Indigenous peoples, land and conflict in Mindanao, Philippines

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Abstract: This article explores the links between conflict, land and indigenous peoples in several regions of Mindanao, the Philippines, notorious for their levels of poverty and conflict. The analysis takes advantage of the unprecedented concurrence of data from the most recent, 2020, census; an independent conflict data monitor for Mindanao; and administrative sources on ancestral land titling for indigenous peoples in the Philippines. While evidence elsewhere compellingly links land titling with conflict reduction, we find a more nuanced story in Mindanao using mixed methods. Conflicts, including land- and resource-related conflicts, are generally less likely in districts (barangays) with higher shares of indigenous peoples. Ancestral domain areas also have a lower likelihood for general conflict but a higher likelihood for land-related conflict. Having explored and ruled out endogenous links, our econometric findings from a pooled cross-section suggest that ancestral domains titling does not automatically solve land-related conflicts. Only fully awarded ancestral domain titles are associated with reductions in land-related conflict but when administrative delays take place (from cumbersome bureaucratic processes, insufficient resources and weak institutional capacity), titling processes may lead to sustained, rather than decreased, conflict.

Key words: Land, Conflict, Indigenous Peoples, Titling, Philippines
JEL classification: D74, Q15

1. Introduction

Poverty and conflict are intimately related in Mindanao. The poverty rate on the island – located in the southern region of Philippines and comprising Caraga, Davao, and the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM) – is notably higher than the national average. In Caraga and BARMM, it is roughly double (Philippine Statistics Authority, PSA, 2021). Moreover, Mindanao has experienced protracted conflict between the state and insurgent groups since the late 1960s, as well as intermittent periods of violence between dozens of militia units, political groupings, communities, and clans (Adriano and Parks, 2013; Herbert, 2019). A wide range of evidence suggests that these two challenges are inextricably linked: Mindanao's conflict zones have higher poverty levels and lower levels of economic growth than anywhere else in the Philippines.

Land is also often at the heart of these challenges. Across developing countries, weak land governance is often a key driver of poverty (World Bank, 2017). Land governance in the Philippines is weak, but even weaker in Mindanao (LGI, 2016). Disputes over land and resources are often the primary trigger of conflict in Mindanao, and conflict also weakens land governance (World Bank, 2023a). As in other developing countries, this creates a vicious cycle leading to a range of challenges, including weak job creation and underemployment (Ravanera, 2018) – which in turn exacerbate conflict, as landless people without work opportunities are more likely to join armed groups (World Bank, 2023a).

Unsurprisingly, Indigenous Peoples (IPs) are particularly vulnerable to these challenges. Across the Philippines, IPs disproportionately reside in areas of high poverty and conflict (World Bank, 2023b and Reyes, Mina, and Asis, 2017). This is hardly surprising, given that IPs are disproportionately exposed to poverty and conflict around the world (UN, 2010; 2022). Recognizing these challenges in the Philippines, the Indigenous Peoples Rights Act (IPRA) gives IPs the right to manage their ancestral domains – which, in Mindanao, amounts to an estimated one-third of all land on the island. Despite this achievement, however, the process of obtaining Certificates of Ancestral Domain Titles (CADTs) is long, arduous, and complex, and many IPs are still struggling to gain ownership of their lands.

While scarce data has prevented rigorous analysis of how these issues interact, new opportunities are emerging. At the global level, there is a rich empirical literature on how conflict and weak land governance can exacerbate poverty, primarily for IPs, but only small number of studies have analyzed these issues in Mindanao. The recent release of new geo-referenced data on violent incidents, however – made available by International Alert Philippines' Conflict Alert (CA) – makes it possible to explore these linkages for the first time. Of course, more detailed and higher-quality data would enable more rigorous analysis. Likewise, the new data on conflict are currently only available for Mindanao; as data collection expands, similar analysis could be conducted for other regions.

To conduct our analysis, we construct a novel pooled cross-section dataset by merging the new data on conflict with census data and existing CADT records. We then use mapping and a suite of simple quantitative tools to analyze the patterns and interactions between violent incidents, CADTs, and the share of IPs in a given barangay (the smallest administrative unit available). Our analysis has three key findings: (i) in general, conflicts are less likely in barangays with higher shares of IPs; (ii) Land- and resource-related conflicts are also less likely in barangays with higher shares of IPs; and (iii) overall, CADT areas have a lower likelihood for general conflict but a higher likelihood for land-related conflict, particularly in CADTs that experience processing delays. The analysis confirms that these findings are not a result of an endogenous relationship between the prevalence of conflict and IP migration.

These findings add depth and complexity to the current understanding of conflict, poverty, land, and IPs in Mindanao, in particular, which can be relevant to other parts of the world characterized by weak land governance. They offer policymakers a more nuanced view of these issues, while highlighting key data gaps and underscoring the need for more research. The rest of the article is structured as follows: Section 2 summarizes the context and reviews the relevant literature. Section 3 describes the evidence we gathered and our methodology. Section 4 describes our key results. The final section concludes.

2. Context and literature review

Social conflict, violence, and poverty are persistent challenges in Mindanao. Since the late 1960s, the island has witnessed widespread conflict between the state and insurgent groups[1]. Additionally, dozens of militia units, political groupings, communities, and clans are often engaged in varying levels of armed conflict (Adriano and Parks, 2013; Herbert, 2019). The island also has relatively high levels of poverty. While the poverty rate in Davao (11.9 percent) is lower than the national average of 13.2 percent, the poverty rates in Caraga (25.9 percent) and BARMM (29.8 percent) are well above that average according to the 2021 Family Income and Expenditure Survey (FIES) (Philippine Statistics Authority, PSA, 2021).

The existing literature suggests that conflict and poverty are intimately related in Mindanao, especially in rural areas. Banzon (2005), Edillon (2005), Capuno (2019) and other studies have assessed the role of poverty, income redistribution, and the government's peace-building efforts in perpetuating conflict in the Philippines. These studies find that resource deprivation—particularly access to water, which is closely associated with poverty levels—is often a major driver of conflict. Likewise, Mindanao has shown highly uneven patterns of development. The areas most affected by conflict also have the highest levels of poverty and the lowest levels of human development (Adriano and Parks, 2013).

Land issues are key drivers of conflict and poverty, creating a vicious cycle. Malayang III (2001) and World Bank (2017) report intense, wide-ranging conflict over lands and resources within ancestral domains in Mindanao, leading to loss of life, the displacement of communities, and increased poverty. Across developing countries, such conflicts are frequently due to weak land governance, which also exacerbates poverty. Insecure property rights discourage investments, undermine the government's ability to collect land taxes, and deprive the poor of a critical asset base (World Bank, 2017). This constitutes a vicious cycle, as insecure property rights lead to weak job creation, food insecurity, limited access to essential services, low productivity, and underemployment – and poor individuals without land or work opportunities are driven to join armed groups to survive or to seek social status (Ravanera, 2018; World Bank, 2023a).

Land governance is already weak in the Philippines, but it is even weaker in Mindanao. An independent evaluation by LGI (2016) found that that Mindanao fares worse than the national average across a range of land governance indicators, including: land rights recognition, rights to forest, common land and rural land use; public land management; transfer of large tracks of land to investors; public provision of land information, registry and cadaster; and dispute resolution.[2] Such factors have contributed to the longstanding grievances over land dispossession in Mindanao that are key drivers of conflict. Moreover, conflict worsens such challenges by undermining whatever rule of law does exist, displacing residents from their land and making property rights even more difficult to secure (World Bank, 2023a). In Mindanao, for example, 28 percent of the households that returned home after being displaced by conflict could not retrieve their farmlands.

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[1] These include the Moro National Liberation Front (MNLF); the Moro Islamic Liberation Front (MILF); Abu Sayyaf; and the New People's Army (NPA), the military wing of the Communist Party of the Philippines (CPP).
[2] As reported in World Bank (2023) using a stakeholder-driven assessment of selected land governance indicators developed by LGI.

The prevailing evidence suggests that IPs are especially vulnerable to poverty, conflict and land issues. Across the Philippines, the country's estimated 9.4 million IPs disproportionately reside in areas of social conflict and poverty (World Bank, 2023b as well as Reyes, Mina, and Asis, 2017). This should perhaps not be surprising, since IPs constitute a disproportionately high number of the world's rural poor, and they are often caught in the middle of violent conflicts related to land or resource disputes (UN, 2010; 2022).

In response to these concerns, 1997's Indigenous Peoples Rights Act (IPRA) sought to recognize the right of IPs in the Philippines to manage their ancestral domains. On paper, IPRA offers IPs a path towards more secure land and resource rights by providing Certificates of Ancestral Domain Titles (CADTs), which formally recognize IPs' possession and ownership over their ancestral domains (Drbohlav and Hejkrlik, 2017; Caballero, 2004). The law defines ancestral domains as the land, waters and resources that a given IP community has traditionally used as their area of domicile and basis for economic and social life (Malayang III, 2001).

Despite the IPRA, however, many IPs in the Philippines are still struggling to obtain secure access to land. Identifying and delineating ancestral domains has proved challenging, leading to conflict with non-indigenous groups as well as within and between IP communities (Prill-Brett, 2007). As documented by Drbohlav and Hejkrlik (2017) and Caballero (2004), the overlapping and conflicting mandates of government bodies tasked with IPRA implementation, as well as a lack of resources and capacity, have contributed to the slow issuance of CADTs. Provincial and regional offices of the National Commission on Indigenous Peoples (NCIP), for instance, remain severely underfunded and understaffed. (Cortez et al., 2018; Rutten, 2016). Moreover, the CADT process involves cumbersome bureaucratic requirements; Appendix 1 details the six steps[3] and 21 sub-activities required to legally obtain full CADT award (Ancestral Domain Office, 2023). The result is a lengthy and complex process that often takes several years to complete.

In addition to being long and arduous, many IPs perceive a lack of ownership over the CADT process. Molintas (2004), for instance, notes that the IPRA has mainly benefited a select few IPs (and non-IPs), especially people in power who seek political advantages from the process. As a result, many IPs – who often have concepts of ownership that contrast with formal laws like IPRA – feel like the state's development policies are not designed to work for them. The CADT application process, for example, involves unwieldy and complicated technical documents, sometimes written only in English, which tend to be intimidating and difficult for many IPs to understand (Molintas, 2004). The application instructions are also often confusing or vague, especially regarding the various government offices to which applicants must submit their documents (Erasga, 2008).

