Open access • Journal Article • DOI:10.1177/0022343309102659

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Published on: 05 May 2009 - Journal of Peace Research (SAGE Publications)

Topics: Human migration, Population, Poison control, Forced migration and Civil Conflict

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Working Paper

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Discussion Paper Series, No. 4

Provided in Cooperation with:
Department of International Economic Policy (iep), University of Freiburg

Suggested Citation: Czaika, Mathias; Kis-Katos, Krisztina (2008) : Civil conflict and displacement: Village-level determinants of forced migration in Aceh, Discussion Paper Series, No. 4, University of Freiburg, Department of International Economic Policy (iep), Freiburg i. Br.

This Version is available at:
http://hdl.handle.net/10419/47895

University of Freiburg
Department of International Economic Policy
Discussion Paper Series
Nr. 4

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April 2008

ISSN 1866-4113

University of Freiburg
Department of International Economic Policy
Discussion Paper Series

The Discussion Papers are edited by:
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Institute for Economic Research
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D-79085 Freiburg, Germany
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Editor:
Prof. Dr. Günther G. Schulze

ISSN: *1866-4113*
Electronically published: 1.4.2008

Civil Conflict and Displacement – Village-level Determinants of Forced Migration in Aceh

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Abstract

The purpose of this paper is to identify the determinants of displacement behavior based on various push and pull factors at the village level. The study concentrates on changes in village population during three years of civil conflict (1999-2002) in Aceh, Indonesia. The empirical analysis is based on a unique dataset from two census rounds of the Indonesian Village Potential Census (PODES). It uses data on around 5200 Acehnese villages and relates village level population change to conflict variables, geographic patterns and traditional socio-economic determinants of migration. By applying quantile regressions, the push (outflow) factors and the pull (inflow) determinants of migration can also be distinguished. We identify the following factors as the main determinants of the Aceh migration pattern in this period: First, conflict clashes induced large rearrangements of the population between villages in highly affected districts, as well as strong village emigration from the geographically remote regions in Central Aceh towards the less conflict-affected coastal industrial areas. Besides conflict factors, an (ongoing) rural-urban migration process, driven by socio-economic factors has taken place during the conflict period. Second, there is also evidence that security considerations, such as the presence of police in a village or neighborhood, were either emigration-reducing or immigration-inducing. Third, although the presence of ethnic-Javanese has not been a primary cause of conflict incidence, their intimidation by the rebel movement has led to a significant outflow, primarily from conflict-affected villages in Central Aceh. These results reveal that, beside a conflict-induced fear of violence, population movements in Aceh have also been an outcome of traditional migration determinants.

INTRODUCTION

Worldwide, the number of international and intra-state conflicts has fallen dramatically since the end of the Cold War. This has led to a continuous reduction in the world's refugee population over the past years. However, internal displacement has not been reduced to the same extent that cross-border refugee movements have. Globally, at the end of 2005, about 23.7 million internally displaced persons (IDPs) were seeking refuge within their own conflict-affected countries (IDMC, 2006a). Obviously, large displacements are induced by armed conflicts and grave human rights violations, but beyond this, the role of other political, economic or social determinants of internal displacement is still unresolved.

Although some hypotheses on the determinants of forced migration decisions have been put forth in the refugee studies literature, the relevance of traditional socio–economic migration determinants has not been systematically analyzed at a disaggregated level. At the cross–country level, most studies emphasize that violence is the major push factor of forced migration flows, indicating that institutional or economic factors have a relatively small impact (see, for example, Schmeidl, 1997; Moore & Shellman, 2004). However, using Colombian household data, Engel & Ibánez, 2007, find that, even in a conflict environment, economic incentives play an important role in household displacement decisions, although the impact of economic incentives is less strong where violence levels are high.

This study identifies the determinants of displacement during a period of conflict in Aceh, Indonesia. The Aceh conflict was politically motivated and arose between the Indonesian military forces TNI (*Tentara Nasional Indonesia*) and the Acehnese Freedom Movement GAM (*Gerakan Aceh Merdeka*). This conflict was particularly intense between 1999 and 2004. During this period, large–scale displacements were a recurrent feature, and the number of displaced persons has been estimated at more than 500,000 (IDMC, 2006b).

Our main task is to investigate the major determinants of these internal displacements during three years of severe clashes (1999 to 2002) in the Aceh province. For this purpose, we use data on 5211 Acehnese villages from two rounds of the Indonesian Village Potential Census *PODES 2000* and *2003* (BPS 2000, 2003). Unlike empirical analysis based on

household data, this village–level dataset enables us to focus on the village–specific determinants of population changes, which makes this analysis unique.

Although we cannot directly interpret our results as explaining the individual migration decision of household members, we are able to identify the most relevant push and pull factors at the village–level. This level of aggregation also allows us to cover almost the whole area affected by the Acehnese conflict (91.3% of Acehnese villages). We distinguish between the effects of conflict–related, and more traditional socio–economic determinants of net population change. Furthermore, and in addition to standard OLS estimation, we apply a quantile estimation technique, which enables us to separate the push (outflow) factors from the pull (inflow) factors driving the change in Acehnese village population stocks during this period of civil conflict.

Obviously, violence and displacement are strongly linked, and this relationship is reflected in our results: the presence of conflict, which is captured by both reported conflict variables and by district controls, reduces net population increase. Beyond this, we are also able to identify several socio–economic factors as driving forces of population displacement, indicating an ongoing rural–urban migration movement within the province of Aceh. We find that population displacement in Aceh is not only caused by the fear of violence, but also by traditional socio–economic migration variables. This corroborates the results of Engel & Ibánez, 2007, from their study of Columbian households.

The remainder of this article is structured as follows. The next section briefly reviews the Acehnese conflict history and its effects on population displacement in the past decade. Then, we shortly review the traditional migration literature and discuss its main implications for our empirical analysis. The empirical section contains an introduction to the dataset, an explanation of the empirical strategy, and a discussion of the results of the regression analysis. Some final remarks conclude.

