

Online Supplemental Appendix

When Protection Fails: Military Bases and Sexual Violence in Colombia

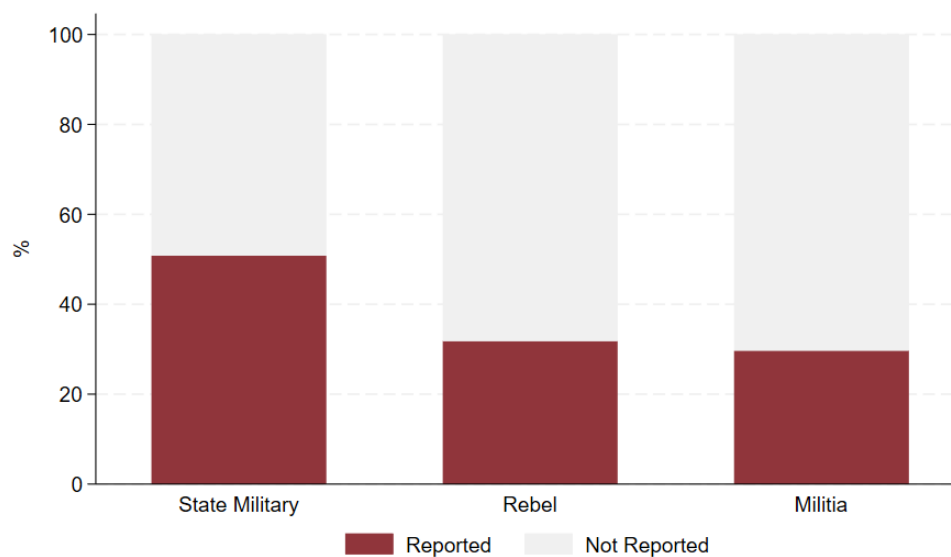
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Note: This Online Appendix provides additional figures and tables, and documentation referenced in the main text.

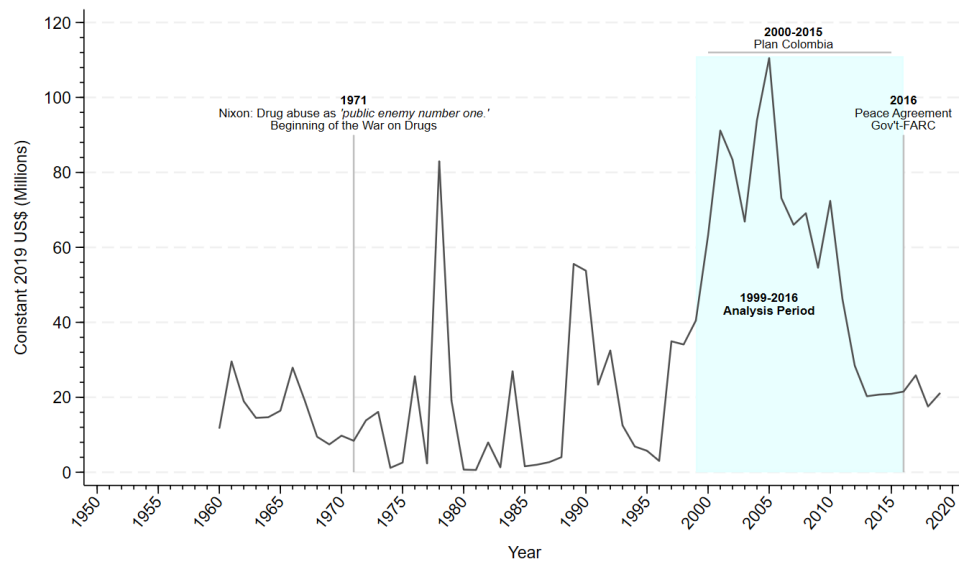
A.1 Additional Figures

Figure A.1: Share of Conflicts Involving Reported Sexual Violence (1989 - 2021)



Note: Sexual Violence in Armed Conflict (SVAC) dataset (Cohen and Nordås 2014). During this period, state militaries, rebel groups, and militia groups were engaged in 189, 176, and 64 unique conflicts, respectively.

Figure A.2: U.S. Military Assistance to Colombia



Source: U.S. Overseas Loans and Grants (Greenbook), USAID

Figure A.3: Geographical Distribution of Military Bases 1999 - 2016

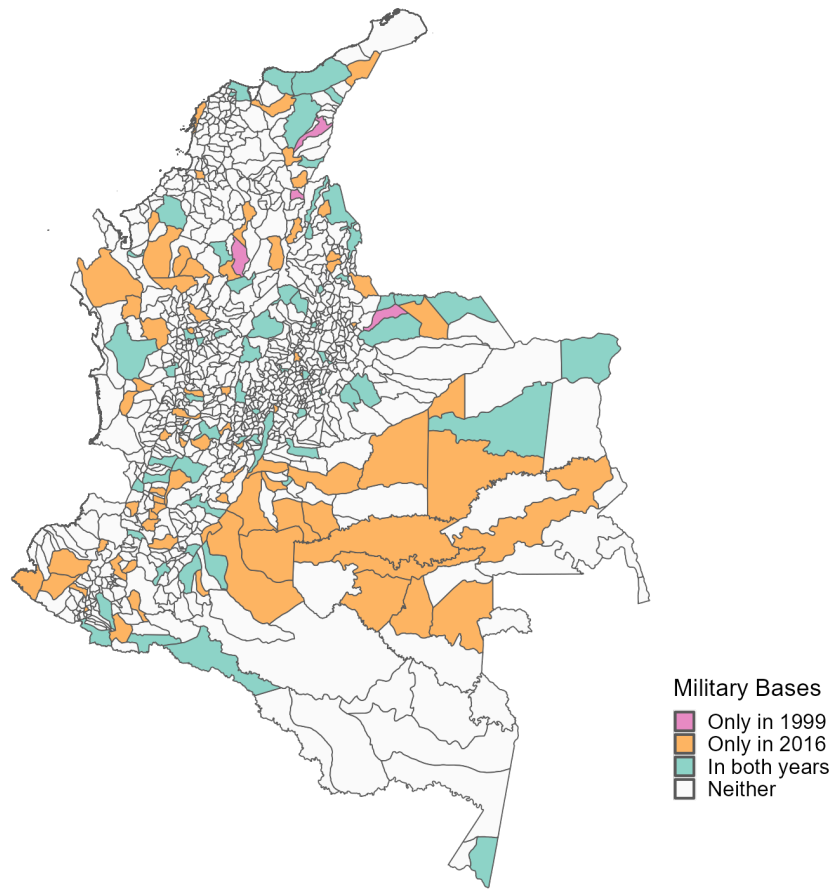


Figure A.4: Batalion Julio Londoño in Established in 2007, Department of Chocó



Source: P217 National Army of Colombia. (2010). Military Engineers in Colombia: 200 Years of History 1810-2010.

