

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. We use data on around 5200 Acehnese villages from two rounds of the Indonesian Village Potential Census (*PODES*) and relate village level population change to conflict variables and traditional determinants of migration. After controlling for conflict variables, we find that socio-economic factors are still significant and robust determinants for explaining forced migration movements. This shows that forced migration cannot be considered as a result of a unidimensional fear of persecution.

JEL Classification: C21, D74, R23

Keywords: Forced displacement, civil conflict, Aceh

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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. In contrast, internal displacement did not reduce to the same extent that cross-border refugee movements did. At the end of 2005, globally 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 descriptive literature, the relevance of traditional 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, Engel and Ibáñez (2007), using the case of Colombia, 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.

To our knowledge, this study is the first attempt to identify the determinants of displacement at the village level. For this, we concentrate on the conflict in Aceh, Indonesia, where displacement behavior has not yet been systematically addressed. The Aceh conflict is a politically motivated conflict which arose between the Indonesian military forces TNI (*Tentara Nasional Indonesia*) and the Acehese Freedom Movement GAM (*Gerakan Aceh Merdeka*). This conflict was particularly intense between 1999 and 2004. Large-scale displacements were a recurrent feature during this period. For the province of Aceh, the number of displaced persons since 1999 has been estimated at more than 500,000 (IDMC 2006b).

Our main task is to investigate the major determinants of these internal forced mi-

gration movements during three years of severe clashes between 1999 and 2002. For this purpose, we use data on 5197 Acehnese villages from two rounds of the Indonesian Village Potential Census *PODES 2000* and *2003*. Unlike empirical analysis based on household data, this village-level dataset enables us to focus on village-specific determinants of migration, which makes this kind of analysis unique. Our approach makes a distinction between the effects of conflict-related, and more traditional socio-economic determinants of net population change. We explain population change by both OLS and quantile regressions, where the latter enables us to focus on different parts of the population change distribution. Particularly by using this technique, we are able to differentiate between determinants of inward and outward population flows.

Obviously, violence and displacement are strongly linked, and this relationship is clearly reflected in our results: the presence and intensity of conflict reduces net population increase. Furthermore, we are also able to identify significant socio-economic explanatory factors behind population movements. Beside purely conflict-induced displacements, we also find a relatively clear pattern of rural-urban migration. Economic opportunities, reflected by the sectoral structure of economic production, act as important pull factors. Thus, we find that population movements in Aceh are not purely a result of fear of violence, but that traditional migration variables also play an important role. This corroborates the results of Engel and Ibáñez (2007) for the case of Columbia. By this meso-level analysis, we can fill an important gap in the understanding of the mechanism of large conflict-induced internal displacements.

The remainder of the paper is structured as follows. The next section briefly reviews the conflict history and its effects on displacement in the past decade in Aceh. Section 3 provides a short abstract of the traditional migration literature and discusses the main implications 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 displacements in Aceh

Indonesia's recent history is characterized by persistent conflicts and population displacements in various provinces. The frequently inflamed violent conflicts between communities as in West and Central Kalimantan, Central Sulawesi, or the Maluku, originate mostly from ethnic, religious, or social causes. In contrast, conflicts in Aceh, Timor-Leste or Papua are more politically motivated and are carried out between rebel fighters and the Indonesian state, which is more characteristic of the 'classical' type of civil war. Suffering frequently from violence, the armed conflict in the Aceh region has been the most persistent conflict in Indonesia, lasting for almost three decades.

Since the mid-70s, the Aceh Freedom Movement (GAM) grew steadily and gained considerable power. This provoked frequent clashes between 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, the transitional President, Habibie, created an atmosphere of momentous change in Aceh. 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 GAM. The months preceding Indonesia's general election in October 1999 saw a

dramatic increase in the number of IDPs (IDMC 2006b).

