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MIGRATION CHOICES DURING CONFLICT IN NEPAL: PULL FORCES AND LANDSCAPE INTERACTIONS

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Conflict's effect on migration depends on an individual's location relative to the conflict. Conflict can thus influence migration and resulting patterns of settlement through push and pull forces. This study investigates the influence of conflict and other factors on location choices during the Nepalese civil war using a model the captures the push and pull forces of these factors. Model results indicate that conflict at origin and potential destination locations combined to influence location choice, and further suggest that landscape features can moderate the influence of conflict on migration. The findings highlight the importance of push and pull factors, and associated landscape interactions, in determining location choices during conflict.

JEL Classification Codes: Q56, R23

Introduction

Conflict can influence human migration decisions in a variety of contexts ranging from targeted violence with forceful relocation to conflict acting implicitly as a deterrent to potential immigrants. Moreover, the influence conflict has on migration decisions is context dependent and depends on by individual and community characteristics (Ibáñez 2014, Williams 2015). Conflict can affect migration decisions directly through targeted violence or reduced community security, or indirectly through its impact on economic,

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social, and demographic migration drivers. Furthermore, traditional drivers of migration may influence migration decisions differently during conflict compared to times of peace (Williams 2015). Researchers and policy makers historically made a clear distinction between forced and voluntary migrations (Crush, Chikanda, and Tawodzera 2015, Van Hear, Brubaker, and Bessa 2009). However, the contemporary literature acknowledges that location decisions during conflict typically weigh economic, social, and conflict-related factors (e.g. Williams 2015, Adhikari 2013).

In deciding where to reside, potential migrants compare the opportunities and security at their current location to the opportunities and security at alternative destinations(Ibáñez and Vélez 2008). Thus, migrations depend on the characteristics of both source and destination locations. Source location conditions that influence migration decisions are push factors, and destination location conditions that influence migration decisions are pull factors. Conflict acts as both a push factor and a pull factor, simultaneously influencing both in-migration and out-migration where conflict occurs. Landscape characteristics such as terrain ruggedness, natural resource abundance, accessibility, and security can also influence migration decisions. For instance, natural resource scarcity at an individual's current location is a push factor while natural resource abundance in potential destinations is a pull factor.

Prior micro-behavioral analyses of migration during conflict largely focus on push factors and out-migration. A few micro-behavioral studies incorporate pull factors (e.g. Engel and Ibáñez 2007, Ibáñez and Vélez 2008), but these analyses do not account for pull factors related to conflict or environmental factors. Prior studies that focus on pull factors use aggregate migration flow data (e.g. Amacher et al. 1998, Czaika and Kis-Katos 2009, Davenport, Moore, and Poe 2003, Lozano-Gracia et al. 2010, Moore and Shellman 2007).

This study examines how differential conditions at origin and potential destinations influenced district-level migration decisions in rural Nepal during a civil conflict, and how individual characteristics moderate those decisions. We model observed location choices as a function of the security, economic opportunities, and environmental amenities provided at an individual's origin and at alternative destinations. We use a representative national sample to examine typical migration decisions during Nepal's civil war. Thus, the data include migrants who do not report as displaced but whose location decision was subject to influence by national conflict dynamics.

The data include information on the origin, destination, and timing of inter-district migrations, and facilitate estimation of a model that accounts for individual characteristics as well as the push and pull forces of migration. Specifically, the model incorporates the influence of conflict, environmental amenities, and other characteristics in origin and destination locations on migration decisions. Furthermore, the model includes all of Nepal's districts as alternative migration destinations, an extension to previous micro-behavioral models of migration during conflict.

This study also examines migration determinants related to landscapes and natural resources, which are of particular importance in the rural migration context. In addition to influencing the desirability of location alternatives, landscape characteristics and landscape features can also moderate the spatial distribution of violence during conflict (e.g. Bohara, Mitchell, and Nepal 2006, Do and Iyer 2010). Because the landscapes can influence both community livelihoods and patterns of violence. We hypothesize that landscape features also moderate the influence of conflict on migration and investigate this hypothesis in the subsequent analysis. We specify and estimate an empirical model to investigate this hypothesis. We also test for spatial dependence among adjacent migration alternatives using a Spatially Correlated Log it model (Bhat and Guo 2004). The results indicate that conflict at both source and destination location influences migration decisions. The results indicate that conflict at both source and destination location influences migration decisions, and provide evidence that natural landscape features can moderate the influence of conflict on migration. These findings highlight the importance of the spatial distribution of conflict and interacting landscape features in determining migration flows during conflict.