CONFLICT HISTORY AND DISPLACEMENT IN ACEH, INDONESIA

Indonesia's recent history is characterized by persistent conflicts and population displacements in various provinces. Frequent flare-ups of violence in the different provinces originate from of a mixture of ethnic, religious, and social causes. The conflict in Aceh was strongly politically motivated and has been carried out between rebel fighters and the

Indonesian state, thus, it is more closely related to the 'classical' type of civil war. Of all of the clashes since Indonesian independence in 1945, the armed conflict in the Aceh region has been one of the most persistent conflicts, lasting for more than three decades.

Since the mid–70s, the Aceh Freedom Movement (GAM) grew steadily and gained considerable power. This provoked frequent clashes between the GAM, military forces and paramilitary groups, culminating in the period between 1999 and 2003. During the period of political liberalization that followed the resignation of President Suharto in early 1998, Aceh experienced a short period of political détente. However, following the riots in the city of Lhokseumawe, which was one of the hardest-hit areas in Aceh, the announced process of demilitarization was significantly slowed (Schulze, 2004; IDMC, 2006b).

In early 1999, frustrated by the lack of substantive changes, Acehnese student activists initiated a campaign for a referendum on Aceh's political status, which rapidly gained support throughout the province. In mid–1999, military troops and security forces killed tens of pro–independence Acehnese demonstrators, and plans for renewed counter–insurgency operations were announced. In this context of deteriorating conditions, the election of President Abdurrahman Wahid increased the mobilization of support for independence in Aceh. In November 1999, a pro–referendum rally drew an estimated two million supporters (about one half of the whole Acehnese population) and brought the province to a standstill (Sidel, 1999). In 1999, large numbers of Acehnese began fleeing their homes in response to military and police actions, or out of fear of being involved in clashes between the security forces and the GAM. The months preceding Indonesia's general election in October 1999 saw a dramatic increase in the number of IDPs (IDMC, 2006b).

In early 2000, the GAM announced the rebels' willingness to negotiate a cease–fire if military operations, including roadblocks, door–to–door searches, and other actions to locate GAM members, were discontinued. In May 2000, the GAM and the Indonesian authorities agreed on a humanitarian pause. However, on June 1st, a day before this pause was to take effect, more than 6,000 people fled their homes in North Aceh because of renewed fighting (IDMC, 2006b). The following months saw continued sweeping operations as well as ongoing clashes, causing displacement and unrest.

In April 2001, Indonesia's efforts to end the separatist rebellion in Aceh entered a new phase with the launch of a military offensive against the GAM rebels. The majority of victims of this offensive were civilians, and severe atrocities were committed by both sides. The

district of Central Aceh was most severely hit during this period, during which hundreds of people were killed by the GAM, the military or local militias (ICG, 2002). In this phase, around 32,000 people fled from Central Aceh and sought refuge in adjacent regions (UNDP, 2006). In early 2002, representatives of the GAM and the Indonesian government agreed to turn the armed conflict into a political dispute with the involvement of other Acehnese groups. In December 2002, an agreement on cessation of hostilities was concluded in Geneva, which resulted in a significant drop in the level of violence.

However, in early 2003, the cease-fire failed and severe clashes again followed in Aceh. The Indonesian government reacted by implementing martial law on May 9th, 2003. Since then, enforced military operations have led to widespread human rights violations. Thousands of civilians have fled their homes or have been forcibly relocated by the military (AI, 2004). Martial law introduced a new round of violence in Aceh, during which the internal displacement of population into designated villages or camps emerged as a strategy of war (Hedman, 2005). In this phase, forced displacement has also been openly used by the military for separating GAM members from their civilian base. Counter-insurgency operations have relied extensively on recruiting civilians to join militias, civilian defense groups, and military auxiliary units. These groups are also reported to have carried out severe human rights violations (AI, 2004).

Between the introduction of martial law in May 2003, and the eve of the tsunami earthquake in December 2004, an estimated 2,300 people were killed in struggles between the Indonesian government, the militias, and the GAM (HRW, 2005). In the same period, around 150,000 persons became internally displaced. After the tsunami earthquake on December 26, 2004, which killed over 100,000 people and displaced over 500,000 people, a cease-fire was installed (HRW, 2005). In August 2005, the Indonesian government and the GAM signed a Memorandum of Understanding bringing this 30-year old conflict to a preliminary end.

According to conservative estimates, the aggravated fighting and violence since 1999 resulted in more than 500,000 internally displaced persons (IDPs) and refugees (IDMC, 2006a). The Acehnese conflict has led to two distinct patterns of displacement. First, within the province, local people have been temporarily displaced when their villages were under attack, and have been sheltered in mosques or community halls, particularly alongside the two main roads that run along the North and East coasts, and along the South and West coasts. These displaced persons have usually remained inside their home province. They typically returned to their villages within a few weeks and started reconstructing their houses and

livelihoods. The four main areas of displacement within Aceh were North Aceh, East Aceh, Central Aceh and West Aceh (refer Figure 1).

Figure 1. Aceh districts

In the period from 1999 to 2000, the average length of stay of the IDPs in the various sites was quite short. Later in 2001, many people who fled their villages had to stay away from their homes for periods ranging from several months up to almost two years due to the destruction of their houses and the loss of other assets (Ramly, 2005). Second, although ethnic-Javanese were not officially considered by the GAM as targets, there were thousands of ethnic-Javanese who left Aceh, fleeing mostly to the neighboring province of North Sumatra or to Java (UNOCHA, 2003; Schulze, 2004). The largest number of such displacements occurred in 2001. By September 2002, there were about 178,000 IDPs outside

of Aceh, most of whom found refuge in North Sumatra. Only a small number of Javanese sought refuge within Aceh (Ramly, 2005).

The subsequent empirical analysis concentrates on net population change at the village level for the period between fall 1999 and fall 2002. Thus, we are able to quantify the effects of the upsurge in violence that preceded the preliminary cease–fire in December 2002, but we do not examine the wave of forced displacement that followed the introduction of Martial law in May 2003.