Figure A.5: Military Base Presence and Duration

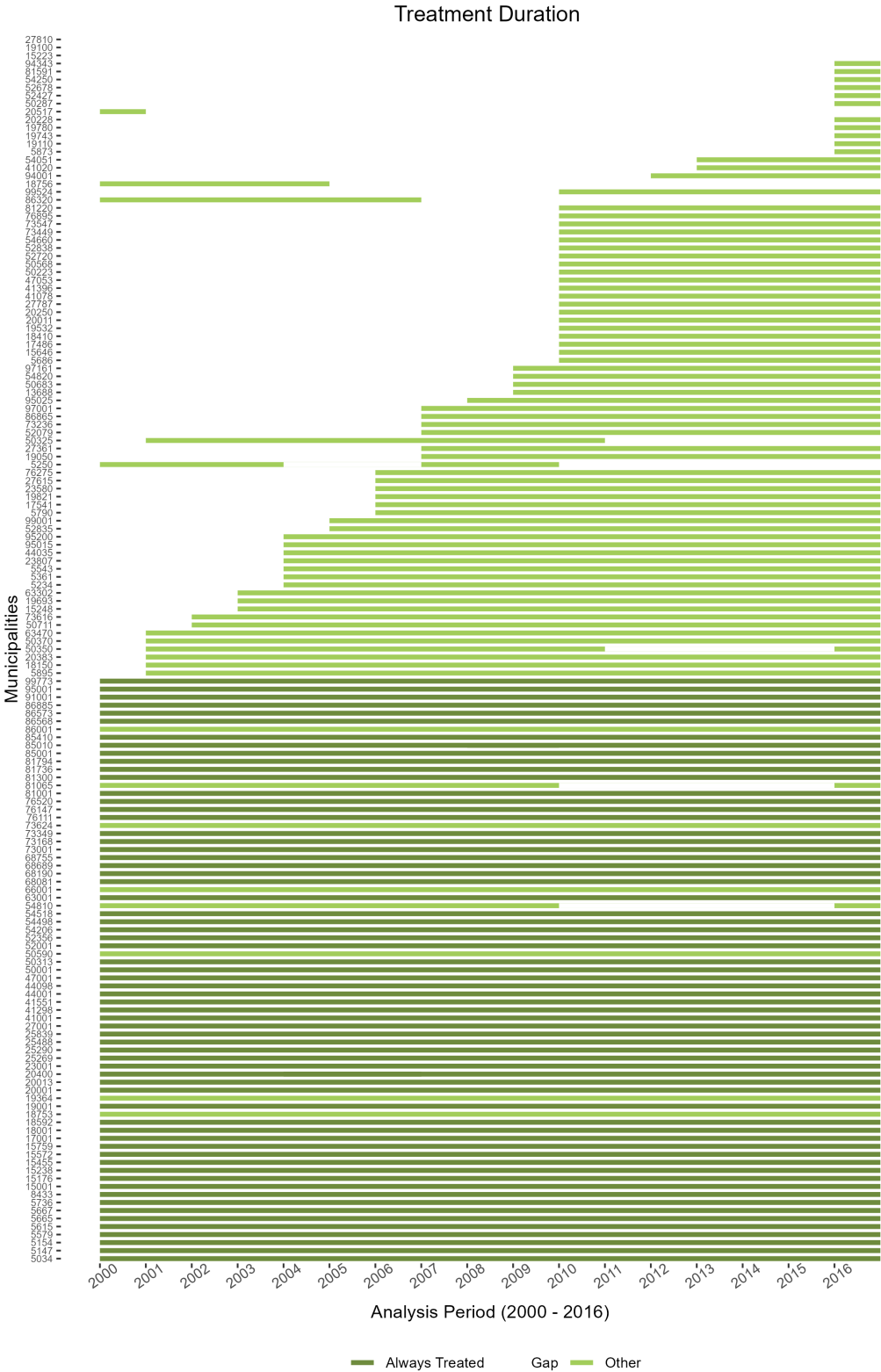
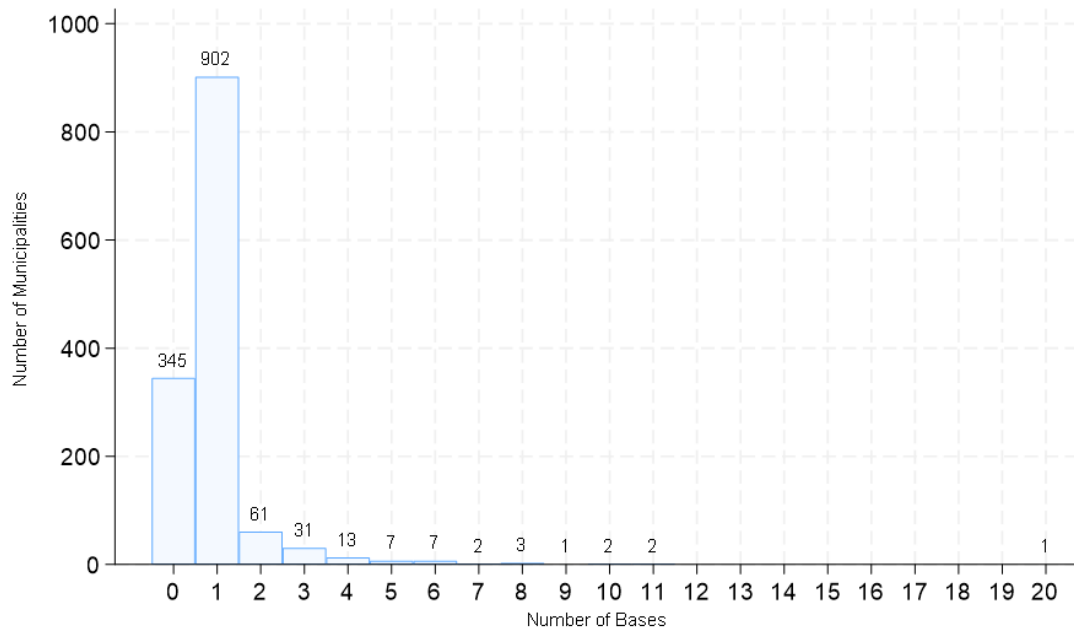
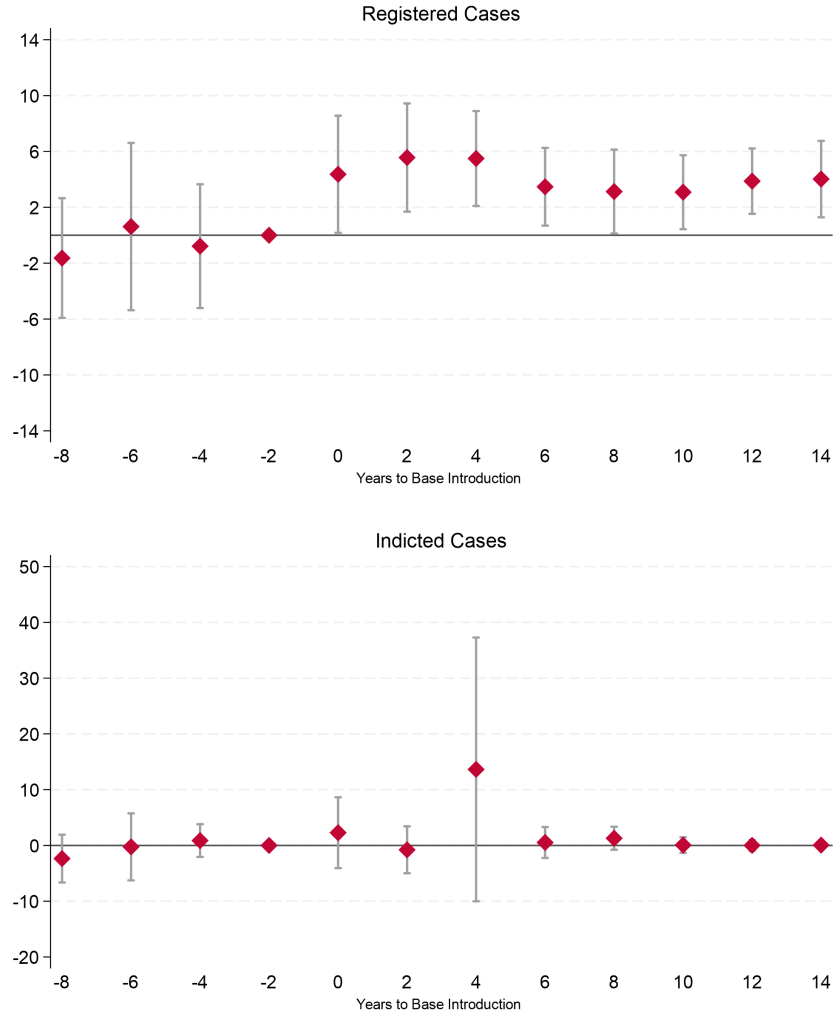