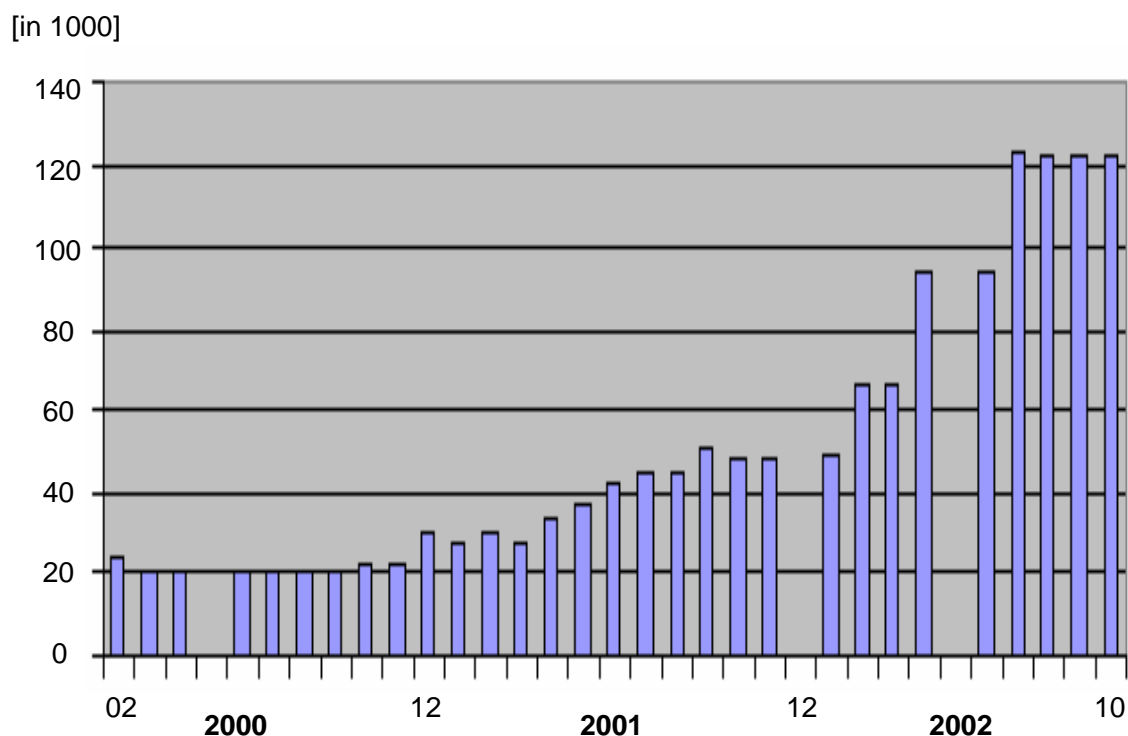
In early 2000, GAM announced the rebels' willingness to negotiate a cease-fire if military operations, including roadblocks, door-to-door-searches, and other actions to locate GAM members, were discontinued. In May 2000, GAM and the Indonesian authorities agreed on a humanitarian pause. However, on the 1st of June, 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 by launching a military offensive against the GAM rebels. The majority of victims of this offensive were civilians, and severe atrocities have been committed by both sides. The district of Central Aceh was hit most severely during this period, when hundreds of people were killed by 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 GAM and the Indonesian government agreed to turn the armed conflict into a political dispute with 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 were again seen in Aceh. The Indonesian government reacted by implementing martial law on the 9th of May 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

Figure 1: Numbers of Aceh IDPs in North Sumatra between 2000 and 2002



Source: IDMC (2006b)

units. These groups are 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 number of 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 26 December 2004, which killed over 127,000 people within minutes, 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. At the end of 2005, the weapon decommissioning of the GAM was completed (IDMC 2006b). In July 2006, the Indonesian parliament enacted the Aceh governance bill into law, and on 10th of December 2006, local elections were. As a result,

a former GAM leader became the new governor of the Aceh province.

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). Basically, the Acehese conflict has led to two distinctive patterns of displacement. First, within the province, local people have in general 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 Appendix B). In the 1999–2000 period, the average length of stay of the IDPs in the various sites was rather 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. Figure 1 displays the numbers of IDPs who remained displaced in North Sumatra for a longer time.

Our 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 address the wave of forced displacement that followed the introduction of martial law in May 2003.

3 Migration and displacement theory

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. However, although many individuals or whole families flee to save their lives in times of violent conflicts, we also observe that many people do 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 families do not only take into account security factors, but other traditional (economic or social) determinants as well. The two hypotheses are not (mutually) exclusive. Whether targeted individuals or families prefer to stay at home even in times of insecurity certainly depends on the degree of risk aversion. As economic determinants can still be expected to play a significant role in explaining forced migration, we must refer briefly to the main implications of the traditional migration literature.

Traditionally, if people migrate voluntarily, they weight benefits against costs from living at the origin or destination site. When deciding upon migration, 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). When considering forced migration or displacement, insecurity creates additional costs that modify the decision-making outcome, and diminishes the relevance of other migration determinants.

Labor migration from less-advanced and less-productive sectors to the modern and more-productive sectors has been the focus of an influential paper by Harris and Todaro (1970). Their rural-urban labor migration model predicts that the rate of migration will be higher, the larger the urban-rural wage gap, and the higher the

