

Rosario University

SCHOOL OF ECONOMICS

The Peace Baby Boom

EVIDENCE FROM COLOMBIA'S PEACE AGREEMENT WITH THE FARC

Thesis

Master's Degree in Economics of Public Policy

Autor: María Elvira Guerra-Cújar

Advisor: Santiago Saavedra

August 2020

The Peace Baby Boom

Evidence from Colombia's peace agreement with the FARC

María Elvira Guerra-Cújar

Abstract

Research has indicated that armed conflict influences fertility during and after a conflict. It remains unclear, however, whether there is an effect of the end of long-lasting conflicts in women's fertility. The present study estimates a *difference-in-differences* model to close that knowledge gap with the identification of the effect of Colombia's end of conflict with the FARC insurgency on the total fertility rate. Results indicate that there was a differential increase in total fertility rate in the areas exposed to FARC attacks prior to the declaration of the permanent ceasefire. We show that these results are not driven by the post-ceasefire baby boom of former FARC's rebels. Instead, our evidence shows that municipalities with mines victims and expelled population by forced displacement before the ceasefire have differentially higher total fertility rate in the four years following the ceasefire, and the newborns have more survival chances. We argue that the mechanism behind this result is the optimism to raise the children in a better environment due to the reduction in victimization in areas that experience FARC violence.

JEL Codes: I12; I15

Keywords: fertility; pregnancy; mortality; armed conflict; violence

El baby boom de la paz

Evidencia del acuerdo de paz de Colombia con las FARC

María Elvira Guerra-Cújar

Abstract

La literatura ha indicado que los conflictos armados influyen en la fertilidad durante y después del conflicto. Sin embargo, sigue sin estar claro si el fin de los conflictos de larga duración tienen un efecto en la fertilidad de las mujeres. En el presente estudio se estima un modelo de *diferencias en diferencias* para cerrar esa brecha del conocimiento con la identificación del efecto del fin del conflicto de Colombia con la insurgencia de las FARC en la tasa total de fecundidad. Los resultados indican que hubo un aumento diferencial en la tasa total de fertilidad en las zonas expuestas a los ataques de las FARC antes de la declaración del cese al fuego permanente. Mostramos que estos resultados no están explicados por el baby boom posterior al cese al fuego de los antiguos rebeldes de las FARC. Por el contrario, nuestra evidencia muestra que los municipios con víctimas de minas y población expulsada por desplazamiento forzado antes del cese al fuego tienen una tasa de fertilidad total diferencialmente más alta en los cuatro años posteriores al cese al fuego, y los recién nacidos tienen más posibilidades de supervivencia. Sostenemos que el mecanismo que subyace a este resultado es el optimismo de criar a los niños en un entorno mejor debido a la reducción de la victimización en las zonas que experimentan la violencia de las FARC.

Códigos de clasificación JEL: I12; I15

Palabras clave: fertilidad; embarazo; mortalidad; conflicto armado; violencia

Acknowledgements

The research included in this thesis could not have been performed if not for the assistance, patience, and support of many individuals. I would like to extend my gratitude to Luisa Fernanda Acero, Camila Bolívar Manzano, Diana Milena Cújar, Maruja Cújar Coutín, Raizza Cújar, Natalia González Bohórquez, Jairo Miguel Guerra Gutiérrez, Germán Arturo Latorre Montoya, Mounu Prem, Paul Rodríguez-Lesmes, Santiago Saavedra, Jose Manuel Tapias Ortega, Juan F. Vargas, Carolina Vélez Ospina, and Camilo Villamizar Plazas. Also the helpful comments from participants in the Workshop on applied microeconomics at Universidad del Rosario.

Author contribution statement Mounu Prem, Paul Rodríguez-Lesmes, and Juan F. Vargas contributed to the implementation of the research and the analysis of the results.

1 Introduction

Armed conflict is a public health problem, not only for the deaths and morbidity that caused directly but also for the indirect effects it generates by disrupting life in the social, economic and political spheres. These indirect effects influence household behaviours, generating consequences such as wealth accumulation and even changes in fertility.

Long-lasting conflicts are likely to generate conditions which may influence households long-term decisions such as fertility (Brück & Schindler, 2009). First, they affect property rights, creating uncertain and insecure socio-economic environments for households. Second, they destabilize institutional and legal frameworks, generating social disruptions. Third, they create distress and decrease life expectancy, increasing the likelihood that households will engage in risky behaviour.