THEORETICAL BACKGROUND OF DISPLACEMENTS

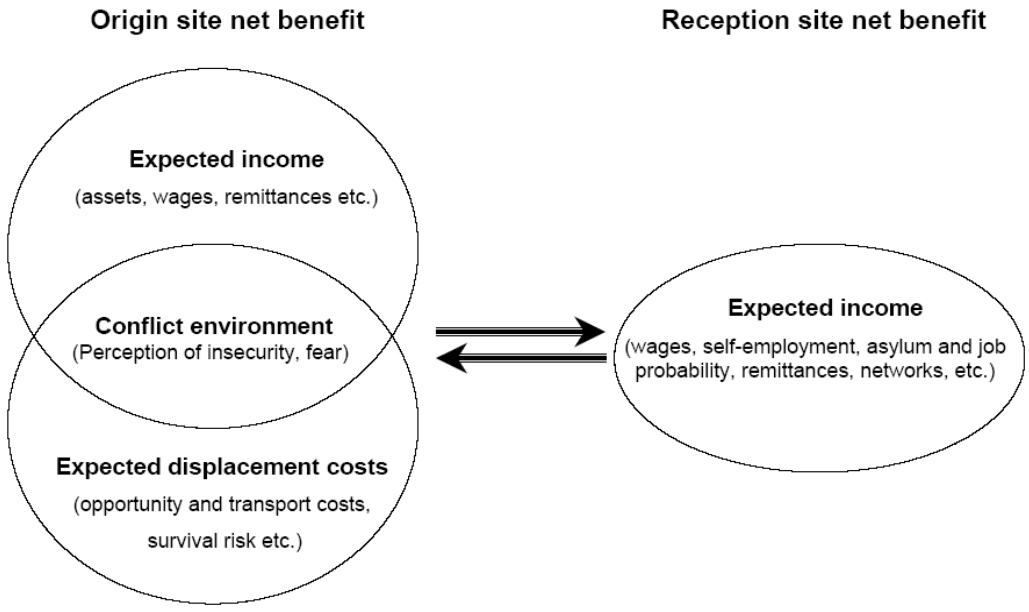
Displacement in the context of civil conflict is a consequence of the presence or the threat of a violent attack, and not a voluntary migration decision in a narrow sense. While many individuals or whole households flee out of a conflict area to save their lives, we also observe many people who not leave their homes to seek refuge. There are at least two explanations for this phenomenon. First, violence is not randomly targeted, that is some individuals or groups within the population are more prone to be violently targeted by armed groups, which make these people more disposed to flee than others. Second, when deciding upon staying or leaving, individuals or households do not only take into account security factors, but other traditional (socio-economic) determinants as well. These two hypotheses are not mutually exclusive. Whether targeted individuals or households prefer to stay at home also depends on the degree of risk aversion. As socio-economic determinants are expected to play a significant role in explaining forced migration, we refer briefly to the main implications of the traditional migration literature with respect to these determinants.

In traditional rural–urban labor migration models the rate of migration is higher, the larger the urban–rural wage gap, and the higher the perceived probability of finding a job in the modern sector (Harris & Todaro, 1970). In the new economic migration literature, Stark, 1991, and other authors refine these early migration models adding new variables, such as income uncertainty, relative deprivation (Faini, 1996), and human capital investment in children. Households spread their risks in structurally different markets by pooling and sharing their incomes afterwards. This is regarded as an insurance against uncertain income flows from specific markets to smooth families' intertemporal income and consumption (Ghatak, Levine & Price, 1996). Thus, uncertainty plays an important role in any migration

decision: in pure economic migration as well as in conflict–induced displacement. When considering forced displacement, insecurity creates additional costs that modify the expected outcome, and diminish the relevance of other socio–economic migration determinants.

When deciding on displacement, individuals or households compare alternative sites and choose the site promising the largest net benefits. Thus, early rational choice models on migration decisions compared alternative locations by calculating the present value difference of individual income reduced by migration costs. Migration is then a result of higher expected net benefits at the reception site (Sjaastadt, 1962). In the context of a conflict, net returns to displacement are determined by the difference between origin and reception site benefits and the influence of insecurity and fear of persecution. Origin site incomes as well as migration costs are directly biased by threats, direct violence, and disruption (Figure 2). The influence of the economic push and pull factors on the perceived value of displacement is mitigated by the impact of the conflict environment, but it is not necessarily eliminated. If economic factors do not play any role in a violent conflict environment, a complete population outflow might occur. However, we generally do not observe this.

Figure 2. Perceived value of displacement



Social networks also play an important role in explaining the size of a population outflow and the duration of stay (Carrington, Detragiache & Vishwanath, 1996). According to this approach, migration costs decrease with the number of migrants already settled in the

destination country. Established networks of previous (economic) migrants can strongly influence the displacement decision by providing housing, support in finding employment and other contacts.

Generally, young, economically active people have stronger incentives to migrate, since their discounted net benefits are larger because of their longer planning horizons (Todaro & Smith, 2006). In conflict environments, young adults, male and female, are the most probable targets for threat, violence, and forced recruitment, which increases the likelihood for displacement of this subgroup of the population.

Thus, displacement is both driven by the (non–random) targeting of violence and economic considerations. In many cases, the fear of violence and non–survival triggers non-transitory displacement by reinforcing the fundamental push factors that drive the rural–urban migration. The relative importance of violence and economic factors is a priori unknown and must be addressed by empirical analysis. The next section investigates the driving forces of potentially conflict–induced displacement at the village level, by considering net population changes in the Aceh province during a period of conflict.

EMPIRICAL ANALYSIS OF DISPLACEMENT IN ACEH

DATA SOURCE AND DESCRIPTIVE STATISTICS

The data used in this study are based on the Village Potential Census PODES (*Potensi Desa*) of the BPS (*Badan Pusat Statistik*) Statistics Indonesia (BPS 2000, 2003). This census collects information on a regular basis at the lowest administrative level from all Indonesian villages and urban neighborhoods.[1] The information is based on the responses of the village heads and includes a wide range of socio–economic indicators on population, economic activities, infrastructure, and also on village security. We use data from two subsequent rounds of *PODES* (*2000* and *2003*) that were collected in the fall of 1999 and 2002. We consider only those Acehnese villages (5211, or 93.1% of all) where a match between the two census rounds has been possible.

[1] In what follows, we use the term village for both villages and urban neighborhoods.

