Conflict, Forced Displacement, and Growth: Evidence from Uganda *

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Abstract

In this project I study how forced displacement affects economic growth and development through urbanization. I find that in the localities (parishes) where internal displacement camps were located, displacement led to higher population growth, in comparison to those from which displaced people came from (the bordering parishes), but no difference compared to those that were not affected by displacement. However, GDP growth as proxied by nighttime lights is significantly higher in the parishes with camps only in comparison with the parishes that did not experience displacement, and is not significantly different from the bordering parishes. Moreover, I find that infrastructure, as measured by road length, grew more in places with camps by 26% in comparison to both, the origin parishes, and those unaffected by the displacement. I find evidence of increased market access in locations with camps, and those bordering the latter.

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1 Introduction

Every year, millions of people are moved away from their homes involuntarily as a result of conflict, repression, and other dangerous situations (UNHCR, IOM). In 2021 alone, more than 53 million people were forcibly displaced just within their countries, compared to 26 million in 2012. Given that displacement typically occurs in situations that go hand in hand with trauma and tragedy, it is difficult to overstate the importance of identifying and understanding the mechanisms through which it affects peoples' welfare, in order to allow for policy interventions that ease the burden on all parties involved. Nonetheless, research on understanding the costs of displacement has been limited, especially in the context of agrarian and developing economies due to limited data availability (Verme and Schuettler, 2021, Alix-Garcia et al., 2018).

In this project I study how forced displacement and the geographical relocation of internally displaced populations interact with economic growth and development by focusing on how displacement is accompanied by urbanization. I study an episode of mass internal displacement that took place in Northern Uganda, when the civil war between the Ugandan government and the Lord's Resistance Army (LRA) took place and led to forcibly relocating villagers of Northern Uganda into internal displacement camps. By the end of the war, almost 2 million residents were evacuated into camps with merely a 48 hour notice, where it was unclear as to how long were they to stay. Camp formation took place gradually and was influenced by the evolution of the conflict. This led to variation in the location, size, and timing of the camps being built. Parishes[1] with camps ranged between 1,500 and 57,000 inhabitants, with an average of 2.5 internally displaced persons (IDPs) in camps for every original non-camp resident; in some places, IDPs were as much as 25 times the non-camp population.

I start first by gathering and combining new historical datasets: I construct a dataset of camp location and population using as sources reports from the WFP and UNOCHA, and I also digitize road maps from 1992. Moreover, I recover the 1991 Ugandan census data which is representative at the village level, from the Uganda Bureau of Statistics. Only a sample at the subcounty level was publicly, or even internally available before a collaboration with the Bureau made it possible to recover the data.

Then, I establish some facts on the effects of displacement on urbanization. I

[1] one administrative unit above the village level

classify parishes -localities at one administrative level above the village- into those that had a camp set up and thus received population inflows, those that were bordering camps and were emptied during the displacement, and those that were not affected by displacement.

First, I find that displacement in parishes where camps were located led to higher population growth, in comparison to those from which IDPs originated (the bordering parishes), but no difference compared to those that were not affected by displacement. However, GDP growth as proxied by nighttime lights is significantly higher in the parishes with camps only in comparison with the parishes that did not experience displacement, and is not significantly different from the bordering parishes. Moreover, I find that infrastructure, as measured by road length, grew more in places with camps by 26% in comparison to both, those parishes that were bordering, and those unaffected by the displacement.

This presents a puzzle: why did people who were forced to move into camps stay in camps after the war ended, and they were free to move back? Anecdotal evidence shows that several of the previous camps, which were preciously trading centres or religious centres, received the title of town a few years after people were encouraged to move back to their villages, which I verify empirically.

In addition, I leverage the variation in camp population and timing to study the effect of camp population on urbanization and growth. I find that an increase in camp population by one log point is associated with a 15% significantly higher population growth and 19.53% higher infrastructure growth, but no change in GDP. I also find that regions in which camps where constructed for shorter periods of time (in the last two years of the war) experienced less growth associated with camp population and GDP.

I therefore proceed to test which mechanisms were responsible for the decisions of people to stay instead of going back to their origins: I find evidence of changes in market access across locations such that parishes that received camps became more central in the network of locations in Northern Uganda. As a consequence of being directly connected to parishes with camps, bordering parishes also become more central. Furthermore, I study the change in the composition of occupations across agriculture and non-agriculture, to find evidence for/against structural transformation. Another hypothesis that could explain return patterns is the effect of the war and displacement on land access and usage. Post-conflict, the affected regions experienced an increase in land disputes due to land-grabbing, the loss of land markers, no clear inheritance rules and general confusion in the functioning of traditional customary land ownership.To test whether this indeed was the case, I look at evidence of misallocation of agricultural resources across space.

Finally, the displacement policy may have also changed the social structure in the family, and influenced labor force participation decisions within the household, which could also influence the decision to stay in the camp or go back, due to changes in within-household bargaining power. To test this theory, I study how labor force gender composition changed over time across locations.

The remainder of the paper proceeds as follows. Section 2 provides historical background on the Ugandan civil war and post-war recovery, and Section 3 provides a review of related literatures. Sections 4 and 5 present the data used and summary statistics, and in Section 6 I present the empirical results. Section 8 sketches a preliminary model. Finally, Section 9 concludes.

2 Background

Following Uganda's independence in 1962, the nation faced prolonged violence and political instability, leading to relative stability after the National Resistance Army assumed control of the capital in 1986. However, Northern Uganda became a hotspot for rebel movements, the most prominent one being the Lord's Resistance Army (LRA), led by Joseph Kony. The LRA engaged in a violent guerrilla war against the Ugandan government, primarily targeting civilians in the Acholi region, with vague political objectives.

The LRA employed tactics such as surprise attacks, abductions, and the use of child soldiers to terrorize Acholi civilians and undermine the central government. Abductions intensified in the late 1990s, which prompted the government to construct "protected villages" or Internal Displacement Camps starting 1996, into which all residents of a locality were forced to move (Blattman and Annan, 2010; Bozzoli, Brück, and Muhumuza, 2011). People reported being given between 24 and 48 hours to pack up their belongings and show up at a camp, for otherwise the government military would consider them as rebels and shoot. Unlike other conflicts where displacement is often influenced by economic or geographic factors, in Northern Uganda, most displacement resulted from random attacks or government mandates (Blattman and Annan, 2010; Bozzoli, Brück, and Muhumuza, 2011).

The majority of violence and displacement occurred in the Acholiland region, expanding to the Lango and Teso regions in 2003. By the end of 2005, the number of displaced persons peaked, affecting over 1,800,000 Ugandans (UNHCR, 2011). In 2006, the LRA signed a Cessation of Hostilities Agreement with the Ugandan government, initiating the return from displacement. Despite challenges and Joseph Kony's withdrawal from peace talks in 2008, the population in IDP camps decreased significantly by the end of 2009, and camps were disbanded (UNHCR, 2009, 2011).

Throughout the displacement and return period, humanitarian interventions were conducted by NGOs and international organizations, particularly the UN Development Programme.