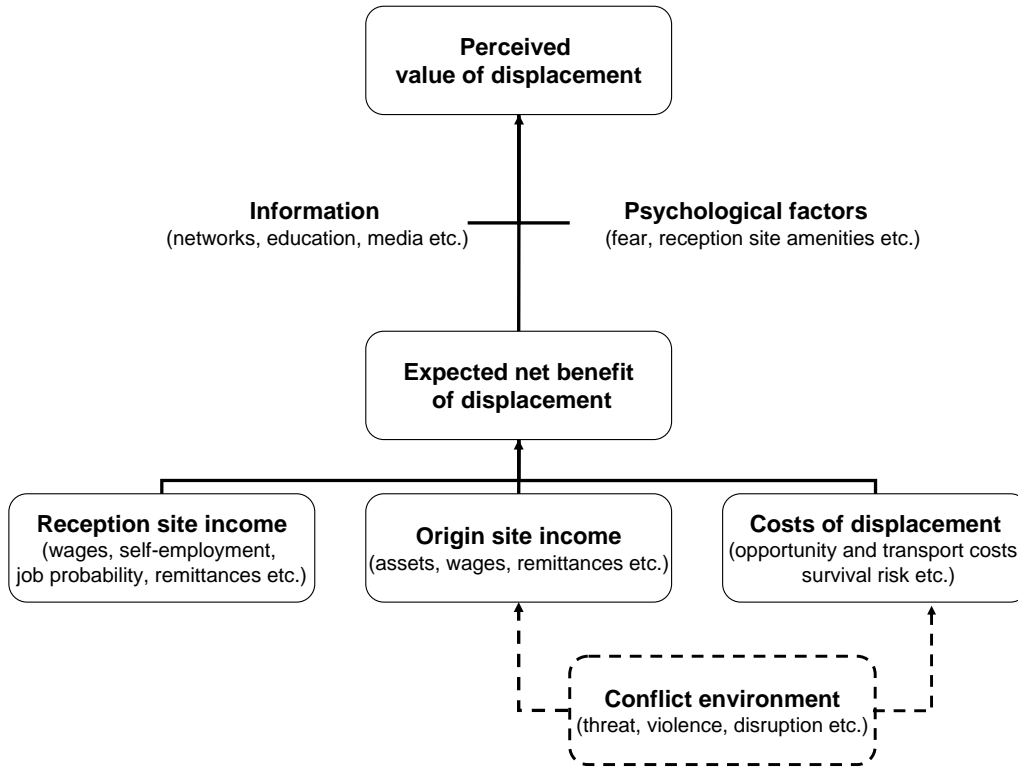
perceived probability of finding a job in the modern sector.¹ In the new economic migration literature, Stark (1991) and other authors refined these early migration models by new variables, such as income uncertainty, relative deprivation (Faini 1996), and human capital investments in children. This shifts the focus of migration research from individual independence to more interdependent approaches. For instance, remittances from migrants to their families at home and other inter-family exchanges are results of such collective migration decisions. According to this sort of investment portfolio theory, families 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). Uncertainty plays an important role in migration theory. Risk-averse individuals tend to avoid the uncertainties that they are faced with at the new destination site. However, in the case of civil conflict, risk-aversion might induce displacement despite uncertainty at the asylum place.

A dynamic view of migration is given by the network approach (Carrington, Detragiache, and Vishwanath 1996). According to this framework, migration costs decrease with the number of migrants already settled in the destination country. Established networks of previous migrants can strongly influence the migration decision by providing housing, support in finding employment and other contacts. Additionally, information about promising economic and social opportunities at the reception place encourages migration by raising the expected benefits (Stark and Levhari 1982). Young people have stronger incentives to migrate since discounted net benefits are larger because of longer planning horizons (Todaro and Smith 2006). In conflict areas, young adults, male and female, are the most probable targets for threat, violence, and forced recruitment, which increases the likelihood for displacement.

Figure 2 shows the most relevant factors affecting a migration decision in a conflict

¹For the international context, the Harris-Todaro model (1970) has been linked with trade theory and factor price equalization, emphasizing capital and labor mobility as key factors for achieving higher economic growth.

Figure 2: Framework of displacement decisions in a conflict environment



environment. Within this framework, the migration decision is based on the perceived value of displacement, which is determined by (i) the expected net benefits of the incomes at the origin and reception sites and direct monetary migration costs, and (ii) non-monetary, psychological factors and information costs. Generally, returns to displacement are given by the difference between origin and reception site incomes and the decrease in insecurity and fear of persecution. In the context of a conflict, origin site incomes as well as migration costs are directly biased by threats, direct violence, and disruption. The influence of the monetary push and pull factors on the emigration decision is mitigated by the impact of the conflict environment, but it is definitely not eliminated. If monetary factors did not play any role in a violent conflict environment, a complete population outflow might occur. This is what we generally do not observe. Partial displacement might be caused by non-random targeting of violence, or traditional economic considerations that still play

a significant role in the displacement decision. Obviously, fear of violence and the risk of non-survival are the most relevant driving forces of displacement by aggravating the fundamental push factors of poverty, desperation, and hopelessness. A violent environment might be the last, but decisive factor in the appreciation of migration alternatives. The next section investigates these implications empirically for conflict-induced migration movements in the Aceh province.

4 Empirical analysis on displacement in Aceh

4.1 Data source and descriptive statistics

Our data are based on the Village Potential Census *PODES* (*Potensi Desa/Kelurahan*) of the BPS (*Badan Pusat Statistik*) Statistics Indonesia. This census collects information on a regular basis (three times per a decade) at the lowest administrative level from all Indonesian villages and urban neighborhoods.² The information is based on the responses of village officials 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, respectively. For our purposes we consider only those villages of the province Aceh where a unique match between the two census rounds has been possible, therefore we use data from 5197 (out of 5738) villages which amounts to 90.6% of all Acehnese villages.

The phenomenon of civil conflict has no clear-cut definition. It could entail forms of severe clashes with significant casualties and damages as well as aspects of common interactions between the state and groups or individuals. In our dataset, conflict incidence at the village level is captured by three different variables. In *PODES 2003*, village officials have been asked 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

²In what follows, we use the term “village” for both villages and urban neighborhoods to simply refer to the smallest administrative unit.

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

	Total	No conflict	Conflict	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
Rel. 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*. By these figures we cover around 90.6% of all Acehese villages.

a result of conflicts.³ Based on the village head’s information on conflict occurrence, we form three different explanatory variables: (i) *Conflict* is set to one if the village head has reported the occurrence of a civil conflict, and zero otherwise, (ii) *Violent conflict* is set to one if there has been a civil conflict which involved deaths and/or injuries, and zero otherwise, and (iii) *Deaths by conflict* measures the total number of deaths as a result of conflicts during the previous year.⁴ Between 1999 and 2002, around a quarter of all Acehese villages have reported the presence of conflict, and in around 13% of the villages these conflicts were violent (Table 1).⁵

We define our main dependent variable as net population change between the two survey rounds 1999 and 2002. *Population change* measures the *absolute* change in village population (in hundreds of inhabitants), but alternatively, it measures also the *relative* change (in percent of village population in 1999). Table 1 shows that the 1236 villages that were involved in conflict during the preceding year of 2002 lost on average around 2.8% of their population between 1999 and 2002.