As a result, IPs face hurdles to develop CADT lands that could be a source of income, jobs and wealth. As reported by World Bank (2023b), Mindanao comprises more than three quarters of all ancestral lands covered by CADTs in the Philippines, representing about 3.37 million hectares – about a third of Mindanao's entire land area and half of its forestlands. These lands have tremendous potential for development and job creation (World Bank, 2023a). Beyond the difficulties of the CADT process, many IP communities lack sustainable development protection

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[3] These steps are preparatory work for delineation; conflict resolution and CADT application deliberation; survey; approval of survey and evaluation of recognition book; approval of CADT; and awarding of CADT.

plans to support their economic development and land management efforts. Moreover, IP communities' weak capacities for assessing development proposals are compounded by distrust of private sector investors, given past experience of inequitable contracts (World Bank, 2023a). Ultimately, IP communities do not fully benefit from their lands.

These factors complicate the prevailing view of how conflict, poverty, land, and IP issues interact in Mindanao. A small but notable number of studies have already shown that establishing laws to protect ancestral domains does not automatically resolve conflict – much less promote social justice or sustainable resource use (Prill-Brett, 2007). Lara and Franco (2022) note that conflicts in Mindanao often persist after land titles are awarded, highlighting a case study from Lianga and Lanuza (Surigao del Sur, located in Caraga region). Likewise, using a case study of the Higaonon Tribe in Opol (Misamis Oriental, Mindanao, Drbohlav and Hejkrlik (2017) conclude that the mere existence of a legal framework for IPs' rights does not ensure the security of their land tenure.

Adding to this scarce literature, our analysis finds that conflict is generally less likely in CADT areas and areas with high shares of IPs – but that CADT processing delays can actually *increase* the probability of violence. We use a range of simple quantitative methods to unpack the links between IP presence, CADTs, and the incidence (as well as magnitude and type of) conflict in a given barangay. Crucial to the analysis is the evaluation of the potential connection between conflict and IP presence, considering endogenous and mutually reinforcing influences. We then go a step further and assess the various stages of CADT processing (i.e. awarded titles, approved but not fully-awarded titles, and absence of titles). We find an association between increased conflict and CADTs that are not fully awarded. To the best of our knowledge, no other study has deliberately analyzed the relationship between IPs, conflict, and the specifics of the CADT process.[4]

3. Latest evidence and trends: conflict, IPs, and CADTs

As noted in the introduction, we use data from three sources to explore the relationship between conflict, IPs, and CADTs: i) 2020 census data, which indicates the share of IPs in each barangay; ii) new geo-referenced data from Conflict Alert (CA), indicating the number of violent incidents in each barangay from 2011 to 2020; and iii) geo-referenced CADT information from the National Commission on Indigenous Peoples (NCIP). We overlap these data to determine where violent incidents occurred – specifically, whether they occurred inside and outside of ancestral domains.

3.1. Violent incidents

The CA database indicates that 51,026 violent incidents occurred in Mindanao between 2011 and 2020. (The conflict data from BARMM is available from 2011 to 2020, but only 2011 to 2015 for Caraga and Davao.[5]) CA tracks the incidence, causes, and human costs of violent conflict and

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[4] These categories in the Philippines are formally known as "registered" and "for registration," respectively.

[5] We used the entire conflict dataset for the three regions across the available periods, pooling all the data we have in a cross-section analysis and we then control our estimations by year and province. In other words, the proposed analysis is not based on panel data as the ensuing panel would be non-randomly incomplete. This ensures that

violent crime, based on documentation and reports by the Philippines National Police (PNP) and print media records. However, the data has certain limitations. First, CA does not report incidents for all three regions across the full 2011-2020 period. Second, the data do not report the ethnicity of the perpetrator and the victim. As such, we roughly approximate the likelihood of IP involvement in a given incident, based on whether the area where it took place can be described as having a high (above average), low (below average) or no presence of IPs. Additionally, incidents in the CA data can be simultaneously recorded as multiple types of violence, such as robbery as well as firearm use. To avoid double counting, we only use the first categorization of each incident (which we assume to be the dominant feature of the incident). Third, CA assigns a large proportion of the incidents as "undetermined" in nature – that is, cannot be classified, which impacts the precision of some of our results. The inability to categorize these events stems from the initial information gathered for each incident, which lacked sufficient details to ascertain their fundamental motivations. The absence of systematically collected additional evidence, such as the age, gender, education of the perpetrator or victim, or the timing of the event, has precluded the option of imputing information to those cases. This inevitably affects the precision of our estimates, particularly if the true causes for undetermined cases differ in complexity from those observed cases that were classifiable. Nonetheless, some key trends emerge in the data.

Violent conflict has shown a downward trend, with most incidents concentrated in Davao. As shown in Figure 1), violence declined briefly in 2012, which can mostly be attributed to declines in the BARMM after the signing of the Framework Agreement on the Bangsamoro (CA, 2014). Despite three subsequent years of increased violence between 2013 to 2015, there was a sharp decline starting in 2016. This might be associated with a switch to the new national administration's "iron fist" approach (as well as the partial coverage in the dataset of Davao and Caraga after 2015). Figure 1 also shows that of the 51,026 incidents reported in the dataset, 44 percent took place in Davao del Norte, Davao de Oro, and Davao del Sur provinces

Most violent incidents appear unrelated to land or resources, though many have undetermined causes. The CA database identifies five categories of conflict: violent incidents related to the shadow economy (20 percent of the observations), common crimes (18 percent), identity issues (12 percent), political issues (5 percent), resource issues, including related to land (3 percent), governance issues (2 percent), and "undetermined" (40 percent).[6] When those categories are further aggregated (land, non-land, undetermined), notably, non-land violent incidents comprise some 59 percent of all reported incidents, with only 1 percent being definitively related to land. However, the fact that 40 percent of incidents are categorized as having an undetermined cause makes it difficult to draw precise conclusions, as discussed above. Regardless, figure 2 shows

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unobservable differences between time periods are taken into account in our statistical analysis – which is relevant because, as indicated, CA did not collect information on incidents for all three regions across all years.

[6] Shadow economy-related incidents include cattle rustling, illicit cross-border trade, human trafficking, illegal drugs, and illegal gambling, among others. Common crimes include: alcohol intoxication, damage to properties, robbery, child abuse, and other common crimes. Political issues involve rebel groups, political repression, rebellion, elections, and violent extremism, among others. Identity issues are incidents related to gender, inter and intra-gang rivalries, personal grudges, clan feuds, and religious conflict, among others. Resource issues touch on natural resources, land conflict, water conflict, urban resources, and resource predation, among others. Governance issues deal with corruption of public office, implementation of government projects, executive and judicial decisions, executive and judicial positions, and Covid-19 issues, among others.

that both land and non-land-related incidents (as well as those with undetermined cause) have declined over time.

Figure 1. Distribution of violent incidents by year and region (number of incidents), 2011-2020
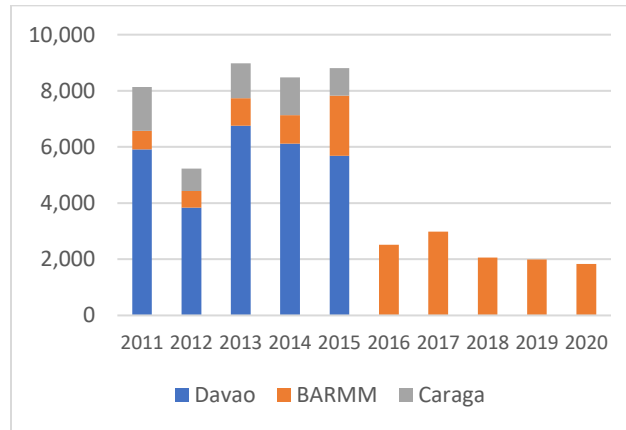
Source: CA, 2011-2020 from BARMM, Caraga and Davao

Figure 2. Land and non-land-related incidents over time (number of incidents), 2011-2020 (Land on left axis, Non-land on right axis)
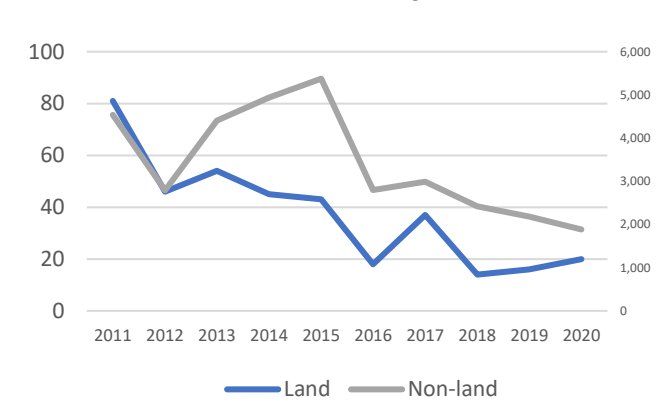
Source: CA, 2011-2020 from BARMM, Caraga and Davao.

3.2. Indigenous peoples

The IP data used in our analysis, obtained from the 2020 Population and Housing Census, refers to total population counts and population counts by ethnicity at the barangay level.[7] This data was provided by the Philippine Statistics Authority (PSA) exclusively for this study. The definition of IPs was revised by PSA for the 2020 census to include people who identify as IPs as well as members of Muslim tribes that are categorized as IPs. Overall, this data indicates that approximately 9.4 million IPs live in the Philippines' 17 regions. In Mindanao, IPs mainly live in Davao del Sur, Davao Oriental, Agusan del Sur, and Basilan provinces. Figure 3 shows their distribution within the BARMM, Caraga, and Davao regions.