In 2004, the Ugandan government published, and officially launched in February 2005, the National Policy for Internally Displaced Persons, which implied that once conflict ceased in the area of origin, camp residents would be free to return (voluntarily). Peace talks were held in 2006, and camp closures began swiftly in the areas where the conflict had ceased[2].

What happened to camps after the war ended? The decision of households to return depended on factors such as the history of violence, household composition, camp services, and individual skills (Bozzoli, Brück, and Muhumuza, 2011; Vinck and Pham, 2009), contributing to varying rates of return and population retention in different areas. Whyte et al., 2014 describe the phenomenon of camps morphing into semi-urban structures: "As peace returns to northern Uganda, a unique arithmetic of development is evident in the former Internally Displaced Persons camps. Small trading centres whose populations multiplied as they became camps now envision futures as Town Boards." New roads were constructed, and hospitals and schools that were built spontaneously for the camps were maintained. Moreover, the end of the war saw an increase in land disputes since there was no formal demarcation of lands, the children of the original owners could not prove that the land belonged to them, and destruction and lack of care of the land made it difficult to identify what pertained to whom. Joireman, Sawyer, and Wilhoit, 2012 find by comparing two IDP settlements with satellite images, that the location that experienced more conflict and for longer time saw displaced people resettling near roads and urban areas, whereas those living in the camp with less conflict and more temporary displacement tended

[2] "Identification of camps selected for phase-out and closure: A threshold of a 50% of population departure was used to raise the discussion on camp phase-out and closure. A mixed committee of national officials and humanitarian actors determined whether a camp should be officially closed and if phase-out activities should be initiated".
Source: https://reliefweb.int/report/uganda/uganda-camp-closure

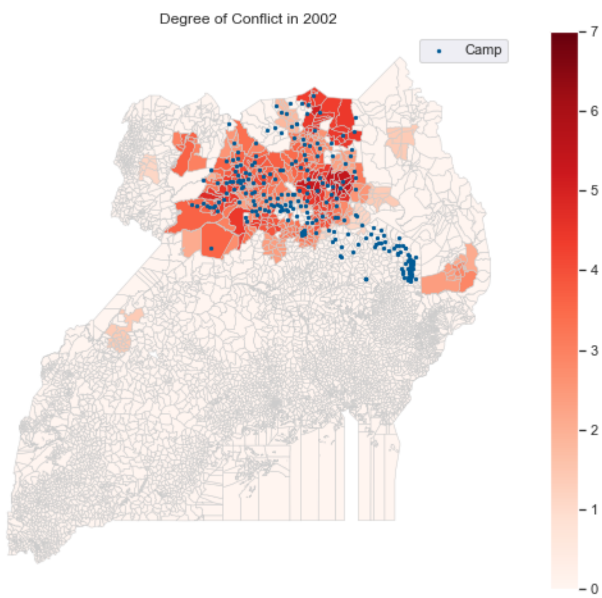


Figure 1. Conflict and camps at the height of the conflict (measured as $log(deaths)$). *Source:* UCDP GED.

to return to their previous rural homes and villages (return instead of resettlement).

3 Related Literature

This paper attempts to bring together several strands of literature: firstly, by adding to the vast literature on migration studies and forced displacement, and secondly by connecting it to the literature on geography, structural transformation and growth.

When considering the literature studying refugee and refugee camp effects, most similar is the the work of Alix-Garcia et al., 2018: they study the effect of long-term refugee camps on host populations. Using nighttime lights data, official statistics from a household census, and household survey data from northern Kenya, they look at how distance from one large refugee camp in Kenya affected the local population. Also, Taylor et al., 2016 show positive net impact of refugee camps on local wages in a calibrated simulation of Congolese refugee camps in Rwanda, and find that cash-based aid has a more positive impact than food-based aid. They also find that the presence of refugee camps increases local trade.

There are also some papers that study internally displaced people, one of the ear-

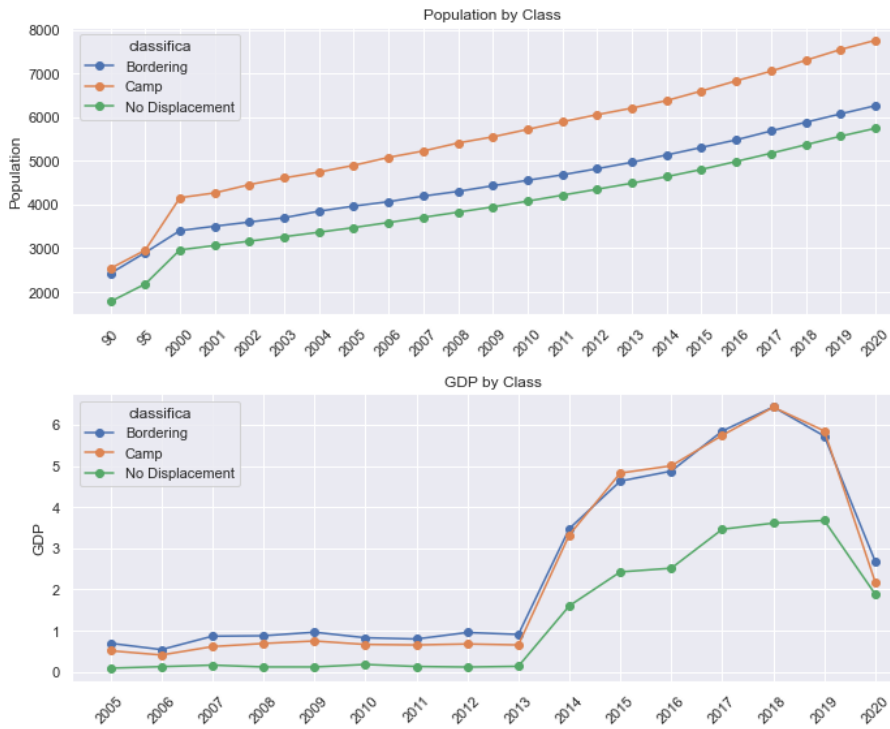


Figure 2. Evolution of population and GDP across parishes that had camps, bordering, and those that had no displacement

liest being that of Ibáñez and Vélez, 2008, who attempt to identify instruments that are better suited for studying forced displacement, as opposed to voluntary migration, by looking into the displacements due to internal conflict in Colombia. They argue that the components that influence voluntary migration are not the same as those of forced migration, since the costs and benefits of migration are different under conditions of violence (more weight is given to security perceptions, people become more risk averse and receive information differently...). Kondylis, 2007, exploring the labor participation rates of internally displaced people in post-war Bosnia and Herzegovina, finds that displaced men and women are less likely to be in work compared to stayers. Perhaps closest to this paper is the work by Chiovelli et al., 2021. They compare people that got displaced during the civil war in Mozambique to their non-displaced counterparts and find that those forced to move became more educated and worked less in agriculture, and that effects were driven mostly by children who took refuge in urban areas away from their rural origins.