³The 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.

⁴According to the village heads, more than 2,400 people were killed, and about 2,200 were injured within a year of the conflict.

⁵Villages 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 village conflict share of 23.8%, and a share of violent conflicts of 13.2% for the whole Aceh province.

If we assume an average annual population growth rate of 1.46% for Aceh (which would reflect average Acehnese population growth in the decade between 1990 and 2000 according to BPS (2007)), we should find an increase in population of about 4.4% over the three years. This would amount to an increase of 161,000 persons in our sample. Instead, total population in the Aceh sample decreased by 0.6%, or about 3,200 persons (see Table 1). These figures indicate a net outward migration of about 164,000 persons from the Aceh province between 1999 and 2002. Higher figures of population reduction in conflict villages indicate that internal (within-province) displacement has been significant. The net population outflow has been even larger in villages where conflict became violent.

4.2 Empirical strategy

Our empirical analysis is structured into two main steps. First, we look at the village-level determinants of conflict by running a probit regression explaining the occurrence of conflict. Second, we estimate the determinants of net population change in order to quantify the relative effects of conflict and traditional migration variables.

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 .

$$C_i^* = \mathbf{X}_i' \boldsymbol{\beta} + \epsilon_i$$

Conflict occurrence C_i is our observed binary variable that is set to one if the village has been involved in a conflict, and zero otherwise.

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

Under the assumption of normality, equation 1 can be estimated by a probit model. From the resulting coefficients we then calculate the marginal effect of each explanatory variable on the probability that a conflict in a village has occurred, which we evaluate at the sample mean of the other observed explanatory variables \mathbf{X}_i . We report standard errors that are robust to heteroskedasticity.

In the regressions explaining population change, we report the results of two alternative procedures. First, we use the standard OLS technique for the regressions on net population change for a set of conflict and other migration-related explanatory variables. Additionally, we apply quantile regressions that minimize the absolute deviation from a given quantile of population change. Denote the net population change in village i by Y_i , the set of explanatory variables by \mathbf{Z}_i , and the vector of the coefficients to be estimated by $\boldsymbol{\gamma}$. Quantile regressions minimize a weighted sum of the residuals $e_i = Y_i - \mathbf{Z}_i' \boldsymbol{\gamma}$ where values above (below) a given quantile receive weights that are proportional (inversely proportional) to the quantile which is to be estimated. For a median regression (quantile $Q = 0.5$), simply a sum of the absolute deviations $\sum_i |e_i|$ is minimized. We also report estimates on the regressions around the first ($Q = 0.25$) and third ($Q = 0.75$) quartiles. For instance, a quantile regression around the first quartile minimizes $\sum_i |e_i| h_i$ where $h_i = 0.5$ if $e_i > 0$, and $h_i = 1.5$ if $e_i < 0$. Negative residuals (resulting from smaller than predicted net population changes) are weighted by a factor three times as large as the weighting factor for positive residuals, while exactly the opposite holds true for a regression around the third quartile. Thus, we are able to focus on the determinants of population change near to the lowest and highest quartile, which roughly coincide with villages with considerable population outflow and inflow, respectively (refer to the quartile range in Table 4). Most importantly, by this procedure, we are able to distinguish between the driving forces behind net population outflow and inflow.⁶

4.3 Main control variables

In the regressions explaining net population change, we include a set of socio-economic control variables in addition to the conflict variables. Changes in village population are either caused by differences in the fertility-mortality ratio or by (forced) migration movements.⁷ We control for differences in fertility by including

⁶The reported standard errors are based on a bootstrap procedure involving 1000 replications.

⁷The 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.

the variable *Family size* which measures the average family size in the village (4.7 persons in an average village).⁸ Average family size is defined by the mean of the number of inhabitants divided by the number of families over the two survey periods, and can be expected to be higher in rural, less-advanced regions.

Our main data problem is of the fact that data on village population are very crude. While villages with completely nonsensical data have been dropped from the analysis, a relatively large part of the measured population change might be still attributable to measurement error.⁹ One way to check for the consistency of village population data is to compare it with another noisily measured variable, the number of resident families, which village heads also reported in both periods. The existence of outliers in the average family size variable indicates measurement errors in population or the number of families, or different perceptions of how to define population and/or family.¹⁰ As one proxy of measurement error, we created the *Change in family size* variable, which is defined as the difference between average family size in a village between 1999 and 2002. The change in family size is positively correlated with population change over the two periods. A large increase in family size between the two periods indicates potential measurement errors in the the number of inhabitants (underestimating population in 1999 or overestimating it in 2002), or in the number of families (overestimating families in 1999 or underestimating them in 2002), or both. In our quantile regressions we include *Change in family size* as an additional regressor.

Furthermore, we also include controls for other traditional determinants of migration. We chose our control variables according to our previous theoretical framework and data availability in the *PODES 2000* and *2003* datasets. For most socio-

⁸See Appendix A for descriptive statistics.