Figure A.6: Distribution of Observations across the Number of Bases



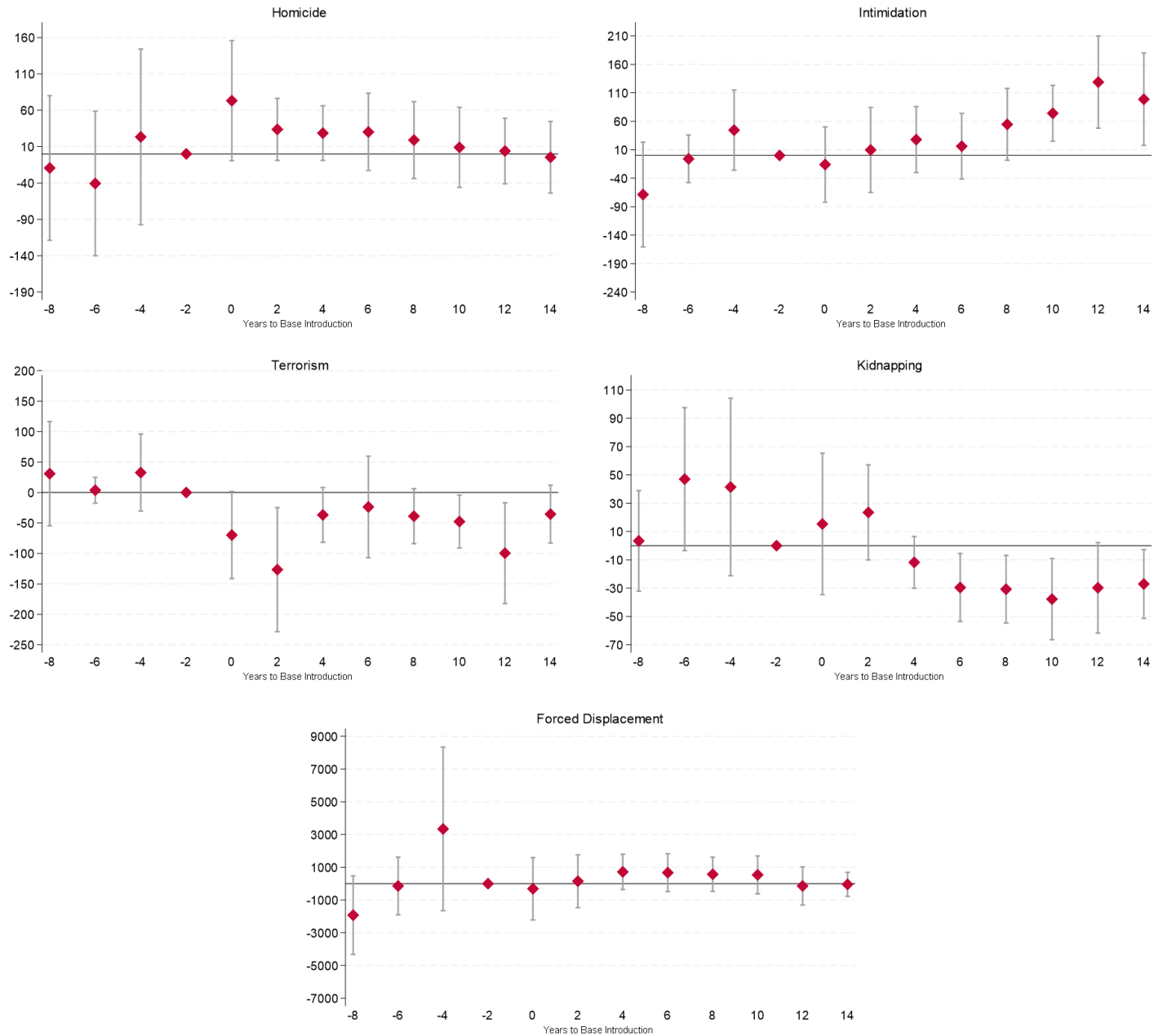
Note: This graph plots the distribution of municipalities across the number of military bases. There are 1377 municipality-year group observations, and 153 unique municipalities with 9 year groups from 2000 to 2016.