There have also been some studies that exploit the unique set up of the civil war in Northern Uganda to assess some of the impacts of displacement. Lehrer, 2009, for example, exploits the exogeneity of the conflict to study the effect of displacement on labour market participation within camps in 2005. Specifically, they explore the gender differences when it comes to decision-making in the labour market, and they find that how long an IDP camp has been in existence negatively affects how much men- and not women- in camps work. Also, Fiala, 2009 uses a discontinuity design to capture the costs of forced displacement that households face. They find that IDP households experience an increase in the value of assets if they had little to no assets, and otherwise experience a decrease in that value. Rohner, Thoenig, and Zilibotti, 2013 make use of variations in the spatial and ethnic intensity of the conflict in Uganda. They find that higher levels of violence led to a decline in generalized trust and enforce ethnic identity. Moreover, they show that recovery from conflict is slower in more ethnically fractionalized counties.

My main contribution in that literature lies in first, exploiting its implications on urbanization and growth, and second, understanding through the lens of a general equilibrium model how different factors interact to shape the path for economic growth, instead on focusing on a partial equilibrium framework.

The paper is also relevant to the literature on geography, structural transformation and growth. The vast empirical literature examining the relationship between economic activity and transport infrastructure is surveyed in Redding and Turner, 2015. They highlight the empirical challenges of identifying the causal impact of transportation infrastructure on outcomes related to economic activity, and several instrumental variables that the literature typically use. In Herrendorf, Rogerson, and Valentinyi, 2014, they discuss how in their model of structural transformation, labor mobility and goods mobility theoretically interact with structural transformation to influence growth outcomes.

Donaldson and Hornbeck, 2016 estimate the impact of railroads on the agricultural sector, specifically by focusing on the concept of market access and how it affected agricultural land values. They find that the increase in market access due to the expansion of the railway in the US between 1870 and 1890 led to an increase in agricultural land values. Perhaps the most relevant paper from that strand of the literature is Fajgelbaum and Redding, 2022. They show how external and internal integration in Argentina influenced the spatial distribution of the population, as well as employment shares within and across sectors, and demonstrate the role of population mobility and the spatial heterogeneity of trade shocks in affecting growth and structural transformation.

I intend to contribute to these studies by understanding the role of frictions placed by forced displacement and conflict in a developing economy, in the framework of structural transformation, transport costs, and growth.

4 Data

4.1 Household Data

The main data on household outcomes and characteristics comes from the Uganda Bureau of Statistics (UBoS). I utilize 10% samples of the 1991, 2002, and 2014 censuses that are representative at the village level to study outcomes related to population density and household occupations and wealth.

The *Uganda National Household Survey* (UNHS) 2002-2019 is a household panel survey that is representative at the country level, and includes economic activity of the household as well as consumption and welfare questions. They also include information related to amenities at the community level.

The *Northern Uganda Survey 2004* is a household survey that is representative of the Northern region of Uganda and surveys individuals living both in, and outside of camps. It includes information on household economic activity, consumption expenditure, enterprises, and records of shocks the household experienced.

4.2 Conflict Data

To measure exposure to conflict, I employ data from the Uppsala Conflict Data Program Geo-Referenced Events Dataset (UCDP GED). Developed with the objective of providing the academic community with comprehensive spatial and temporal information on violent events from 1989 onwards, this dataset encompasses crucial details for each event, including location, date, type, and the number of fatalities. An event is defined as an occurrence where armed force is used by an organized actor against another organized actor or civilians, resulting in at least one direct death at a specific location and date (Sundberg and Melander, 2013).

4.3 Camp Data

Camp location data was taken from maps produced by the UN Office for the Coordination of Humanitarian Affairs (UNOCHA) (Coordination of Humanitarian Affairs, 2009), and camp population data was taken from WFP (World Food Programme) reports (WFP Uganda, 2005).

4.4 Infrastructure and Geospatial Data

I obtain historical road data by digitizing maps from the *Uganda Districts Information Handbook 1992* (Rwabwogo, 1992). Figure A2 demonstrates a sample of the maps, which includes not only the roads and their classification (murram, tarmac, or railway lines), but also the locations of trading centres and district headquarters. In addition, I use 2009 road data extracted from OpenStreetMap. From OpenStreetMap I also export data on waterway locations in Uganda.

To proxy for GDP, I use a harmonized timeseries of nighttime light data spanning the years 1992-2018 from Li et al., 2020.

5 Summary Statistics

Table 1 shows the number of camps in the sample and the number of parishes with camps, as well as how many parishes are classified as "Bordering Parishes", which for the moment is an ad-hoc way of determining the parishes from which people were displaced (or in other words, the origin). In Figure 3a, I show that there is much variation in the number of displaced people in camps in different parishes, and in 3b I show that across camps, there is a lot of variation in camp population. In Table 2, I compare the characteristics across parishes in Northern Uganda that have camps, those that are bordering, and those that do not fall in either category which I assume for now that did not experience any displacement of the population[3]. This table show that parishes with camps, and those bordering, had higher population in 1990 than those that experienced no displacement, but that the former two are not statistically different in that aspect. In terms of nighttime light intensity, which I use as a proxy for GDP, I find no difference between parishes with camps and others, but parishes with camps do have higher road length within their area than the other two categories, which speaks to the fact that camps were initially constructed where trading centres were located.

[3]An immediate next step in the coming future is to estimate a matrix of migration flows across parishes and thus have a less ad-hoc measure of displacement.

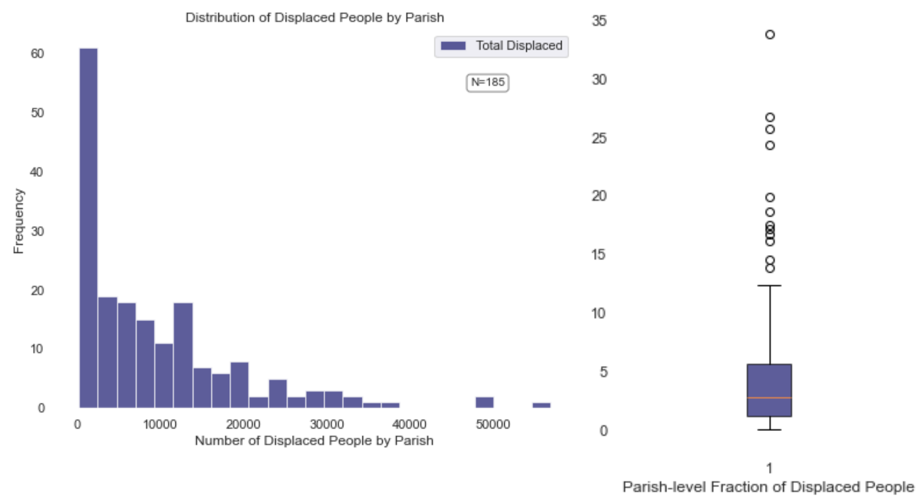
Table 1. Sample of Camps and Parishes

	N
Camps	247
Parishes with Camps	185
Bordering Parishes	315
North-East Parishes	1,734