Figure 3. Percentage of IPs Population by Province, 2020

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[7] Ideally, the inclusion of other variables to help characterize IPs, such as economic and social indicators from the census, would allow us to add further relevant controls to our analysis. While this study did not benefit from such information among IPs, geographical, economic and social data on the barangays where IPs reside was provided (as explained in section 4).
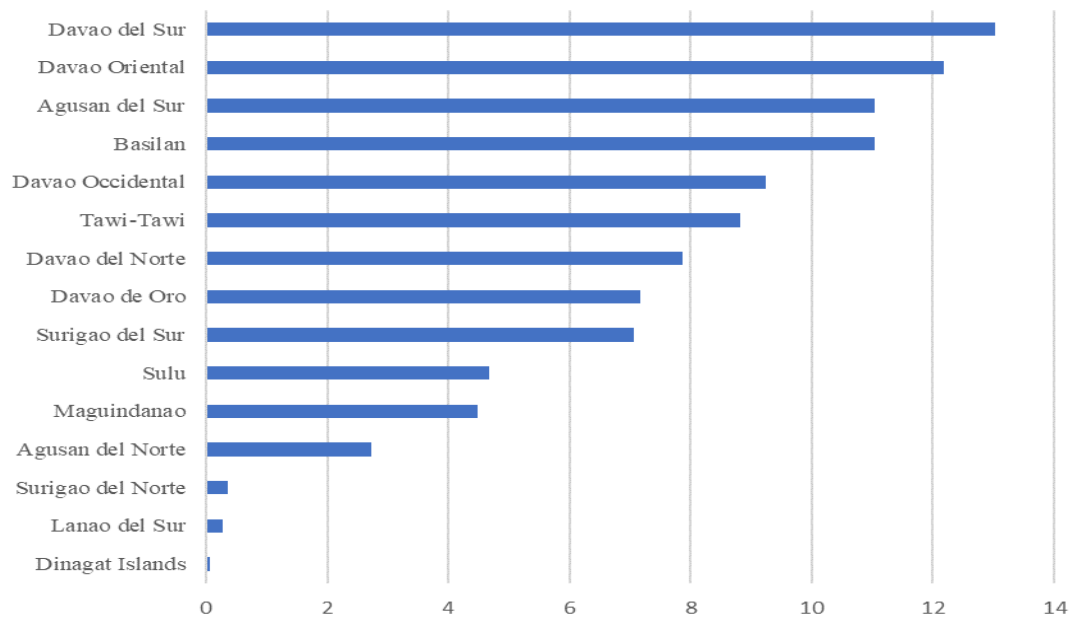
Source: 2020 Population and Housing Census, BARMM, Caraga, and Davao.

3.3. Certificates of Ancestral Domain Titles (CADT)

A CADT refers to a title formally recognizing IPs' rights of possession and ownership over their ancestral domains, as identified and delineated by the IPRA law.[8] It denotes the land and resources that IPs have traditionally used as their area of domicile and the basis of their economic and social life (Malayang III, 2001). As of March 31, 2021, the NCIP has approved 257 CADTs with a total land area of 5,971,334 hectares across the Philippines (NCIP Ancestral Domain Office, 2023, special tabulations). There are another 205 CADTs in process, representing 3,719,176 million hectares, as well as 486 identified CADTs that are not subject to any application process, covering 3,756,151 million hectares (NCIP Ancestral Domain Office, 2023, special tabulations). The CADT area data used in our analysis was georeferenced and provided by NCIP.

Based on the distribution of CADT areas in Caraga, Davao, and the BARMM, a significant majority of CADTs have not yet received full awards. Our analysis includes 72 CADT areas processed from 2002 to 2022 (one in the BARMM, 33 in Caraga, and 38 in Davao). Critically for our analysis, this information determines whether a given CADT area has a fully awarded title or approved but not yet fully awarded. Of the 33 CADTs in Caraga, three are awarded and 30 have been approved but are not yet awarded. Of the 38 CADTs in Davao available for this study, 9 are awarded and 29 are approved but not yet awarded. In the BARMM, this information is not available for the one CADT in that region.

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[8] Sec. 3, Chapter II, 1997 IPRA.

4. Linking conflict, IPs and CADTs

4.1. A simple analytical approach

As noted in the introduction, after cleaning our three datasets, we merged them into single data file suitable for empirical analysis.[9] This combined data allowed us to discern, visualize, and analyze which violent incidents occurred inside or outside ancestral domains. We narrowed our data to incidents for which have all information of interest (i.e., whether an incident is land, non-land related, or undetermined; whether it occurred in an area with high, low, or no presence of IPs; and the CADT status of where the incident occurred). The resulting dataset included 41,380 observations (individual incidents) across 2,854 barangays.

We then analyzed this dataset using maps as well as statistical analysis to unpack their patterns and associations. We also ran a series of tests to check the robustness of our results. Additionally, we performed a Linear Probability Model (LPM) to estimate the likelihood of violent conflict and the extent to which the presence of IP populations and other factors drove that prediction, which allowed us to test our results while controlling for additional factors and unpacking them by type of conflict. We used this model because it has the advantage of being easy to interpret[10] – positive coefficients associated with a given area indicate that conflict is more likely, with the reverse being true for negative coefficients. Finally, we assessed whether past conflicts influence the current presence of IPs in a barangay, thereby investigating—and as indicated below, ruling out—the possibility that endogeneity significantly biased our estimates.

The empirical strategy to construct the LPM and the summary statistics of the variables used in the regression analysis is explained next. The unit of observation was each incident X. The analysis estimates the probability of an incident X_i occurring at a barangay g and year t based on five broad groups of factors: violence-related factors (V); geographically-varying variables (G); risk factors (R); barangay-level provision of services (S); and time-varying factors (T):

Pr(Incident $X_{i,g,t}$)= f (V, G, R, S, T)   (1)

For violence-related factors (V), we used a dummy variable (inside CADT) that equals 1 if incident X took place inside an ancestral domain and 0 otherwise.

Additionally, a set of dummy variables were used to account for V factors in the likelihood of incident X_i happening. *Awarded* takes the value 1 if the territory for incident X was an area with

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[9] Once each dataset was cleaned, incident data was merged with the ancestral domain data using the barangay codes. In the case of Davao, the barangay codes were not available and had to be constructed using artificial an intelligence (AI) recursive algorithm. The resulting dataset was merged with the 2020 Census population data at the barangay level following the revised classification provided by PSA, based on the Philippine Standard Geographic Code (PSGC) as of March 2022.

[10] LPM is a binary regression model where the variable of interest for each observation takes values 0 or 1. In this case, a positive coefficient indicates that when one variable (e.g. share of IPs) increases, the mean of the other variable (e.g. violent incidents) also tends to increase. All econometric results were then replicated using a Probit model, which served as a robustness check; our main findings did not change as a result of these checks. Results are available upon request.

awarded CADT and 0 otherwise. *Approved* takes the value 1 for incidents taking place in approved but not fully-awarded CADT areas and 0 otherwise. Together, these dummy variables control for potentially different impacts on the likelihood of conflict for awarded and approved CADT areas.

Our specifications also contain several variables that control geographic factors (*G*). *Urban* is a dummy variable that indicates where the population is larger than 5,000 people (which is the population threshold used by PSA to determine urban contexts). *Mining* is a dummy variable that equals 1 if the barangay contains a mining site and 0 otherwise. *Poverty* is the incidence of poverty at provincial level in 2021. *Active4Ps* is a variable that measures the number of beneficiaries of active development projects happening in the barangay. *Central* is equal to 1 if the baranguay is a poblacion/central district or part of the poblacion/central district; *Highway* is equal to 1 if the barangay is accessible to the national highway. Risk factors (R) include the variable *Precarious,* which is equal to 1 if the household reside in a precarious location within the barangay at the time of the collection of the Census; *Relocation* is equal to 1 if there are a temporary relocation area in the barangay; *Move-in* is equal to 1 if there was a large or significant number of households who moved in or transferred to their barangay in the last five years due to environmental or peace and order reasons; *Move-out* is equal to 1 if there was a large or significant number of households who moved out or transferred due to environmental or peace and order reasons in the last five years; Services factors (S) capture *Svs_index*, which is equal to 1 if the barangay has any of these services: hospital, puericulture center, fire station, post office, landline, cellular phone signal, public street sweeper; *Edu_index* is equal to 1 if the barangay has elementary school, high school or college; *Eco_index* is equal to 1 if the barangay has any of the following: a wholesale and/or retail trade establishment, recreational establishment, manufacturing establishment, accommodation and food service establishment, financial establishment, establishment offering repair services, establishment offering personal services, or other establishments.[11] Additional variables that could potentially influence the prevalence of conflict, such as a barangay's efficiency and governance considerations (e.g., the ability to increase local revenues per inhabitant or control corruption), are unavailable in existing sources. See Appendix 2 for a more detailed description of the variables.

Time factors (*T*) are accounted for using year-fixed effects for each incident X_i. Fixed effects is a method of controlling for all variables, whether they are observed or not, as long as they stay constant within some larger category, in this case province and year.[12] This is convenient in

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[11] These three variables pertain to the year 2020, capturing the socioeconomic infrastructure of the community at that specific time. The data source is the Census, but unfortunately, it does not provide details on when these infrastructures were constructed or how long they have been present in the community. While there is arguably a low risk of causality between conflict and socioeconomic infrastructure (due to displacement significantly altering the demand for such services), it becomes crucial to assess if the primary and potentially more influential driver of endogeneity in this context, conflict and displacement, proves to be statistically significant. It is also noteworthy that the survey does not specify what constitutes a significant number of households or a precarious location precisely when posed to respondents. These factors may impact the precision of the results, although it remains unclear if they introduce a specific bias, as people may hold varying views on what qualifies as precarious locations or sizable displacement.

[12] Estimates cluster errors by barangay. Given that the analysis spans for several years across barangays, this will naturally lead to within-barangay and across-year correlations. We would also expect some extent of correlations from the unobservables, given that the same barangay in different years is probably more alike than two randomly selected barangays, and so clustering by barangay would be appropriate.

econometric terms because it avoids biases resulting from omitted variables not included in the model, provided they are not subject to change in the period considered. Appendix 2 shows the summary statistics of the variables used in the regression analysis.

Land is a dummy variable that takes the value of 1 if the conflict is land-related and 0 otherwise. *Noland* is a dummy variable that takes the value of 1 if the conflict is non-land-related and 0 otherwise. *IPs* is the percentage of indigenous population.

The summary statistics show the disproportion between land and non-land incidents. Land incidents represent only 1 percent of all incidents in our data set, while non-land ones make up 58 percent.[13] On average, IPs represent 20 percent of the population in the barangays where incidents happened. Some 29 percent of the incidents occurred inside a CADT. Urban barangays make up 55 percent of all barangays, and the mining sites cover 17 percent of the territory. There are an average of 416 beneficiaries of active development projects per barangay. About 43 percent of the barangays are a poblacion/central district or part of the población/central district and 92 percent are accessible to the national highway. Some 72 percent of the households are in precarious locations, and 11 percent of the barangays have a temporary relocation area. Given to environmental and peace and order reasons, 31 percent of the people thought it was a large or significant number of households who moved in or transferred to their barangay in the last five years, and that move-out in 16 percent. Notably, 98 percent of barangays either have a primary, secondary or college facilities, almost all barangays (99 percent) have at least one service and 85 percent have at least one establishment.