Background

The Maoist insurrection in Nepal occurred from 1996 to 2006. The Communist Party of Nepal (Maoists) declared the "People's War" in February 1996 with the stated goal of replacing the country's constitutional monarchy with a democratic republic. The insurrection was largely rooted in widespread poverty, unemployment, inequality, and exploitation within the feudal Nepalese caste system (Upreti 2006). Early in the conflict, Maoist tactics involved attacks on government installations and communications infrastructure in several Midwestern districts. The Maoists expanded their campaign nationwide beginning in 2000. By 2001 they were operating in 68 of Nepal's 75 districts (Williams 2009). In that same year, the Nepalese government mobilized a special police force to combat the Maoists. From that time on, government forces generally controlled the cities and large towns, while the Maoists controlled a majority of the rugged rural areas (Williams 2009). The spatially widespread and heterogeneous distribution of conflict-related violence during the insurrection provides an opportunity to observe the push and pull impacts of conflict on migration at the national level. Figure 1 provides a map of Nepal's districts and ecological zones for reference.

Targeted violence during the conflict occurred primarily between government forces and Maoist insurgents. The Nepalese government did not target non-combatants with violence on a large scale, or engage in ethnic cleansing during the conflict. However, between 1996 and 2003 about two thirds of conflict fatalities were non-combatants, the majority of whom were caught up in "cross-fire" (Gersony 2003). Thus, the war reduced the security of typical citizens who were not in combat or targeted by combatants.

This study examines location choices in rural Nepal where around80% of Nepal's population lives (Bohra-Mishra and Massey 2011). Rural Nepal is also where the rebellion originated and where most of the fighting occurred. The rural countryside in Nepal spans three distinct ecological zones, from towering Himalayan peaks to lowland forests. These varied landscapes influenced fighting in the civil war. Bohara, Mitchell, and Nepal (2006) found that the Maoists utilized rugged terrain for the cover it provided and the communications and logistics challenges it posed for government forces. In a related study,

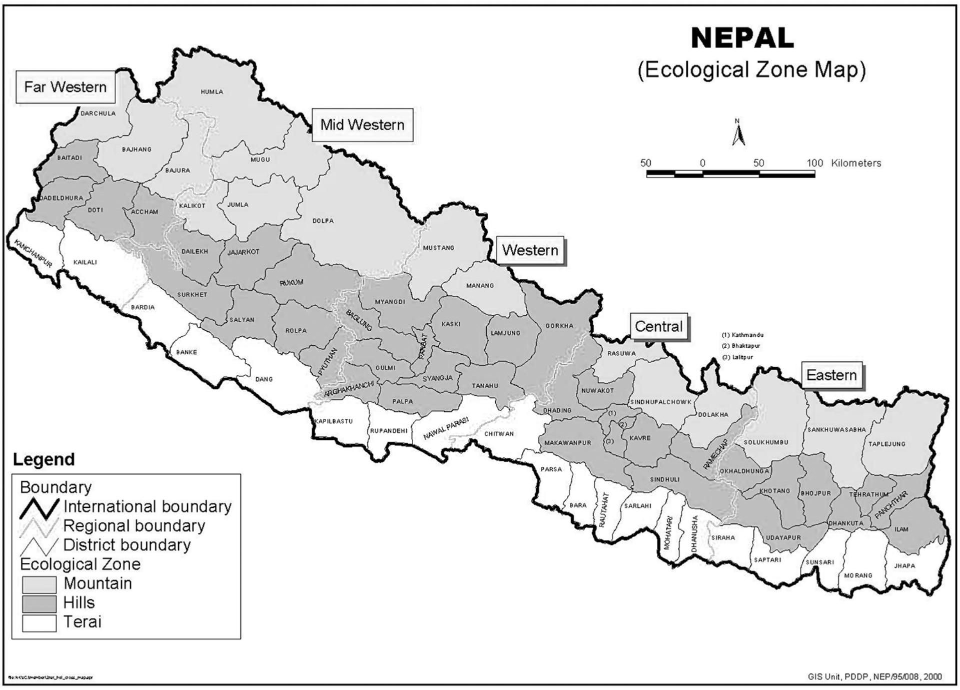

Figure 1: Districts, Ecological Zones, and Regions of Nepal

Source: http://un.org.np/sites/default/files/maps/tid_188/NatBio00002.jpg

Do and Iyer (2010) found that conflict-related deaths during the Civil War tended to be higher in landscapes where fighting is favorable for insurgents, such as mountains and forests.

The uprising directly displaced a substantial number of Nepalese citizens. The Norwegian Refugee Council estimated that between 100,000 and 200,000 people had been displaced in Nepal by 2004. (Adhikari 2011)The Informal Sector Service Center (INSEC),a human rights organization reported that the uprising internally displaced 50,356 Nepalese through 2004.

