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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 data–set 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 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. The study finds that the negative impact of conflict incidence on village population stock is mainly driven by reductions in inflow for slightly affected (inflow) villages, and by an outflow push for severely affected (outflow) villages. After controlling for conflict variables, socio-economic factors remain significant and robust determinants for explaining internal displacements. Villages that are more dependent on agricultural production experience larger population outflows, and smaller population inflows, which reflects a clear rural–urban migration pattern. The presence of small–scale manufacturing industries helps to retain village population. These results emphasize that forced migration cannot be considered as only a result of a unidimensional fear of violence.

Keywords: Displacement, civil conflict, Aceh

JEL Codes: C21, D74, R23

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1 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 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, e.g. Schmeidl (1997), Moore and Shellman (2004)). However, using Colombian household data, Engel and Ibánez (2007) find that, even in a conflict environment, economic incentives play an important role for 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 displace-

ments during three years of severe clashes (1999 to 2002) in the Aceh province. For this purpose, we use data on 5197 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. We distinguish between the effects of conflict–related, and more traditional socio–economic determinants of net population change. Furthermore, and additional 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 and intensity of conflict reduces net population increase. Beyond this, we are also able to identify several socio–economic factors as driving forces of population displacement that indicate an ongoing rural–urban migration movement within the province of Aceh. We find that population displacement in Aceh is not only caused by fear of violence, but also by traditional socio–economic migration variables. This corroborates the results of Engel and Ibánez (2007) for Columbian households.

The remainder of the paper is structured as follows. The next section briefly reviews the Acehnese conflict history and its effects on population displacement in the past decade. Section 3 provides a short review of the traditional migration literature and discusses the main implications that are relevant for our empirical analysis. Section 4 briefly introduces the dataset, explains the empirical strategy, and presents the results of the regression analysis. Section 5 concludes.

2 Conflict history and displacement in Aceh

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 out of a mixture of ethnic, religious, or 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. Among all 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 in August 1998, the announced process of demilitarization was significantly slowed (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 rebelion 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 hit most severely 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 persons 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 followed again 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 defence groups, and military auxiliary units. These groups are reported to have carried out severe human rights violations (AI 2004).

— FIGURE 1 around here —

Between the introduction of martial law in May 2003, and the eve of the tsunami earthquake in December 2004, an estimated 2,300 people have been 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 2006b). The Acehnese conflict has led to two distinctive 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 running along the North and East coasts, and along the South and West coasts. These displaced persons have usually remained inside the province. They returned to their villages within a few weeks and started reconstructing their houses and livelihoods. The five main areas of displacement within Aceh were North Aceh, East Aceh, Central Aceh, West Aceh, and Pidie (see Figure 1). In the 1999–2000 period, 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 from several months up to almost two years due to destruction of the houses and loss of assets (Ramly 2005). Second, there were thousands of ethnic-Javanese who left Aceh, fleeing mostly to the neighboring province of North Sumatra or to Java (UNOCHA 2003). 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 (Ramly 2005). Only a small number of Javanese sought refuge within Aceh.

The subsequent empirical analysis concentrates on net population change at the village level for the period between the fall of 1999, and the fall of 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.

3 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 the 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 makes 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. The two hypotheses are not mutually exclusive. Whether targeted individuals or households prefer to stay at home 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 and Todaro 1970). In the new economic migration

literature, Stark (1991) and other authors refine these early migration models by 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, and 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 around here —

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

nomic) 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 and 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 (non–random) targeting of violence and economic considerations. In many cases, the fear of violence and non–survival triggers nontransitory 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 has to 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.

4 Empirical analysis of displacement in Aceh

4.1 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, employment, economic activities, infrastructure, culture, 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 (5197, or 90.6% of all) where a match between

the two census rounds has been possible.

The term 'conflict' has generally no clear-cut definition. It could entail severe atrocities with significant casualties and damages as well as minor clashes. In our dataset, conflict incidence at the village level is captured by three different variables. 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.[2] Based on the data on conflict occurrence, we use three alternative explanatory variables: (i) *Conflict* is set to one if the village head has reported the occurrence of violent or non–violent civil conflict, and zero otherwise, (ii) *Violent conflict* is set to one if there has been an armed conflict which involved deaths or injuries, and zero otherwise, and (iii) *Deaths by conflict* measures the total number of deaths as a result of conflict during the previous year.[3] Between 1999 and 2002, around a quarter of the sample villages have reported the presence of conflict, and in around 13% of the sample villages this conflict was violent (Table 1).[4]