Social conditions have been considered crucial in the decision to have children. In the literature, it has been studied the association of fertility with women wages, schooling, availability of medical resources, child wages, men education, calorie availability, and child mortality. The latter has been positively correlated by the literature in conflict situations, focusing on two main mechanisms driving the decision of couples. On the one hand, women may want to compensate for the loss of children during the conflict, that is called the replacement effect (Heuveline & Poch, 2007; Schindler & Bruck, 2011; Rutayisire, 2014; Kraehnert et al., 2018), which is reinforced when is essential to replace individuals of the same ethnic group who have been killed during conflicts (Fargues, 2000; Tabeau & Bijak, 2005). On the other hand, parents' response to child mortality having more children because children will provide social well-being and economic help to their parents, that is called the old-age security approach or risk insurance theory (Verwimp & Bavel, 2005). In the same line, couples may hoard more births than desired because the couple formed the expectation that some of their children may die (Schultz, 1997).

In this paper, we contribute to the demographic impact of armed conflict literature by studying the effect of the declaration of the permanent ceasefire by the *Revolutionary Armed Forces of Colombia* (FARC from the Spanish acronym) on the total fertility rate (TFR). We use a *difference-in-differences* empirical strategy, exploiting the timing of the permanent ceasefire and the spatial distribution of FARC attacks between 2011 and 2014. We find that the permanent ceasefire declared by the FARC insurgency induced a short-term increase in TFR. The results suggest that one standard deviation (SD) higher number of FARC attacks per 10,000 inhabitants over the period 2011-2014, causes a statistically significant increase of 2.6% in the TFR, after the ceasefire relative to the rest of municipalities.

We used municipal level data to provide empirical evidence of potential mechanisms that may link conflict to fertility. Our evidence is consistent with the main mechanism being the substantial post-ceasefire reduction in victimization. Indeed, the increase in TFR is larger in places that had more land mines before the ceasefire and where there were more people expelled by forced displacement.

This paper contributes to the literature in three ways. First, studying the causal relationship between the reduction of violence and fertility. Second, by testing the mechanisms through which the absence of conflict influences fertility. Finally, it contributes to recent efforts to study the consequences of the end of the Colombian conflict. These papers highlight significant unintended negative consequences in terms of the security of local leaders (Prem et al., 2019) and deforestation (Prem et al., 2019), and positive consequences for school dropout rates (Namen et al., 2019).

The rest of the paper is organized as follows. Section 2 provides some context of Colombia's armed conflict and the health care system. Section 3 describes the conceptual framework. Section 4 describes the data sources and measurement. Section 5 describes our empirical strategy to estimate the causal effect of the ceasefire on fertility. Section 6 reports our main results. Section 7 discusses the potential mechanisms behind our main results. Finally,

Section 8 concludes.

2 Context

2.1 Colombia's internal armed conflict and the peace process with the FARC.

The armed conflict in Colombia has its origins in the bipartisan violence and the inequities that resulted from the National Front: failed attempts to reform the structure of land tenure, and limited advocacy of dissenting actors who questioned the bipartisan agreement ([CNMH, 2013](#)). In that context, in the mid-1960s, the foundation of left-wing guerrillas FARC, and the National Liberation Army (ELN from the Spanish acronym) occurs. Inspired by the Cuban and Chinese revolutions, and dissenting from the restrictions on political participation imposed by the National Front, the guerrillas fought for over 50 years intending to overthrow the government to build a socialist/communist country. Although there is no single pattern that determines the guerrilla location, in their origins they were in rural areas, and their area of influence was exclusive in the peripheral areas of the departments. However, intending to expand their sphere of influence, they transformed a good part of the national territory into spaces of armed confrontation, to reduce the action forcefulness of the State military forces. In this vein, they articulated economic, political and military circumstances to their location and expansion strategy ([Echandía Castilla, 1997](#)). For this reason, most people affected by conflict was from the rural area, as well as those who identified themselves as indigenous and Afro-descendants ([INS, 2017](#)).

In pursuance to finance the protracted war, both guerrilla groups have profited from different forms of illegal activities within the Colombian territory as kidnappings, extortion, assaults on property and looting ([Richani, 1997](#)). Towards the 80s, with the increase in demand for cocaine from the United States, the rise of illegal economies from drug trafficking was presented. Sub-national territorial dominance has always been an essential objective of

the armed groups to meet one of the requirements for obtaining the belligerency status and being a subject of international law, and with the new trafficking scenario, they need to control the transport routes of illegally obtained goods, which lead them to inflict violence on both military and civilian targets.