Table 1. Data

Table 1 shows the

Source: Authors' database

4.2. Key results

The results below are organized around the three key findings of our analysis:

    (i)   *In general, conflicts are less likely in barangays with higher shares of IPs.*

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[13] Above in section 3.1, we reported 59 percent of non-land incidents. That number corresponds to the average before merging the CA violent incident data with CADT and the IP population. In that process we lost a few observations: 2,119 incidents.

Barangays with higher shares of IPs are associated with fewer incidents of violence, according to our analysis of the combined 2011-2020 dataset. Across Mindanao, higher levels of conflict occurred in areas with fewer IPs as a share of the local population. The scatterplot in Figure 4 visualizes this correlation, with the downward-sloping red line showing the general trend: the higher the share of IPs (vertical axis), the lower the incidence of violence (horizontal axis).

Figure 4. Presence of IPs and violent incidents per barangay, 2021-2020
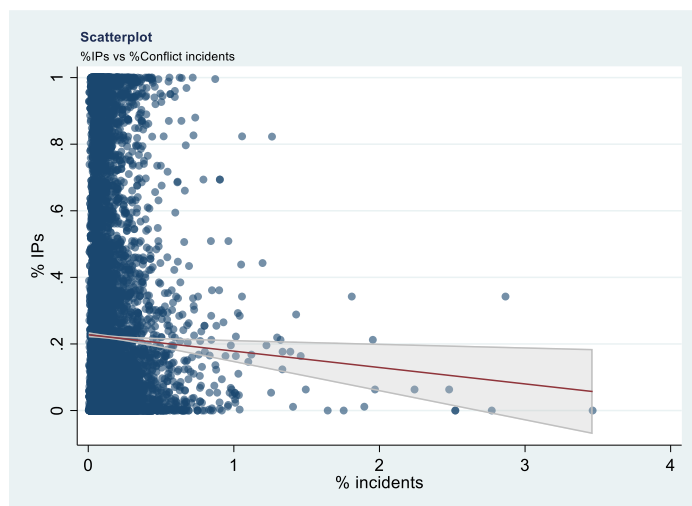
Source: Authors' database.

Note: The pairwise correlation of these two variables is -0.0342 and is significant at the 1% level. "% of incidents" is calculated as % of incidents in a barangay over total incidents in the entire sample, while % of IPs capture the share of IPs in a barangay over total population in each barangay.

(ii)   *Land- and resource-related conflicts are also less likely in barangays with higher shares of IPs.*

More specifically, our analysis also suggests that barangays with higher shares of IPs are associated with fewer incidents of land- and resource-related violence. Figure 5 shows that fewer land- and resource-related violent incidents occur in areas with high IP presence (gray bar) compared to areas with low IP presence (orange bar). (As noted from above, CA data categorizes land-related conflict as a subset of resource-related conflict, which also includes other conflict over water and other natural resources.) However, the fewest incidents of land- and resource-related conflict actually occurred in areas with no IP presence (blue bar), which tend to be urban areas. While this fact alone would seem to suggest a positive correlation between IP presence and violence, the more important factor is the decrease in conflict when moving from low-IP areas (orange bar) to high-IP areas (gray bar). Given the large number of incidents in the dataset, this decrease (between the orange and blue bars) drives the statistical correlation. This is called a "non-monotonic" or nonlinear relationship, and our analysis finds that it is robust to alternative ways of looking at the areas where incidents take place.[14]

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[14] In effect, similar nonlinear relationships were observed quartiles of barangays ordered by their concentration of violent conflict: those results are available upon request.

Similar trends are observed for non-land- and non-resource-related conflict, as well as violent incidents with an undetermined cause. As with figure 5, figure 6 shows that the highest level of non-land-related, non-resource-related, and undetermined violent incidents occurred in areas with low IP presence. The finding about undetermined incidents is particularly notable, given that this category presumably includes both land-related and non-land-related conflict). Note that the results in figure 6 are also non-monotonic, but this does not affect the direction of the correlation for the same reasons mentioned above.

Figure 5. Distribution of violent incidents by land-related and resource-related categories, 2011-2020
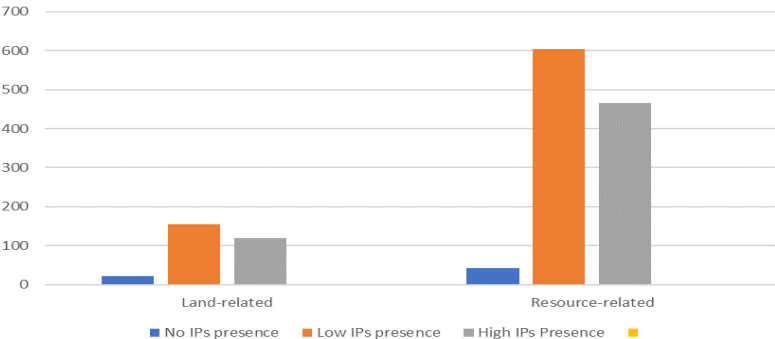
Source: Authors' database

Figure 6. Distribution of violent incidents by non-land-related and non-resource-related, and undetermined categories, 2011-2020
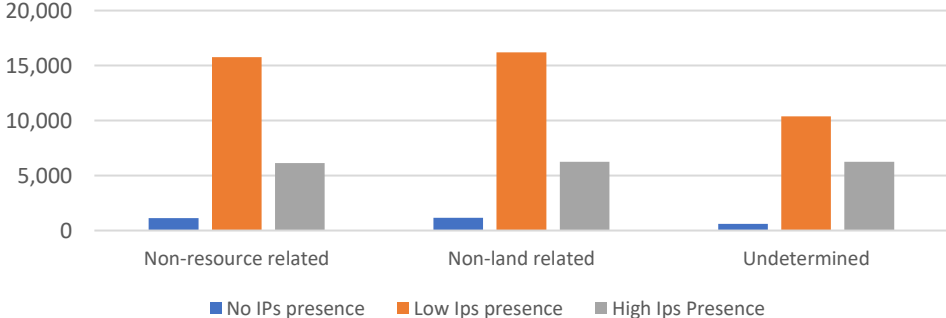
Source: Authors' database

> (iii)   *Overall, CADT areas have a lower likelihood for general conflict but a higher likelihood for land-related conflict, particularly in CADTs that experience processing delays.*

Our analysis further suggests that conflicts, in general, are more likely to happen outside CADT areas. The geo-referenced data allows us to analyze the distribution of violent incidents in Mindanao in order to visualize whether they occurred inside or outside a CADT. When

unpacking conflict by category, however, land-related conflicts are more likely to occur inside CADTs. [15] We obtained this finding by conducting a simple regression analysis that controlled for other factors that might affect the correlation.[16] Table 2 presents the regression results, which shows that land conflicts are positively correlated with CADTs to a 95% confidence level. Likewise, the table also shows that non-land-related conflicts are negatively correlated with CADTs, although this relationship is not statistically significant . Together, these results suggest that non-land conflicts are generally less likely to occur within CADTs but land-related conflicts are more likely to occur within CADTs. These results should not be interpreted as causal, but they provide rigorous support for the accuracy and strength of our findings.[17]

Table 2. LPM estimation results for the likelihood of experiencing land and non-land conflict inside CADTs areas (2011-2015)

VARIABLES	Land	No Land
Violent incidents inside CADT	0.003	-0.003
	[0.003]	[0.003]
Fixed effects	Yes	Yes
Barangay-clustered errors	Yes	Yes
Observations	17,017	17,017
R-squared	0.006	0.006

*** p<0.01, ** p<0.05, * p<0.1
Source: Authors' estimates

However, focusing on a CADT's processing stage complicates these findings, and suggests that the likelihood for land-related conflicts are only higher in CADTs that are "approved by not fully awarded." The findings described above refer analysis of all CADTs, whether they are "fully awarded" or experiencing processing delays – "approved but not fully awarded." When dividing the data into these two categories, the correlations change slightly. In fact, contrary to Table 2 above, we find that fully awarded CADTs are actually associated with *less* conflict, whether land-related or not. On the other hand, we find that approved but not fully awarded CADTs are associated with *less* non-land-related conflict but *more* land-related conflict. Thus, the pair of findings presented above – that CADTs have a lower likelihood of general conflicts but a higher likelihood of land-related conflicts – appears to only hold for approved but not fully awarded CADTs. Table 3 presents the regression results of this level of the analysis.[18] In other words, the correlation between land-related conflicts and CADTs appears to be entirely driven by those CADTs that are experiencing processing delays. Fully awarded CADT areas reduce the

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[15] There are 177 land incidents that happened inside CADTs and 118 that happened outside CADT areas. There are 6,779 non-land-related incidents that happened inside CADTs and 17,072 non-land-related incidents that happened outside CADT areas.

[16] Controls included in the analysis are defined at the barangay level and refer to its demographics, poverty levels, the extent to which benefits from 4Ps social transfer program, inventory of public services provided, and several risk factors for conflict such as presence of mining activities or refugee centers.

[17] All specifications in Table 2 include controls and year fixed effects. See Appendix 3 for full regression results. Results using Probit, for robustness checks, are available upon request to the authors.

[18] These results are weaker (in statistical terms), partly due to few CADT areas being fully awarded, but they are still suggestive of a distinctive effect on conflict based on whether the process of granting CADT status is completed or not. These results hold when we use other models such as Probit. Results available upon request.

probability of land conflict, but when still being processed, the presence of CADTs does not have the same effect.

Table 3. LPM Estimation results for CADT status (2011-2015)

VARIABLES	Land	No Land
Approved	-0.004	0.004
	[0.005]	[0.005]
Awarded	0.004	-0.004
	[0.003]	[0.003]
Fixed effects	Yes	Yes
Barangay-clustered errors	Yes	Yes
Observations	17,017	17,017
R-squared	0.007	0.007

*** p<0.01, ** p<0.05, * p<0.1
Source: Authors' estimates

The influence of reverse causality on our estimations is a potential concern. Reverse causality would be salient if prior conflicts exert an influence on the future distribution of IP populations. In such a scenario, the estimates outlined in Tables 3 and 4 may encompass a combination of contemporary and past factors, thereby complicating the disentanglement of specific policy interventions aimed at addressing the impact of CADTs on conflict dynamics. To evaluate the potential endogeneity in the data, we begin by examining the correlations between the population of IPs and the occurrence of conflicts per barangay. Our initial analysis reveals a pairwise correlation coefficient of 0.40 between the number of conflicts observed across barangays in 2011 and the IP population in barangays in 2020. This correlation suggests that higher levels of previous conflict are associated not with a decrease, but rather an increase, in future IP populations within the barangay. When examining the correlations between conflict and IP populations concurrently, we find coefficients of 0.70 for the year 2020 and 0.45 for the year 2011, respectively. Furthermore, the correlation between IP populations in 2010 and 2020 stands at 0.97. Put differently, it appears that IP populations in the Philippines tend to remain within their respective barangays even when conflict arises, indicating limited migration outside of the local area.