We define our main dependent variable as net population change between the two survey rounds 1999 and 2002. *Population change* measures both the *absolute* change in village population (in hundreds of inhabitants), and the *relative* change (in percent of village population in 1999). Table 1 shows that the 1236 villages that were involved in conflict during the year preceding the second survey round lost on average around 2.8% of their population between 1999 and 2002; the net population outflow was even larger in villages where conflict was violent.[5]

— TABLE 1 around here —

Based on our sample, we estimate for the period of 1999–2002 a net population outflow from the Aceh province of about 181,000 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 161,000 persons in our sample. Instead, total population in the Aceh sample decreased by 0.9%, or about 3,200 persons (see Table 1). These numbers indicate a net outward migration of about 164,000 persons in our sample villages (90.6% of all), and are in accordance with other estimates (Ramly (2005), c.f. Section 2).

4.2 Empirical strategy

Our empirical analysis is separated into two parts. First, we investigate the village–level determinants of conflict by running a probit regression to explain conflict occurrence. Second, we estimate the determinants of net population change in order to quantify the effects of conflict as well as the effects of other socio–economic variables. Additionally, we distinguish between the push and pull factors of migration.

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 $\mathbf{X}_i$, the unknown vector of parameters $\boldsymbol{\beta}$, and the normally distributed error term ϵ_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,

$$C_i \;=\; \mathbb{1}(\mathbf{X}_i'\boldsymbol{\beta} + \epsilon_i > 0), \tag{1}$$

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 (in absolute and relative terms), which is explained by a set of conflict variables and other migration-related

variables $\mathbf{Z}_i$:

$$\Delta Pop_i \quad = \quad \mathbf{Z}_i'\boldsymbol{\gamma} + \varepsilon_i. \tag{2}$$

We estimate the vector of the coefficients $\boldsymbol{\gamma}$ by two alternative procedures. First, we report estimates from the standard OLS technique. Second, we apply quantile regressions that enable us to distinguish between the push and pull factors of migration. Quantile regressions minimize a weighted sum of the absolute residuals where values above (below) a given quantile receive weights that are proportional (inversely proportional) to the quantile which 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.

Considering the lowest and highest quartile 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. By this procedure, villages with a larger than predicted net population decrease (that is, with a considerable population outflow relative to what could be expected) receive a threefold weight.[6]

Explaining conflict occurrence

In both regressions, control variables are included to reflect the previous theoretical framework and are based on data availability in the *PODES 2000* and *2003* datasets. For most socio–economic variables we rely on *PODES 2000* and indicate explicitly where we were restricted to using data from *PODES 2003*. By using explanatory variables from *PODES 2000*, we are able to reduce problems of reverse causality to a considerable extent.

Conflict occurrence is explained by a set of socio–economic and political variables.[7] 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 consid-

ered 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 and 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. For an additional control of vulnerability and conflict potential we use *Flood families* which measures the share of families in a village that has been harmed by flooding within the three years between the two census rounds.

We control for economic opportunities by including *Agricultural production* as a proxy variable for the structure of economic activity. This variable measures the share of families whose main source of living is the agriculture sector.[10] As an additional economic indicator, *Small manufacturing* controls for the presence of small– and medium–scale industries in a village.

For capturing the influence of the socio–cultural environment, we include the ethnic and religious diversity within a village. *Ethnic diversity* is a dummy, set to one if there was more than one ethnic group in the village in 2002, and zero otherwise.[11] In Aceh, multi-ethnic villages are not rare, in fact 38.7% of the sample villages consist of an ethnically mixed population. *Religious diversity* is a dummy set to one if there is more than one religious group in the village that has a place of worship, and zero otherwise.

A further set of variables controls for the political and security environment. The security variable *Police presence* 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 mitigating 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, and Pradhan (2004)). Furthermore, we include the dummy variable *Head educated* which indicates that the respondent to the questionnaire (most tipically the village

head) has completed at least secondary school or higher. We expect that well–educated village officials are more capable in conflict prevention. Additionally, two separate measures, *Distance to (sub–)district office*, capture the (political) remoteness of a village. The distance of a village to its respective district (*Kabupaten*) and sub-district (*Kecamatan*) office are measured in hundreds of kilometers.[12]

For addressing cluster effects of conflict occurrence, we include in a second regression *Violent conflict (district–level)* as a measure of conflict intensity at the district level. This variable is calculated as the share of villages within the district that were involved in a violent conflict. We do not expect this variable to be endogenous, as the average number of villages per district is relatively large (around 530), but also because the two conflict variables (*Conflict* and *Violent conflict*) are not equivalent in their definitions. Finally, we control for nonlinearity effects of the village population size on conflict incidence.