Figure A.7: Intensive-Margin Effects on Sexual Violence
Outcome: Number of Cases per 100,000 Inhabitants



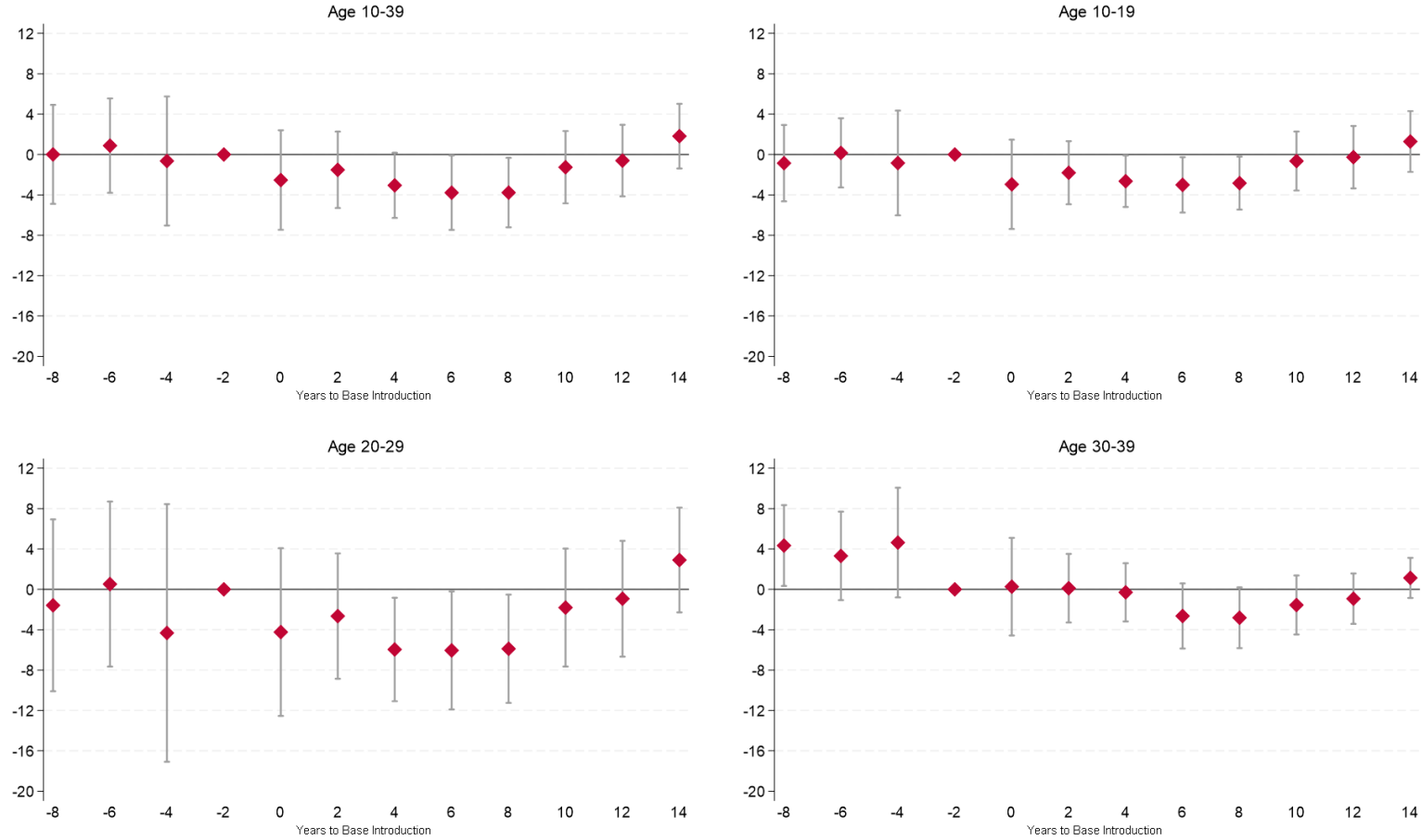
Note: These graphs plot the estimated coefficients for each two-year period relative to the period of military base introduction, calculated using the estimator proposed by Chaisemartin and D'Haultfœuille (2024). The lines are the 90% confidence intervals. Robust standard errors are clustered at the municipality level. This analysis sample includes 153 unique municipalities and excludes 959 never-treated municipalities.

Figure A.8: Effects on Crime Rates by Types
Outcome: Cases per 100,000 Inhabitants



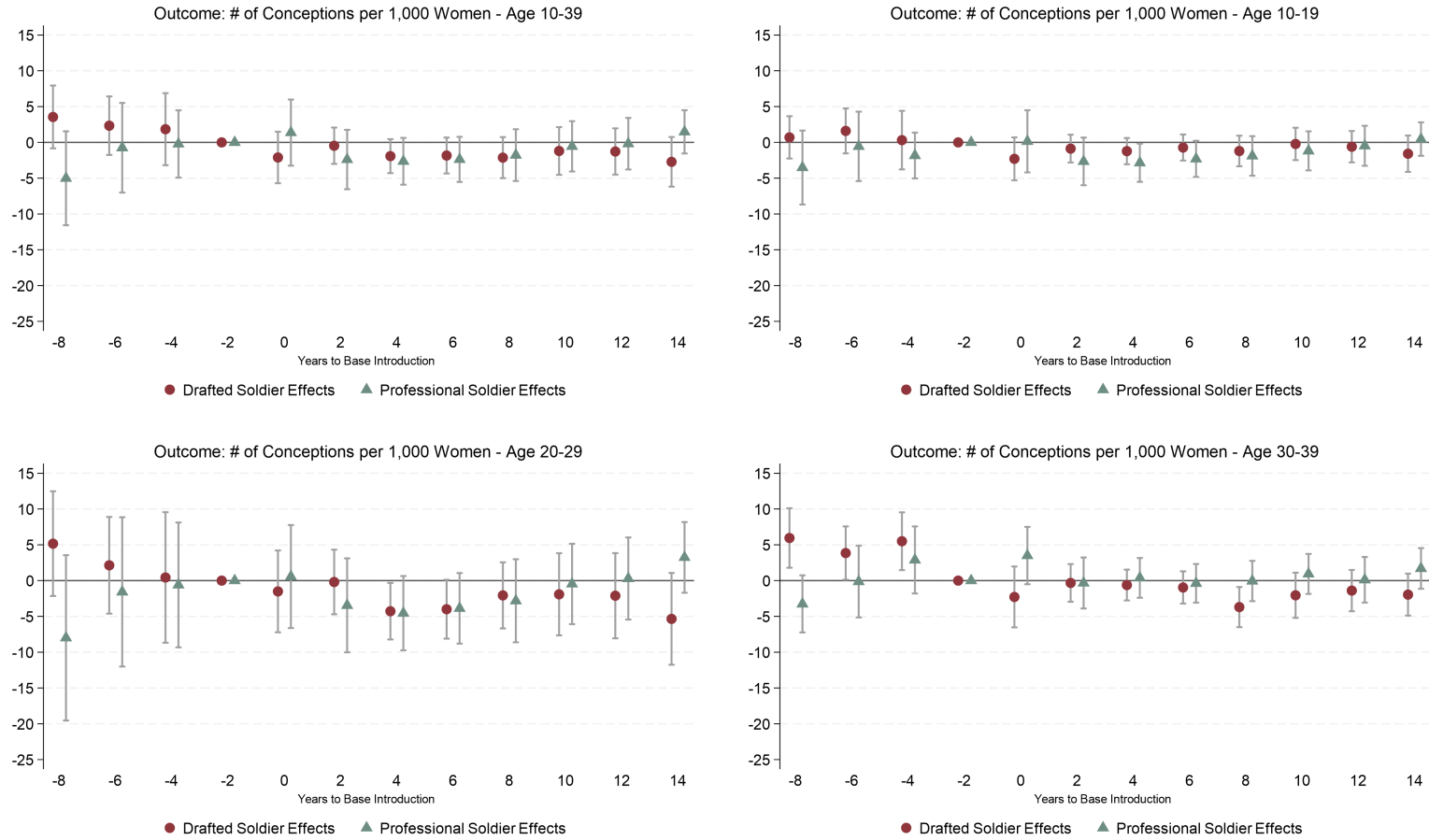
Note: The lines are the 90% confidence intervals. Robust standard errors are clustered at the municipality level. This analysis sample includes 153 unique municipalities and excludes 959 never-treated municipalities.