Displacement statistics reflect acute conflict impacts, but conflict can also influence migration choices more diffusely across the population. Some studies in the literature examine migration responses among typical citizens rather than focusing on displaced populations. One set of studies (Bohra-Mishra and Massey 2011, Williams 2013, 2015, Williams et al. 2012) investigate outmigration from Chitwan district using representative longitudinal household data collected during the fighting. Notable findings from the Chitwan studies include that community organizations can dampen the effect of conflict on outmigration (Williams 2013) and that the traditional drivers of migration can have differential impacts during conflict (Williams 2015). With regard to investigating the influence of conflict on migration choices, the evidence from Chitwan is somewhat mixed. Williams (2013) found that gun battles in Chitwan and surrounding districts increased the likelihood of outmigration in the subsequent month and Williams et al. (2012) found that gun battles and political events increased the likelihood of first international migrations. On the other hand, Bohra-Mishra and Massey (2011) found that violence in and around Chitwan, as measured by a standardized violence index, decreased the likelihood of out-migration to other districts, within Chitwan, and internationally. For international and intra-district migrations, violence was found to have a threshold effect, where low and moderate levels of violence decreased the odds of out-migration while high levels of violence increased the odds of out-migration.

Two additional studies investigated the drivers of reported internal displacements during the uprising in Nepal. Adhikari (2013) surveyed displaced and non-displaced persons and found that exposure to violence and threats of violence increased the likelihood of displacement. Other predictors of displacement included land ownership and access to a motorable road. At the district-level, Adhikari (2012) found that displacement counts are positively associated with conflict-related violence, road kilometers, and infrastructure destruction, but negatively associated with forestry user group active at, a measure of social capital.

A model of location choice during conflict

This paper models the determinants of individual location decisions during Nepal's civil war using a discrete choice framework (see Pellegrini and Fotheringham 2002). The model's foundational assumption is that individuals migrate when they expect to be better off moving to some alternative destination compared to remaining at their current location. Formally, individual migrates from their origin location H when equation (1) holds for at least one destination alternative d.

$$EU_{nd} > EU_{nH} \tag{1}$$

Letting D equal the number of possible destination alternatives, individual selects one of $D + 1 = J$. from the location alternative set $\{H, d_1, d_2, d_3, \ldots, d_D\}$. Reframing the location decision to include all origin and destination alternatives yields (2), or that individual selects location if the expected utility of residing there is greater than the expected utility of residing in all other location alternatives.

$$EU_{nj} > EU_{nk} \forall j \neq k \tag{2}$$

Further, the utility individual expects from residing in location j can be expressed as (3) where v_{nj} is the observable, deterministic component of utility and ε_{nj} is the unobservable, random component.

$$EU_{nj} = v_{nj} + \varepsilon_{nj} \tag{3}$$

Following Engel and Ibáñez (2007), equation (4) defines the observable utility of location alternatives as a function of security, economic, and social factors.

$$v_{nj} = f(S_{nj}, Y_{nj}, C_{nj}, Z_n) \tag{4}$$

Variables S_{nj} and Y_{nj} represent individual perceptions of the security and economic opportunities, respectively, at location j. The migration and information costs associated with selecting location *j* are captured by C_{nj}, while Z_n are individual characteristics that moderate the location decision. The current model extends the Engel and Ibáñez (2007) location-choice framework of to include multiple potential destinations. In other words, our model frames the migration decision as a choice among many possible alternative locations rather than a binary choice between whether to flee or remain. Including additional destination alternatives facilitates an investigation of competing pull-factors and provides a more appropriate framework for explaining the location decisions of typical citizens, many of whom were not directly impacted by conflict.

Operationalization of the preceding conceptual model of migration for empirical analysis requires further specification. Nepal's 75 districts are the set of location alternatives. Combining equations (3) and (4) then yields (5).

$$EU_{nj} = f(S_{nj}, Y_{nj}, C_{nj}, Z_n) + e_{nj};$$
$$\text{where } n = 1, \ldots, N;\ J = \text{district}_1, \ldots, \text{district}_{75} \tag{5}$$

Assuming that v_{nj} is linear in parameters, the utility individual *n* expects from locating in district *j* is given by (6). The indicator variable DEST_{nj} equals one if location *j* is a potential destination and equals zero if location *j* is the individual's origin district[1].