The determinants of population change

In the regressions explaining population change we apply—in addition to the conflict variables—a similar set of socio–economic variables as for the conflict occurrence model. These are the *Poor families* variable controlling for village poverty, the proxies for economic activity, *Agricultural production* and *Small manufacturing*, and the socio–cultural determinants, *Religious* and *Ethnic diversity*.

Additionally, we account for location by including geographical *Altitude* measured in thousand meters above sea level. We expect this variable to be positively correlated with emigration, as economic activity in Aceh is concentrated rather in the flat, coastal regions. The *Transport station* variable proxies for costs of migration by indicating the presence of either a bus or train station, airport, or seaport in the village. For measuring the effect of police presence we include the continuous variable *Distance to police* for the distance to the nearest police post (in kilometers). We expect that population outflow is larger if the nearest police station is far away (especially, in the face of a conflict).

Basically, changes in village population are either caused by differences in the fertility–mortality ratio or by (forced) migration movements.[13] Variations in fertility are controlled for by the variables *Family size* and *Change in family size*. Family size is calculated as the number of inhabitants divided by the number of families in 1999, while change in family size measures the change in the average family size between the two census rounds. The latter variable also serves as a proxy for measurement error in population size, which might arise because most villages lack exact population registries, and only 22.3% of the sample villages perform population registration on a regular basis.[14]

4.3 Estimation results

Explaining conflict occurrence

Table 2 reports the estimates of two conflict model specifications. To reduce the problem of endogeneity in our regressions on the determinants of conflict occurrence, we take all explanatory variables (except for religious diversity) from the earlier *PODES 2000* round for estimating conflict occurrence in 2001/2002.[15]

— TABLE 2 around here —

The likelihood that a (violent) conflict arises might be influenced by political, civil, socio-economic, or other conflict-related variables.

Poverty significantly increases conflict occurrence. If the share of poor households in a village rises by 10%, the probability of conflict occurrence increases by 0.8% (evaluated at the sample mean of all other variables). Similarly, disaster-ridden villages are more prone to civil clashes. We also find that the Acehnese conflict is affected by socio–economic variables. Villages that are more dependent on agricultural production face a higher risk of conflict, while economic activity, measured by the presence of SMEs, raises conflict probability by around 5%.

As the Acehnese conflict is not considered to be primarily caused by ethnic or religious fragmentation, we find no robust results for the influence of these factors. Although religious diversity seems to reduce conflict occurrence, this effect vanishes when we control for conflict occurrence at the district–level, while the effect of more ethnicities even takes the opposite sign. Furthermore, we find evidence that governance and executive structures are related to conflict incidence. The presence of a police office nearby reduces the potential of violence by around 3%, while the presence of an educated village official (with at least secondary education) is also associated with lower conflict probability, at least as long as conflict clustering is not accounted for. Distance to the political centers of the districts and subdistricts are proxies for village remoteness, and reduce the probability of conflict.

Our estimations also indicate that villages within conflict zones are more prone to be involved in a conflict. When the district–level share of villages involved in a violent conflict increases by 10%, the broader defined conflict risk in a village increases by around 16%. This indicates that conflict clustering and contagion effects are significant factors in the Acehnese conflict.

The determinants of population change

According to the displacement model in Section 3, 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 3 and 4.

— TABLE 3 around here —

In Table 3, the specifications differ with respect to the definition of the dependent variable and to the definition of the conflict variable. *Population change* is both measured in absolute and relative terms, while conflict incidence is captured by a binary (*Conflict*) or a continuous (*Deaths by conflict*) variable.[16]

As expected, we find in all OLS specifications a negative effect of conflict on net population change. The occurrence of a conflict leads to an average reduction in population of about 18 persons; if the conflict turns out to be violent, the population reduces on average by about 30 persons.[17] By specifying the number of conflict deaths, we see that an additional casualty reduces the village population by around 10 persons on average. Specification (3) shows in relative terms that a conflict reduces a village population on average by about 1.36 percentage points. If we now apply a quantile regression technique, the overall effect of conflict–induced displacement provided by these OLS estimation results can be decomposed further.