⁹Most villages lack exact population registries, only 22,3% of the sample villages perform population registration on a regular basis.

¹⁰Apparently, as long as the same definition is used in both periods, the effect of varying definitions of the population change variable should be small. An error is more likely to arise if census respondents changed between the rounds. We have also repeated our empirical analysis using numbers of families instead of numbers of inhabitants which has yielded basically the same results but has not improved the explanatory power of our analysis.

economic variables we rely on *PODES 2000* and indicate explicitly where we were constrained to use data from *PODES 2003*. By using explanatory variables from *PODES 2000*, we are able to reduce problems of reverse causality, which is especially important in our regressions on conflict occurrence.

The effects of village-level poverty on population change are captured by the share of poor families in the village. *Poor families* measures the share of village households who are officially considered to be poor. In an average village, 54.6% of the village population can be considered to be poor by this definition. The poverty indicator is based on a set of welfare-criteria by the Indonesian National Family Planning Agency (BKKBN), which includes food consumption habits, the ability to access health-care, the possession of alternative sets of clothing, information on the floor material, and on the household members' ability to practice their religion. Accordingly, Indonesian households are classified into five categories based on their 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 as households belonging to the two lowest categories, KPS and KS I.¹¹ An additional measure of vulnerability, *Flood families*, serves as a control for conflict potential in our conflict regressions, and measures the share of families in the village that have been harmed by flood 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. The variable is highly correlated with other measures of economic urbanization, for example the share of village land devoted to industrial use or an urban dummy, but outperforms them in the regression analysis. We also include the indicator variable *Small indus-*

¹¹These families were the main targeted beneficiaries of the Social Safety Net Program of the Indonesian government. The program addressed the rising poverty during and after the economic crisis (especially by subsidized rice rations, and the distribution of health care cards). 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.

tries which controls for the presence of small-scale manufacturing in the village. The variable *Transport station* proxies for village infrastructure by indicating the presence of either a bus or train station, airport, or seaport in the village. An additional location factor is accounted for by including *Altitude* in thousand meter above sea level. We expect this variable to be positively correlated with outward migration as economic activity in Aceh is rather concentrated in flat, coastal regions.

We also include two simple measures of ethnic and religious diversity: *Ethnic diversity* is an indicator variable which is set to one if there was more than one ethnic group in the village in 2002, and zero otherwise.¹² 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 another indicator variable that is set to one if there is more than one religious group in the village that has a worship place, and zero otherwise. Almost all (97.8%) of the sample villages have a Muslim majority, but there are 44 villages where at least two religions are practiced.

The variable *Distance to police* controls for security considerations, which becomes especially important in the presence of a conflict. It is measured by distance in kilometers to the nearest police post. We expect that in the face of the conflict, outward migration will be larger, when the nearest police station is further from the village. The effect of the relatively neutral, conflict mitigating role of the police (as opposed to the role of the military and paramilitary groups) has been documented for several Indonesian conflicts (see Barron, Kaiser, and Pradhan (2004)). In the regressions explaining conflict occurrence, we alternatively include the indicator variable *Police not present* which is set to one if the nearest police station is very difficult or difficult to reach (which applies to 38.9% of the villages), and zero otherwise.

Political remoteness of a village is measured by the distance in hundreds of kilometers to the own district (*kabupaten*) and sub-district (*kecamatan*) office.¹³ Furthermore, in regressions explaining conflict occurrence, we also include information on the

¹²Although we would prefer information from the beginning of the period, there was no question on ethnicity in the 1999 questionnaire.

¹³We report these variables only in the regressions explaining conflict and omit them from the regressions explaining population change where they had no explanatory power.

village head’s educational attainment, based on information from *PODES 2003*. We include three different categorical variables indicating the head’s highest educational attainment (completed primary, secondary, or higher education with the baseline category of being no education completed). Additionally, the variable *No village head* indicates that there was no village head in office at the time of the *PODES 2003* census. This variable is endogenous to conflict, as 64% of the villages without head were conflict-ridden, and the absence of a village head might be a result of the conflict itself.

Additionally, in regressions explaining conflict we also add measures of conflict intensity at the district and sub-district level which are calculated as the share of villages within the subdistrict and district, respectively, that were involved in a conflict.

4.4 Estimation results

4.4.1 Correlates of conflict

By estimating the determinants of conflict in Indonesia based on the data 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. To reduce this problem, we take as many explanatory variables from the earlier *PODES 2000* round as possible for estimating conflict occurrence in 2001/2002.

Table 2 reports the estimates of three conflict model specifications. The likelihood that a (violent) conflict arises might be influenced by political, civil, socio-economic, or other conflict variables. Our estimations indicate that villages within conflict zones are threatened by a larger probability of being affected, that is conflict risk increases with the share of villages in a district (and even more on a subdistrict level) involved in the conflict. Conflict clustering and contagion, respectively, are self-enforcing factors of the Acehese conflict. Furthermore, conflict occurrence is higher in larger, more populous localities, that is we find some evidence for a village size bias. Distance to the political centers of the districts and subdistricts, as proxies