Figure 3

(a) Camp Population Distribution

(b) Camp Population Distribution



6 Empirical Analysis

6.1 Extensive margin: Camp existence

I start by employing the following specification to identify the effect of displacement on urbanization and growth:

$$\Delta Y_{p,t} = \beta_0 + \beta_1 \times Camp_p + \beta_2 \times Bordering_p + \beta_3 C_{p,t} + \beta_4 Y_{p,1992} + \delta + X_{p,1992} + \epsilon_{p,t} \quad (1)$$

where $\Delta Y_{p,t}$ represents log growth of the outcome of interest (population, road length, or nightlight intensity), $Camp_p$ and $Bordering_p$ are indicators for whether the parish p has a camp or if it borders one with a camp, respectively. $C_{p,t}$ indicates the intensity of conflict in the years leading up to time t, $Y_{p,1992}$ is the initial value of Y before displacement, δ represents district fixed effects, and $X_{p,1992}$ indicates controls for parish characteristics before the start of the IDP policy, such as how isolated the

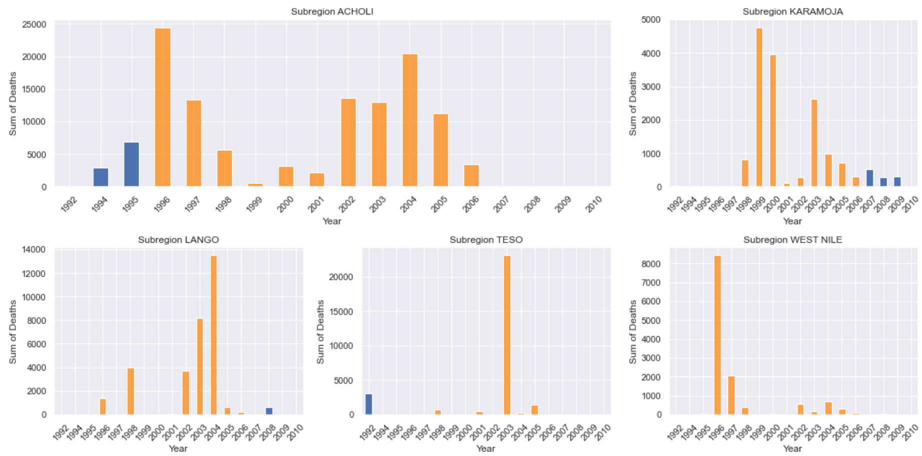


Figure 4. Evolution of Conflict by Region

Table 2. Parish Characteristics

Variable	(1) No Displacement N/Clusters	Mean/(SE)	(2) Camps N/Clusters	Mean/(SE)	(3) Bordering N/Clusters	Mean/(SE)	(1)-(2) N/Clusters	Mean difference	(1)-(3) Pairwise t-test N/Clusters	Mean difference	(2)-(3) N/Clusters	Mean difference
Population 1990	608	2175.595	163	3092.696	300	2960.815	771	-917.101***	908	-785.220***	463	131.881
	608	(68.602)	163	(173.988)	300	(136.456)	771		908		463	
Log Nighttime Lights 1992	608	0.003	163	0.022	300	0.047	771	-0.019	908	-0.044***	463	-0.025
	608	(0.002)	163	(0.012)	300	(0.015)	771		908		463	
Road Length 1992	608	39363.966	163	54290.389	300	46211.072	771	-1.49e+04***	908	-6847.106**	463	8079.316**
	608	(2166.500)	163	(2681.669)	300	(2195.534)	771		908		463	
Area	608	4.53e+07	163	6.92e+07	300	6.87e+07	771	-2.39e+07***	908	-2.35e+07***	463	4.73e+05
	608	(3.54e+06)	163	(4.07e+06)	300	(5.07e+06)	771		908		463	
Mean Elevation	608	1132.970	163	1044.210	300	1044.252	771	88.760***	908	88.718***	463	-0.042
	608	(6.982)	163	(5.636)	300	(4.809)	771		908		463	
Distance to Border	427	338.710	69	329.427	147	339.751	496	9.283	574	-1.041	216	-10.324
	427	(4.945)	69	(14.733)	147	(9.567)	496		574		216	
Access to waterway	608	0.528	163	0.491	300	0.540	771	0.037	908	-0.012	463	-0.049
	608	(0.020)	163	(0.039)	300	(0.029)	771		908		463	
Pre-war Conflict	608	7.143	163	26.117	300	19.773	771	-18.973***	908	-12.630***	463	6.343
	608	(0.634)	163	(3.548)	300	(2.408)	771		908		463	
During war Conflict	608	20.669	163	145.877	300	123.753	771	-125.208***	908	-103.084***	463	22.124
	608	(1.736)	163	(11.715)	300	(8.062)	771		908		463	

If the table includes missing values (.n, .o, .v etc.) see the Missing values section in the help file for the Stata command iebaltab for definitions of these values. Significance: ***=.01, **=.05, *=.1. Errors are clustered at variable: [p_02_id]. Full user input as written by user: [iebaltab pop90 lnlights92 road_length92 area _elevmean hubdist has_waterway conflict_prewar conflict_war , grpvar(classification) vce(cluster p_02_id) rowvarlabels grplabels("0 No Displacement @ 1 Camps @ 2 Bordering ") addnote("Some note") texnotewidth(1.2) savetex("C:/Users/Ayah/Dropbox/Displacement/7. Output/4. Tables/1. Balance Checks/Baltab_north_characteristicswhite2.tex") replace] Some note

Notes: Standard errors clustered at the parish level. Sample includes all parishes that have experienced conflict within 10km between 1991 and 2006. ***p<0.01, **p<0.05, *p<0.1.

parish was, population and area, urban population. Standard errors are clustered at the parish level. Identification relies on the assumption that once we control for conflict intensity and original connectedness of a location, then the assignment of a camp, or an emptying out of a camp, is as good as random.

6.2 Results

Table 3 shows that with respect to parishes that received camps, "origin" and no displacement parishes grew 22% and 11% less in terms of population respecively, showed 29% and 26% les road length growth, and that places with camps experienced 24% more GDP growth than parishes that had no displacement, but that there is no

Table 3. Population Density, Infrastructure, and GDP Growth

	(1) Population Growth	(2) Road Length Growth	(3) GDP Growth	(4) GDP PC Growth
Camps	8.874	21.72***	17.25**	0.0140
	(5.751)	(7.781)	(8.281)	(0.0149)
Bordering	-17.63***	-7.149	16.96**	0.0478*
	(5.313)	(6.197)	(7.506)	(0.0251)
Observations	681	681	681	681
Adjusted R^2	0.575	0.310	0.498	0.077

Notes: Standard errors clustered at the parish level in parentheses. Controlling for: mean elevation, standard deviation of elevation, area, water sources nearby, and initial population, road length, and nighttime lights when not the outcome variable.
Sample includes all parishes that have experienced conflict within 10km between 1991 and 2006. Growth in %.
***p<0.01, **p<0.05, *p<0.1.

statistical significance in terms of differences in GDP growth across origin parishes and camp parishes. The sample is composed of all parishes that have experienced conflict within 20km between 1991 and 2006 in the region, but the results are robust if we restrict the sample to a smaller conflict buffer of 10km, as displayed in appendix table B1.