On October 2012 the Colombian government and FARC started peace negotiations in Cuba. While the constant ebb and flow characterized the four-year-long process, one of the most significant milestones was the establishment of a permanent ceasefire by FARC on December 20, 2014; which was replaced by the definitive bilateral ceasefire and the subsequent disarmament of FARC in 2016. In fact, as a result of the ceasefire, FARC withdrew their troops to Transitory Normalization Zones of Transformation, where military contact with government security forces and other armed groups was unlikely to take place. The aforementioned explains why FARC's offensive activities drop by 98% during this period (CERAC, 2016). The Transitory Normalization Zones of Transformation was transformed into Territorial Training and Reincorporation Spaces (ETCR from the Spanish acronym), created to train the former FARC's rebels for their reincorporation into civilian life, develop productive projects and fit the technical needs of the surrounding communities.

In Figure 1 we present the evolution of violence related to the conflict in municipalities exposed and non-exposed to FARC violence, in order to understand the dynamics of the conflict in the period of study. Panel (a) shows the average number of violent cases in a municipality, which includes selective murders, attacks on the population, terrorist attacks, damage to property and civilians, forced disappearance, massacres, kidnappings, sexual violence and recruitment. Panel (b) presents the victims from anti-personnel mines, and panel (c) presents the victims from forced displacement. Those graphics shows a sizable reduction in the overall victimization, and by 2016 the gap for violent cases and mines victims between the two types of municipalities is closed. Even though there is an increase in 2017 in victims from anti-personnel mines and forced displacement, the overall reduction is more significant.

In this paper, we show that FARC's inability to exert violence by their initiative, or to respond violently to actions perpetrated either by the military or other armed groups during the ceasefire, caused a small but precisely estimated increase in births. We interpret this increase as a reaction by the change in municipal conditions generated by the conflict.

2.2 Colombia's health system. Article 44 and 49 of the Political Constitution establishes health care as a fundamental right and a public service whose provision is carried out under the direction, coordination and control of the State with the participation of public and private agents. Law 100 of 1993 creates the General System of Social Security in Health (SGSSS from the Spanish acronym). The mentioned Law introduced competition into both insurance and the provision of care through a managed-care model ([Bardey & Buitrago, 2017](#)), where public and private firms intervene, with two types of affiliation to the SGSSS that aim to cover the entire population: the contributory regime - for people with payment capacity- and the subsidized regime - for people without payment capacity or with particular priority for the government -. Besides, there is a population that is part of a unique scheme: members of the military and police forces, teachers belonging to the teaching staff, people affiliated to the health system of the universities and public servants of Ecopetrol.¹

Both regimes had access to the same packages of health benefits after a decision taken by the Constitutional Court in 2015, and health insurers must guarantee the provision of it. However, in practice, health insurers limit access to healthcare ([Vargas et al., 2010](#)). In 2019, 95,21% of the population is affiliated to the SGSSS, of which 45,38% are in the RC, 45,51% are in the RS, and 4,3% are in the special regime ([MinSalud, 2019](#)).

According to [INS \(2017\)](#), between 1998 and 2015, there was a direct positive relationship between fertility in adolescents and the conflict intensity index, showing higher fertility as the conflict index quintile increased. They found that children born of girls aged 10 to 14 years

¹Ecopetrol, formerly Colombian Petroleum Company S.A., is the leading and most significant oil company in Colombia. It is linked to the Ministry of Mines and Energy.

old had the highest proportions of low birth weight births.² Additionally, there was a higher proportion of low birth weight in the quintiles of municipalities with less intensity of the conflict, which is counterintuitive. The study posits the central dynamics of armed conflict that could have affected health in Colombia: the modalities of violence,³ direct attacks on health services, and the ways to obtain resources for war.⁴

Colombia is an interesting case study because it has a total fertility rate (TFR) of 1.82, for the period 2015-2020 (UN, 2019). Similarly, in Latin America and the Caribbean, the TFR is 2.04, and the average across countries of the Organisation for Economic Cooperation and Development is somewhere between 1.4 and 1.9 children per woman (OECD, 2019). We can observe that the TFR in Colombia is similar to the region, so it is a good reflection of these low and middle-income countries. Bearing in mind the conflict context of Colombia, it is essential to study if the ceasefire has an effect on that outcome.