Figure A.9: Effects on Fertility
Outcome: Number of Conceptions per 1,000 Women by Mothers' Age Groups



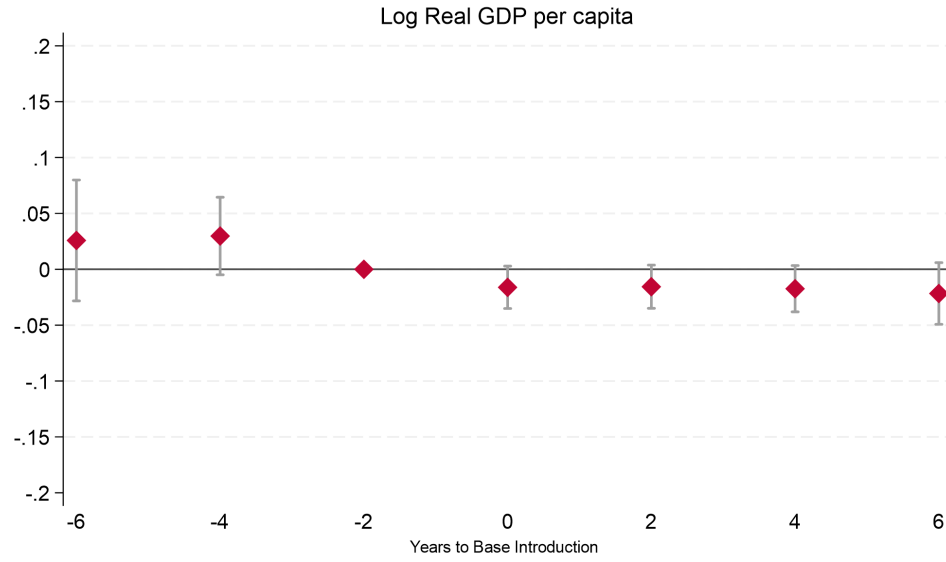
Note: These graphs plot the estimated coefficients for each two-year period relative to the period of military base introduction, calculated using the estimator proposed by Chaisemartin and D'Haultfœuille (2024). The lines are the 90% confidence intervals. Robust standard errors are clustered at the municipality level. This analysis sample includes 153 unique municipalities and excludes 959 never-treated municipalities.

Figure A.10: Effects on Fertility by Base Type



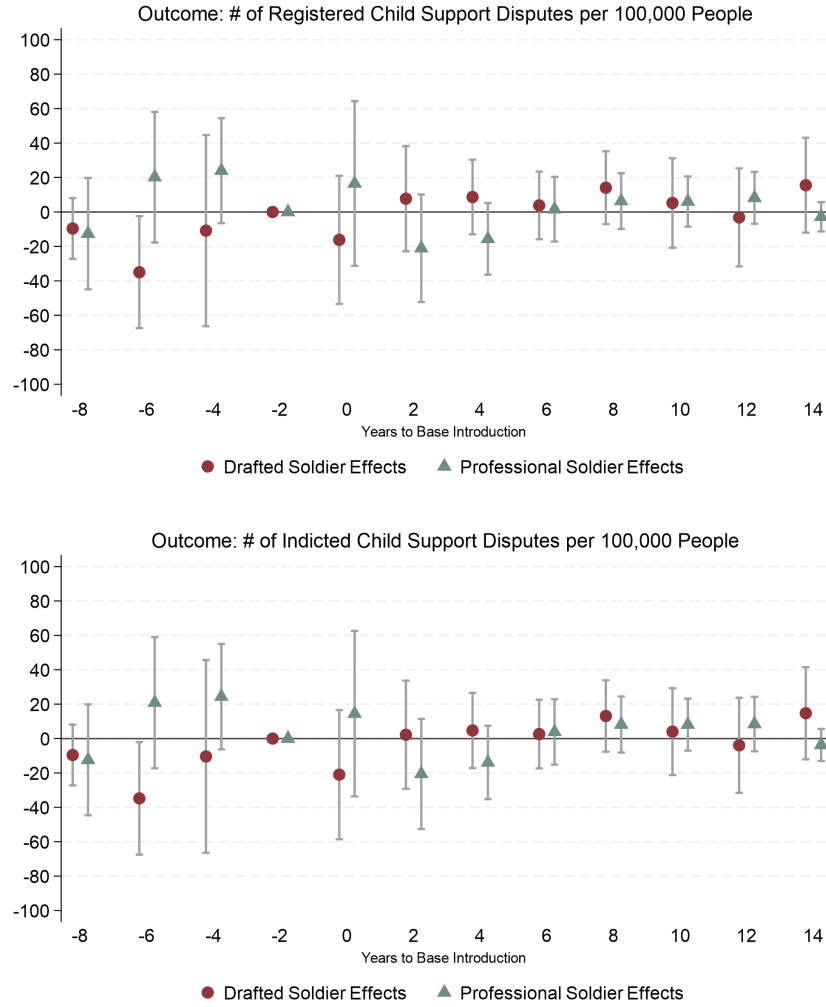
Note: These graphs plot the estimated coefficients for each two-year period relative to the period of military base introduction, calculated using the estimator proposed by Chaisemartin and D'Haultfœuille (2024). The lines are the 90% confidence intervals. Robust standard errors are clustered at the municipality level. This analysis sample includes 153 unique municipalities and excludes 959 never-treated municipalities.

Figure A.11: Effects on Municipal Economies



Note: This graph plots the estimated coefficients for each two-year period relative to the period of military base introduction, calculated using the estimator proposed by Chaisemartin and D’Haultfœuille (2024). The lines are the 90% confidence intervals. Robust standard errors are clustered at the municipality level. This analysis sample includes 153 unique municipalities and excludes 959 never-treated municipalities. The data on municipal GDP per capita is only available from 2000 to 2009, and is made available by CEDE (2021).

Figure A.12: Effects on Child Support Disputes by Base Type
Outcome: Number of Cases per 100,000 Inhabitants



Note: This graph plots the estimated coefficients for each two-year period relative to the period of military base introduction, calculated using the estimator proposed by Chaisemartin and D’Haultfoeuille (2024). The lines are the 90% confidence intervals. Robust standard errors are clustered at the municipality level. This analysis sample includes 153 unique municipalities and excludes 959 never-treated municipalities.