Given that the conflict did not progress homogeneously across the region (neither with timing nor intensity) as shown in 4, meaning that the duration of displacement also varied spatially, we can leverage this variation to study how the duration of displacement plays a role in the development of a parish. Therefore, I run the same regression as in 1 but this time also including an interaction term between each district and the $Camp_p$ variable. I find that the results in Table 3 mask wide heterogeneous effects by district.

Using the data on camp population, we can also look at the intensive margin of displacement, to see whether parishes with camps that received more people also had higher population and GDP growth. I run the following specification:

$$\Delta Y_{p,t} = \beta_0 + \beta_1 \times CampPop_p + \delta + C_{p,t} + X_{p,1992} + \epsilon_{p,t} \tag{2}$$

The results, in Table 4, are consistent with what we would expect: higher camp population is positively correlated with higher population growth road length growth, and GDP (but again, not per capita). The results are consistent when we also add controls for subregion fixed effects, which experienced displacement at different tmiing and rates.

Table 4. Within-Camp Population Density, Infrastructure, and GDP Growth

	(1) Population Growth	(2) Road Length Growth	(3) Nighttime Light Growth	(4) GDP PC Growth	(5) Population Growth	(6) Road Length Growth	(7) Nighttime Light Growth	(8) GDP PC Growth
Log Camp Population	15.51***	19.91***	9.502*	-0.0124*	15.03***	8.866*	-1.890	-0.0228***
	(3.609)	(4.470)	(5.431)	(0.00678)	(3.600)	(4.701)	(4.765)	(0.00720)
Log Population 1990	-54.88***	4.977	-16.50**	-0.0581***	-58.49***	2.172	-10.88	-0.0596***
	(5.248)	(6.751)	(7.349)	(0.0138)	(5.533)	(6.649)	(6.707)	(0.0136)
Road Length 1992	0.0000961	-0.000632***	-0.000379**	-0.000000197	0.0000702	-0.000616***	-0.000298**	-0.000000173
	(0.0000924)	(0.000196)	(0.000167)	(0.000000195)	(0.0000936)	(0.000180)	(0.000140)	(0.000000180)
Pre-war Conflict 20km	-0.0307	0.370***	0.366***	0.000331***	-0.0151	0.109	0.0306	0.0000749
	(0.0560)	(0.0979)	(0.0789)	(0.000120)	(0.0600)	(0.102)	(0.0551)	(0.000117)
N	185	185	185	185	185	185	185	185
SubRegion FE	No	No	No	No	Yes	Yes	Yes	Yes

Notes: Standard errors clustered at the parish level in parentheses. Controlling for: mean elevation, standard deviation of elevation, area, water sources nearby, and initial population, road length, and nighttime lights when not the outcome variable.
Sample includes all parishes that had a camp between 1991 and 2006.
Camp population is measured in 2005 at the height of the conflict.
***p<0.01, **p<0.05, *p<0.1.

6.2.1 Robustness: Adding an Intensive Margin of Displacement

While grouping parishes into those with camps, bordering, and other gives us a nice intuition and an easy-to-interpret comparison group, the "No Displacement" grouping is perhaps too general, and the specification does not allow for flexibility in terms of treatment intensity. Since I am restricting analysis to places that have experienced some conflict, there could be some misspecification in how the bins are being chosen, in that some places did indeed experience displacement, but were just not bordering the camps. To address this concern, I partition the set of parishes even more, to define a second-degree and third-degree bordering group, with the idea that these parishes may have also experienced displacement, but at a decaying rate, the further they are from camps. The empirical specification is as follows:

$$\Delta Y_{p,t} = \beta_0 + \sum_{c}^{max} \beta_c \times Bordering_{c,p} + \beta_3 C_{p,t} + \beta_4 Y_{p,1992} + \delta + X_{p,1992} + \epsilon_{p,t} \qquad (3)$$

where c indicates the classification into one of the bordering regions. The reference group in this scenario is the camp group.

The results (without including district fixed effects) are displayed in table 5.

7 Mechanisms: Evidence

The results shown before indicate that after the forced displacement shock in 1996, people did not go back to their origin parishes. This presents the question, why did people choose not to go back? And how did this choice affect growth? The aim of the rest of this paper is to understand which mechanisms influenced people's migration decisions after they have been forcibly displaced during wartime. I propose three

Table 5. Population Density, Infrastructure, and GDP Growth

	(1) Population Growth	(2) Road Length Growth	(3) Nighttime Light Growth	(4) GDP PC Growth
Bordering 1	-25.38***	-34.87***	-3.784	0.0381**
	(4.360)	(7.183)	(7.012)	(0.0176)
Bordering 2	9.376	-53.18***	-33.09***	-0.0359***
	(6.742)	(8.415)	(10.07)	(0.0116)
Bordering 3	14.85*	-71.87***	-64.61***	-0.0367**
	(8.658)	(9.384)	(10.98)	(0.0161)
No Displacement	-31.00***	-51.70***	-63.56***	-0.0680***
	(7.303)	(8.976)	(11.11)	(0.0206)
Observations	681	681	681	681
Adjusted R^2	0.505	0.167	0.267	0.062

Notes: Standard errors clustered at the parish level in parentheses. Controlling for: mean elevation, standard deviation of elevation, area, water sources nearby, and initial population, road length, and nighttime lights when not the outcome variable. Sample includes all parishes that have experienced conflict within 10km between 1991 and 2006. Growth in %.
***p<0.01, **p<0.05, *p<0.1.

mechanisms through which this may have happened:

Market Access Hypothesis Places with camps became more connected and easier to reach. This happened because of increased concentration of population at camp locations, and because the government responded to agglomerations by building more roads to connect these places, which in turn increases market access, which would facilitate people meeting and trading.

Structural Transformation Hypothesis After being forced to live in camps for 2-15 years, people may have switched to services and other sectors that offer higher returns in high agglomeration settings, which could affect their decision to not only return, but also to return to their previous professions in agriculture, which may be less profitable.

Land Misallocation Hypothesis Prior to the government's displacement policy, land property rights in Uganda were determined through customary and tenure, where in each village, the chief is in charge of allocating plots of land to families Amone and Lakwo, 2014, and sons inherit from their fathers, and women from their husbands. However, upon the cessation of hostilities, land demarcations, and who chooses which land to give to whom, became unclear. In a World Bank study of land rights in Northern Uganda, the ymention "In the aftermath of IDP return, customary tenure has transformed in terms of institutions and practices. Contrary to earlier practices, household heads are now "owners" not "trustees" of rights in land, therefore the power base of this tenure has shifted from the clans to the household heads." Moreover, there was very little information being communicated by the government concerning any land reforms. The report includes results from a survey that show that leaders in the community were split on "whether or not to move from customary tenure to more formal tenure systems". This led to an increase in conflict due to land disputes, and the survey cites that 85% of respondents reported having experienced threats to land tenure. (Rugadya, Nsamba-Gayiiya, and Kamusiime, 2008) Therefore, frictions in access to land and the corrosion of previous land institutions may hav distorted IDP's decision to migrate back to their villages and land.