The term 'conflict' generally has no clear-cut definition. It could describe severe atrocities with significant casualties and damages as well as minor clashes. In our dataset, conflict incidence at the village level is captured by two different questions. In *PODES 2003*, village officials have been asked for the first time whether the village has experienced any conflict during the previous year. Additionally, they were asked to state the number of casualties (conflict–related deaths or injuries) that occurred during the last year as a result of conflicts. The questionnaire did not give further guidance to exactly what events would define a conflict, and hence misreporting of conflict, depending on the own interpretation of each village head, cannot be excluded (Barron, Kaiser & Pradhan, 2004). Nevertheless, village heads are very well–informed about the presence and extent of civil conflict in their own village. The information that we can draw from a village census is much more general than data from questionnaires targeting selective and small–scale household samples. Based on the data for conflict occurrence, the variable *Conflict* is set to one if the village head has reported the occurrence of a civil conflict, and zero otherwise. A potential measurement error might also arise because we observe conflict incidence in the village only during the last year before the survey, while our population change variable refers to the period of the last three years. Nevertheless, our reported conflict incidence is arguably still capturing a general proneness to conflict, as it is significantly higher in those regions that are known to have been most severely affected by the Acehnese conflict. In order to reduce potential measurement errors, we also code an alternative measure of conflict labeled as *Conflict cluster*, which is set to one if at least 20% of the villages within a subdistrict (*kecamatan*) reported conflict in the previous year. In this way, we also capture the effects of conflict clusters within the neighborhood while excluding villages with isolated (and potentially minor) conflicts. Additionally, we include district controls in our regressions to also capture part of the differences in conflict intensity between districts. According to these definitions, between 1999 and 2002, around a quarter of the sample villages have reported the presence of a conflict, while more than one third of the villages belonged to a conflict cluster (Table I).[2]

We define our main dependent variable as net *Population change* between the two survey rounds 1999 and 2002, which measures the absolute change in village population in hundreds of inhabitants. Table I shows that villages that were involved in a conflict or were located in a

[2] Villages with conflict constitute nearly the same proportion of Aceh as a whole and in our matched 91.3% sample. As a comparison, *PODES 2003* reports a share of conflict of 23.8% in the whole Aceh province.

conflict cluster during the year preceding the second survey round (around one third of the villages) lost on average around 2.7% of their population between 1999 and 2002.[3]

Table I. Conflict and population change in the Aceh sample, 1999-2002

	Total	No conflict	Conflict	Conflict cluster
Total pop. in 1999	3,684,021	2,684,672	999,349	1,381,138
Abs. pop. change	-651	25,208	-25,859	-38,068
Rel. pop. change (%)	-0.0002	0.94	-2.59	-2.70
Sample villages (N)	5,211	3,972 (76.2%)	1,239 (23.8%)	1,807 (34.7%)

Notes: Own calculations based on *PODES 2000* and *2003*. The sample covers around 93.1% of all Acehnese villages.

Based on our sample, we estimate for the period of 1999–2002 a net population outflow from the Aceh province of about 176,600 persons. This figure is based on an average annual population growth rate of 1.46% (documented for Aceh by BPS (nd) for 1990–2000), which implies an increase in population of about 4.4% over these three years. This would amount to an increase of 163,700 persons in our sample. Instead, total population in the Aceh sample decreased by about 650 persons (see Table I). These numbers indicate a net outward migration of about 164,400 persons in our sample villages (93.1% of all), and are in accordance with other estimates (Ramly, 2005).

EMPIRICAL STRATEGY

In our empirical analysis we focus on the determinants of net population change in order to quantify the effects of conflict as well as the effects of other socio–economic variables. We run the regressions both for all villages and separately for villages with and without conflict during the last year. Additionally, by applying quantile regressions we distinguish between the push and pull factors of migration. As a first descriptive step, we relate the reported conflict occurrence to the same set of explanatory factors as in our subsequent regressions of population change.

[3] The variable 'population change' is corrected by the numbers of deaths because of conflicts or epidemics.

Estimation Models

In our conflict regressions, we model the unobserved levels of conflict intensity C_i^* in village i as a latent variable, dependent on the vector of explanatory variables X_i, the unknown vector of parameters β, and the normally distributed error term δ_i. Conflict occurrence C_i is our observed binary variable which is set to one if the village has been involved in a conflict during the previous period, and zero otherwise,

$$C_i = 1 \;\; if \;\; \left(X_i'\beta + \delta_i > 0\right), \qquad \text{and zero otherwise,} \tag{1}$$

which is estimated by a probit model. Based on the resulting coefficients we calculate the marginal effects of each explanatory variable on the probability that a conflict in a village has occurred, evaluated at the sample mean.

In the second set of regressions, the dependent variable is the population change ΔPop_i that occurred between 1999 and 2002 in village i, which is explained by a set of conflict variables and other migration-related variables X_i :

$$\Delta Pop_i = \gamma_0 C_i + X_i'\gamma + \epsilon_i. \tag{2}$$

We estimate the vector of the coefficients γ_0 and γ by two alternative procedures. First, we report estimates from the standard OLS technique, both for all villages and for the subsamples of conflict and non–conflict villages. Second, we apply quantile regressions that minimize the sum of the absolute residuals where values above (below) a given quantile receive weights that are proportional (inversely proportional) to the quantile that is to be estimated. We report estimates from quantile regressions around the first ($Q = 0.25$), second ($Q = 0.50$), and third ($Q = 0.75$) quartile. The great advantage of this technique is that it enables us to distinguish between the push and pull factors of migration. Considering the lowest and highest quartiles is especially useful as these two quartiles roughly coincide with villages with considerable population outflow and inflow, respectively. For instance, when running the regression around the lowest ($Q = 0.25$) quartile, our parameter estimates reflect the push factors of migration to a larger extent as observations on villages with a larger than predicted net

population decrease (that is, with a population outflow considerably larger than expected) receive a threefold weight.[4]

In the probit and OLS specifications we cluster standard errors on the subdistrict level; by doing this we allow for the correlation of error terms for villages within the same subdistrict.

Main control variables

Basically, changes in village population are either caused by differences in the fertility–mortality ratio or by (forced) migration movements.[5] In all sets of regressions, we apply—in addition to the conflict variables—the same set of socio–economic, political and geographic controls that could be related to one of these two channels or to both.[6] By using explanatory variables mainly from *PODES 2000*, we are able to reduce problems of reverse causality to a considerable extent.