A.2 Additional Tables

Table A.1: Overview of the Outcome Data

	Data Description	Link	Years Available	Years Used in This Paper
Fertility	Birth certificate data from the Vital Statistics	https://www.datos.gov.co/widgets/kk5w-ugzm	1979 - 2022	1998 - 2016
Demographics	Population projection based on the National Census of Population and Livelihood	https://www.dane.gov.co/index.php/estadisticas-por-tema/demografia-y-poblacion/proyecciones-de-poblacion	1995 - 2026	1998 - 2016
Sexual violence and child support	Lawsuit data by the Office of Attorney General	-	2000 - 2021	2000 - 2016
Violence and security	The Conflict and Violence module of the Municipality Panel compiled by the Center for Economic Development Studies	https://datoscede.uniandes.edu.co/es/catalogo-de-microdata	1993 - 2019	1998 - 2016
Education	Census of Educational Establishments by the Ministry of Education	https://microdatos.dane.gov.co/index.php/catalog/EDU-Microdatos	2004 - 2022	2004 - 2016

Table A.2: Share of Treated Observations by Base Types

Base Types	Counts	Share (%)
Standard bases	578	62.42
Counterinsurgency bases	306	33.05
Both	42	4.54
Total	926	100.00

Table A.3: Average Total Effects on Sexual Violence (Intensive Margin)
Outcome: Number of Cases per 100,000 Inhabitants

	Registered	Indicted
	(1)	(2)
N. Army base	12.230***	6.779
	(3.299)	(5.662)
Obs.	1,359	1,359
Control mean	22.44	14.31

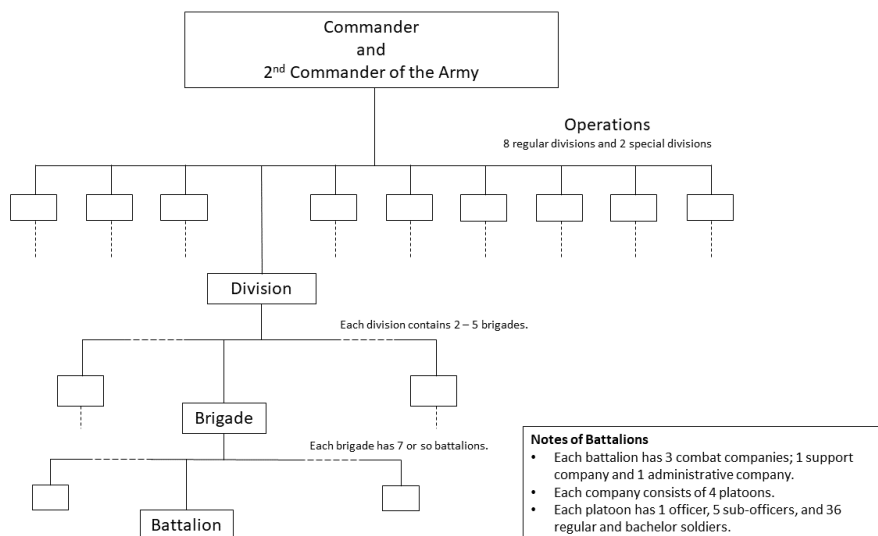
Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors in parentheses clustered at the municipality level. The de Chaisemartin and D’Haultfœuille estimator calculates the *average total effect*, which is the weighted sum of the effects of all periods. This analysis sample includes 153 unique municipalities and excludes 959 never-treated municipalities.

A.3 Documentation and Background Information

A.3.1 National Army of Colombia

At the top of the army hierarchy are the commander and second commander of the army in Bogotá, who directly preside over ten *divisions*. Figure A.13 shows the organization of the Colombian National Army during our analysis period. Each division typically has two to five *brigades*. A brigade usually consists of two to five *battalions*. A battalion typically consists of about five companies. Each company is generally staffed with around 800 soldiers. This indicates that a brigade base can have anywhere between 8,000 and 20,000 soldiers, while a battalion base can have around 4,000 soldiers on the premises.

Figure A.13: The Organization of the Colombian National Army



Note: The presented organization chart reflects the organization during the analysis period.

There are two different kinds of brigades (standing and mobile) and two different kinds of battalions (standing and counterinsurgency). These units vary in terms of the types of soldiers and strategic purposes, as explained in the rest of this subsection. We use these differences in our statistical analysis to explore the potential heterogeneity of the effects of military base presence and their mechanisms.

Standing brigades and battalions. Standing brigades and battalions are military units commonly present in regular armies. These units have a fixed location and territorial jurisdiction that rarely varies over time. These brigades and battalions are mainly staffed

with *drafted soldiers*, who serve a mandatory minimum of 18 months up to 24 months.¹ Members of these units are usually assigned to protect roads, electrical systems, and other infrastructure that could be targeted by non-state armed actors. In addition, these brigades and battalions carry out counterinsurgency operations locally, which are mostly conducted by drafted soldiers (Dávila 1999).

Mobile brigades and counterinsurgency battalions. Mobile brigades and counterinsurgency battalions specialize in guerrilla warfare. They are the main human resources that the army uses to fight against non-state armed actors. These units are predominantly staffed by *professional soldiers* who, after completing the mandatory 18 months of military service, receive substantial and periodic training and are provided with significant compensation and health benefits, serving for up to 20 years (Human Rights Watch 1993). Because of the differences in age and training, professional soldiers typically are better educated than drafted soldiers.

The reinforcement of the army through increasing mobile brigades and counterinsurgency battalions is the centerpiece of the military restructuring that took place during the period under study. The army needed well-trained and disciplined soldiers to confront guerrilla and paramilitary groups in unconventional combat settings in the mountains and jungles of Colombia. As a result, soldiers in these units often move between battle zones within their jurisdiction for extended periods.

Drafted and professional soldiers. As described above, there is a substantial difference between the drafted and professional soldiers staffing the two broad categories of military units. Both soldier types are deployed to and reside on various military bases across the country. Both drafted and professional soldiers can be transferred to multiple bases during their terms. However, professional soldiers, being more highly trained, tend to be transferred more frequently depending on military needs. This section explains the key differences between these soldier categories and describes their deployment and compensation patterns.

Professional soldiers normally go through an operational cycle. They start with a three-week training period before being deployed to the field. These trainings are not conducted on their bases but at various training centers. After this phase, soldiers are sent to conduct military operations for three to four months. The deployment period is followed by a rest phase of three weeks, during which soldiers usually go back to their places of origin to visit

¹Colombia's conscription system requires all male citizens aged 18 to 24 to serve in its armed forces, with some exceptions. Female citizens may participate voluntarily (Suarez 2023). This means that the great majority of soldiers at the military bases considered in this analysis are young men.

their parents, families, and friends.

Meanwhile, drafted soldiers follow a different pattern of field deployment. The compulsory military service starts with a training phase of 10 weeks, followed by a specialization period spanning 6 to 8 weeks. After this training period, drafted soldiers rest for two weeks, during which they are allowed to leave the military base. Once they return, soldiers are deployed to the field for a period ranging from 12 to 14 months. During this time, drafted soldiers follow the same operational cycle as professional soldiers. According to current and retired army officers, military units usually assign drafted soldiers to the protection of fixed positions (i.e., military bases and infrastructure such as roads and electrical grids). Their operational cycle finishes with an adaptation-to-civilian-life phase, where they take technical courses to facilitate their reintegration into the labor force.