7.1 Changes in Road Network Centrality

In Table 3 column (2), we find that road length grew significantly more in parishes that had IDP camps. This suggests that there were changes in the road network as a response to the construction of camps and the movement of people. To verify this, Table 6 shows regression results where the outcome variables are the log change in the centrality level of a parish. Column (1) demonstrates the growth in degree centrality, defined as the number of nodes that each parish is connected to directly, as a fraction of all the nodes in the graph.

$$DC(p) = \frac{d_i(p)}{n-1}$$

Betweenness centrality measures how well located a parish is, in terms of the paths it lies upon. A ratio close to 1 indicates that a parish lies on most of the shortest paths connecting any other 2 parishes:

$$c_B(p) = \sum_{s,t \in P} \frac{\sigma(s,t|p)}{\sigma(s,t)}$$

where P is the set of parishes, $\sigma(s,t)$ is the number of shortest (s,t)-paths, and $\sigma(s,t|v)$ is the number of those paths passing through some node v other than s,t. If $s=t$, $\sigma(s,t)=1$, and if $v \in s,t$, $\sigma(s,t|v)=0$

Another measure of centrality is closeness, which expresses how close a parish is to any other parish in the network:

$$C(p) = \frac{1}{\sum_{u \in P} l_{p,u}} \tag{4}$$

where $l(p,u)$ indicates the shortest path distance between u,p nodes.

Table 6 indicates that for a given level of the centrality of the original parish network connected by 1992 roads, having a camp made parishes 0.18% closer to any

Table 6. Camps and Evolution of Parish Network Centrality

	(1) Growth Degree Centrality	(2) Growth Betweeness Centrality	(3) Growth Closeness Centrality	(4) Growth Page Rank Centrality
Camps	0.0325***	0.895***	0.283**	0.00685**
	(0.0105)	(0.284)	(0.117)	(0.00282)
Bordering	0.0221**	0.747***	0.165	0.00425*
	(0.00943)	(0.242)	(0.111)	(0.00257)
Observations	1474	1474	1474	1474
Adjusted R^2	0.379	0.085	0.276	0.634

Notes: Standard errors clustered at the parish level in parentheses. Controlling for: mean elevation, standard deviation of elevation, area, water sources nearby, and initial population, road length, and nighttime lights.
Sample includes all parishes that have experienced conflict within 20km between 1991 and 2006. Growth in %.
***p<0.01, **p<0.05, *p<0.1.

average parish in the region, and 0.21% more central (in between) any average pair of parishes in the region.

7.2 Population Persistence

Although several parishes received significantly high numbers of displaced people compared to their original population (see Figure 3b), it's not clear whether an initial shock is transitory or permanent, and thus whether it is sufficient to give rise to urbanisation. Therefore, it's important to understand under which conditions people could choose to stay or go back to their rural homes.

7.3 Intensive margin: Camp population

We move on to study the intensive margin, meaning how the number of people in a camp matters for development. To do that, I use camp population data in 2005, the year during which the number of displaced people was at its highest.

$$\Delta Y_{p,t} = \beta_0 + \beta_1 \times CampPop_p + \beta_2 C_{p,t} + \beta_3 Y_{p,1992} + \beta_4 SR + X_{p,1992} + \epsilon_{p,t} \quad (5)$$

where $\Delta Y_{p,t}$ represents log growth of the outcome of interest (population, road length, or nightlight intensity), $CampPop_p$ is for population living in camps in parish p, respectively. $C_{p,t}$ indicates the intensity of conflict in the years leading up to time t, $Y_{p,1992}$ is the initial value of Y before displacement, SR represents subregion fixed effects, and $X_{p,1992}$ indicates controls for parish characteristics before the start of the IDP policy, such as how isolated the parish was, population and area, urban population. Standard errors are clustered at the parish level.

Table 7 shows that higher camp population is correlated positively with population, road length, and GDP growth. Including subregion fixed effects reveals that the positive effects of higher camp population on infrastructure and GDP growth are driven by the Acholi subregion (the omitted category in the regression), which is the region where displacement was the most protracted.

Table 7. Camp Population and Growth

	(1) Population Growth	(2) Road Length Growth	(3) Nighttime Light Growth	(4) GDP PC Growth	(5) Population Growth	(6) Road Length Growth	(7) Nighttime Light Growth	(8) GDP PC Growth
Log Camp Population	15.51***	19.91***	9.502*	-0.0124*	15.03***	8.866*	-1.890	-0.0228***
	(3.609)	(4.470)	(5.431)	(0.00678)	(3.600)	(4.701)	(4.765)	(0.00720)
Log Population 1990	-54.88***	4.977	-16.50**	-0.0581***	-58.49***	2.172	-10.88	-0.0596***
	(5.248)	(6.751)	(7.349)	(0.0138)	(5.533)	(6.649)	(6.707)	(0.0136)
Road Length 1992	0.0000961	-0.000632***	-0.000379**	-0.000000197	0.0000702	-0.000616***	-0.000298**	-0.000000173
	(0.0000924)	(0.000196)	(0.000167)	(0.000000195)	(0.0000936)	(0.000180)	(0.000140)	(0.000000180)
Pre-war Conflict 20km	-0.0307	0.370***	0.366***	0.000331***	-0.0151	0.109	0.0306	0.0000749
	(0.0560)	(0.0979)	(0.0789)	(0.000120)	(0.0600)	(0.102)	(0.0551)	(0.000117)
N	185	185	185	185	185	185	185	185
SubRegion FE	No	No	No	No	Yes	Yes	Yes	Yes

Notes: Standard errors clustered at the parish level in parentheses. Controlling for: mean elevation, standard deviation of elevation, area, water sources nearby, and initial population, road length, and nighttime lights when not the outcome variable.
Sample includes all parishes that had a camp between 1991 and 2006.
Camp population is measured in 2005 at the height of the conflict.
***p<0.01, **p<0.05, *p<0.1.

7.4 Land use and land coverage

8 A Model of Camp Allocation

To understand the effect of camps and the resulting population redistribution on the economy, we need to first understand under which conditions camps were created. Although there exists virtually no documentation of how the government of Uganda chose the locations of camps and how people had to move from one location to the other, evidence suggests that camps were typically located closer to roads, in locations where there were typically more inhabitants, and as a response to conflict in the region. Therefore, in this section I develop a model of camp allocation and population movement decisions with the above-mentioned conditions in mind. The motive for developing this model is to have a microfounded probability of a location hosting a camp, which can then be used to match locations and provide a causal interpretation of the coefficients in previous specifications.