3 Literature review

Becker (1960) pioneered the exploration of the theory of fertility behaviour in economics, developing Malthus' discussion about the determinants of fertility. This model of election theory regards children as a durable consumption and fertility behaviour as a well-informed behaviour of consumers (parents). The amount of money spent on children determined their quality, and the quantity depends on the income, with the quantity income elasticity usually being small compared to the quality elasticity. He later introduces altruism in his theory

²The minimum age of sexual consent is an age established by some governments to protect teenagers from abuse by older people, and the consequences that may occur when they are not fully aware of their rights and body development. In Colombia, sex with anyone below 14 years old is considered a criminal offence.

³The National Center for Historical Memory documented 14 modalities of violence: 1. Selective killings, 2. Massacres, 3. Deaths of civilians in war actions, 4. Terror attacks, 5. Attacks to populations, 6. Attacks on the property of civils, 7. Kidnapping, 8. Torture, 9. Forced disappearance, 10. Forced displacement, 11. Sexual violence, 12. Antipersonnel mines, 13. Illegal recruitment and 14. Threat.

⁴Illicit crops and drug trafficking, illegal mining, cooptation of public revenues, kidnapping, and extortion. The analysis of the health consequences of aerial spraying of illicit crops with glyphosate has been studied by Camacho & Mejía (2014), who found three groups of diseases potentially related to aerial spraying: dermatological problems, respiratory diseases, and abnormalities during pregnancy-abortion.

(Becker & Barro, 1986) and advises that parents should analyze the optimal fertility decisions through rational behaviour (Barro & Becker, 1989). Most of the fertility studies have been based on this theory, and even the mechanisms related to the demography disruption generated by armed conflict takes into account his approach. We will next make a review of previous research and hypotheses about the channels.

Fertility and armed conflicts.

The social disruption caused by the conflict through the affectation of micro or macro-level conditions causes demographic changes even when it ceases. During the conflict, most micro-level studies have found a decline in fertility. The primary explanation of this decline is because parents postpone births for different reasons: delayed marriage, in Tajikistan (Shemyakina, 2009) and Bangladesh (Curlin et al., 1976), increased incidence and duration of marital separation, in Angola (Agadjanian & Prata, 2002) and Eritrea (Woldemicael, 2008), to avoid impoverishment in the short term, in Ethiopia (Lindstrom & Berhanu, 1999), and for the shortage of eligible men, in Cambodia (De Walque, 2006). In contrast, during the conflict in Colombia Torres & Urdinola (2019) found a positive association between fertility and conflict in rural areas, driven by women's responses to higher mortality levels and the weakening of local institutions assumed to provide protection and health-related services.

When the conflict ceases, the evidence about the direction and magnitude of the effect of violence on fertility is mixed. Some of the micro-level studies found an increase in fertility, driven by two different mechanisms. The first theory is named the risk-insurance theory of reproductive behaviour or old-age security approach. This theory posits the insurance role of children under conditions of economic insecurity: parents response to child mortality having more children because children will provide social well-being and financial help to their parents, especially when they get old (Nugent, 1985; Schultz, 1969). Returning to Becker's theory, even though it is not clear whether parents make child investments out of altruism or in exchange for the care and resources expected, one hypothesis is that they demand children

for the provision of support and care in their old age (Cain, 1981). So, given high children mortality on conflict, and to achieve the necessary number of surviving children up until the age they can work, parents increase their fertility. In this case, there are sex preferences of parents because the economic productivity and noneconomic value to parents of boys and girls differ (Schultz, 1997). The old-age security approach has been proposed as the channel in the context of refugee women from Rwanda (Verwimp & Bavel, 2005), who had higher fertility rates than their non-refugee counterparts. However, their children had lower survival chances, and the survival chances of daughters of refugee mothers were significantly lower, which could be because until 1994, women and daughters could not inherit the land, though exceptions were made in particular circumstances.