Besides investigating the role of conflict for forced migration flows, this analysis shall test whether a strong rural–urban migration pattern is still present in times of major conflict. As our main control for economic opportunities we include the indicator variable *Urban*, which is based on the official classification of villages and neighborhoods by the Indonesian state, and proxies the availability of public services and the structure of economic activity in the village. The urban dummy is strongly correlated with other measures of economic structure (e.g. the share of families in the village living primarily from agriculture, or the share of village land that is in non-agricultural use).[7] Additionally, we also include geographic *Altitude* (in thousand meters above sea level) that might capture economic incentives to emigrate

[4] Another possibility to examine the push and pull factors of migration would be to define indicator variables of large population outflow (or inflow), and estimate probit or ordered probit models. However, by applying this procedure we would lose information on the intensity of population change. Additionally, as our population change measure is relatively noisy, we find it less obvious to identify a discrete regime switch between outflow and inflow villages. This is the main reason that we prefer the use of quantile regressions, which allows us a smoother identification of inflow and outflow villages.

[5] The number of deaths by conflict remains far below the population flows due to displacement. However, changes in fertility behavior might have played a significant role as well, since fertility might have been strongly reduced in conflict-ridden areas. For village–specific mortality factors we partly correct by subtracting from population decrease the deaths by conflict and by epidemics over the last period.

[6] Descriptive statistics and definitions of variables are presented in the appendix.

[7] We experimented with these alternative measures and all yielded very similar results.

similarly to the urban dummy. Furthermore, we also control for the political remoteness of a village by the *Distance to district* (*kabupaten*) *office* (in hundreds of kilometers).

We capture the effect of village-level poverty by the share of *Poor families* in a village. This variable measures the share of village households that are considered to be poor according to a set of welfare-criteria established by the Indonesian National Family Planning Agency (*BKKBN*).[8] This agency categorizes Indonesian households into five classes of welfare status: pre-prosperous families KPS (*Keluarga Pra-Sejahtera*), and families of prosperity status *KS I* to *IV* (*Keluarga Sejahtera*) (Perdana & Maxwell, 2004). Poor families are defined by the census as households belonging to the two lowest categories *KPS* and *KS I*.[9] By this definition, on average around 55% of village populations are considered to be poor. Variations in potential fertility are controlled for by the variable *Fertile couples* which measures the number of couples of reproductive age in the village, and is also based on information collected for the *BKKBN*.

We include the *Transport station* variable as a rough proxy for costs of migration by indicating the presence of a bus or train station, airport, or seaport in the village. The variable has been set to one also in neighborhoods of larger cities where there is a station in another part of the city. The security environment is controlled for by the variable *Police presence* which is set to one if the nearest police station is easy to reach (which applies to 65.8% of the villages), and zero otherwise. The conflict mitigation role of the police, as opposed to the influence of the military and paramilitary groups, has been documented for several Indonesian conflicts (see Barron, Kaiser & Pradhan, 2004). We expect that population outflow is larger if the nearest police station is far away (especially, in the face of a conflict).

Additionally, we also include controls that should capture the migration patterns specific to the Acehnese conflict. For instance, we know that in the three years of conflict ethnic–Javanese have been much more likely to leave Aceh altogether (see above). To capture this pattern of migration, we include in our regressions the *Share of Javanese* as a further control.

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[8] These welfare criteria include food consumption habits, access to health care, the possession of alternative sets of clothing, information on the floor material of the dwelling, and on the household members' ability to practice their religion.

[9] These families were the main targeted beneficiaries of the Social Safety Net Program of the Indonesian government, which addressed rising poverty during and after the economic crisis. Thus, the variable might also reflect a certain policy bias; villages with a larger share of poor families might also be those with better social safety coverage.

The variable is based on information from the 2000 Census of Indonesia, and is only available at the subdistrict (*kecamatan*) level.[10] We also include a set of district indicators for those Acehnese regions which we know were the most affected by the conflict: districts with high conflict incidence (Central, North, West, South and Southwest Aceh) and also neighboring districts that experienced population inflows. The remaining nine, less affected districts in Northern and Southern parts of Aceh serve as a control group. Additionally, we include dummies for the three largest cities, Banda Aceh, Langsa, and Lhokseumawe, of which the latter was the hardest-hit area. These large centers may experience very different migration patterns from the rest of the country. Finally, we control for nonlinear effects of the village population size by including a fourth grade polynomial of population size in all regressions.

ESTIMATION RESULTS

Table II reports the estimates of two probit models explaining conflict occurrence that differ only with respect to the conflict variable; the dependent variable in column (1) is reported conflict, in column (2) the presence of a conflict cluster in the subdistrict **(*kecamatan*).**

The likelihood that a conflict arises might be influenced by political, civil, or socio-economic variables. However, in our case both conflict variables are mainly explained by geographic location. We do not find robust evidence for the role of ethnicity in the Acehnese conflict occurrence either, as we find that the share of ethnic-Javanese (the most populous and economically most important minority) in a subdistrict is not related to conflict occurrence. The distribution of observed conflict over the districts supports our general trust in the conflict variables: reported conflict occurrence is much more likely in those districts that were actually mostly affected in this period (North, East, Central, Southwest and South Aceh, and the large cities).

[10] For the few subdistricts with missing data district–level averages or averages of the neighboring districts have been imputed.

Table II. Probit estimation: Conflict incidence

Dependent variable	(1) Conflict		(2) Conflict cluster		
	Marg.eff.	t-stat.	Marg.eff.	t-stat.	Mean
Urban	-0.020	-0.57	-0.027	-0.49	0.080
Altitude	-0.029	0.36	-0.203	-1.09	0.178
Distance (dist office)	0.001	0.03	-0.062	-0.66	0.078
Poor families	-0.015	-0.21	0.015	0.11	0.546
Fertile couples	0.019	1.11	0.042	1.29	0.986
Transport station	-0.079**	-2.21	-0.133***	-2.64	0.061
Police present	0.031	1.02	0.042	0.83	0.342
Share of Javanese	0.093	0.52	0.067	0.25	0.087
Central Aceh	0.291*	1.89	0.605***	2.63	0.037
West Aceh	0.044	0.44	0.183	0.72	0.051
Nagan Raya	0.009	0.09	0.287	1.09	0.040
Southwest Aceh	0.210***	3.10	0.546**	2.46	0.024
South Aceh	0.434***	3.61	0.454***	2.61	0.046
North Aceh	0.729***	8.15	0.735***	5.70	0.157
East Aceh	0.513***	4.68	0.689***	4.30	0.089
Aceh Tamiang	-0.043	-0.44			0.040
Langsa (city)	0.274*	1.83	0.570**	2.09	0.010
Lhokseumawe (city)	0.500***	2.73	0.563*	1.95	0.013
Banda Aceh (city)	0.205	1.39	0.354*	1.77	0.016
Population polynomial	Yes		Yes		
No. observations	5211		5211		
Pseudo R2	0.324		0.342		
Observed/predicted conflict	0.238	0.172	0.347	0.304	