Consider a government at war with rebels, whose main objective is to avoid the increase in rebel recruitment by restricting the civilian population's movements and placing them in camps. The economy is composed of a set $\mathbb{V}$ of parishes, each characterized by a population N_v and with a history of conflict $\hat{\xi}_v$ such that

$$\hat{\xi}_v = \sum_t^T \delta^t \frac{\#death_{v,t}}{totaldeaths_t} \tag{6}$$

We can normalize $\hat{\xi}_v$ such that

$$\xi_v = \frac{\hat{\xi}_v - min(\hat{\xi})}{max(\hat{\xi}) - min(\hat{\xi})} \tag{7}$$

where $\delta \in (0, 1)$ is a decay parameter giving more importance to the more recent conflict occurrences.

The government simultaneously chooses where to allocate camps, and which parishes should be emptied into another parishes' camps. Therefore we can define the matrix Λ with entries $\lambda_{vv'}$ as the government's decisions of how to allocate people. $\lambda_{vv'} = 1$ if a camp is covered by a camp in v', and $\lambda_{vv} = 0$ if it's population was moved somewhere else. Therefore the camp population in v is the sum of the row entries ($\sum_{v'} \lambda_v v'$). We can also define the $1 \times \bar{V}$ vector $\mathbf{k}$ where the components take the value 1 if a parish v has a camp.

$$\max_{\lambda,\mathbf{k}} \sum_{v=1}^{\bar{V}} \sum_{v'=1}^{\bar{V}} N_v(\lambda_v \mathbf{k}_{v'} + (1 - \xi_v)(\mathbb{I} - \lambda_v \mathbf{k}_{v'})) \tag{8}$$

The distance parameter $d_{vv'}$ is dictated by the road network in the region. We can assume that the government is not going to make people cross more than $\bar{d}$ parishes to be in a camp, so that

$$d_{vv'} < \bar{d} \tag{9}$$

Furthermore, it is harder for the government to control a location that is too far (e.g: too close to the border), so we could consider adding another constraint such that

$$d_{vKampala} < \tilde{d} \tag{10}$$

We also restrict the government's capacity to create new camps:

$$\sum_{v=1}^{\bar{V}} k_v \leq \bar{k} \tag{11}$$

We can rewrite the problem as in Church, Murray, et al., 2018 such that:

$$\max_{\lambda_v, \mathbf{k}_{v'}} \sum_{v \in \mathbb{V}} N_v(\lambda_v + (1 - \xi_v)(1 - \lambda_v)) \tag{12}$$

subject to:

$$\sum_{v' \in \{v' | d_{vv'} \leq \bar{d}\}} k_{v'} \geq \lambda_v \tag{13}$$

$$\sum_{v=1}^{\bar{V}} k_v \leq \bar{k}$$

$$d_{vKampala} < \tilde{d}$$

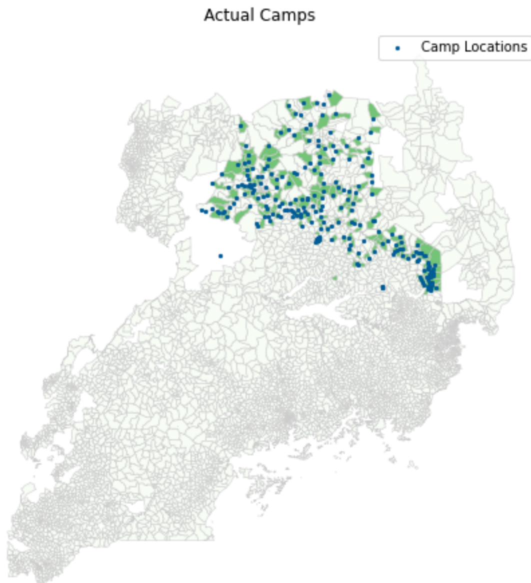
and $\lambda_v = 1$ if parish v will have it's population controlled by being near a camp (its population will be displaced), and $k_{v'} = 1$ if a camp will be located in parish v'

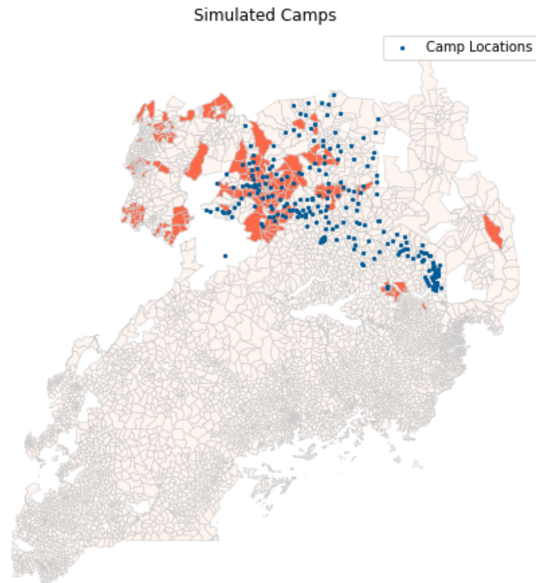
Solution

Using maximal covering location problem algorithms, figure 5b shows the current predictions of the model without the implementation of constraint 10 and 5a shows the actual distribution of camp locations. Once the model has been fully implemented, we can accurately predict which locations were equally likely to have camps but did not for reasons that we could assume to be random. Once we match these parishes, then we can interpret the coefficients of specifications 1 as causal.

9 Conclusion

To conclude, this project investigates the impact of forced displacement on economic growth and development, by focusing on the case of Northern Uganda during the civil war between the government and the Lord's Resistance Army. I use historical data on conflict, displacement, and transportation infrastructure to shed light on the role of urbanisation as a key player in how forced displacement affects development.





(a) Camp Distribution: Benchmark

(b) Camp Distribution: Simulation

My findings suggest that the presence of IDP camps within parishes had varied effects on population growth, infrastructure development, and GDP growth. Parishes with camps experienced higher population growth compared to those that did not face displacement, and bordering parishes experienced spillover effects from the receiving parishes. Moreover, the duration and size of displacement camps were significant factors that influenced local development.

The results contribute to the literature on forced displacement, urbanization and geography, and economic growth, providing insights into the process of post-conflict recovery. Understanding the regional variations in the impact of displacement can inform policymakers and aid organizations in designing targeted interventions to foster sustainable development in conflict-affected areas.

A Data Appendix

A.1 Linking Census Data

A major contribution of this paper is accessing Uganda's 1991 Census from the Uganda Bureau of Statistics, which was deemed corrupted (a 10% sample with sub-county information is available in IPUMS, but the original data with detailed geographic information was said to no longer exist when this author inquired). With the help of Allan Agaba and Akbar Kanyesigye at the UBoS IT department, we managed to recover the back up files and sample 10% of the data (representative at the village level) as per the bureau's policy. However, since the recovered data is a back up of the original dataset, it required much work to get it to a state that can be used for data analysis joint with the rest of the data in this project. In this section I explain the methodologies I used to link parishes across census years, and how I recovered the labels of parish identifiers in 1991, which were not available in the data.