— TABLE 4 around here —

The two alternative model specifications (A and B) of the quantile estimations (see Table 4), show that 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). This indicates that while conflict occurrence is a strong reason for emigration, it is an even stronger reason for *not* entering a conflict-ridden village. Interestingly, the *Deaths by conflict* variable shows an opposite effect; the effect of deaths by conflict in outflow villages (lowest quartile) is stronger and more significant than the effect on inflow villages (upper quartile). Hence, violent conflict, defined in a narrow sense by the occurrence of casualties, primarily reinforces the push factors instead of reducing the pull factors of migration. In contrast, conflict defined in a broader sense, that is a conflict that does not necessarily involve casualties, decreases the attractiveness of a village by more than its effect on the population outflow of a village. This is also well reflected in Part B of Table 4. Conflict incidence raises average population outflow ($Q = 0.25$) by around 0.9% while average population inflow ($Q = 0.75$) is reduced by around 2.2% points. On the contrary, average population outflow increases by about 0.5% points per additional casualty, while average population inflow is only insignificantly reduced. According to these results, the negative impact of conflict incidence on a village population stock is mainly

driven by a reduced inflow for the slightly affected (inflow) villages, and by an outflow push for severely affected (outflow) villages.

Beyond the evidence on conflict–induced displacement, we also find a significant role for other socio–economic determinants of individual or household displacement decisions.[18] 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 throughout a positive effect on population change. Poverty as a push factor seems to be less relevant; the results confirm the theory of a 'refugee hump' which is mainly produced by unavailable resources (and information) for migration of the lower income groups. However, the results might also reflect higher fertility in the lower income groups. Furthermore, the increased pull effect of villages with a high share of poor families might also be indicative for 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 might also be related to a larger inward migration.

The variables reflecting economic activity show a clear pattern of explanation. Villages that are more dependent on agricultural production experience larger population outflows, and smaller population inflows. This, together with remoteness measured by geographical altitude, shows strong evidence for a rural–urban migration pattern. In the Aceh province, population displacement runs from rural and mountainous areas of Central Aceh to the more urbanized Northern and Southern coastal areas of the province. This result is corroborated by our control variable for the presence of small and medium manufacturing industries. Although not significant in the OLS estimation, this variable has a positive effect on net population change for the lower quantiles. Hence, the presence of SME industries in a village is more a reason for staying than for coming. Small–scale manufacturing activity helps to retain village population and weakens the push factors without significantly changing the pull factors.

Migration costs, proxied by the indicator of availability of any transport station in the community, do not show the expected influence. For all regressions on absolute population change, this variable turns out to be insignificant; direct availability of transport opportunities seems to play only a minor role in displacement decisions. This finding is not very surprising as the actual costs of migration incurred by a household include a broad range of expenses, which might not be well captured by a transport station dummy. We also control for ethnic and religious diversity but, as the Acehnese conflict is not primarily religiously or ethnically motivated, their roles are a priori less clear. While population in absolute terms is increasing with ethnic diversity in the OLS regressions, the quantile regressions reveal a more complex pattern: Ethnically diverse villages tend to have both a larger population outflow and a larger population inflow. Thus, there is no evidence for displacement having entailed an ethnic rearrangement (homogenization) of the Acehnese society. In contrast, religious diversity has a consistently positive influence on population change, especially as a retaining factor, reducing the population outflow (at lower quantiles).

Displacements are also related to a lack of police presence and thus are due to institutional weaknesses of the state. The distance to the next police station performs well in the OLS regression, implying that an additional ten kilometer distance to the next police station leads ceteris paribus to an average outflow of about 9 persons. The quantile regressions display that this result is mainly driven by the larger population outflow out of those villages that experienced larger decreases in population.

Our control variable for fertility, the average size of families, is positive and predominantly significant. Obviously, population change is also driven by population growth. Additionally, the variable on change in family size turns out to be highly significant throughout all regressions, potentially indicating that either the population variable, or the number of families variable, or both, are noisy. In all regressions we also include a fourth grade polynomial in population size which indicates a highly

significant nonlinear influence of village size on population changes.

Finally, our results demonstrate for the Aceh province that internal displacements in conflict situations are not unidimensionally caused by conflict variables. Other socio–economic variables, that is factors that drive common rural–urban migration movements, are still relevant in a conflict situation. Traditional push and pull factors are not suspended in times of conflict, although, it is obvious that large displacements are at least 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.

5 Conclusion

The intention of this paper is to contribute to an improved understanding of the determinants of civil conflict and 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.