$$EU_{nj} = \alpha_n DEST_{nj} + \boldsymbol{\beta}_n' \boldsymbol{S}_{nj} + \boldsymbol{\delta}_n' \boldsymbol{Y}_{nj} + \boldsymbol{\theta}_n' \boldsymbol{C}_{nj} + \boldsymbol{\gamma}_n' \boldsymbol{Z}_n DEST_{nj} + \varepsilon_{nj} \tag{6}$$

The parameter α_n captures difference in utility from a location being a potential destination instead of a person's original district and vector $\boldsymbol{\gamma}_n'$ contains parameters moderating how individual characteristics influence the expected utility inter-district migrations. From equation (2), the probability that individual selects district *j* is given by equation (7).

$$P_{nj} = P(EU_{nj} > EU_{nk}) > \forall j \neq k \tag{7}$$

Imposing preference homogeneity and assuming that ε_{nj} is independently and identically distributed (IID) and follows a type one extreme value distribution yields the familiar conditional log it model in (8).

$$P_{nj} = \frac{e^{v_{nj}}}{\sum_{j=1}^{J} e^{v_{nj}}} \tag{8}$$

Let m_{nj} equal one if individual *n* chooses district *j* and equal zero otherwise. Then the log likelihood function of the conditional logit model is given by (9).

$$\sum_{n=1}^{N} \sum_{j=1}^{75} m_{nj} \ln P_{nj} \tag{9}$$

While elegant, the conditional logit model imposes the independence of irrelevant alternatives (IAA) assumption. This restrictive assumption implies that the probability ratio of an individual choosing between two alternative districts (i.e. P_{nk}/P_{nj}) is independent of the availability of other possible alternatives. IIA implies that all pairs of alternatives in the choice set must be equally similar or dissimilar (Hensher, Rose, and Greene 2005).This study employs the random parameters (RP) logit model to relax the IIA assumption and accommodate preference heterogeneity in the location choice model. The RP logit model

[1]. This specification facilitates inclusion of individual characteristics without specifying alternative specific constants for each district alternative.

assumes that parameter vectors (α_n, $\boldsymbol{\beta}_n$, $\boldsymbol{\delta}_n$, $\boldsymbol{\theta}_n$, γ_n) are randomly distributed across the population according to some density function $f(\boldsymbol{\beta}_n \mid \boldsymbol{\theta}^*_\beta)$. Vector $\boldsymbol{\theta}^*$ contains parameters describing the true distribution of $\boldsymbol{\beta}_n$. In this study, we assume that all model parameters are normally distributed and uncorrelated with each other. Mean and standard deviation estimates for each random parameter were obtained using maximum simulated likelihood.

Data, Measures and Hypotheses

This study combines micro-data on location and individual characteristics with district-level data on landscape characteristics, demographics, and conflict intensity. Location and demographic data are from the rural portion of the Nepal Living Standards Survey (NLSS), administered from April 2003 to April 2004. The survey, which represented the second iteration of the NLSS program, collected information on household structure and activities as well as the individual characteristics of individuals. One NLSS question asked individuals to report the district-origin of, and years since their last migration. These responses form the dependent variable for the location choice model. In particular, this study counts as migrants individuals who reported moving to their current district from another district in the past 3 years. The sample is restricted to persons 17 years and older. The ongoing conflict during this period posed significant challenges for NLSS survey implementation. With regard to conflict zones, the NLSS interviewers "...were on high alert in these areas, kept themselves in a very low profile, and in many instances were assisted by the local people." (Bontch-Osmolovski and Glinskaya 2004). In total, 12 of 434 (2.8%) primary sampling units, representing 144 households, were not sampled due to conflict.

This study's research design exploits the fact that nearly every district experienced conflict during the period analyzed, and that the violence varied by intensity across districts. In particular, the dispersion of violence facilitates observation of location choices across individuals living in districts with a wide range of violence intensity. The violence intensity data used in this study was collected by the Informal Sector Service Center (INSEC). INSEC is a human rights organization operating throughout Nepal at the village development committee level. During the Nepalese Civil War, INSEC collected sub-national data on the annual number individuals killed by rebels and government forces.

Data were also compiled to reflect district characteristics that influence location choices. Indicators of pre-conflict economic conditions were constructed using the first iteration of the NLSS, conducted in 1995 and 1996. Forest cover data and motorable road data, both from 2000, was derived from the analysis of remotely sensed imagery in a GIS platform.[2] The population data were collected by the Nepal Central Bureau of Statistics.[3]The NLSS sample and district-level data used for modeling are presented in Table 1. Descriptions of the variables used for model estimation are presented in Table 2.

[2.] Spatial data collected by the University of Maryland, and processed by Keshav Bhattarai at Central Missouri University.

