - Net cereal production by county, year 2008



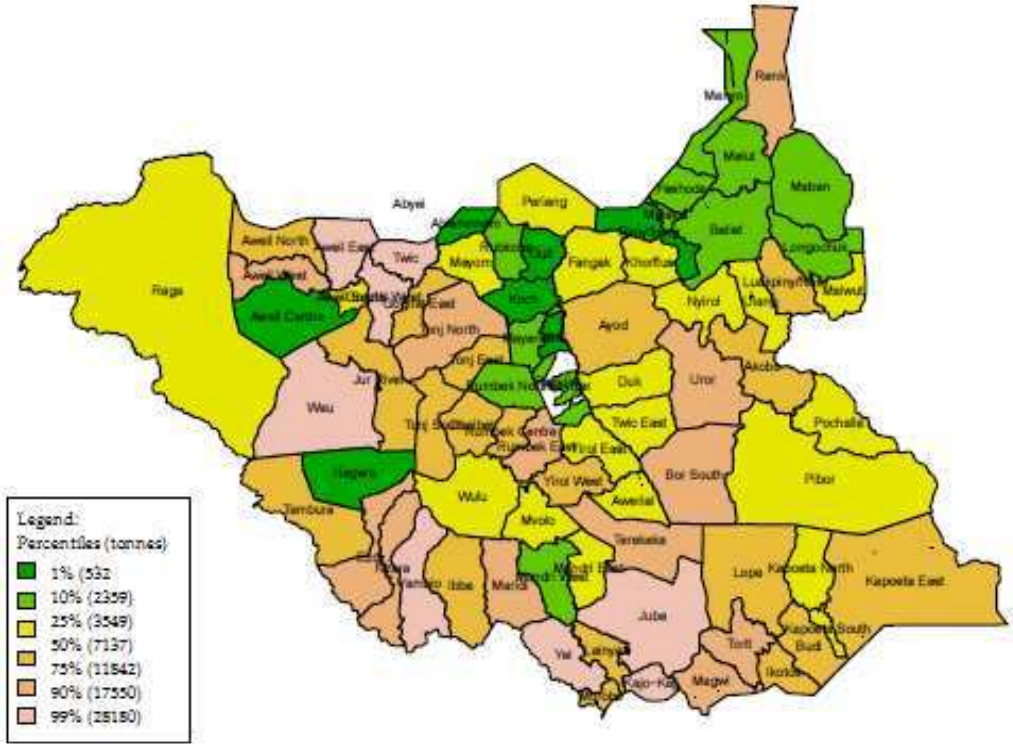
Source: South Sudan National Bureau of Statistics, NBS.

Figure 4 - Net cereal production by county, year 2009



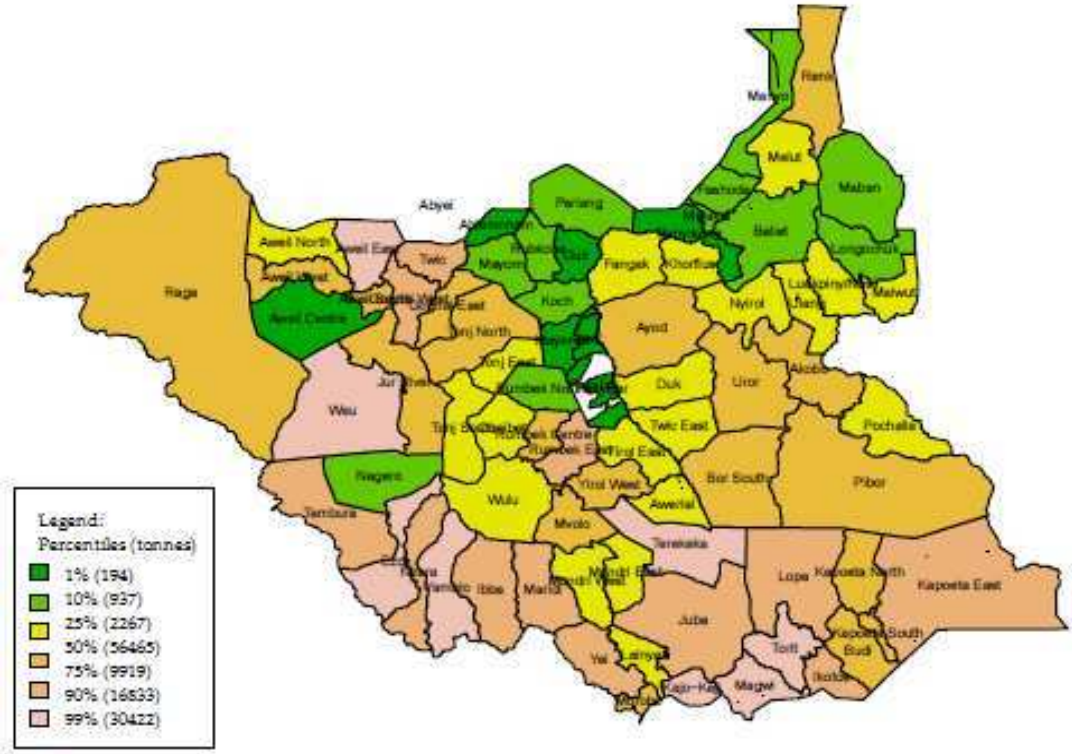
Source: South Sudan National Bureau of Statistics, NBS.

Figure 5 - Net cereal production by county, year 2010



Source: South Sudan National Bureau of Statistics, NBS.

Figure 6 - Net cereal production by county, year 2011



Source: South Sudan National Bureau of Statistics, NBS.

APPENDIX

A.1 List of Regions, States and Counties of South Sudan

Region	Greater Upper Nile			Bahr el Ghazal				Equatoria		
State	Upper Nile	Jonglei	Unity	Warrap	Northern Bahr el Ghazal	Western Bahr el Ghazal	Lakes	Western Equatoria	Central Equatoria	Eastern Equatoria
Counties	Baliet	Akobo	Abiemnhom	Gogrial East	Aweil Centre	Jur River	Awerial	Ezo	**Juba**	Budi
	Fashoda	Ayod	Guit	Gogrial West	Aweil East	Raja	Cueibet	Ibba	Kajo-Keji	Ikotos
	Longochuk	Bor South	Koch	Tonj East	Aweil North	**Wau**	Rumbek Centre	Maridi	Lainya	Kapoeta East
	Luakpiny/Nasir	Canal (Khorflus)	Leer	Tonj North	Aweil South		Rumbek East	Mundri East	Morobo	Kapoeta North
	Maban	Duk	Mayendit	Tonj South	Aweil West		Rumbek North	Mundri West	Terekeka	Kapoeta South
	Maiwut	Fangak	Mayom	Twic			Wulu	Mvolo	Yei	Lopa/Lafon
	Malakal	Nyirol	Panyijar				Yirol East	Nagero		Magwi
	Manyo	Pariang	Rubkona				Yirol West	Nzara		Torit
	Melut	Pibor						Tambura		
	Panyikang	Pochalla						Yambio		
	Renk	Twic East								
	Ulang	Uror								

Note: Juba is the country capital; regional capitals are in bold, state capital are underscored.