Both drafted and professional soldiers follow a strict set of disciplinary rules while living on military bases. Naturally, their movement in and out of the bases is restricted. All soldiers must obtain permission from their superiors to leave their bases, which is granted only in special circumstances, as officers expect soldiers to attend to personal matters during their rest periods. Meanwhile, soldiers are allowed to invite guests to their bases on Sundays, if local security conditions permit. Guests are not limited to immediate families; therefore, soldiers can invite their sexual partners. Army officers mentioned that sometimes non-single professional soldiers are allowed to visit their partners outside their bases and are not limited to the regular Sunday on-base visit.

The most important difference between these two categories of soldiers, in terms of this project, is compensation. Just on the basis of monthly compensation, professional soldiers are paid over 800% more than drafted soldiers. Table A.4 provides a comparison of compensation by soldier class. Furthermore, professional soldiers, as employees of the army, receive a comprehensive package of benefits, including seniority bonus, annual service bonus, vacation bonus, Christmas bonus, travel allowances, vacation entitlement, severance pay, housing benefits, family subsidy, and burial expenses. Table A.5 describes these benefits in detail. Because they also receive uniforms and necessities while living on the bases, much of these earnings are disposable income, especially when they are single.

Table A.4: Monthly Compensation by Soldier Categories

	Basic Soldiers	Professional Soldiers	% Difference
2000	US\$9.20	US\$83.48	807.06
2001	US\$10.11	US\$91.79	807.52
2002	US\$10.93	US\$99.17	807.53
2003	US\$11.74	US\$106.56	807.55
2004	US\$12.66	US\$114.90	807.54
2005	US\$13.49	US\$122.44	807.58
2006	US\$14.43	US\$130.95	807.57
2007	US\$15.34	US\$139.20	807.57
2008	US\$16.32	US\$148.12	807.56
2009	US\$17.57	US\$159.48	807.56
2010	US\$17.92	US\$165.29	822.16

Source: Authors' calculation based on Decrees 1794 and 2724 of 2000, 2737 of 2001, 745 of 2002, 3552 of 2003, 4158 of 2004, 923 of 2005, 407 of 2006, 1515 of 2007, 673 of 2008, 737 of 2009, 1530 of 2010, and the yearly minimum wage from Datosmacro (2022). Values in Colombian pesos (COP) are converted to the U.S. dollar (USD) values using the 2023 average conversion rate of COP 4,362 to USD 1.

Note: The compensation for conscripted soldiers are called bonus (*bonificación* in Spanish), which is meant to as an allowance to supplement the supply of uniforms, and basic necessities including food and hygiene products. Conscripted soldiers can receive a 40% increase in their monthly bonus if their performance is exceptional. Meanwhile, the compensation for professional soldiers is a salary, and determined as 140% of the legal minimum wage. Volunteer soldiers, as professional soldiers were known before 2000, who have already served before December 31, 2000 receive the 160% of minimum wage.

Table A.5: Benefits for Professional Soldiers

Benefit	Description
Seniority bonus	After two years of service, a professional soldier is entitled to a monthly seniority bonus equal to 6.5% of their basic salary. This bonus increases by 6.5% for each additional year of service, up to a maximum of 58.5%.
Annual service bonus	Soldiers are entitled to an annual service bonus equivalent to 50% of their basic monthly salary plus the seniority bonus. This is paid in the first 15 days of July each year.
Vacation bonus	Soldiers receive a vacation bonus equal to 50% of their basic monthly salary plus the seniority bonus for each year of service. This is calculated for vacations accrued from February 1 of the year following the decree's enactment.
Christmas bonus	A Christmas bonus equivalent to 50% of the basic salary earned in November, plus the seniority bonus, is paid in December each year.
Travel allowances	Soldiers are entitled to travel allowances for individual transfers within the country and for individual service commissions.
Vacation entitlement	Soldiers are entitled to 30 calendar days of paid vacation for each year of service.
Severance pay	Soldiers are entitled to severance pay equivalent to one basic salary plus the seniority bonus for each year of service, which is annually liquidated and deposited in a designated fund.
Housing benefits	Soldiers can participate in housing plans and programs offered by the Military Housing Promotion Fund and other entities.
Family subsidy	Married soldiers or those in a marital union are entitled to a monthly family subsidy equal to 4% of their basic monthly salary plus the seniority bonus.
Burial expenses	The Ministry of Defense covers the burial expenses of soldiers who die in active service or while receiving a pension, up to eight times the legal minimum monthly wage.

Source: Degree 1794 of 2000

To illustrate the difference in compensation, we compare the approximate annual compensation of hypothetical drafted and professional soldiers in 2010, with a legal minimum monthly wage of US\$118.06 (Datosmacro 2022). The drafted soldier's annual compensation was approximately US\$215.² Meanwhile, the annual total compensation for the professional soldier, inclusive of annual service, vacation, and Christmas bonuses, was about US\$2,231 if single, and US\$2,311 if married.³ In summary, professional soldiers earn approximately 10 times more than drafted soldiers.

While we unfortunately do not have data on the composition of army soldiers by rank, the 2007 Ministry of Defense report provides some insight. In 2007, the report states that professional soldiers represented about 39% of the army's soldiers, while the remaining composition

²US\$17.92 * 12 months = US\$215.04.

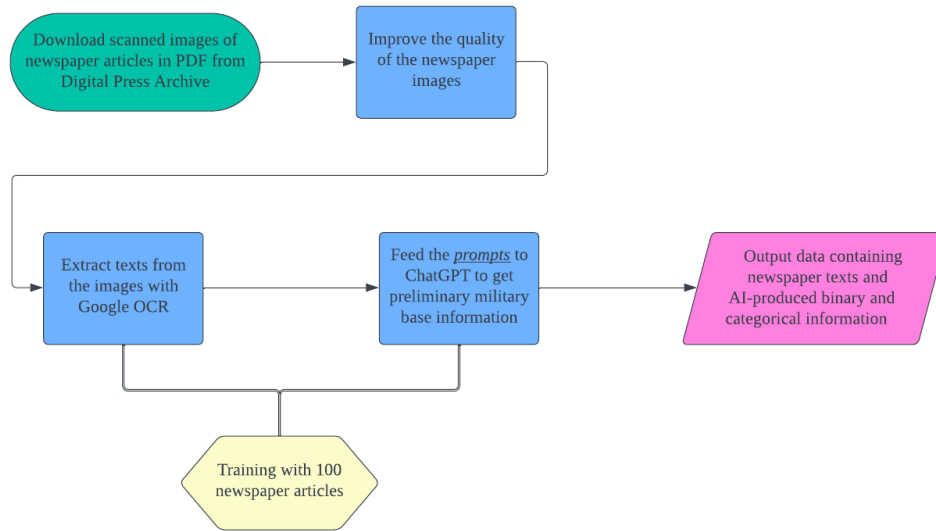
³If single, US\$165.29 (monthly salary) * 12 months + US\$82.65 (annual service) + US\$82.65 (vacation) + US\$82.65 (Christmas) = US\$2,231.43. The annual family subsidy of US\$79.34 is added if the professional soldier is married.

included drafted soldiers (Ministry of Defense of Colombia 2007). Clearly, the drafted soldier class dominates in number, though the professional soldier class had a significant presence.