[3.] Central Bureau of Statistics—National Planning Commission Secretariat. 2016. Nepal-National Population Census 2001. Government of Nepal.NPL-CBS-NPC-2001-v2.

Table 1: District and Nepal Living Standards Survey Sample Characteristics

	Mean	SD	Min	Max
District characteristics (n = 75)				
Population	302,114	211,695	9,462	1,063,821
Unemployment	0.08	0.05	0.01	0.22
Violent deaths	91.09	95.13	0	531
Road Kilometers	456,911	190,264	47,613	1,079,434
Percent primary forest	50.17	11.20	21	75
Mountain ecological zone	0.19	0.39	0	1
Terai ecological zone	0.49	0.50	0	1
Individual characteristics (n = 9,981)				
Age in years	38.93	16.55	17	99
Female gender	0.44	0.50	0	1
Dalit caste	0.12	0.32	0	1
Bahun and Chhetri castes	0.32	0.47	0	1
Married	0.77	0.42	0	1

Table 2: Model Variables

Variable	Description	Expected sign
District variables		
DIST	The distance between origin and destination districts (hundreds of km)	–
POPSZ	The natural log of population size (millions of people) at an individual's origin district plus the natural log of population size at the destination district.	+
KILLED	The total number of violent deaths in a district from 2000 to 2003 (hundreds of people)	–
WORK	The ratio of unemployment at the destination over unemployment at the origin.	–
ROAD	Total road distance in a district (millions of km)	+
FOREST	Percent forest cover in a given district	+
MTN	Dummy variable for the mountain ecological belt.	–
TERAI	Dummy variable for the terai ecological belt.	–/+
KFOR	*FOREST*KILLED*	–
KMTN	*MTN*KILLED*	–
KTERAI	*TERAI*KILLED*	–/+
DEST	Indicator variable for potential destinations	–
Individual variables		
AGE	Age in years	–
FEM	Indicator for female gender	–
MAR	Indicator for being married	+
BRCHH	Indicator for Bahun and Chhetri(high) castes	–/+
DALIT	Indicator for Dalit (low) caste	–/+

Migration decisions during conflict are likely to depend on conflict dynamics as well as traditional migration determinants. Furthermore, traditional determinants of migration, including economic, social, and demographic factors, can influence locations differently during conflict (Williams 2015). The model of migration in equations (1) through (4) defines the expected utility of a location as a function of location-specific and individual factors. The location-specific factors include security conditions (S_{nj}), information and migration costs (C_{nj}), and economic opportunity (Y_{nj}). The variables used to characterize individual and district-level characteristics are described in the following paragraphs.

The core hypothesis of this study is that conflict occurring at origin and potential destination locations influenced the district-level location choices of typical Nepalese during the civil war. This study measures exposure to conflict as the number of conflict-related deaths from 2000 to 2003 per district. Violence from the Maoist insurgency in Nepal peaked during the years considered in this study. The violence was geographically widespread, with violent deaths occurring in all but two districts over the time period studied. Most prior studies find a positive relationship between violence intensity and migration (Davenport, Moore, and Poe 2003, Engel and Ibáñez 2007, Moore and Shellman 2007, Schmeidl 1997). On the other hand, Bohra-Mishra and Massey (2011) found that violence in and around Chitwan district decreased the likelihood of migrating to another district. Increased violence in a district is expected deter individuals from choosing to locate there. Thus, conflict-related fatalities are expected to reduce the likelihood of choosing to reside in an area.

Individuals incur costs when they choose to migrate to a new location. The distance between source and destination locations has long been used (e.g. Ravenstein 1885) to characterize and model migration costs. Specifically, this distance captures the travel, psychological, and information costs associated with a migration alternative (Ibáñez 2014). This study uses Euclidean distance between district centroids to capture migration costs. Specifically, the variable *DIST* equals the Euclidean distance between an individual's origin district and potential destination districts.

Larger populations at source and destination areas reflect greater social and economic connectivity between the two. Thus, migration costs and economic barriers are likely smaller for origin-destination pairs with larger populations. The model incorporates population size through variable *POPSZ,* which equals the sum of the natural logarithms of the origin and potential destination district populations in 2000. This specifies that percent changes in connectivity influence migration choices.

Migration responds to economic opportunity, even during times of conflict (Ibanez 2014). Measures of district unemployment were developed to control for the impact of cross-district differences in employment opportunities on migration choices. Specifically, for each district we calculated the percent of residents, surveyed before the conflict, who reported being unable to find work for the last seven days. The model variable is *WORK* equals the ratio of the unemployment at potential destination districts over the unemployment measure in an individual's district of origin.