On the other hand, the second theory predicts a replacement effect⁵ for women who lost a child during the conflict (Schultz, 1969, 1976; Ben-Porath, 1976; Sah, 1991). The replacement effect is the mechanism postulated by Curlin et al. (1976) in the study about the impact of the Bangladesh civil war in births. Also, after Rwanda's genocide, research made by Schindler & Bruck (2011), Rutayisire (2014), and Kraehnert et al. (2018), found that the death of a mother's child during the genocide increases both the hazard of having a child within five years and the total number of births within 15 years following the genocide. In this case, the incentive of parents to "replace" the child may be reinforced by the objective of replacing individuals of the same ethnic group who have been killed during the genocide (Heuveline & Poch, 2007) because the demographic balance between opposing groups is often an implicit but essential stake in the conflict (Fargues, 2000; Tabeau & Bijak, 2005).

By contrast, Clifford et al. (2010) find evidence for a decrease in nuptiality and fertility after the independence of Eritrea, associated with the 1995 food crisis. The aforementioned empirical evidence attested that the effects and mechanisms of violence on fertility are likely to vary depending on the intensity and duration of the conflict, the type of violence ex-

⁵In the literature, the volitional replacement effect is the one that can explain the relationship between child death and fertility (Palloni & Rafalimanana, 1999).

perienced by the population, and the induced changes in the local economic and social conditions.

In our analysis, we capture heterogeneous effects that can shed some light regarding the underlying mechanisms of the impact of conflict on fertility by focusing on three channels: (1) the health and survival chances of newborn, (2) the post-ceasefire baby boom of former FARC's rebels, and (3) the variation across municipal-level characteristics proxies of victimisation, coca suitability and coca eradication.

4 Data

To investigate the effect of the ceasefire on fertility, we build a municipality-year level panel with data from different sources. We focus on the presidential term of Juan Manuel Santos, from 2011 to 2018, who initiated peace negotiations with FARC in 2012. The sample includes 1,092 municipalities, which are all municipalities with a population of less than 200,000 in the year 2010, based on the National Administrative Department of Statistics (DANE from the Spanish acronym) projections. We drop mayor cities and capitals to make the municipalities comparable with the ones where the ceasefire took place. We now describe the main variables and data sources.

4.1 Health data. Civil registration and vital statistics (CRVS) systems are the most widespread and abundant source of information with which to estimate health indicators to study the dynamics of the population, set public health goals and policy, and to direct research and resources. Colombia has a strong vital statistics system, which registers around 95% of births and 86% of deaths ([Colombia Implementation Working Group, 2018](#); [Toro Roa et al., 2019](#)). We take advantage of that to construct the primary dependent variable, using the Colombian nationally health data from the Integrated Information System of the Ministry of Health and Social Protection (SISPRO from the Spanish acronym) which contains

vital statistics from 2005 to 2018. Specifically, we compute a municipality-level TFR as follows:

$$TFR = \frac{\sum_{a=15-19}^{45-49} f_a}{1000} \quad (1)$$

where f_a is the age-specific fertility rate (ASFR) for women whose age corresponds to the five-year age group a . The following seven five-year age groups are utilized: 15 to 19; 20 to 24; 25 to 29; 30 to 34; 35 to 39; 40 to 44; and 45 to 49. We calculate the annual number of births based on the mother’s municipality of residence, not the baby’s place of birth.

4.2 Conflict data. To construct a measure of exposure to FARC violence before the start of the ceasefire, we use the conflict dataset originally compiled by [Restrepo et al. \(2003\)](#), and updated through 2014 by Universidad del Rosario. This dataset codes violent events recorded in the *Noche y Niebla* reports from the NGO Center for Research and Popular Education (CINEP from the Spanish acronym), which provides a detailed description of the violent event, its date of occurrence, the municipality in which it took place, the identity of the perpetrator, and the count of the victims involved in the incident.⁶

To measure FARC attacks, we first created a continuous measure based on the total number of FARC attacks over 10,000 inhabitants that took place from 2011 to 2014 in a municipality. Second, we created a dummy for *exposure to FARC violence* if there was at least one violent case by FARC in the same period mentioned before. Third, we standardized the continuous measure using the mean and standard deviation from 2014. Based on our last definition, we define 99 municipalities (9% of our sample) as municipalities exposed to FARC violence before the ceasefire.

⁶*Noche y Niebla* sources include: 1. Press articles from more than 20 daily newspapers of both national and regional coverage. 2. Reports gathered directly by members of human rights NGOs and other organizations on the ground, such as local public ombudsmen and, particularly, the clergy ([Restrepo et al., 2003](#)). Notably, since the Catholic Church is present in even the most remote areas of Colombia, we have extensive coverage of violent events across the entire country.