Notes: The marginal effects are based on a probit regression, and are evaluated at the sample mean. The regressions include a fourth order polynomial in population size and a constant. The reported values of t-statistics are based on robust standard errors that are clustered at subdistrict level (202 clusters). *,**,*** denote values significant at levels of 10, 5, and 1 percent.

According to the previous theoretical displacement model, we jointly address the influence of socio–economic determinants and conflict variables for explaining net population change. We use both OLS and quantile regressions as two alternative estimation techniques, reporting the respective results in Tables III to V.

Table III. Determinants of change in village population (OLS)

Dependent variable	Change in village population (in .00)			
	Coeff. (1)	t-stat	Coeff. (2)	t-stat.
Conflict	-0.120	-0.80		
Conflict cluster			-0.248*	-1.79
Urban	0.902**	2.53	0.902**	2.53
Altitude	-0.303	-0.86	-0.324	-0.93
Distance (distr office)	0.039	0.24	0.027	0.17
Poor families	-0.252	-1.46	-0.250	-1.45
Fertile couples	0.652***	3.11	0.658***	3.17
Transport station	0.943**	1.97	0.925*	1.93
Police present	0.249***	2.77	0.245***	2.74
Share of Javanese	-1.272**	-2.15	-1.223**	-2.10
Central Aceh	-1.966**	-2.55	-1.879**	-2.50
West Aceh	0.283	0.88	0.308	0.98
Nagan Raya	-0.403	-1.15	-0.369	-1.13
Southwest Aceh	0.222	0.63	0.331	0.92
South Aceh	-0.172	-0.68	-0.115	-0.43
North Aceh	0.253*	1.81	0.354**	2.46
East Aceh	0.071	0.35	0.185	0.83
Aceh Tamiang	1.223***	2.81	1.180***	2.72
Langsa (city)	2.752**	2.53	2.838**	2.48
Lhokseumawe (city)	0.822	0.69	0.904	0.77
Banda Aceh (city)	0.382	0.41	0.423	0.45
Population polynomial	Yes		Yes	
No. observations	5,211		5,211	
R2	0.133		0.134	

Notes: Regressions are performed by OLS, and include a constant and fourth order polynomial of population size, the coefficients on which are not reported. The reported values of t-statistics are based in robust standard errors that are clustered on subdistrict level (202 clusters). *.**.*** denote values significant at levels of 10, 5, 1 percent.

In Table III, the two specifications differ only with respect to the definition of the conflict variable as measuring individual *Conflict* or the presence of a *Conflict cluster*. Surprisingly, we do not find that reported conflict has a robustly significant negative effect on net population change. However, the conflict cluster variable has a significantly negative effect on net population change in most of our specifications. This may be due to the fact that the clustering of conflicts better reflects the relevant push factors for forced migration over the whole three-year period than the reported conflict occurrence in the last year in any given village. From column (2) in Table III, we see that the presence of a conflict cluster in a subdistrict (20% or more of the villages reporting conflict) reduced village population on average by about 25 persons ceteris paribus. From the geographic distribution of migration flows, we also see that the single most affected district, Central Aceh, experienced also the highest net population outflow of, ceteris paribus, almost 200 persons per village on average. The largest forced migration flows (within the province) have been going to the Northeastern coast of Aceh: the city of Langsa, and the neighbouring Aceh Tamiang district (c.f. Figure 1). The data also supports the evidence that the Javanese population has been more likely to migrate: net outward migration from a village increased by about 12 persons on average with a 10 percentage point increase in the share of Javanese population within the subdistrict.

By applying a quantile regression technique, the overall effect of conflict–induced displacement provided by the OLS estimation results can be further decomposed. The two alternative model specifications (A and B) of the quantile estimations (Table IV) differ only in the inclusion of district dummies: whereas in model B the conflict cluster variable reduces both population outflow and inflow, the effect of conflict in outflow villages is directly captured through the district dummies in model A. This may be due to clustering of conflict affected subdistricts. The impact of conflict on population outflow (near to the first quantile, Q = 0.25) is smaller than its impact on inflow (near to the Q = 0.75 quantile). Furthermore, the quantile regressions also draw a more differentiated picture of the geographic distributions of population movements. In the districts of Central Aceh, West Aceh, and Nagan Raya, we observe both villages with larger population outflows and villages with larger inflows; this may reflect the presence of inner-district migration.[11] Beyond that, stronger migration flows can be registered towards the coastal cities of Langsa and Banda Aceh, while Lhokseumawe

[11] This pattern might be amplified by measurement errors in village population if they were larger in these most affected regions.

experienced less population inflow. This may be due to the fact that neighborhoods in the industrial area of Lhokseumawe, home to many Indonesian, foreign and local businesses, have been particularly affected by GAM activities such as the 'village tax' (Schulze, 2004).