Rural Nepalese depend on forests and other natural systems for their livelihoods. Many rural Nepalese livelihoods are dependent on wood and other forest products. Data show that 82% of the households in rural villages use wood as their primary fuel for heating and cooking in 1996 (Baland et al. 2010). A typical Nepalese household spent about 50 person-days annually collecting firewood (Shrestha and Bhandari 2007).Further, over 150 medicinal herbs are harvested from the Nepalese mountains with an annual transaction value of around 2.5 billion rupees (Upreti 2006).Environmental and landscape conditions are expected to influence rural migration decisions during conflict because of the dependence of local natural resources in rural Nepal. The model variable *PFOR* is the amount of primary forest cover in district location alternatives. Nepal has three distinct ecological zones with diverse ecosystems and landscapes. The zones also vary drastically in terrain and elevation. The indicator variables *MTN* and *HILL* equal one for districts in the rugged mountain zone and foothills zone respectively. The lowland terai zone is the base category.

Total road distance is a proxy for overall development and accessibility in an area. Road development improves connectivity between rural areas and provides access for resource use and colonization. Hence, total roadway length is expected to be positively associated with the probability of moving to a district. The variable *ROAD S*equals the number of kilometers of roads in a district.

Individual characteristics can moderate migration decisions during times of peace and during conflict. The model includes, age, gender, marital status, and caste to account for these effects. Prior studies of migration during conflict in Nepal find a negative relationship between out migration and female gender and out migration and individual age (e.g. Bohra-Mishra and Massey 2011, Williams 2015, Williams et al. 2012) The model includes the indicator variable *FEM* for females and the variable *AGE* which is the individuals reported age in years. Marital status may also moderate migration decisions. For example, Bohra-Mishra and Massey (2011) and Williams (2015) both found that marriage increases probability of out migration for residents of Chitwan. Likewise, the model includes the dummy variable *MAR* to identify married individuals. The Nepalese civil war was rooted in inequality and exploitation related to the Nepalese caste system. Nepalese of Bahun and Chhetri ethnicities have historically controlled most of the government in Nepal (Thapa and Sijapati 2003). Individuals of these castes also tend to have higher incomes compared to individuals in lower castes (Wagle 2010). The impact of caste on the probability of inter-district migration is unclear. For example, Williams (2015) and Williams et al. (2012) found that membership in the Dalit caste was not a significant determinant of outmigration. The indicator variables *BRCHH* and *DALIT* identify individuals belonging to the Bahun and Chhetri (high) and Dalit (low) castes, respectively.

Nepal's highly varied landscape influenced patterns of violence during the civil war and may moderate the relationship between conflict and location choice. Do and Iyer (2010)found that conflict-related deaths tended to be higher in landscapes where fighting is favorable for insurgents, such as mountains and forests. Further, Bohara, Mitchell, and Nepal (2006) found that the rebels utilized rugged terrain to engage in violence for cover it provided and the communications and logistics challenges it posed for government forces. The tendency of rebels to engage in violence in rugged terrain likely influenced the livelihoods and perceived security of local communities. For example, the presence of insurgents in forest areas made it difficult for residents to harvest forest products and had a negative economic impact on communities that relied on the forests. Conflict that occurred in landscapes favorable to the insurgents may have also had a larger impact on perceived security compared to conflict that occurred elsewhere. In particular, individuals may perceive the likelihood of future conflict to be greater in landscapes that are suitable for harboring insurgents, and in turn expect that forest and mountain natural resources to be less productive in these areas. This study hypothesizes that conflict occurring in landscapes favorable to insurgents has a greater impact on migration compared to conflict occurring elsewhere. We investigate the hypothesis through the inclusion of interaction variables between *KILLED* and landscape variables *FOREST*, *MTN*, and *TERAI*, to create the variables *KFOR*, *KMTN*, and *KTERAI*, respectively. We expect the signs of *KFOR* and *KMTN* to be negative in accordance with our hypothesis.

Results

We specified three models for estimation using the variables and empirical methods described in the preceding sections (Table 3). The first, (I), includes only the district variables and the second, (II), adds individual characteristics to the model. The third specification, (III), investigates our hypothesis regarding the interactions between landscape features and the influence of conflict on location decisions.

Location choices may exhibit spatial dependence if nearby districts are systematically similar or different in ways that influence location choices but are unobservable by analysts. Before proceeding with estimation of the RP logit models, we investigated the presence of spatial dependence through estimation of the Spatially Correlated Logit (SCL) model (see Bhat and Guo 2004). The SCL model was estimated for specification (I). The estimated parameters on district level characteristics were consistent with the RP logit model while the estimated spatial dependence parameter was near unity and statistically insignificant[4]. The SCL results suggest spatial dependence is not a serious issue in our model and we proceed without accounting for it.