Additionally, we investigate how the findings presented in Tables 2 and 3 are impacted when we incorporate the IP populations of barangays in 2010 as an additional control variable. Table 4 displays the revised coefficient estimates for the presence of CADTs and their status following the inclusion of barangay IP populations in a quadratic form. A quadratic form is preferred due to the non-linear relationship evident in figures 5 and 6 between the IP population and the occurrence of conflict within the barangay. The results presented in Table 4 validate that the incorporation of IP population data from 2010 does not substantially change the original estimates, although the statistical significance of CADT presence diminishes. Furthermore, the quadratic representation of IP populations does not alter the results obtained for the influence of CADT status (awarded vs approved) on both land and non-land conflict. (Appendix 4 provides full estimtes).

Table 4: LPM Estimation results for CADT status after including IP population in 2010

VARIABLES	Land	No Land	Approved Land	Awarded Land	Approved No Land	Awarded No Land
Violent incidents inside CADT (original estimates)	0.003	-0.003	-0.004	0.004	0.004	-0.004
	[0.003]	[0.003]	[0.005]	[0.003]	[0.005]	[0.003]
Violent incidents inside CADT (after adding 2010 IP log pop)	0.004	-0.003	-0.003	0.005	0.003	-0.005
	[0.003]	[0.003]	[0.005]	[0.003]	[0.005]	[0.003]
Violent incidents inside CADT (after adding 2010 IP log pop, and in quadratic form)	0.004	-0.004	-0.003	0.005	0.003	-0.005
	[0.003]	[0.003]	[0.005]	[0.003]	[0.005]	[0.003]
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Barangay-clustered errors	Yes	Yes	Yes	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1

Source: Authors' estimates

A final robustness check is undertaken. We substitute our variable of interest, violent incidents within CADTs for the period 2011-2020, with the IP population (in quadratic form) in barangays in 2010 as the independent variable. This serves as an alternate approach to examine whether the presence of IP populations and conflicts are intertemporally related. The results, detailed in Appendix 5, show that larger IP populations in a barangay in 2010 are not significantly correlated with conflict (whether land- or non-land-related) in the same barangay in 2020. Considering all these findings collectively, we conclude that there is no substantial evidence of endogeneity linking conflict and IP population across different time periods.

These results are consistent with the literature on CADTs' inability to reduce conflict on their own. As reviewed earlier, Prill-Brett (2007), Lara and Franco (2022), and Drbohlav and Hejkrlik (2017) all suggest that awarding CADT status does not necessarily mean that conflict disappears, and World Bank (2023a) provides insights of why this is the case: namely, several flaws of CADTs. For example, even when a CADT is being awarded, multiple and conflicting land titles may be issued by different government bodies (e.g., Certificates of Land Ownership Awards provided by the Department of Agrarian Reform). Likewise, required procedures to secure indigenous communities' "free, prior, and informed consent" over land issues can be tedious and time-consuming, resulting in processing delays. Frequently, IP communities' rights are also inadequately recognized by other parties, resulting in disregard for CADTs that are still being processed.

Addressing these challenges will likely require strengthening land governance in Mindanao. NCIP estimates that at the current pace, it would take 50 years to complete land titling in Mindanao. The major reasons for slow CADT implementation are well known – e.g., delays in completion of cadastral surveys, missing or erroneous survey records, high costs for titling, and a range of other cumbersome and costly procedures. But these difficulties can lead to other challenges. The longer titling is delayed after completion of cadastral surveys, for instance, the more complex adjudication becomes – since transfers, death of original claimant, subdivisions,

and consolidations usually occur (NCIP Ancestral Domain Office, 2023). Addressing these issues will require a spectrum of efforts, including broad improvements in the ecosystem of land governance institutions across Mindanao.

Such efforts should include enhancing dispute resolution, particularly in cases of overlapping titles. The current legal framework for dispute resolution is overly complex and potentially creates more disputes than it solves. A key challenge is overlapping titles. As noted above, when multiple titles are issued in areas governed by different land laws, possession of one title is often not enough to secure property rights (World Bank, 2021). Various land agencies frequently create their own independent records and maps without sufficient coordination, results in overlapping titles that become the subject of litigation. Prior efforts to address this challenge have not been effective.[19] Overlapping titles often lead to the underutilization of large tracks of land, since owners' rights (even when there are titles) remain insecure, increasing the risks for further litigation and even violent conflict (World Bank, 2023).

5. Concluding remarks

This article has explored the relationship between conflict and IPs in Mindanao. Its main contribution is to provide more systematic and comprehensive evidence to complement existing qualitative work, which points to a prevalence for conflict inside CADT areas. While most of these studies base their results on case studies and qualitative evidence, our analysis focuses on a broad region (including Caraga, Davao, and the BARMM) and uses a suite of quantitative tools, such as econometric and spatial analysis.

We have shown that barangays with higher shares of IPs are associated with less conflict, including land-related conflicts. These findings hold when expanding the scope of the analysis to include resource-related conflict, and even when looking at conflicts of undetermined origin. While the article focuses on Mindanao, it is likely that our results could apply to other IP areas in the Philippines.

There are no reasons for complacency, however: our evidence also shows that CADT processing delays can increase violence. Only 31 percent of all violent incidents take place inside CADT areas – but CADTs have a higher likelihood of land-related conflict. Moreover, this positive correlation with land conflict appears to be entirely driven by CADTs that are experiencing processing delays. "Approved but not yet fully awarded" CADTs are associated with *more* land conflict and *less* non-land conflict, while "fully awarded" CADTs are associated with *less* conflict for both land and non-land conflict.

These findings suggest that the existence of CADTs do not on their own solve land-related conflicts. Our results suggest that CADTs can reduce conflict in general, and fully awarded CADTs can reduce land-related conflict. But the problem is that too few CADTs are fully awarded, and "approved but not yet awarded" CADTs can increase violence. These

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[19] The joint administrative order approved in 2012 to prevent the overlapping in tenure issuance across different public agencies (the Department of Environment and Natural Resources, the Department of Agrarian Reform, and the Department of Land Registration) largely failed to correct previous overlapping claims or address the overlapping of legal frameworks; it simply provides a procedure for cross-validation (NCIP 2023).

administrative delays, in turn, are the result of lengthy and bureaucratic processes that are not backed up by sufficient resources and institutional capacity.

Addressing CADT implementation challenges must be coupled with stronger land governance. Improvements are needed in multiple areas, such as: rights to forest; public land management; transfer of large tracks of land to investors; public provision of land information, registry and cadaster; and dispute resolution. These challenges will not be easy to address, but they can no longer be ignored. Success on these reforms promises far-reaching benefits, including increased investment, job creation, income and wealth generation for IPs, and – ultimately – less poverty and conflict.

This study underscores persistent data gaps and the need for more analysis into conflict, land, and IP issues. More and higher-quality data is always needed for better policymaking, but this is especially true for the case of IP issues in the Philippines. For example, there is a strong need for more continuous collection and dissemination of IP-specific statistics. More specifically, data on IPs should include details about their socioeconomic characteristics, and data on conflict should include more explicit details about the victims and perpetrators, including their IP status. Only with more detailed and precise data will policymakers be equipped to more effectively reduce conflict, strengthen land governance, and reduce poverty – for IPs in Mindanao and for all members of Philippine society.

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Appendix 1: The CADT application process in the Phillipines

Figure A1: Activities under the stages of the CADT application
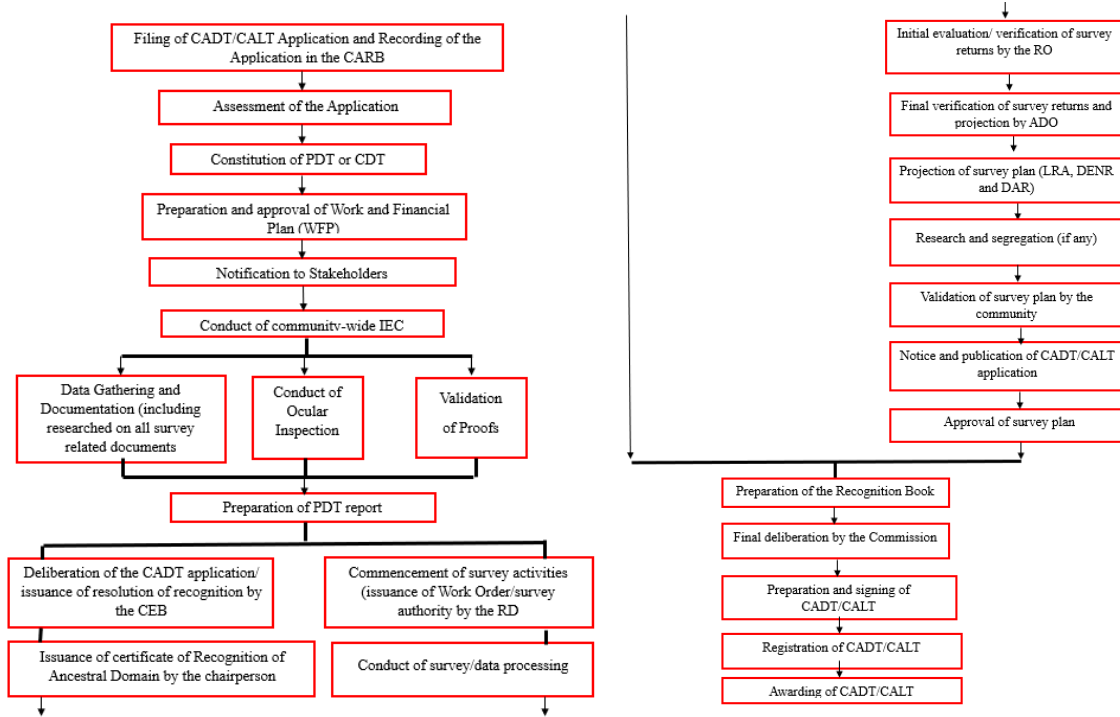
Source: NCIP, Ancestral Domain Office staff

Note: Certificate of Ancestral Domain Title (CADT), Certificate of Ancestral Land Title (CALT), CADT/CALT Application Record Book (CARB), Provincial Delineation Team (PDT), Community Delineation Team (CDT), Information Education and Consultation (IEC), Commission En Banc (CEB), Register of Deeds (RD), Regional office (RO), Ancestral Domain Office (ADO), Land Registration Authority (LRA), Department of Environment and Natural Resources (DENR), Department of Agrarian Reform (DAR).