We generally find strong evidence that conflict occurrence is largely reflected by conflict clusters. Violence contagion effects are prevalent determinants of the Acehnese conflict. A lack of security forces, such as the non–presence of police, and the influence of economic factors, are consistently significantly associated with conflict incidence. Furthermore, and unsurprisingly, we find strong evidence that violence in its different scales is a major determinant for the large displacements of Acehnese people that occurred during our period of observation. In particular, we display

that severe violence has a relatively strong impact on displacement working as push factor, while conflicts in general rather reduce village inward migration. However, while we know that the clashes between the GAM, militias and military forces were the major force behind the large displacement of the Acehnese population, we also find convincing evidence for the relevance of conventional socio–economic migration determinants. Our results indicate that economic opportunities play an important role even in the context of civil conflict. While villages with a dominant agricultural sector experience a larger population outflow and a reduced population inflow, the presence of a manufacturing industry in a village acts as a retaining factor. Finally, socio–economic (dis–)incentives for migration are still effective, even during the severe clashes in Aceh. Potentially, civil conflict might even work as an accelerator of an ongoing urbanization process. However, this analysis is left to further research.

Appendix. Descriptive statistics

Variable	Definitions	Mean	St. dev.	Min.	Max.
Population change (absolute)	Absolute change in village population (in hundreds) between 1999 and 2002	-0.011	2.501	-37.67	21.16
Population change (relative)	Relative change in village population (in %) between 1999 and 2002	3.410	24.624	-94.82	436.1
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	0.426	0	1
Violent conflict	Dummy variable set to one if conflict with casualties has been reported (within the previous year, reported in 2002)	0.132	0.339	0	1
Deaths by conflict	Total number of conflict-related deaths during the previous year (reported in 2002)	0.355	1.788	0	60
Poor families	Share of families in a village, officially registered as poor in 1999	0.546	0.268	0	1
Agricultural production	Share of families who live primarily from agricultural production in 1999	0.837	0.222	0	1
Small manufacturing	Dummy variable set to one if small–scale manufacturing industry is present in 1999	0.361	0.480	0	1
Transport station	Dummy variable set to one if transport station (bus, train, airport, seaport) is available in 2002	0.022	0.146	0	1
Altitude	Altitude in thousand meter above sea level	0.178	0.311	0	2
Ethnic diversity	Dummy variable set to one if there were more than one ethnicity present in the village in 2002	0.387	0.487	0	1
Religious diversity	Dummy variable set to one if there were more than one religious group with an own praying house in the village in 1999	0.008	0.092	0	1
Distance to police	Distance to the nearest police station measured in kilometers in 1999	9.440	16.581	0	99
Police presence	Dummy variable set to one if police station was not far or not very far to reach in 1999	0.368	0.482	0	1
Distance to subdistrict office	Distance to the subdistrict (*Kecamatan*) office measured in hundreds of kilometers in 1999	0.078	0.140	0	3.19
Distance to district office	Distance to the district (*Kabupaten*) office measured in hundreds of kilometers in 1999	0.463	0.344	0	4.85
Families harmed by flood	Share of families in 2002 who were harmed by flood in the past three years	0.069	0.204	0	1
Head educated	Dummy variable set to one if the respondent to the questionnaire had secondary or higher education in 1999	0.385	0.487	0	1
Conflict share at district level	Share of villages within a district (*Kabupaten*) that had been involved in a conflict (defined by the variable Conflict)	0.239	0.250	0	0.721
Family size	Average family size in the village in 1999	4.655	0.723	1.755	9.083
Change in family size	Difference between the average family sizes in a village between 1999 and 2002	-0.110	0.808	-3.639	3.915
Population	Number of village population in 1999 (in thousands)	0.707	0.801	0.047	9.681
Population squared	Square of the number of village population (in thousands) in 1999	1.142	4.207	0.002	93.72

Notes: All descriptive statistics pertain to the $N = 5197$ villages in our sample.

Tables and Figures

Table 1: Conflict and population change in the Aceh village sample, 1999-2002

	Total	No conflict	Conflict (total)	Violent conflict
Total pop. in 1999	3,675,600	2,679,000	996,500	622,900
Absolute pop. change	-3,233	24,613	-27,846	-32,233
Relative pop. change (%)	-0.09	0.92	-2.79	-5.18
Sample villages (N)	5,197	3,961 (76.2%)	1,236 (23.8%)	687 (13.2%)

Notes: Own calculations based on *PODES 2000* and *2003*. The sample covers around 90.6% of all Acehnese villages.