Estimation of the RP logit models was carried out with maximum simulated likelihood using 100 Halton draws for simulation. Estimation results from the specified RP logit models are presented in Table 3. Standard errors were clustered by household. Mean and standard deviation estimates are presented for each model parameter. The magnitudes of mean and the standard deviation parameter estimates represent the mean marginal utility and the degree to which the effect varies across observations, respectively. The Chi-squared values indicate overall significance for each model presented.

The mean estimates were robust across specifications and the Chi-squared values indicated overall significance across models. The estimated parameter means for key variables *DIST* and *LNPOP* are of the expected sign and are statistically significant as is the estimated mean parameter on the conflict parameter *KILLED*[5]. The corrected Akaike

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4. When the spatial dependence parameter equals one, the SCL model collapses to the conditional logit model

5. The positive mean estimate on KILLED in Model (3) results from the inclusion of interactive effects.

Table 3: Random Parameter Logit Location Choice Model Results

	(I)		(II)		(III)	
VARIABLES	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
DIST	-4.795***	-1.619***	-4.588***	1.696***	-4.035***	1.521***
	(0.874)	(0.347)	(0.853)	(0.355)	(0.639)	(0.289)
POPSZ	5.467***	-4.464***	6.841***	4.871***	7.260***	3.977**
	(1.438)	(1.584)	(1.621)	(1.694)	(1.823)	(1.921)
KILLED	-0.265***	-0.0397	-0.307***	0.0213	2.377**	-0.0275
	(0.0872)	(0.0251)	(0.0920)	(0.0386)	(0.926)	(0.0398)
WORK	-0.990*	1.037**	-0.945	1.147**	-0.748	1.007***
	(0.522)	(0.416)	(0.793)	(0.560)	(0.591)	(0.356)
FOREST	0.0176**	-0.0197	0.0167*	0.0209	0.0366**	0.0137
	(0.00734)	(0.0192)	(0.00861)	(0.0146)	(0.0144)	(0.0382)
MTN	0.634***	-0.289	0.753***	-0.357	2.869***	-0.200
	(0.235)	(0.377)	(0.269)	(0.444)	(0.828)	(0.922)
TERAI	1.036***	0.241	1.159***	-0.481	1.723***	-0.207
	(0.205)	(0.255)	(0.228)	(0.333)	(0.391)	(0.318)
ROADS	0.466	-0.370	0.729	0.622	0.718	-0.0930
	(0.475)	(0.571)	(0.521)	(1.282)	(0.666)	(0.707)
DEST	-4.452***	-0.555	-3.659***	-1.926***	-3.458***	-1.863*
	(0.846)	(1.429)	(0.788)	(0.648)	(0.877)	(1.008)
AGE			-1.235***	0.477***	-1.510***	0.522***
			(0.303)	(0.151)	(0.430)	(0.175)
FEM			-0.376*	-0.211	-0.506	-0.754
			(0.216)	(0.602)	(0.360)	(0.725)
MAR			0.388	1.524	1.305***	0.354
			(1.230)	(1.739)	(0.433)	(0.825)
BRCHH			0.573	0.683	-8.283	7.866
			(0.455)	(0.736)	(11.63)	(7.557)
DALIT			0.0117	0.860	-0.134	0.858
			(0.497)	(1.149)	(1.086)	(2.032)
KFOR					-0.0387**	0.00175
					(0.0192)	(0.00129)
KMTN					-2.690**	-0.211
					(1.062)	(0.385)
KTERAI					-0.686*	0.0930
					(0.405)	(0.0619)
Observations	9981	9981	9981	9981	9981	9981
Log likelihood	-1653	-1653	-1582	-1582	-1565	-1565
Model degrees of freedom	9	9	14	14	17	17
chi2	202.3	202.3	247.9	247.9	213.8	213.8
AICc	3325.5	3325.5	3195.6	3195.6	3169.3	3169.3

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

information criterion for small sample sizes (AICc) is a relative measure of model fit with a penalty for adding additional parameters. Lower AICc values indicate an improved fit. Including individual characteristics improves the model fit, as does including landscape interactions. Model (II) results were used to calculate the odds ratios reported below due to difficulty with interpreting odds ratios in the presence of interactions.