Appendix 2: Summary of Statistics and List of variables

Variable	Obs	Mean	Std. Dev.	Min	Max
land	41,380	0.007129	0.084133	0	1
noland	41,380	0.57639	0.494136	0	1
insidecadt	41,380	0.316651	0.465176	0	1
Ips	41,380	0.205234	0.254886	0	1
awarded	41,380	0.109715	0.312538	0	1
approved	41,380	0.168874	0.374645	0	1
poverty	41,380	20.12209	12.50888	7.2	51
urban	41,380	0.546278	0.49786	0	1
active4Ps2020	41,380	416	351	0	1,831
mining	41,380	0.167351	0.373294	0	1
central	41,380	0.425882	0.494482	0	1
highway	41,380	0.919913	0.271431	0	1
precarious	41,380	0.717883	0.450035	0	1
relocation	41,380	0.113992	0.317806	0	1
moved_in	41,380	0.307274	0.46137	0	1
moved_out	41,380	0.162204	0.368642	0	1
edu_index	41,380	0.978081	0.14642	0	1
svs_index	41,380	0.993596	0.07977	0	1
eco_index	41,380	0.85319	0.353921	0	1

Variable	Definition
land	Equals to 1 if the conflict is land-related and 0 otherwise
noland	Equals to 1 if the conflict is not-land-related and 0 otherwise
insidecadt	Equals 1 if incident X took place inside an ancestral domain and 0 otherwise
Ips	Percentage of indigenous population
awarded	Equals 1 if the territory for incident *X* was an area with awarded CADT and 0 otherwise.
Approved	Equals 1 for incidents taking place in approved but not fully-awarded CADT areas and 0 otherwise
poverty	Incidence of poverty at provincial level in 2021
urban	Equals to 1 if population is larger than 5,000 people
active4ps2020	Measures the number of beneficiaries of active development projects happening in the barangay
mining	Equals 1 if the barangay contains a mining site and 0 otherwise
central	Equal to 1 if the Baranguay is a 21enefits21/central district or part of the población/central district
highway	Equal to 1 if the barangay is accessible to the national highway
precarious	Equal to 1 if the household reside in a precarious location (along estero/cree/waterway, riverbank/shoreline, railroad, garbage dumpsite, under a bridge, along sidewalk or easement of roads and highways, cliff/cementery/others, government land without legally recognizable claim to the land, private land they do not own

relocation	Equal to 1 if there are a temporary relocation area in the barangay
moved_in	Equal to 1 if there was a large or significant number of households who moved in or transferred to their barangay in the last five years due to typhoon, other natural calamity/disaster, peace and order problem, other reasons
moved_out	Equal to 1 if there was a large or significant number of households who moved out or transferred to their barangay in the last five years due to typhoon, other natural calamity/disaster, peace and order problem, other reasons
edu_index	Equal to 1 if the barangay has elementary school, high school or college
svs_index	Equal to 1 if the barangay has any of these services such as hospital, puericulture center, fire station, post office, landline, cellular phone signal, public street sweeper
eco_index	Equal to 1 if the Baranagay has any of the following: a wholesale and/or retail trade establishment, recreational establishment, manufacturing establishment, accommodation and food service establishment, financial establishment, establishment offering repair services, establishment offering personal services, other establishments.

Appendix 3: Robustness checks

Results are divided in two sets, those comprising land-related conflicts, columns 1 to 6, in tables A3.1 and A3.2, and estimations for non-land-related conflicts, columns 7 to 12. Estimates for models in columns 1 and 7 are unconditional and only control for whether the incident took place inside or outside a CADT area for land and non-land conflicts, respectively. Estimates in columns 2 and 8 add year- and province-fixed effects to the unconditional effects of CADT location. Columns 3 and 9 add to those estimates the extent to which the barangay receives 4Ps benefits and whether it contains mining sites; columns 4 and 10 results additionally control for the proximity to highways; columns 5 and 11 add several conflict risk factors; while columns 6 and 12 provide the results for most comprehensive models where all fixed effects, barangay-clustered errors, and all possible types of controls—23enefits, mining sites, proximity to highways, conflict risk factors and levels of public service provision—are considered. Logit estimations of the same specifications A3.1 and A3.2 are available upon request, results are very similar.

Table A3.1 Robustness checks results predicting violent incidents in BARMM, Caraga and Davao (2011-2015)

VARIABLES	(1) Land	(2) Land	(3) Land	(4) Land	(5) Land	(6) Land	(7) No Land	(8) No Land	(9) No Land	(10) No Land	(11) No Land	(12) No Land
Inside CADT?	0.006**	0.003	0.002	0.001	0.002	0.002	-0.006**	-0.003	-0.002	-0.001	-0.002	-0.002
	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]
Poverty			0.002	0.002	0.002	0.002			-0.002	-0.002	-0.002	-0.002
			[0.001]	[0.001]	[0.001]	[0.001]			[0.001]	[0.001]	[0.001]	[0.001]
urban			-0.009***	-0.007***	-0.008***	-0.007**			0.009***	0.007***	0.008***	0.007**
			[0.002]	[0.002]	[0.002]	[0.003]			[0.002]	[0.002]	[0.002]	[0.003]
active4Ps_2020			-0.000	0.000	0.000	0.000			0.000	-0.000	-0.000	-0.000
			[0.000]	[0.000]	[0.000]	[0.000]			[0.000]	[0.000]	[0.000]	[0.000]
mining			-0.001	-0.002	-0.002	-0.002			0.001	0.002	0.002	0.002
			[0.005]	[0.005]	[0.004]	[0.004]			[0.005]	[0.005]	[0.004]	[0.004]
central				-0.005***	-0.006***	-0.005***				0.005***	0.006***	0.005***
				[0.002]	[0.002]	[0.002]				[0.002]	[0.002]	[0.002]
highway				-0.008	-0.007	-0.007				0.008	0.007	0.007
				[0.007]	[0.007]	[0.007]				[0.007]	[0.007]	[0.007]
precarious					0.001	0.002					-0.001	-0.002
					[0.002]	[0.002]					[0.002]	[0.002]
relocation					-0.006*	-0.006*					0.006*	0.006*
					[0.003]	[0.003]					[0.003]	[0.003]
moved_in					0.007***	0.007***					-0.007***	-0.007***
					[0.002]	[0.002]					[0.002]	[0.002]
moved_out					-0.005	-0.005					0.005	0.005
					[0.003]	[0.003]					[0.003]	[0.003]

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
edu_index						0.020***						-0.020***
						[0.004]						[0.004]
svs_index						0.021***						-0.021***
						[0.005]						[0.005]
eco_index						-0.011**						0.011**
						[0.005]						[0.005]
prov = 24		-0.003**	-0.003*	-0.003	-0.004**	-0.005**		0.003**	0.003*	0.003	0.004**	0.005**
		[0.002]	[0.002]	[0.002]	[0.002]	[0.002]		[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
prov = 25		0.011***	-0.021	-0.021	-0.023	-0.023		-0.011***	0.021	0.021	0.023	0.023
		[0.004]	[0.022]	[0.022]	[0.021]	[0.021]		[0.004]	[0.022]	[0.022]	[0.021]	[0.021]
prov = 36		-0.010***	-0.009*	-0.008	-0.008	-0.011*		0.010***	0.009*	0.008	0.008	0.011*
		[0.002]	[0.005]	[0.006]	[0.005]	[0.007]		[0.002]	[0.005]	[0.006]	[0.005]	[0.007]
prov = 38		0.011*	-0.039	-0.042	-0.042	-0.043		-0.011*	0.039	0.042	0.042	0.043
		[0.006]	[0.034]	[0.033]	[0.033]	[0.032]		[0.006]	[0.034]	[0.033]	[0.033]	[0.032]
prov = 66		0.005	-0.091	-0.097	-0.099	-0.098		-0.005	0.091	0.097	0.099	0.098
		[0.005]	[0.065]	[0.064]	[0.063]	[0.063]		[0.005]	[0.065]	[0.064]	[0.063]	[0.063]
prov = 67		0.003	-0.031	-0.031	-0.033	-0.032		-0.003	0.031	0.031	0.033	0.032
		[0.004]	[0.021]	[0.021]	[0.020]	[0.020]		[0.004]	[0.021]	[0.021]	[0.020]	[0.020]
prov = 68		0.021***	-0.018	-0.019	-0.020	-0.019		-0.021***	0.018	0.019	0.020	0.019
		[0.007]	[0.026]	[0.025]	[0.025]	[0.025]		[0.007]	[0.026]	[0.025]	[0.025]	[0.025]
prov = 82		0.007*	-0.016	-0.016	-0.019	-0.018		-0.007*	0.016	0.016	0.019	0.018
		[0.004]	[0.016]	[0.016]	[0.015]	[0.015]		[0.004]	[0.016]	[0.016]	[0.015]	[0.015]
prov = 85, omitted			-	-	-	-			-	-	-	-
Year = 2012			-0.004	-0.003	-0.003	-0.003			0.004	0.003	0.003	0.003
			[0.003]	[0.003]	[0.003]	[0.003]			[0.003]	[0.003]	[0.003]	[0.003]
Year = 2013			-0.004	-0.004	-0.003	-0.003			0.004	0.004	0.003	0.003
			[0.003]	[0.003]	[0.003]	[0.003]			[0.003]	[0.003]	[0.003]	[0.003]
Year = 2014			-0.007***	-0.007**	-0.007**	-0.007**			0.007***	0.007**	0.007**	0.007**
			[0.003]	[0.003]	[0.003]	[0.003]			[0.003]	[0.003]	[0.003]	[0.003]
Year = 2015			-0.009***	-0.009***	-0.009***	-0.009***			0.009***	0.009***	0.009***	0.009***
			[0.003]	[0.003]	[0.003]	[0.003]			[0.003]	[0.003]	[0.003]	[0.003]
prov = 85		0.048*						-0.048*				
		[0.028]						[0.028]				
Constant	0.010***	0.012***	0.003	0.010	0.007	-0.024**	0.990***	0.988***	0.997***	0.990***	0.993***	1.024***
	[0.001]	[0.003]	[0.011]	[0.013]	[0.013]	[0.011]	[0.001]	[0.003]	[0.011]	[0.013]	[0.013]	[0.011]
Observations	17,017	17,017	17,017	17,017	17,017	17,017	17,017	17,017	17,017	17,017	17,017	17,017
R-squared	0.001	0.006	0.008	0.009	0.010	0.011	0.001	0.006	0.008	0.009	0.010	0.011