Table 2: Probit estimation: Conflict incidence

Conflict	Marginal effects (1)	Marginal effects (2)	Sample mean
Conflict share (district level)		0.857	0.239
		(36.78)	
Poor families	0.078	-0.013	0.546
	(3.32)	(0.58)	
Families harmed by flood	0.320	0.085	0.069
	(11.54)	(3.31)	
Agricultural production	0.179	0.098	0.837
	(5.15)	(3.29)	
Small manufacturing*	0.053	0.057	0.361
	(4.14)	(4.41)	
Ethnic diversity*	0.036	-0.013	0.387
	(2.64)	(0.96)	
Religious diversity*	-0.192	-0.094	0.008
	(3.44)	(1.51)	
Police presence*	-0.033	-0.027	0.342
	(2.48)	(2.04)	
Distance to subdistrict office	-0.084	-0.045	0.078
	(1.51)	(1.33)	
Distance to district office	-0.034	0.015	0.463
	(2.00)	(0.83)	
Head educated*	-0.040	0.010	0.651
	(3.07)	(0.79)	
Population	0.121	0.137	0.707
	(6.46)	(7.82)	
Population squared	-0.013	-0.017	1.142
	(3.92)	(5.69)	
No. observations	5197	5197	
Pseudo R^2	0.054	0.333	
Observed conflict	0.238	0.238	
Predicted conflict	0.227	0.170	

Notes: The reported marginal effects are based on a probit regression, and are evaluated at the sample mean. The absolute values of t–statistics (based on robust standard errors) are reported in parentheses. For dummy variables (marked with *) marginal effects are for a discrete change from 0 to 1.

Table 3: Determinants of change in village population (OLS)

Dependent variable	Change in village population			
	Absolute (in .00)		Relative (in %)	
	(1)	(2)	(3)	(4)
Conflict	-0.185		-1.357	
	(2.15)		(1.83)	
Deaths by conflict		-0.095		-0.153
		(1.77)		(0.82)
Poor families	0.244	0.224	3.439	3.306
	(1.66)	(1.56)	(2.74)	(2.65)
Agricultural prod.	-1.828	-1.834	-7.233	-7.445
	(5.54)	(5.66)	(3.54)	(3.68)
Small manufacturing	0.045	0.063	1.038	1.006
	(0.64)	(0.91)	(1.57)	(1.53)
Transport station	0.352	0.343	10.030	10.123
	(0.72)	(0.70)	(2.13)	(2.14)
Altitude	-1.149	-1.062	-7.107	-6.917
	(6.84)	(6.41)	(5.99)	(5.78)
Ethnic diversity	0.140	0.128	0.744	0.676
	(2.08)	(1.89)	(0.97)	(0.87)
Religious diversity	1.205	1.173	21.200	21.393
	(1.79)	(1.74)	(2.04)	(2.05)
Distance to police	-0.009	-0.009	-0.079	-0.077
	(3.36)	(3.30)	(3.14)	(3.08)
Family size	0.093	0.087	1.449	1.383
	(1.89)	(1.80)	(2.78)	(2.70)
Change in family size	0.607	0.610	10.182	10.185
	(10.33)	(10.36)	(16.21)	(16.21)
Population polynomial	Yes	Yes	Yes	Yes
No. observations	5197	5197	5197	5197
R^2	0.122	0.126	0.183	0.183

Notes: Regressions are performed by OLS, and are using robust standard errors. Regressions also include a constant and a fourth order polynomial of population size, the coefficients on these are not reported. Absolute values of t–statistics are in parentheses.