The results support our hypothesis that the distribution of violence across Nepal influenced typical location choices during the conflict. The odds ratio associated with *KILLED* implies that individuals were 26% less likely to select districts with 100 more of the violent compared to an otherwise identical district. The positive and significant estimate on *FOREST* indicates that location choices were related to primary forest abundance. Specifically, the odds ratio suggests that increasing a districts forest cover by 10% made individuals 18% more likely to locate there, compared to an otherwise identical district. With regard to individual characteristics, the models confirm a common finding that older individuals are less likely to undertake migrations. The associated odds ratio indicates that an additional 10 years of age was associated with a 71% reduction in the probability of making an inter-district move compared to an otherwise identical individual.

The model (III) results provide evidence for evaluating our hypothesis that landscape characteristics moderated the relationship between conflict and migration decisions. Specifically, the mean parameter estimates on *KFOR* and *KMTN* indicate that the impact of conflict on location choice was greater in districts with more primary forest cover and in mountain zone districts, respectively. Odds ratios from Model (III) indicate that Ceteris Paribus, the relationship between violent deaths and location choice was moderated by district depends on the ecological zone and the forest cover in the district. For illustration, 100 additional deaths in a mountain district with 50% primary forest cover would reduce the probability of living there by 89% ($e^{(2.377\ -\ 2.69\text{-}.0387*50)}$). If those deaths occurred in in a terai district the probability of locating in the district would decrease by 22% ($e^{(2.377\ -\ .686\ \text{-}.0387*50)}$). Further, 100 additional deaths in a terai district with 60% primary forest cover would decreases the probability of locating there by 47% ($e^{(2.377\ -\ .686\ \text{-}.0387*50)}$). These results support our hypothesis that landscape features moderated the impact of conflict on location choices.

Discussion

This study analyzed location choices during the Nepalese civil war under the hypothesis that both push and pull forces of conflict influence location choice. The hypothesis that landscape features moderated the influence of conflict on migration choice was also investigated. The empirical model characterizes location choice as a decision between location alternatives, including origin and potential destination alternatives. Framing location choices in this way permits modeling of the push and pull impacts of conflict on location decisions. Location data from a national household survey was combined with landscape and conflict data to specify and estimate the model. The presence of spatial dependence in the model was investigated through estimation of a SCL model. The developed model captures how the national distribution of conflict, landscape features, and economic opportunity related to to location decisions in the observed data. The results provide preliminary evidence that the push and pull forces of conflict act together to influence individual location decisions. The results also suggest that landscape features exert push and pull forces on location decisions, and may moderate the influence of conflict on location decisions.

In this study we examined whether conflict affects the district-level location decisions of typical citizens during conflict through the push and pull forces. Two characteristics of this study place it in the literature on location choices during conflict. First, we analyzed the individual location decisions of typical Nepalese citizens, distinguishing it from work that examines aggregate migration flows, and studies that investigate the determinants of forced migration through analysis or reported displaced persons. This study instead examined whether conflict influenced the location decisions of typical citizens who lived in Nepal through the conflict. Second, this study examined how factors in alternative locations, or pull forces, influence individual location decisions. This distinguishes it from studies that examine how conflict, and other origin-based factors, affect outmigration. In making location choices, we assumed that individuals compare the conditions in their origin to conditions at alternative destinations. In this view, it is the relative, not the absolute magnitude of push and pull forces that drives location choice. All else equal, the influence that conflict in an individual's origin has on outmigration depends on the intensity of conflict at alternative destinations. Thus, the pull forces of migration can both influence the spatial distribution of resettlement and the moderate the impact of push factors on outmigration.

Nepal's varied ecology and terrain create a mosaic of push and pull factors associated with natural resource abundance, infrastructure, and other amenities (disamenities). This finding supports Shrestha and Bhandari (2007), who found that reduced access to forest resources increased likelihood of labor-related migration from the Chitwan Valley of Nepal. The varied landscape in Nepal also influenced patterns of violence and location decisions during the civil war. The interaction model results suggest that the physical landscape may also moderate the influence that conflict has on location decisions. A possible interpretation of this result is that conflict occurring in areas favorable to insurgent activity creates a stronger deterrent to location choice compared to conflict occurring elsewhere. For example, the presence of insurgents in forest areas may have made it difficult for residents to harvest forest products. Moreover, expectations of recurrent violence were likely higher in landscapes that favored insurgent operations.

The results imply that policies addressing national-level impacts of conflict on internal migration should consider: The spatial distribution, and associated push and pull forces of conflict, Landscape features and economic conditions in potential destinations. And the interaction between landscape features, the spatial distribution of conflict, and location choice decisions. A better understanding of these factors is required for them to usefully inform policy decisions. Future research could disentangle the push and pull forces of conflict on migration and further investigate factors that may moderate those forces. Further research is also warranted to understand how landscape features interact with location choices and patterns of conflict.

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