A.3.2 Construction of the Military Base Data

As the data on military base locations were not made available, we constructed them from newspapers published in Colombia from 2000 to 2010. Figure A.14 provides an overview of this data cleaning process, and we describe it in detail in the following.

Figure A.14: Process to Extract Text from Newspaper Images



A.3.2.1 Text Data Extraction from Newspaper Images

The first step is to collect newspapers published in Colombia from 2000 to 2010 related to military units. To do so, we downloaded relevant newspaper articles from the Digital Press Archive, a newspaper database provided by the Popular Research and Education Center/Program for Peace (Cinep/PPP). The database offers over 70,000 digitized publications from 10 national and regional newspapers since 1979, categorized into five groups; 1) church and conflict, 2) politics and government, 3) drug trafficking, 4) society and culture, and 5) ecology and environment. We use two keywords in Spanish, *brigada* (brigade) and *batallón* (battalion), to restrict our search, which has yielded about 11,000 articles published from January 1, 2000 to December 31, 2010. All the digitized materials are scanned images of newspaper articles in the PDF format with a range of image quality. Figure A.15 presents some examples of newspaper articles that we have used.

The second step is to improve the quality of the article images. We processed all the scanned newspaper articles to smooth, reduce noise, and binarize the images, and adjust contrast. Image binarization is a process to convert a gray-scale image to a binary (black and white) image that can be used to identify the foreground of the image. This process helps extract texts from noise in the articles.

The third step is to read the improved article images with Google Cloud Vision, which can detect text data from images using Optical Character Recognition (OCR) and machine learning. Since texts in newspaper articles are organized in irregularly shaped chunks and font sizes (as opposed to, for example, texts in an academic paper in paragraphs), detecting texts in proper orders that form sentences can be challenging. Therefore, we used the manually extracted data from 100 articles to train a machine learning model more suitable to detect texts from newspaper articles. This step created an initial text dataset containing the texts from all newspaper articles.

The final step is to use ChatGPT 3.5 to get basic information about each newspaper article using the text data from the previous step. To optimize this process, we again used the training dataset from the same 100 articles to train ChatGPT to accurately obtain information of interest. More specifically, we wanted to ChatGPT to extract names, locations (municipalities and department), and activation and deactivation dates of military bases. The prompt we gave ChatGPT is found in Box A.3.2.2 below. We use the AI-extracted data to inform and speed up the later treatment variable creation, not necessarily to take the data to directly create the treatment variables without manual inspection of the content of the relevant newspaper articles.

Figure A.15: Examples of Newspaper Articles



A.3.2.2 Prompt for ChatGPT

Please note that this journalistic article from Colombia has been extracted using OCR software, which could result in spelling errors, incomplete words and incorrect word separation. Your task is to correct these errors and normalize the words according to the spelling rules standard before continuing with information extraction.

The article is: *ArticleText*

Now that the article has been corrected, perform the following tasks consistently:

1. Identify and list all mentions of departments only in Colombia and save them in the “departments” field
2. Identifies and lists all mentions of locations in Colombia, such as Capital district (Bogotá), tourist district (Cartagena de Indias), municipalities, townships, paths, towns and rural areas that appear in the article. It also includes any relevant Colombia-only locations in the field called “municipalities”.
3. For the departure of insurgent forces, take into account guerrillas, self-defense or paramilitary groups and drug trafficking groups.
4. Includes in the list of army units only those that are mentioned in the article, covering names of commands, battalions, divisions, brigades, Companies, Platoons and Squads. The names of these units may consist of personal names, Roman numerals, or ordinal numbers, as II Brigade, II Brigade, José María Battalion and Seventh Brigade. You do not generically include the army, national army, insurgent forces or names of generals.
5. Identify and list all the government institutions mentioned in the following article. Institutions to consider include the Ombudsman’s Office, Attorney’s Office, Prosecutor’s Office, mayor’s offices and governorships.
6. To identify the department (Save it in *ColumnName*) and/or municipality, township or vereda (Save it in *ColumnName*) headquarters of the newspaper:
 - (a) Search on this line: *ArticleText*
 - (b) If nothing is found, search in the first 100 characters
 - (c) If neither is found, look to see if the word after the title is a location. The title is *ArticleText*
 - (d) If neither is found, look to see if the last word of the text is the name of a location.
7. Include in the list of national navy units only those mentioned in the article, such as marine infantry, coast guard commands, Naval Operations Command, and surface units.
8. Include in the list of air force units only those mentioned in the article, covering Air Combat Command (CACOM), Air Combat Group (GAC), and squads.

9. Make sure you do not include duplicates in your lists, even if an item is mentioned multiple times in the article. Do not include anything that is not present in the article.
10. Check if the article contains information on the creation (foundation) and/or deactivation (closing or dismantling) of formal Colombian military units (battalions, divisions, brigades, companies, bases), and not temporary ones.
11. If you find created Colombian military units, extract the date of creation, the name of the unit, and the text where its creation is specified (no more than 20 words). Return the information in *ColumnName*.
12. If you find deactivated Colombian military units, extract the deactivation date, the name of the unit, and the text where its deactivation, dismantling, or closure is specified (no more than 20 words), only from the paragraph or phrase where this is mentioned. Return the information in *ColumnName*.
13. If you cannot find the name of a created or deactivated unit, return an empty record. Only include military units or divisions from Colombia.
14. Do not show the corrected article. Only return the JSON.
15. Only show data found in the article text. Do not make inferences or add locations that are not explicitly mentioned, and make sure they refer to Colombia.

A.3.3 Dealing with Many Zeros in Outcome Variables

The municipality-level data on sexual violence and child support disputes contain a large number of observations with zeros, around 35% for registered cases and 55% for indicted cases. In economics, it is common to transform skewed outcomes using the natural logarithm or inverse-hyperbolic sine (IHS) to achieve normally distributed residuals. However, we chose not to transform our outcomes, and deal with the mass of zero issue by simply aggregating the outcome data by two years. We make this choice because recent studies have shown that these transformations can be problematic when the outcome includes a significant number of zeros. Mullahy and Norton (2024) demonstrate that, in linear regressions, estimates from transformed data with few zeros are similar to those from scaled linear probability models. However, when the data contain many zeros, estimates can vary significantly depending on the parameters chosen for the logarithm or IHS transformation. Furthermore, Chen and Roth (2023) suggest that estimates from transformed outcomes with a high proportion of zeros cannot be straightforwardly interpreted as percentage changes, complicating standard interpretation.

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