Table 4: Quantile regressions of population change

A. Dependent variable	Absolute change in village population (in .00)					
	Q25	Q50	Q75	Q25	Q50	Q75
Conflict	-0.026	-0.070	-0.089			
	(1.73)	(5.64)	(3.75)			
Deaths by conflict				-0.042	-0.018	0.003
				(1.68)	(1.51)	(0.19)
Poor families	0.072	0.110	0.106	0.070	0.084	0.098
	(2.69)	(6.24)	(2.56)	(2.63)	(4.60)	(2.48)
Agricultural prod.	-0.108	-0.099	-0.302	-0.108	-0.122	-0.294
	(1.66)	(2.07)	(2.75)	(1.81)	(2.57)	(2.83)
Small manufacturing	0.032	0.041	0.044	0.040	0.039	0.027
	(2.06)	(3.67)	(1.57)	(2.45)	(2.97)	(1.08)
Transport station	0.088	0.130	0.325	0.086	0.125	0.341
	(0.64)	(1.43)	(1.59)	(0.62)	(1.36)	(1.73)
Altitude	-0.493	-0.171	-0.153	-0.452	-0.160	-0.161
	(4.53)	(6.46)	(2.56)	(4.32)	(6.44)	(2.77)
Ethnic diversity	-0.054	0.064	0.147	-0.057	0.065	0.157
	(2.41)	(4.36)	(4.86)	(2.51)	(3.99)	(5.99)
Religious diversity	0.667	0.399	0.315	0.667	0.419	0.341
	(3.48)	(1.85)	(0.60)	(3.60)	(1.95)	(0.59)
Distance to police	-0.005	-0.001	0.000	-0.004	-0.001	0.001
	(3.82)	(2.21)	(0.40)	(3.49)	(2.18)	(0.52)
Family size	0.022	0.025	0.054	0.017	0.022	0.051
	(2.13)	(3.13)	(3.16)	(1.61)	(2.52)	(3.23)
Change in family size	0.331	0.246	0.297	0.336	0.250	0.298
	(13.42)	(13.30)	(14.55)	(13.89)	(14.01)	(14.74)
Population polynomial	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	0.083	0.030	0.083	0.075	0.030	0.082
B. Dependent variable	Relative change in village population (in %)					
	Q25	Q50	Q75	Q25	Q50	Q75
Conflict	-0.943	-1.480	-2.225			
	(2.47)	(5.21)	(3.95)			
Deaths by conflict				-0.493	-0.221	-0.012
				(1.90)	(1.74)	(0.07)
Further controls	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	0.105	0.057	0.086	0.105	0.055	0.084

Quartile range of absolute population change			
$Q0 - Q25$	$Q25 - Q50$	$Q50 - Q75$	$Q75 - Q100$
$[-3767; -9]$	$[-8; 7]$	$[8; 36]$	$[37; 2116]$

Notes: Observations $N = 5,197$. Standard errors are based on 1000 bootstrap replications. Regressions also 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; full results are available on request. Absolute values of t–statistics are in parentheses.