*** p<0.01, ** p<0.05, * p<0.1

Barangay-clustered standard errors in brackets

Urban is a dummy variable that indicates where the population is larger than 5,000 people. *Mining* is a dummy variable that equals 1 if the barangay contains a mining site and 0 otherwise. *Poverty* is the incidence of poverty at provincial level in 2021. *Active4Ps* is a variable that measures the number of beneficiaries of active development projects happening in the barangay. *Central* is equal to 1 if the baranguay is a poblacion/central district or part of the poblacion/central district; *Highway* is equal to 1 if the barangay is accessible to the national highway; *Precarious* is equal to 1 if the household reside in a precarious location; *Relocation* is equal to 1 if there are a temporary relocation area in the barangay; *Move-in* is equal to 1 if there was a large or significant number of households who moved in or transferred to their barangay in the last five years due to environmental or peace and order reasons; Move-out is equal to 1 if there was a large or significant number of households who moved out or transferred due to environmental or peace and order reasons in the last 5 years; Svs_index is the 1 if the barangay has some of these services: hospital, puericulture center, fire station, post office, landline, cellular phone signal, public street sweeper; Edu_index is equal to 1 if the barangay has elemtary school, high school and college; Eco_index is equal to 1 if the Baranagay has any of the following: a wholesale and/or retail trade establishment, recreational establishment, manufacturing establishment, accommodation and food service establishment, financial establishment, establishment offering repair services, establishment offering personal services, other establishments. See Appendix 4 for a more detailed description of the variables.

Table A3.2 Robustness Checks results predicting violent incidents in BARMM, Caraga and Davao by processing status of CADTs (2020)

VARIABLES	(1) Land	(2) Land	(3) Land	(4) Land	(5) Land	(6) Land	(7) No Land	(8) No Land	(9) No Land	(10) No Land	(11) No Land	(12) No Land
status3	0.001	-0.004	-0.006	-0.008	-0.005	-0.005	-0.001	0.004	0.006	0.008	0.005	0.005
	[0.003]	[0.005]	[0.006]	[0.006]	[0.005]	[0.005]	[0.003]	[0.005]	[0.006]	[0.006]	[0.005]	[0.005]
status4	0.007**	0.004	0.002	0.001	0.002	0.002	-0.007**	-0.004	-0.002	-0.001	-0.002	-0.002
	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]
Poverty			0.002	0.002	0.002	0.002			-0.002	-0.002	-0.002	-0.002
			[0.001]	[0.001]	[0.001]	[0.001]			[0.001]	[0.001]	[0.001]	[0.001]
urban			-0.010***	-0.007***	-0.008***	-0.007**			0.010***	0.007***	0.008***	0.007**
			[0.002]	[0.003]	[0.003]	[0.003]			[0.002]	[0.003]	[0.003]	[0.003]
active4Ps_2020			-0.000	0.000	0.000	0.000			0.000	-0.000	-0.000	-0.000
			[0.000]	[0.000]	[0.000]	[0.000]			[0.000]	[0.000]	[0.000]	[0.000]
mining			0.002	0.002	0.001	0.000			-0.002	-0.002	-0.001	-0.000
			[0.005]	[0.005]	[0.005]	[0.005]			[0.005]	[0.005]	[0.005]	[0.005]
prov = 24		-0.003**	-0.003*	-0.003	-0.004**	-0.004**		0.003**	0.003*	0.003	0.004**	0.004**
		[0.002]	[0.002]	[0.002]	[0.002]	[0.002]		[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
prov = 25		0.011***	-0.022	-0.022	-0.023	-0.023		-0.011***	0.022	0.022	0.023	0.023
		[0.004]	[0.022]	[0.021]	[0.022]	[0.021]		[0.004]	[0.022]	[0.021]	[0.022]	[0.021]
prov = 36		-0.010***	-0.012***	-0.012**	-0.010*	-0.013*		0.010***	0.012***	0.012**	0.010*	0.013*
		[0.003]	[0.005]	[0.006]	[0.005]	[0.007]		[0.003]	[0.005]	[0.006]	[0.005]	[0.007]
prov = 38		0.012**	-0.038	-0.042	-0.042	-0.042		-0.012**	0.038	0.042	0.042	0.042
		[0.006]	[0.034]	[0.033]	[0.033]	[0.032]		[0.006]	[0.034]	[0.033]	[0.033]	[0.032]
prov = 66		0.005	-0.094	-0.100	-0.102	-0.102		-0.005	0.094	0.100	0.102	0.102

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	[0.005]	[0.065]	[0.064]	[0.064]	[0.063]	[0.005]	[0.065]	[0.064]	[0.064]	[0.063]
prov = 67	0.003	-0.031	-0.031	-0.033	-0.031	-0.003	0.031	0.031	0.033	0.031
	[0.004]	[0.021]	[0.021]	[0.020]	[0.020]	[0.004]	[0.021]	[0.021]	[0.020]	[0.020]
prov = 68	0.021***	-0.019	-0.020	-0.020	-0.020	-0.021***	0.019	0.020	0.020	0.020
	[0.007]	[0.026]	[0.025]	[0.025]	[0.025]	[0.007]	[0.026]	[0.025]	[0.025]	[0.025]
prov = 82	0.010**	-0.013	-0.013	-0.016	-0.015	-0.010**	0.013	0.013	0.016	0.015
	[0.004]	[0.016]	[0.016]	[0.016]	[0.015]	[0.004]	[0.016]	[0.016]	[0.016]	[0.015]
prov = 85, omitted		-	-	-	-		-	-	-	-
Year = 2012	-0.003	-0.003	-0.003	-0.003	-0.003	0.003	0.003	0.003	0.003	0.003
	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]
Year = 2013	-0.004	-0.004	-0.003	-0.003	-0.003	0.004	0.004	0.003	0.003	0.003
	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]
Year = 2014	-0.007***	-0.007**	-0.007**	-0.007**	-0.007**	0.007***	0.007**	0.007**	0.007**	0.007**
	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]
Year = 2015	-0.009***	-0.009***	-0.009***	-0.009***	-0.009***	0.009***	0.009***	0.009***	0.009***	0.009***
	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]
central			-0.006***	-0.006***	-0.006***			0.006***	0.006***	0.006***
			[0.002]	[0.002]	[0.002]			[0.002]	[0.002]	[0.002]
highway			-0.008	-0.007	-0.008			0.008	0.007	0.008
			[0.007]	[0.007]	[0.007]			[0.007]	[0.007]	[0.007]
precarious				0.001	0.001				-0.001	-0.001
				[0.002]	[0.002]				[0.002]	[0.002]
relocation				-0.005*	-0.005*				0.005*	0.005*
				[0.003]	[0.003]				[0.003]	[0.003]
moved_in				0.006***	0.006***				-0.006***	-0.006***
				[0.002]	[0.002]				[0.002]	[0.002]
moved_out				-0.005	-0.005				0.005	0.005
				[0.003]	[0.003]				[0.003]	[0.003]
edu_index					0.020***					-0.020***
					[0.004]					[0.004]
svs_index					0.020***					-0.020***
					[0.005]					[0.005]
eco_index					-0.011**					0.011**
					[0.005]					[0.005]
prov = 85	0.048*					-0.048*				

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		[0.028]						[0.028]				
Constant	0.011***	0.012***	0.003	0.010	0.008	-0.022*	0.989***	0.988***	0.997***	0.990***	0.992***	1.022***
	[0.001]	[0.003]	[0.011]	[0.013]	[0.013]	[0.011]	[0.001]	[0.003]	[0.011]	[0.013]	[0.013]	[0.011]
Observations	17,017	17,017	17,017	17,017	17,017	17,017	17,017	17,017	17,017	17,017	17,017	17,017
R-squared	0.001	0.007	0.009	0.009	0.010	0.011	0.001	0.007	0.009	0.009	0.010	0.011

*** p<0.01, ** p<0.05, * p<0.1

Barangay-clustered standard errors in brackets

Urban is a dummy variable that indicates where the population is larger than 5,000 people. *Mining* is a dummy variable that equals 1 if the barangay contains a mining site and 0 otherwise. *Poverty* is the incidence of poverty at provincial level in 2021. *Active4Ps* is a variable that measures the number of beneficiaries of active development projects happening in the barangay. *Central* is equal to 1 if the baranguay is a poblacion/central district or part of the poblacion/central district; *Highway* is equal to 1 if the barangay is accessible to the national highway; *Precarious* is equal to 1 if the household reside in a precarious location; *Relocation* is equal to 1 if there are a temporary relocation area in the barangay; *Move-in* is equal to 1 if there was a large or significant number of households who moved in or transferred to their barangay in the last five years due to environmental or peace and order reasons; Move-out is equal to 1 if there was a large or significant number of households who moved out or transferred due to environmental or peace and order reasons in the last 5 years; Svs_index is the 1 if the barangay has any of these services: hospital, puericulture center, fire station, post office, landline, cellular phone signal, public street sweeper; Edu_index is equal to 1 if the barangay has elemtary school, high school and college; Eco_index is equal to 1 if the Baranagay has any of the following :a wholesale and/or retail trade establishment, recreational establishment, manufacturing establishment, accommodation and food service establishment, financial establishment, establishment offering repair services, establishment offering personal services, other establishments. See Appendix 4 for a more detailed description of the variables.