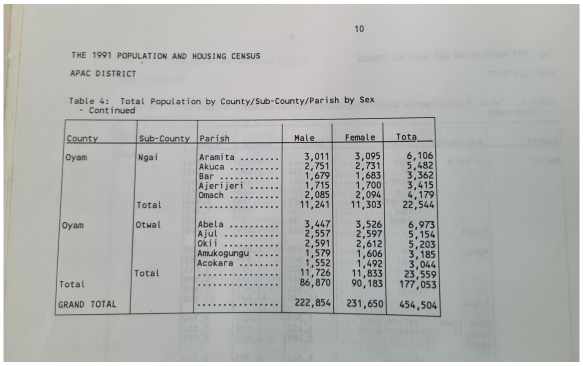
A.1.1 Linking Locations over Time

To the best of my knowledge, no effort had been done to link parishes across census years, including year 1991. The main concern is that, as administrative boundaries have changed over time (Uganda went from having 38 districts to 135 today), without any geographic references it would be impossible to match parishes over time. As it turns out, even though higher level administrative units have changed (districts, counties, and subcounties), the smallest units have to the most part remained unchanged: in Northern Uganda, the number of parishes changed from 959 in 1991 to 1194 in 2002. The first step therefore is to match these 959 parishes. In order to do so, I use the `fuzzywuzzy` package in python to do within-district matching of parishes. This does not result in a perfect mapping, because even within the same district, there are parishes with the same name, resulting with duplicate false matches.

To clean up the duplicates, I filter the data into sure and problematic matches by using information on the counties and subcounties across the years (which is not enough to get perfect matches for the full sample because of the changing administrative boundaries). This gives us 889 perfect matches, and 243 duplicate observations that I then clean manually.

A.1.2 Recovering Parish Identifiers

To be able to link parishes across time, this required the names of the parishes. Unfortunately, these names were not part of the backup 1991 census data, which only had parish ids without the labels. To solve this issue, I searched for historical census reports in the UBoS library and found tables that included the 1991 parish names and populations (see Figure A1). I digitized these reports and used them to match parish ids with names based on population.



10

THE 1991 POPULATION AND HOUSING CENSUS

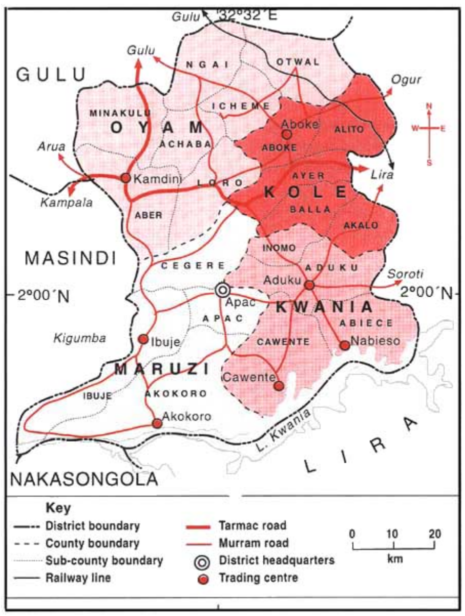
APAC DISTRICT

Table 4: Total Population by County/Sub-County/Parish by Sex - Continued

County	Sub-County	Parish	Male	Female	Tota
Oyam	Ngai	Aramita	3,011	3,095	6,106
		Akuca	2,751	2,731	5,482
		Bar	1,679	1,683	3,362
		Ajerijeri	1,715	1,700	3,415
		Omach	2,085	2,094	4,179
	Total	....	11,241	11,303	22,544
Oyam	Otwal	Abela	3,447	3,526	6,973
		Ajul	2,557	2,597	5,154
		Okii	2,591	2,612	5,203
		Amukogungu	1,579	1,606	3,185
		Acokara	1,552	1,492	3,044
	Total	....	11,726	11,833	23,559
Total		....	86,870	90,183	177,053
GRAND TOTAL		....	222,854	231,650	454,504

Appendix Figure A1. 1991 Census Parishes

A.2 Digitizing 1991 Maps



Appendix Figure A2. 1992 Road Map

B Data Analysis Appendix

Appendix Table B1

	(1) Population Growth	(2) Road Length Growth	(3) Nighttime Light Growth	(4) GDP PC Growth
Camps	14.89**	23.60***	18.20**	0.00584
	(5.978)	(7.658)	(8.170)	(0.0144)
Bordering	-11.89**	-5.007	19.55***	0.0417
	(5.647)	(5.992)	(7.424)	(0.0254)
Observations	1071	1071	1071	1071
Adjusted R^2	0.730	0.325	0.399	0.081

Notes: Standard errors clustered at the parish level in parentheses. Controlling for: mean elevation, standard deviation of elevation, area, water sources nearby, and initial population, road length, and nighttime lights when not the outcome variable.
Sample includes all parishes that have experienced conflict within 10km between 1991 and 2006. Growth in %.
***p<0.01, **p<0.05, *p<0.1.

B.1 Estimating Migration Flows

To understand how the intensity of displacement matters for economic development, I develop an estimate of migration flows and use it as my treatment variable. To do that, I start with some simple accounting relations:

let g_p be the predicted population growth rate in a parish p. The estimates of g_p are taken as the district-level growth rates between 1992 and 2002. Then we can define:

$$\Delta_{2005,1995} Pop_p = Inflows_p(1 + g_p) + LocalPop_{p,1995}(1 + g_p) \tag{14}$$

$$Inflows_p = \frac{1}{1 + g_p} \Delta_{2005,1995} Pop_p - LocalPop_{p,1995} \tag{15}$$

In addition, let $B(p)$ denote the neighbouring parishes to p from which any positive inflows to p would be coming, and from there, we can make the assumption that there is an inflow $inflow_{p'p}$ from p' to p only if there is a decrease in the expected population of p':

$$Inflows_p = \sum_{p' \in B(p)} inflow_{p'p} \tag{16}$$

$$= \sum_{p' \in B(p)} \frac{1}{1+g'_p} \Delta_{2005,1995} Pop_{p'} \times \mathbb{I}_{\{\Delta_{2005,1995} Pop_p - LocalPop_{p,1995}(1+g'_p)<0\}} \times \mathbb{I}_{\{camp_{p'}=0 \wedge camp_p=1\}} \tag{17}$$

where $camp_p = 1$

This rule would allow us to identify which parishes experienced an outflow, (denoted by $inflow_{p'p}$ here) , and also to quantify this outflow by simply looking at the decrease in the population in each location. Some cases will arise where it's possible that the people of one parish got dispalced to several other neighbouring parishes with camps. In that case, we need to make assumptions about how the outflow was distributed among these neighbouring parishes with camps. A simple start would be to simply divide the outflow by the number of neighbouring parishes with camps and distribute people equally among camps. A more accurate measure would take into consideration the existence of roads and distances between the origin and destinations.

Seguiment tesis doctorals / Gestió Acadèmica > Gestió fí d'estudis > Pla de recerca i activitats

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