Table IV. Quantile regressions of population change

Dependent variable	Change in village population (in .00)						Test Q25 = Q75
Model A.	Q25	t-stat	Q50	t-stat.	Q75	t-stat.	p-val.
Conflict cluster	-0.008	-0.58	-0.028**	-2.31	-0.075**	-2.37	0.030
Urban	0.030	0.61	0.059	1.52	0.043	0.35	0.920
Altitude	-0.179***	-2.99	-0.091***	-2.88	-0.155**	-2.14	0.751
Distance (dist office)	-0.024	-0.87	0.078***	3.43	0.246***	6.18	0.000
Poor families	-0.003	-0.13	0.069***	4.45	0.084*	1.79	0.047
Fertile couples	0.273***	3.19	0.136***	3.62	0.397***	5.40	0.173
Transport station	0.110	0.79	0.347***	2.64	0.549***	2.58	0.043
Police present	0.039***	3.03	0.029***	3.36	0.054**	2.22	0.512
Share of Javanese	-0.526***	-2.67	-0.164***	-4.16	-0.123	-1.31	0.037
Central Aceh	-3.631***	-5.81	-0.683***	-2.35	0.460***	2.57	0.000
West Aceh	-0.171***	-4.31	0.026	0.94	0.221***	2.68	0.000
Nagan Raya	-0.177**	-2.10	-0.052***	-2.75	-0.100*	-1.68	0.408
Southwest Aceh	-0.242***	-3.83	-0.065	-0.74	0.071	0.86	0.000
South Aceh	-0.104**	-2.20	0.046	1.10	0.075	1.28	0.006
North Aceh	0.001	0.04	0.001	0.06	0.003	0.09	0.946
East Aceh	-0.099	-1.07	0.011	0.39	0.042	0.61	0.157
Aceh Tamiang	0.218**	2.37	0.172***	3.31	0.301**	2.45	0.540
Langsa (city)	0.087	0.20	1.142	1.27	3.141***	2.86	0.001
Lhokseumawe (city)	-0.061	-0.41	-0.394***	-2.90	-0.649**	-2.22	0.052
Banda Aceh (city)	0.641*	1.86	0.428	1.50	1.446***	2.89	0.112
Population poly	Yes		Yes		Yes		
Pseudo R2	0.076		0.020		0.085		

Model B.							
Conflict cluster	-0.040**	-2.48	-0.043***	-5.10	-0.070***	-2.97	0.231
Urban	0.072	1.39	0.078**	2.15	0.233	1.61	0.235
Further controls	Yes		Yes		Yes		
District dummies	No		No		No		
Pseudo R2	0.043		0.012		0.069		

Quartile range of population change			
Q0 – Q25	Q25 – Q50	Q50 – Q75	Q75 – Q100
[−3747;−6]	[−5;9]	[10;37]	[38;2116]

Notes: Observations N = 5,211. Reported values of t-statistics are based on bootstrap standard errors (with 1000 replications). All regressions include a constant and a fourth order polynomial in population size, the coefficients on which are not reported. Model B includes the same set of explanatory variables as Model A except for the district dummies; full results are available on request.

The quantile regressions show that the decrease in village population was larger in subdistricts with a relatively high share of ethnic-Javanese, while ethnic composition does not explain differences in net village population inflow. Thus, although the presence of ethnic-Javanese is not related to the outbreak of conflict (Table II), it explains strongly the outward migration flows. These results are reinforced when distinguishing between conflict and non-conflict villages (see Table V): Population is reduced with the share of ethnic-Javanese, but only in conflict-affected villages. Thus, corroborated by other sources (e.g. Schulze, 2004), we can state that although GAM officially denied targeting ethnic-Javanese, they were nevertheless intimidated into leaving their homes.

Beyond the evidence of conflict–induced displacement, we also find a significant role for other socio–economic determinants of aggregate displacement movements. The *Urban* variable, reflecting the concentration of economic activity, shows a clear pattern of explanation: urban villages experience a larger increase in net population (Table III). In the quantile regressions (Table IV) the *Urban* dummy loses significance, but geographic *Altitude* is significantly related to larger decreases as well as smaller increases in population. This result indicates that migration runs from rural and mountainous central areas to the more urbanized Northern and Southern coastal areas of the Aceh province. These two measures of economic remoteness/urbanization show strong evidence for a rural–urban migration pattern.

The same pattern can be retraced in the case of inward migration to the large cities, particularly Langsa. When distinguishing between villages that reported conflict and those that did not (Table V), it is apparent that the mere presence of conflict in large cities or urban regions does not hinder an ongoing urbanization process.

Our control for political remoteness, the *Distance to the district office* turns out to be insignificant in most specifications, although it does lead to larger population inflows among the inflow villages in the quantile regressions. The indicator of availability of any transport station in the community, which we use as a proxy for migration costs, is mostly positively related to population change. However, it is most likely that this variable also captures pull factors of rural–urban migration. Based on the evidence from quantile regressions (Table IV), direct availability of transport opportunities seems to play only a minor role in displacement decisions in the case of population outflow, but might act as a significant pull factor for population inflows. However, since actual migration costs include a broad range of expenses, they may not be well captured by a transport station dummy.

Displacements are related to a lack of police presence and thus we can infer that they are also due to institutional weaknesses of the state. The presence of a police station has a significant and overall robust positive effect on population change, reducing outflow and increasing inflow (Table IV) in both conflict and non–conflict villages (Table V). Thus, public institutions still play a significant role in times of large population displacement.

The effect of poverty on net population change in a village acts generally through several channels. The share of poor families in a village has no robustly negative effect on population change in OLS regressions (Table III), although the negative effect becomes significant in villages that did not report conflict (Table V). In quantile regressions the share of the poor in a village even increases population inflows (Table IV). Thus, in the face of conflict, poverty as a push factor seems to be less relevant; the results confirm the theory of a 'migration hump' that is mainly produced by unavailable resources (and information) for migration of the lower income groups. Furthermore, the increased pull effect of villages with a high share of poor families may also be indicative of a policy bias, since the composition of this variable is based on the registration for social support programs for the poor. Poor families tend to migrate to destination sites where governmental support is more likely, and thus, registered poverty may also be related to a larger inward migration.