4.3 Other datasets. We complement these data with a set of municipality-level characteristics from different sources. The primary source is the annual panel of Colombian municipalities, maintained and hosted by the Center for Economic Development Studies (CEDE from the Spanish acronym), where we obtained the measures of rural share, distance to the department’s capital, poverty index, forced displacement and coca eradication.

We also use as measures of victimization, the presence of other armed groups as in Prem et al. (2019), to measure the total number of attacks by armed groups, except for FARC, in the municipality. We use the measure of coca soil and climate suitability at the municipality level from Mejía & Restrepo (2013), a standardized index for coca suitability, and a dummy that equals one for municipalities above the median of the empirical coca suitability distribution. Finally, we use data of the Colombian Reintegration Agency for the ETCR and the Office of the High Commissioner for Peace - Decontaminate Colombia for the mines victims dataset.⁷

4.4 Descriptive statistics. Table 1 reports descriptive statistics of the main variables during the part of the sample period that preceded the ceasefire (2011-2014). During that period, there were 1.6 live births for every 1,000 women between 15 and 49 years old, and the highest ASFR was for girls aged 20 to 24 years old. Also, the average of antenatal care visits in the municipalities was 5.7 the majority of the deliveries were attended by health professionals (97 vs 3 per 100 live births by traditional midwives and others), and there was more infant than neonatal mortality (25 per 1,000 live births vs 8 per 1,000 live births). Further, Table 2 shows that there were no statistically significant differences in TFR between municipalities exposed and non-exposed to FARC conflict during the period 2011-2014.

Regarding childbearing in early adolescence (15 to 19 years old), Table 2 shows that, consistent with the findings of Sanchez-Cespedes (2018), municipalities exposed to FARC violence had higher early childbearing rates. The table also suggests that municipalities that

⁷A detailed description of all the variables and their sources is available in Appendix Table A.1

experienced FARC violence before the ceasefire were, on average, different from non-exposed municipalities in several other characteristics. These include the share of births attended a by health professional, the antenatal care visits, the survival chances of newborns, the share of the rural population, the distance to the department's capital and the poverty index.

The differences between municipalities exposed and non-exposed to FARC attacks can be seen graphically in Figure 2 that shows the spatial distribution of the change in the evolution of TFR and overlay it with exposure to FARC violence; and Figure 3 that shows the difference on ASFR before and after the ceasefire. In Figure 2 we present, on a map, the difference in average fertility rate between 2018 and 2015 minus the average fertility rate between 2014 and 2011. A darker colour signifies a more substantial increase. Further, we include dots to highlight the municipalities exposed to FARC violence before the ceasefire, where bigger circle shows a higher number of attacks per capita. Because municipalities filled with darker colour tend to have bigger dots, this graphical analysis suggests that the increase in fertility was more substantial in municipalities most affected by violence perpetrated by FARC over the period 2011-2014. In Figure 3 we present, on a graphic bar, the mean of ASFR before and after the ceasefire. The darker colours are for the period before the ceasefire, while the lighter colours represent the period after the ceasefire. We can observe that there is an overall decrease in fertility rates after the ceasefire, but in municipalities that suffered attacks from FARC the decrease in TFR is less than in the comparison municipalities, specially for women aged 20 to 24. The difference in ASFR between municipalities with FARC attacks and without FARC attacks widens after the ceasefire, suggesting a smaller decrease in ASFR in municipalities suffering FARC attacks relative to the other municipalities. In the rest of the paper, we study these suggestive patterns with more rigour and detail.

5 Empirical strategy

5.1 Main specification. We exploit the timing of the permanent ceasefire announced by FARC on the 20th December 2014, as well as FARC attacks across municipalities before the ceasefire. More formally, using the subindex m to denote municipalities, d to denote departments, and t to denote years, we estimate the following *difference-in-differences* model:

$$y_{mdt} = \alpha_m + \delta_{dt} + \beta_1 (Cease_t \times FARC_m) + X_{mt-1} + \varepsilon_{mdt} \quad (2)$$

where y_{mdt} is our measure of TFR; α_m and δ_{dt} are municipal and department-time fixed effects that capture any time-invariant municipal level heterogeneity and any aggregate department-level time shock, respectively; $Cease_t$ is a dummy that equals one after the start of the permanent ceasefire and $FARC_m$ measures pre-ceasefire exposure to FARC violence; X_{mt} are controls at municipal level,⁸ and ε_{mdt} is the error term, clustered at the municipality level. The controls include the infant mortality rate, number of victims related to anti-personnel mines, the share of the rural population, distance to the department capital, poverty index and logarithm of the population in 2010.