Table 2: Probit estimation: Conflict incidence

Conflict	Marginal effects			Sample mean
	(1)	(2)	(3)	
Population	0.130 (6.93)	0.143 (8.21)	0.120 (5.82)	0.707
Population (squared)	-0.014 (4.21)	-0.018 (5.90)	-0.017 (4.63)	1.142
Distance to subdistrict office	-0.145 (1.88)	-0.060 (1.79)	0.011 (0.29)	0.078
Distance to district office	-0.051 (2.87)	0.006 (0.33)	-0.032 (1.57)	0.463
Poor families	0.072 (3.12)	-0.020 (0.90)	-0.022 (0.85)	0.546
Families harmed by flood	0.281 (10.23)	0.078 (3.08)	0.114 (3.50)	0.069
Agricultural production	0.145 (4.21)	0.082 (2.73)	0.084 (2.45)	0.837
Small manufacturing(*)	0.055 (4.30)	0.057 (4.44)	0.026 (1.80)	0.361
Ethnic diversity(*)	0.036 (2.68)	-0.013 (1.01)	-0.021 (1.41)	0.387
Religious diversity(*)	-0.194 (3.77)	-0.102 (1.65)	-0.052 (0.70)	0.008
Police not present(*)	0.141 (10.59)	0.050 (3.84)	0.041 (2.72)	0.368
Head w/ primary education(*)	0.043 (1.18)	-0.017 (0.54)	-0.048 (1.46)	0.230
Head w/ secondary education(*)	-0.022 (0.65)	-0.040 (1.28)	-0.054 (1.65)	0.347
Head w/ higher education(*)	-0.032 (0.92)	-0.057 (1.81)	-0.061 (1.85)	0.385
No village head(*)	0.386 (3.52)	0.191 (1.99)	0.195 (2.18)	0.005
Conflict share at district level		0.832 (35.41)	0.065 (1.86)	0.239
subdistrict level			0.937 (31.09)	0.239
Observations	5197	5197	5197	
Pseudo R^2	0.080	0.337	0.590	
Observed prob. of conflict	0.238	0.238	0.238	
Predicted prob. of conflict	0.221	0.169	0.150	

Notes: We report marginal effects after a probit regression which are evaluated at the sample mean. Absolute values of t-statistics (based on robust standard errors) are in parentheses. For dummy variables (marked with *) marginal effects are for a discrete change from 0 to 1.

for village remoteness, reduce the probability of conflict, although only in regressions where (sub-)district level conflict intensity is not accounted for. Our proxy

for poverty, the share of poor households in a village, shows a significant positive effect when not controlling for conflict clusters. This indicates that poverty is more prevalent in conflict zones and is therefore associated with conflict incidence. Other economic variables also play a significant role in the Acehese conflict. Villages that are more dependent on agricultural production face a higher risk of conflict. Economic potential, measured by the presence of SMEs, is closely associated with a higher probability of being involved in the conflict. Furthermore, disaster-ridden villages are generally more prone to civil clashes. Although the Acehese conflict is not ethnically or religiously motivated, ethnic diversity is associated with higher probability of conflict while religious diversity with lower probability of conflict. Both variables lose significance when conflict shares are also included in the regressions. Furthermore, we find a strong indication that poor governance and executive structures are related to an uprise in violence. The absence of a near and reachable police office enhances the potential of violence. The presence of an (educated) village head is associated with a significantly lower conflict probability, at least when regional conflict intensity is accounted for. Here we cannot claim a causal relationship, as the lack of a (qualified) village head in 2002 might also have arisen as a result of the conflict itself.

4.4.2 Determinants of population change

According to the displacement model in Section 3, we jointly address the effect of economic and conflict variables for net population change. We use both OLS and quantile regressions as two alternative estimation techniques, reporting the respective results in Tables 3 and 4.

In Table 3, we distinguish our specifications with respect to the definition of our 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 either as a binary (*Conflict* and *Violent conflict*) or a continuous (*Deaths by conflict*) variable.

In all OLS specifications, we find strong negative effects of conflict on net popu-

Table 3: OLS estimation: Change in village population, 1999-2002

Population change	absolute (1)	absolute (2)	absolute (3)	relative (4)
Conflict	-0.211 (2.40)			-1.769 (2.27)
Violent conflict		-0.320 (2.33)		
Deaths by conflict			-0.112 (2.09)	
Family size	0.179 (3.42)	0.171 (3.29)	0.173 (3.35)	2.871 (4.83)
Poor families	0.153 (1.02)	0.144 (0.97)	0.130 (0.89)	1.873 (1.37)
Agricultural production	-1.869 (5.58)	-1.876 (5.64)	-1.875 (5.71)	-7.672 (3.68)
Small manufacturing	0.013 (0.18)	0.033 (0.46)	0.034 (0.48)	0.521 (0.74)
Transport station	0.380 (0.76)	0.379 (0.75)	0.369 (0.74)	10.416 (2.11)
Altitude	-1.192 (6.87)	-1.166 (6.74)	-1.089 (6.37)	-7.815 (6.33)
Ethnic diversity	0.052 (0.76)	0.062 (0.91)	0.037 (0.54)	-0.734 (0.92)
Religious diversity	1.332 (1.94)	1.324 (1.93)	1.292 (1.88)	23.134 (2.19)
Distance to police	-0.009 (3.18)	-0.009 (3.19)	-0.009 (3.11)	-0.076 (2.83)
Population polynomial	Yes	Yes	Yes	Yes
Observations	5197	5197	5197	5197
R^2	0.087	0.088	0.092	0.077

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 which are not reported. Absolute values of t-statistics are in parentheses.