Table V. Determinants of population change by conflict occurrence (OLS)

Dependent variable	Change in population in villages				Test	
	(1) w/o conflict		(2) with conflict		(1) ≥ (2)	(1) ≤ (2)
	Coeff.	t-stat	Coeff.	t-stat	p-val	p-val.
Urban	0.473	1.53	1.756**	2.08	0.070	
Altitude	-0.618*	-1.78	0.822	0.76	0.101	
Distance (dist office)	-0.095	-0.63	0.686	1.21	0.086	
Poor families	-0.297*	-1.69	-0.250	-0.54		0.461
Fertile couples	0.721**	2.47	0.652**	2.08		0.432
Transport station	0.863*	1.69	0.377	0.46		0.302
Police present	0.225**	2.52	0.417**	2.36	0.150	
Share of Javanese	-0.318	-0.46	-2.023**	-2.32		0.052
Central Aceh	-1.363*	-1.95	-3.893**	-2.56		0.053
West Aceh	0.255	0.82	-0.026	-0.09		0.241
Nagan Raya	-0.155	-0.47	-3.211***	-6.29		0.000
Southwest Aceh	0.001	0.00	1.146	1.09	0.116	
South Aceh	-0.370	-1.10	0.297	1.21	0.065	
North Aceh	0.094	0.72	0.422*	1.85	0.103	
East Aceh	0.219	0.97	-0.635	-1.58		0.036
Aceh Tamiang	0.884**	2.09	0.597	0.51		0.401
Langsa (city)	1.498	1.49	6.665***	2.73	0.043	
Lhokseumawe (city)	-0.065	-0.08	3.273*	1.75	0.039	
Banda Aceh (city)	0.524	0.49	0.540	0.51	0.495	
Population poly	Yes		Yes			
No. observations	3,972		1,239			
R2	0.101		0.242			

Notes: Regressions are performed by OLS, and include a constant and a fourth order polynomial of population size, the coefficients on which are not reported. The reported values of t–statistics are based on robust standard errors that are clustered on subdistrict level (188/116 clusters). *,**,*** denote values significant at levels of 10, 5, and 1 percent. The last two columns present p-values of pairwise hypotheses tests on the H0 hypothesis of inequality of coefficients in (1) and (2).

Our control variable for fertility, the number of fertile age couples, is positive and significant in all regressions. Obviously, population change is also driven by population

growth. In all regressions we also include a fourth grade polynomial for population size that indicates a highly significant nonlinear influence of village size on population changes.

Finally, these results demonstrate that internal displacements in conflict situations, at least in the context of Aceh, are not unidimensionally caused by conflict variables. The factors that drive common rural–urban migration movements are still relevant in a conflict situation. Thus, traditional push and pull factors are not suspended in times of conflict, though it is obvious that large displacements are primarily initiated by the conflict. However, without other economic, political, social, and institutional factors at work, such conflict–induced population movements would certainly be less significant in their numbers and magnitudes.

CONCLUDING REMARKS

The intention of this article is to contribute to an improved understanding of the determinants of civil conflicts and their related forced migration movements. Our empirical analysis is based on village–level data for the province of Aceh, collected by a regular village census taken throughout Indonesia. Since we can only observe net changes in village population, we are unable to model individual or household migration behavior. Even though we cannot learn from our analysis *who* migrates in the face of a conflict, we are able to identify *which villages* are more prone to population outflows and inflows. This meso–level approach is able to indicate the most relevant push and pull factors at the village–level. This is an innovation in forced migration research.

In Aceh, conflict occurrence was very strongly related to the geography of conflict clusters. The presence of such conflict clusters contributed significantly to the displacements of the Acehnese population during our period of observation. Relatively large displacement flows could be observed from the most conflict-affected regions in central Aceh towards the more stable and prosperous urban areas at the coast. However, there were also large population rearrangements between villages within the most conflict-affected districts. Although often categorized as a political conflict, the intimidation of ethnic-Javanese had a substantial effect on outward migration, particularly from conflict-affected villages with a relatively large Javanese population. Furthermore, security, specifically police presence, has had a significant influence on migration flows.

Finally, while we know that the clashes between the GAM, militias and military forces were the major driving forces behind the large displacement of the Acehnese population, we also find convincing evidence for the relevance of conventional socio–economic migration determinants. These results indicate that economic opportunities and rural–urban migration incentives play an important role even in the context of civil conflict. Traditional migration considerations are still effective, even during periods of severe clashes. Potentially, civil conflict might even work as an accelerator of an ongoing urbanization process.

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APPENDIX

Table A. Descriptive statistics, Aceh sample

Variable	Definitions	Mean	St.dev.	Min.	Max
Population change	Change in village population (in hundreds) between 1999 and 2002	0.004	2.523	-37.47	21.16
Conflict	Dummy variable set to one if a conflict with or without casualties has been reported (within the previous year, reported in 2002)	0.238	-	0	1
Conflict cluster	Dummy variable set to one if at least 20% of the villages within the same subdistrict (kecamatan) reported conflict (within the previous year, reported in 2002)	0.347	-	0	1
Urban	Dummy variable set to one if municipality was officially considered as urban in 1999 (classification is based on economic structure and access to services)	0.080	-	0	1
Altitude	Altitude in thousand meter above sea level	0.178	0.311	0	2
Distance (dist office)	Distance to the district (Kabupaten) office measured in hundreds of kilometers in 1999	0.463	0.345	0	4.85
Poor families	Share of families in the village who were officially registered as poor in 1999	0.546	0.268	0	1
Fertile couples	Number of fertile age couples in 1999 in the villages (in hundreds)	0.986	1.179	0	15.1
Transport station	Dummy variable set to one if transport station (bus, train, airport, seaport) is available in the village in 2002 (for large towns is also set to 1 if other parts of the town have a station)	0.061	-	0	1
Police presence	Dummy variable set to one if police station was not far/very far to reach in 1999	0.658	-	0	1
Share of Javanese	Share of Javanese population within the subdistrict (kecamatan), estimations are based on Indonesian Census 2000	0.087	0.140	0	0.689
Population	Number of village population in 1999 (in thousands)	0.707	0.801	0.047	9.681
Central Aceh	District dummy	0.037	-	0	1
West Aceh	District dummy	0.051	-	0	1

Nagan Raya	District dummy	0.040	-	0	1
Southwest Aceh	District dummy	0.024	-	0	1
South Aceh	District dummy	0.046	-	0	1
North Aceh	District dummy	0.157	-	0	1
East Aceh	District dummy	0.089	-	0	1
Aceh Tamiang	District dummy	0.040	-	0	1
Langsa (city)	District dummy	0.010	-	0	1
Lhokseumawe (city)	District dummy	0.013	-	0	1
Banda Aceh (city)	District dummy	0.016	-	0	1

Notes: All descriptive statistics pertain to the N = 5211 villages in our sample.