Table A3.3 Full LPM results predicting violent incidents in BARMM, Caraga and Davao (2020) with IP populations 2010 as control

VARIABLES	(1) Land	(2) Land	(3) Land	(4) No Land	(5) No Land	(6) No Land
Inside CADT?	0.003	0.004	0.004	-0.003	-0.004	-0.004
	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]
lpob2010		-0.001	0.001		0.001	-0.001
		[0.001]	[0.003]		[0.001]	[0.003]
pob2010_2			-0.000			0.000
			[0.000]			[0.000]
prov = 24	-0.003**	-0.004**	-0.004**	0.003**	0.004**	0.004**
	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
prov = 25	0.011***	0.013***	0.013***	-0.011***	-0.013***	-0.013***
	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]
prov = 36	-0.010***	-0.016***	-0.011	0.010***	0.016***	0.011
	[0.002]	[0.005]	[0.009]	[0.002]	[0.005]	[0.009]
prov = 38	0.011*	0.008	0.010	-0.011*	-0.008	-0.010
	[0.006]	[0.006]	[0.007]	[0.006]	[0.006]	[0.007]
prov = 66	0.005	0.008	0.009	-0.005	-0.008	-0.009
	[0.005]	[0.006]	[0.006]	[0.005]	[0.006]	[0.006]
prov = 67	0.003	0.003	0.005	-0.003	-0.003	-0.005
	[0.004]	[0.004]	[0.005]	[0.004]	[0.004]	[0.005]
prov = 68	0.021***	0.020***	0.021***	-0.021***	-0.020***	-0.021***
	[0.007]	[0.007]	[0.007]	[0.007]	[0.007]	[0.007]
prov = 82	0.007*	0.007*	0.007*	-0.007*	-0.007*	-0.007*
	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]
prov = 85	0.048*	0.044	0.045*	-0.048*	-0.044	-0.045*
	[0.028]	[0.027]	[0.027]	[0.028]	[0.027]	[0.027]
Year = 2012	-0.004	-0.004	-0.004	0.004	0.004	0.004

	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]
Year = 2013	-0.004	-0.004	-0.004	0.004	0.004	0.004
	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]
Year = 2014	-0.007***	-0.007***	-0.007***	0.007***	0.007***	0.007***
	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]
Year = 2015	-0.009***	-0.009***	-0.009***	0.009***	0.009***	0.009***
	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]
Constant	0.012***	0.019***	0.013	0.988***	0.981***	0.987***
	[0.003]	[0.005]	[0.010]	[0.003]	[0.005]	[0.010]
Observations	17,017	17,017	17,017	17,017	17,017	17,017
R-squared	0.006	0.007	0.007	0.006	0.007	0.007

*** p<0.01, ** p<0.05, * p<0.1

Barangay-clustered standard errors in brackets

Urban is a dummy variable that indicates where the population is larger than 5,000 people. *Mining* is a dummy variable that equals 1 if the barangay contains a mining site and 0 otherwise. *Poverty* is the incidence of poverty at provincial level in 2021. *Active4Ps* is a variable that measures the number of beneficiaries of active development projects happening in the barangay. *Central* is equal to 1 if the baranguay is a poblacion/central district or part of the poblacion/central district; *Highway* is equal to 1 if the barangay is accessible to the national highway; *Precarious* is equal to 1 if the household reside in a precarious location; *Relocation* is equal to 1 if there are a temporary relocation area in the barangay; *Move-in* is equal to 1 if there was a large or significant number of households who moved in or transferred to their barangay in the last five years due to environmental or peace and order reasons; Move-out is equal to 1 if there was a large or significant number of households who moved out or transferred due to environmental or peace and order reasons in the last 5 years; Svs_index is the 1 if the barangay has any of these services: hospital, puericulture center, fire station, post office, landline, cellular phone signal, public street sweeper; Edu_index is equal to 1 if the barangay has elemtary school, high school and college; Eco_index is equal to 1 if the Baranagay has any of the following :a wholesale and/or retail trade establishment, recreational establishment, manufacturing establishment, accommodation and food service establishment, financial establishment, establishment offering repair services, establishment offering personal services, other establishments. See Appendix 4 for a more detailed description of the variables.

Table A3.4 Full LPM results predicting violent incidents in BARMM, Caraga and Davao by processing status of CADTs (2020) with IP populations in 2010 as control

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Land	Land	Land	No Land	No Land	No Land
status3	-0.004	-0.003	-0.003	0.004	0.003	0.003

	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]
status4	0.004	0.005	0.005	-0.004	-0.005	-0.005
	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]
lpob2010		-0.001	0.001		0.001	-0.001
		[0.001]	[0.003]		[0.001]	[0.003]
pob2010_2			-0.000			0.000
			[0.000]			[0.000]
prov = 24	-0.003**	-0.004**	-0.004**	0.003**	0.004**	0.004**
	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
prov = 25	0.011***	0.012***	0.013***	-0.011***	-0.012***	-0.013***
	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]
prov = 36	-0.010***	-0.015***	-0.011	0.010***	0.015***	0.011
	[0.003]	[0.005]	[0.009]	[0.003]	[0.005]	[0.009]
prov = 38	0.012**	0.010	0.011*	-0.012**	-0.010	-0.011*
	[0.006]	[0.006]	[0.007]	[0.006]	[0.006]	[0.007]
prov = 66	0.005	0.007	0.008	-0.005	-0.007	-0.008
	[0.005]	[0.006]	[0.006]	[0.005]	[0.006]	[0.006]
prov = 67	0.003	0.003	0.004	-0.003	-0.003	-0.004
	[0.004]	[0.004]	[0.005]	[0.004]	[0.004]	[0.005]
prov = 68	0.021***	0.020***	0.021***	-0.021***	-0.020***	-0.021***
	[0.007]	[0.007]	[0.007]	[0.007]	[0.007]	[0.007]
prov = 82	0.010**	0.010**	0.010**	-0.010**	-0.010**	-0.010**
	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]
prov = 85	0.048*	0.044	0.046*	-0.048*	-0.044	-0.046*
	[0.028]	[0.028]	[0.027]	[0.028]	[0.028]	[0.027]
Year = 2012	-0.003	-0.003	-0.003	0.003	0.003	0.003
	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]
Year = 2013	-0.004	-0.004	-0.004	0.004	0.004	0.004
	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]
Year = 2014	-0.007***	-0.007***	-0.007***	0.007***	0.007***	0.007***
	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]

	(1)	(2)	(3)	(4)	(5)	(6)
Year = 2015	-0.009***	-0.009***	-0.009***	0.009***	0.009***	0.009***
	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]
Constant	0.012***	0.017***	0.013	0.988***	0.983***	0.987***
	[0.003]	[0.005]	[0.010]	[0.003]	[0.005]	[0.010]
Observations	17,017	17,017	17,017	17,017	17,017	17,017
R-squared	0.007	0.007	0.007	0.007	0.007	0.007

*** p<0.01, ** p<0.05, * p<0.1

Barangay-clustered standard errors in brackets

Urban is a dummy variable that indicates where the population is larger than 5,000 people. *Mining* is a dummy variable that equals 1 if the barangay contains a mining site and 0 otherwise. *Poverty* is the incidence of poverty at provincial level in 2021. *Active4Ps* is a variable that measures the number of beneficiaries of active development projects happening in the barangay. *Central* is equal to 1 if the baranguay is a poblacion/central district or part of the poblacion/central district; *Highway* is equal to 1 if the barangay is accessible to the national highway; *Precarious* is equal to 1 if the household reside in a precarious location; *Relocation* is equal to 1 if there are a temporary relocation area in the barangay; *Move-in* is equal to 1 if there was a large or significant number of households who moved in or transferred to their barangay in the last five years due to environmental or peace and order reasons; Move-out is equal to 1 if there was a large or significant number of households who moved out or transferred due to environmental or peace and order reasons in the last 5 years; Svs_index is the 1 if the barangay has any of these services: hospital, puericulture center, fire station, post office, landline, cellular phone signal, public street sweeper; Edu_index is equal to 1 if the barangay has elemtary school, high school and college; Eco_index is equal to 1 if the Baranagay has any of the following :a wholesale and/or retail trade establishment, recreational establishment, manufacturing establishment, accommodation and food service establishment, financial establishment, establishment offering repair services, establishment offering personal services, other establishments. See Appendix 4 for a more detailed description of the variables

Table A3.5 Full LPM results predicting violent incidents in BARMM, Caraga and Davao (2020) with IP populations 2010 replacing location of conflict incident as independent variable

	(1)	(2)	(3)	(4)
VARIABLES	Land	Land	No Land	No Land
Log pob2010	-0.004	0.001	0.004	-0.001
	[0.003]	[0.003]	[0.003]	[0.003]
Sq log pob2010	0.000	-0.000	-0.000	0.000
	[0.000]	[0.000]	[0.000]	[0.000]
prov = 24		-0.004**		0.004**

		[0.002]		[0.002]
prov = 25		0.014***		-0.014***
		[0.004]		[0.004]
prov = 36		-0.012		0.012
		[0.009]		[0.009]
prov = 38		0.011		-0.011
		[0.007]		[0.007]
prov = 66		0.008		-0.008
		[0.006]		[0.006]
prov = 67		0.004		-0.004
		[0.005]		[0.005]
prov = 68		0.021***		-0.021***
		[0.007]		[0.007]
prov = 82		0.009***		-0.009***
		[0.003]		[0.003]
prov = 85		0.045*		-0.045*
		[0.027]		[0.027]
Year = 2012		-0.004		0.004
		[0.003]		[0.003]
Year = 2013		-0.004		0.004
		[0.003]		[0.003]
Year = 2014		-0.008***		0.008***
		[0.003]		[0.003]
Year = 2015		-0.009***		0.009***
		[0.003]		[0.003]
Constant	0.024***	0.014	0.976***	0.986***
	[0.009]	[0.010]	[0.009]	[0.010]
Observations	17,017	17,017	17,017	17,017
R-squared	0.000	0.007	0.000	0.007

Urban is a dummy variable that indicates where the population is larger than 5,000 people. *Mining* is a dummy variable that equals 1 if the barangay contains a mining site and 0 otherwise. *Poverty* is the incidence of poverty at provincial level in 2021. *Active4Ps* is a variable that measures the number of beneficiaries of active development projects happening in the barangay. *Central* is equal to 1 if the baranguay is a poblacion/central district or part of the poblacion/central district; *Highway* is equal to 1 if the barangay is accessible to the national highway; *Precarious* is equal to 1 if the household reside in a precarious location; *Relocation* is equal to 1 if there are a temporary relocation area in the barangay; *Move-in* is equal to 1 if there was a large or significant number of households who moved in or transferred to their barangay in the last five years due to environmental or peace and order reasons; Move-out is equal to 1 if there was a large or significant number of households who moved out or transferred due to environmental or peace and order reasons in the last 5 years; Svs_index is the 1 if the barangay has any of these services: hospital, puericulture center, fire station, post office, landline, cellular phone signal, public street sweeper; Edu_index is equal to 1 if the barangay has elemtary school, high school and college; Eco_index is equal to 1 if the Baranagay has any of the following :a wholesale and/or retail trade establishment, recreational establishment, manufacturing establishment, accommodation and food service establishment, financial establishment, establishment offering repair services, establishment offering personal services, other establishments. See Appendix 4 for a more detailed description of the variables

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