lation change. The occurrence of a violent conflict leads to an average reduction in population of 32 people. If we specify for the number of conflict deaths, we see that an additional casualty reduces the village population by around 11 persons on average. Specification (4) shows in relative terms that a conflict reduces a village population on average by about 1.77 percent. If we compare these results with our quantile estimations in Table 4, we see that the impact of conflict on population outflow (measured around the .25 quantile) is smaller than its impact on non-inflow (measured around the .75 quantile). This means that conflict incidence is a strong

Table 4: Quantile estimation: Change in village population, 1999-2002

Population change (absolute)	Q(25%) (1)	Q(50%) (2)	Q(75%) (3)	Q(25%) (4)	Q(50%) (5)	Q(75%) (6)
Conflict	-0.038 (2.43)	-0.082 (7.20)	-0.112 (4.89)			
Deaths by conflict				-0.074 (2.82)	-0.038 (3.18)	-0.017 (0.95)
Family size	0.023 (2.29)	0.028 (3.63)	0.057 (3.68)	0.018 (1.72)	0.022 (2.81)	0.050 (3.23)
Poor families	0.001 (2.98)	0.001 (5.90)	0.001 (2.66)	0.001 (2.64)	0.001 (4.55)	0.001 (2.53)
Agricultural production	-0.001 (1.64)	-0.001 (2.05)	-0.003 (2.68)	-0.001 (1.94)	-0.001 (2.67)	-0.003 (3.05)
Small manufacturing	0.033 (2.21)	0.033 (3.31)	0.041 (1.62)	0.034 (2.04)	0.038 (3.33)	0.023 (0.95)
Transport station	0.072 (0.42)	0.144 (1.48)	0.317 (1.55)	0.073 (0.55)	0.127 (1.34)	0.343 (1.64)
Altitude	-0.595 (5.18)	-0.183 (6.74)	-0.161 (2.74)	-0.453 (4.17)	-0.162 (6.54)	-0.159 (2.75)
Ethnic diversity	-0.049 (2.07)	0.064 (4.33)	0.146 (5.18)	-0.057 (2.51)	0.065 (3.96)	0.155 (5.66)
Religious diversity	0.762 (3.61)	0.395 (1.83)	0.326 (0.53)	0.725 (3.70)	0.419 (1.98)	0.346 (0.57)
Distance to police	-0.005 (3.62)	-0.001 (2.82)	0.000 (0.31)	-0.005 (3.63)	-0.001 (2.62)	0.001 (0.57)
Change in family size	0.328 (12.98)	0.251 (13.47)	0.297 (14.80)	0.331 (13.11)	0.251 (14.17)	0.300 (14.65)
Population polynomial	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5197	5197	5197	5197	5197	5197
Pseudo R^2	0.076	0.031	0.831	0.079	0.031	0.082

Quartile range of absolute population change

Q(25%)	Q(50%)	Q(75%)	Q(100%)
-3767 ; -9	-8 ; 7	8 ; 36	37 ; 2116

Notes: We report results from simultaneous quantile regressions for the first, second, and third quartile. 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. Absolute values of t-statistics are in parentheses.

reason for emigration, but it is an even stronger reason for not entering a conflict-affected village. The *Deaths by conflict* variable indicates an opposite effect. We find some evidence that the effect of deaths by conflict on outflow villages (lower quantiles) is stronger and more significant than the effect on inflow villages (upper quantiles). Our interpretation of this result is that the impact of conflict violence

on displacement in a narrow sense (i.e. deaths) reinforces push factors by more than it reduces pull factors. Conflict in a broader sense, that is a conflict that does not necessarily involve casualties, has a stronger negative impact on pull factors of a village than on its push factors.

Our control variable for fertility, the average size of families, is throughout positive and significant, that is we see that differences in population change are also driven by population growth. Poverty, measured as the share of poor families in a village, is shown to have a relatively weak effect on population change. Positive and insignificant in the OLS while small and significant throughout the quantile estimation, the effect of poverty acts through several channels. Poverty can be expected to work as a push factor, but at the same time it might also raise information costs and reduce mobility. It might be also associated with higher fertility which raises net population change. Additionally, as the composition of this variable is based on the registration for social support programs for the poor, it might also reflect a policy bias in the migration pattern. Since poor families tend to migrate to destination sites where governmental support is more likely, registered poverty might also be related to a larger inward migration. The net effect of these forces is a priori unclear, and turns out to be rather small in our regressions.

The other economic variables show a very clear pattern of explanation. Villages that are more dependent on *Agricultural production*, experience unambiguously larger population outflows, and smaller population inflows. Together with our *Altitude* variable, which controls for geographical remoteness, we find strong evidence for a rural-urban migration pattern. For the Aceh province this means that population displacement runs from rural and mountainous areas in Central Aceh to the more urbanized agglomerations close to the coasts in the North and the South of the province. This result is corroborated by our *Small manufacturing* dummy variable. Although not significant in the OLS estimation, this variable has a positive effect on net population change for the lower quantiles. Hence, the existence of a small manufacturing industry in a village is more a reason for staying than for coming, that is it helps retain population and weakens the push factors, without significantly changing the pull factors. From these effects we see that economic activity is a major

determinant for migration and displacement, even in a conflict environment.