Figure 1: The districts of the Aceh province

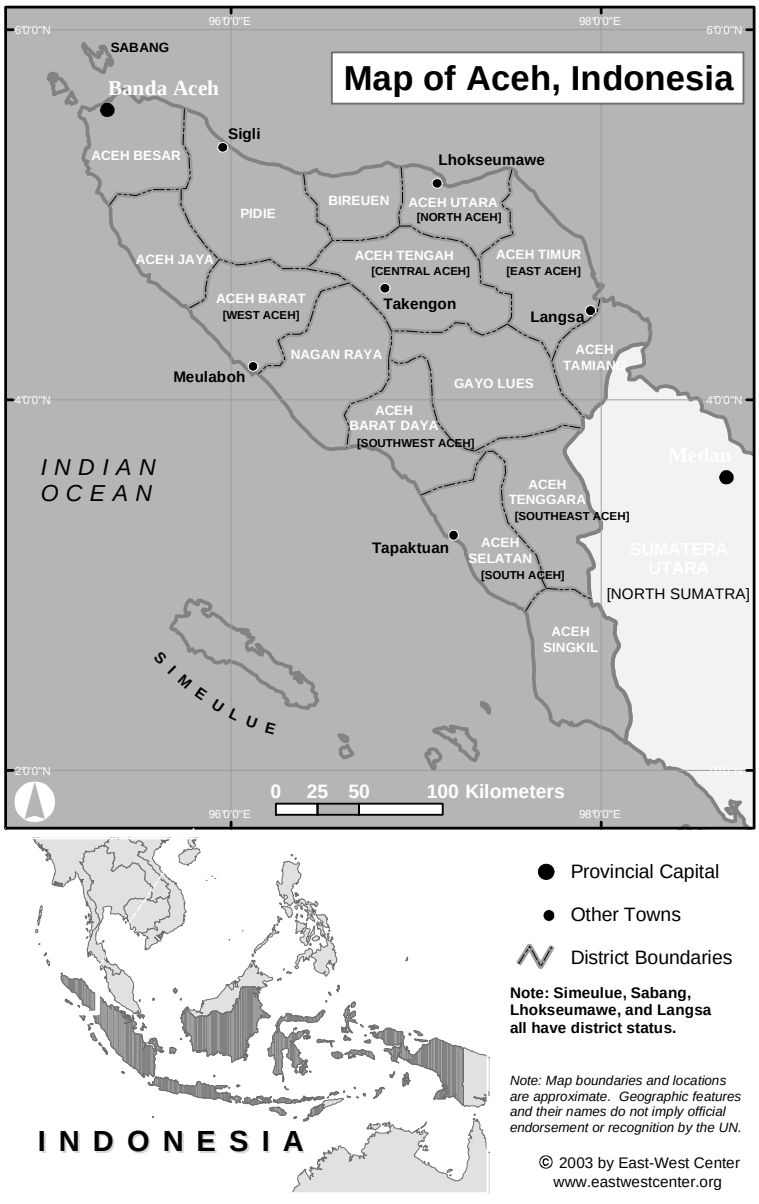
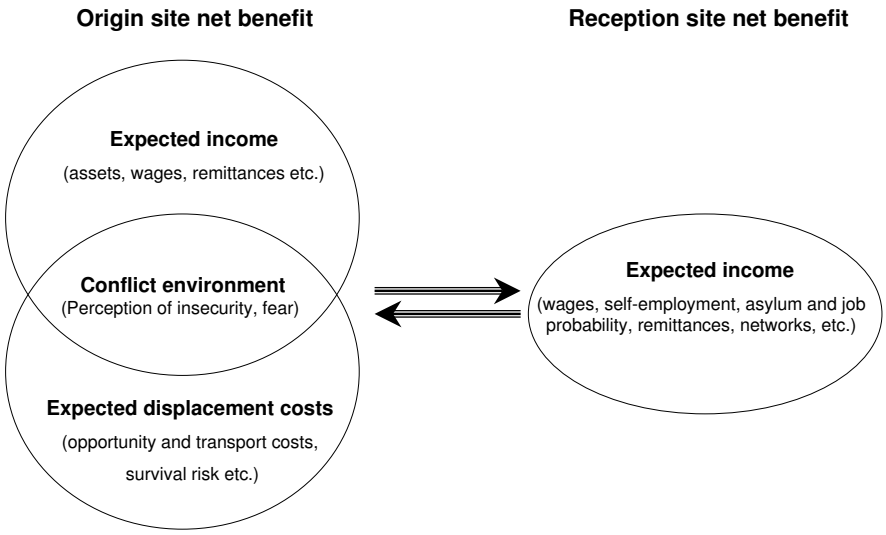


Figure 2: Perceived value of displacement



Notes

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

[2] 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, and 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.

[3] According to the village heads, more than 2,400 people were killed, and about 2,200 were injured because of conflict during the year preceding the fall of 2002.

[4] Villages with conflict and violent conflict constitute nearly the same proportion of Aceh as a whole and in our matched 90.6% sample. As a comparison, *PODES 2003* reports a share of conflict of 23.8%, and a share of violent conflicts of 13.2% of villages in the whole Aceh province.

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

[6] The reported standard errors are based on a bootstrap procedure with 1000 replications.

[7] Descriptive statistics and definitions of variables are presented in Appendix.

[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 the 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 a better social safety coverage.

[10] Alternative measures of economic urbanization, like the share of village land devoted

to industrial use or an urban dummy, were also considered, and yielded similar results.

[11] Although we would prefer information from the beginning of the period, there was no question on ethnicity in the 1999 questionnaire.

[12] These variables are only reported in the regressions on conflict occurrence, and are omitted from the regressions on population change since they had no explanatory power.

[13] 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 change the deaths by conflict and by epidemics over the last period.

[14] The existence of outliers in the average family size variable indicates potential measurement errors in population, or the number of families, or both.

[15] By using explanatory data predominantly from *PODES 2003*, Barron, Kaiser, and Pradhan (2004) encountered the problem of endogeneity bias in explanatory variables, since conflict occurrence affects almost all explanatory variables to some extent.

[16] We also run our regressions on population change with the alternative variable *Violent conflict*, which represents a narrow definition of conflict by only capturing conflicts with reported casualties. Using this variable does not change our general findings.

[17] Regressions with the *Violent conflict* variable are not reported, but results are available on request.

[18] Table 4 reports only the estimation results of the control variables for model A, where the dependent variable is given by the absolute changes of village population. Results for the covariates of model B, where the dependent variable is given by relative changes in population, are throughout similar to those of model (A). These results are available on request.

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