Direct migration costs, proxied by our *Transport station* dummy, do not show the expected evidence. For all regressions on absolute population change, this variable is insignificant, and becomes significant only when estimating the relative population change. Hence, we might conclude that in face of the conflict, the direct availability of transport opportunities plays only a minor role in people's migration decision. Alternatively, if forced migration relies less on the means of public transport, our *Transport station* variable is a poor measure of the actual costs of migration.

If we control for ethnic and religious diversity, the interpretation of estimates becomes more complex. First, while *Ethnic diversity* is insignificant throughout all OLS regressions, the quantile regressions reveal a more intricate pattern. Population outflow is higher in ethnically diverse villages, but people tend to take refuge in ethnically diverse villages again. Thus, displacement in Aceh did not entail an ethnic rearrangement of the society. *Religious diversity* has a positive significant influence on population change. However, this result is mainly driven by the lower and medium quantile villages and not by the villages that experienced a net population inflow. Therefore, religious diversity rather retains people from emigration. In general, we do not see the Acehese conflict and its displacements as being driven by an ethnic or religious fragmentation.

Instead, displacements are strongly related to a lack of police presence and thus to institutional weaknesses of the state. Our *Distance to police* variable performs well in the OLS regression, implying that an additional ten kilometer distance to the next police station leads ceteris paribus to an averaged outflow of 9 persons. The quantile regressions display that this result is mainly driven by the larger population outflow in the lower quantiles.

Finally, in quantile regressions we introduce the *Change in family size* variable to capture weaknesses of the dataset in terms of mis-reporting or matching mistakes. This variable turns out to be highly significant throughout all regressions (OLS results available on request), revealing that either the population variable, or the number of families variable, or both are noisy. By including this additional variable,

we are able to explain an additional fraction of the variance in the dependent variable. In all regressions we also include a fourth grade polynomial in population size which controls for the (highly significant) nonlinear influence of village size on population changes.

Our results demonstrate convincingly that internal displacements in conflict situations are not uni-dimensionally determined by conflict variables, but that other traditional socio-economic variables, like the driving forces behind the rural-urban migration, clearly also matter. This means that traditional push and pull factors are not suspended in times of conflict, although, it is clear that large displacements are initiated by conflict. However, without other traditional push and pull factors, that is the economic, political, social, and institutional factors, such movements would 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, stemming from a regular village census taken throughout Indonesia. The occurrence of a conflict is largely reflected by conflict clusters, that is violence contagion effects are prevalent determinants of the Acehese conflict. A lack of security forces and local mediators, such as the non-presence of police or qualified village heads, is strongly correlated with conflict incidence.

Unsurprisingly, we find strong evidence that violence in its different severities is unambiguously a major determinant of the large displacements observed during our period of study. We find that more severe violence has a particular impact as push factor, while conflicts with less or no casualties rather reduce inward migration. However, while we know that the clashes between the GAM, militias and military forces were unequivocally the major force behind the large displacement of the Acehese population, we also find convincing evidence for the relevance of con-

ventional migration determinants. Our results indicate that economic opportunities play an important role as pull factors, even in the context of civil conflict. The share of non-agricultural production as a source of livelihood both reduces outward and raises inward migration, while the presence of SMEs in a village acts as a retain factor. Thus, migration incentives based on rural-urban differences in economic potential are still effective during severe clashes in Aceh. Civil conflict might even be an accelerator of an ongoing urbanization process. To prove this is left to further research.

Some of the limitations of our analysis lie in issues of data design. For instance, our population change variable does not capture short-term fluctuations in population after transitory displacements before 2001. Additionally, we only have information on conflict occurrence for last year of the observed time period (1999-2002). This could possibly bias the measured effects of conflict. Other limitations of our analysis are simultaneously strengths. On the one hand, as our units of observation are villages, we can only observe net changes in village population being unable to model individual or household migration behavior. On the other hand, these meso-level aggregates reveal clearly the most relevant push and pull factors on a village-level. Even though we cannot learn from our analysis *who* migrates in face of a conflict, we are able to identify *which villages* are more prone to population outflows. This is clearly an innovation in forced migration research.

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A 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
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
Family size	The mean of average family sizes in the village of 1999 and 2002	4.655	0.723	1.755	9.083
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	9.440	16.581	0	99
Police not present	Dummy variable set to one if police station was far or very far to reach in 2002	0.368	0.482	0	1
Distance to subdistrict office	Distance to the subdistrict (<i>kecamatan</i>) office measured in hundreds of kilometers in 1999	0.078	0.140	0	3.19
Distance to district office	Distance to the district (<i>kabupaten</i>) 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 w/ primary education	Dummy variable set to one if village head's highest education was primary school in 2002	0.230	0.421	0	1
Head w/ secondary education	Dummy variable set to one if village head's highest education was junior high school in 2002	0.347	0.476	0	1
Head w/ higher education	Dummy variable set to one if village head had senior high school or higher education in 2002	0.385	0.487	0	1
No village head	Dummy variable set to one if there was no village head in 2002	0.005	0.069	0	1
Conflict share at district level	Share of villages within a district (<i>kabupaten</i>), which had been involved in a conflict (defined by the variable Conflict)	0.239	0.250	0	0.721
Conflict share at subdistrict level	Share of villages within a subdistrict (<i>kecamatan</i>), which had been involved in conflict (defined by the variable Conflict)	0.239	0.336	0	1
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

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

B Districts of the Aceh province