We choose the continuous measure to do the analysis because, as can be observed in Table 3, this measure is robust to estimating the more demanding models, which include departmentxtimes fixed-effects (Column 2), and differential changes parametrised by pre-ceasefire controls (Column 3).

All regressions are weighted by the number of live births between 2011 to 2014 for each age group, based on the mother’s municipality of residence.⁹ In this way we give the same weight to every baby born and thus our coefficient of interest, β_1 , captures the differential change in the main variable after the start of the ceasefire relative to before, in municipalities

⁸A detailed description of all the variables and their sources is available in Appendix Table A.1. The control variables are measured in the period before the ceasefire.

⁹In Table A.2 and Table A.3 we show our results unweighted.

exposed to FARC violence versus those not exposed to FARC violence.

5.2 Identifying assumption. The main assumption behind the *difference-in-differences* model is that in the absence of the ceasefire, the TFR in municipalities exposed to FARC violence would have evolved similarly to those in municipalities non-exposed to FARC violence. The validity of this *parallel trends* assumption can be assessed by estimating the following dynamic version of the main specification:

$$y_{m dt} = \alpha_m + \delta_{dt} + \sum_{j \in T} \beta_j (FARC_m \times \delta_j) + \varepsilon_{m dt} \quad (3)$$

where T includes all years of our sample period except 2014, which is the year right before the ceasefire.¹⁰ Therefore the parameters β_j can be interpreted as the difference in TFR in municipalities exposed to FARC attacks compared to municipalities non-exposed, in year j relative to the year right before the ceasefire started (2014).

5.3 Potential mechanisms. We augment the main specification in equation 2 to test for heterogeneous effects by municipal-level characteristics. We do so by adding a third interaction term. Specifically, let the municipality characteristic Z_m (measured before the ceasefire, except for the ETCR), be a potential mechanism of interest. We estimate:

$$y_{m dt} = \alpha_m + \delta_{dt} + \beta_1 (Cease_t \times FARC_m \times Z_m) + \beta_2 (Cease_t \times Z_m) + \beta_3 (FARC_m \times Z_m) + \beta_4 (FARC_m \times Cease_t) + X_{m t-1} + \varepsilon_{m dt} \quad (4)$$

Our coefficient of interest, β_1 , captures the differential change in the main variables in places exposed to FARC attacks and with municipality characteristic Z_m . More specifically, we assess potential heterogeneous effects given by the ETCR and municipal-level proxies of victimization, forced displacement, coca suitability, and coca eradication. We have described these variables in section 4 and Appendix Table A.1. Note that the results coming from this

¹⁰We omit this year to avoid perfect collinearity.

test are suggestive about potential mechanisms, but not necessarily causal. They have to be interpreted with caution.

Using the above specifications, we estimate the impact of the 20th December 2014 permanent ceasefire, on TFR in areas previously exposed to FARC violence (equation 2), the dynamic persistence of this effect (equation 3), and heterogeneous effects given by municipality characteristics (equation 4). The next section reports the estimated results.

6 Results

6.1 Main findings. As a first step, we investigate the effects of the ceasefire on TFR. Our sample includes all municipalities with less than 200,000 inhabitants in 2010, weighted by the number of live births between 2011 to 2014 for women between 15 and 49 years old. Recall that our main coefficient of interest is the interaction between a continuous (pre-ceasefire) FARC exposure to violence indicator and a time dummy that captures the period after the announcement of the permanent ceasefire (2015-2018). In Table 3 we report the estimates from estimating equation 2. Columns 1 and 4 includes municipality and year fixed effects; Columns 2 and 5 includes municipality and departmentxtimes fixed effects; and Columns 3 and 5 includes the latter but also control for differential changes in TFR after the ceasefire due to several pre-ceasefire municipality characteristics. The controls include the infant mortality rate, number of victims related to anti-personnel mines, the share of the rural population, distance to the department capital, poverty index and logarithm of the population in 2010.

We find that a one-standard-deviation increase in the number of FARC attacks per 10,000 inhabitants over the period 2011-2014, causes a statistically significant increase in TFR of 0.04 births per 1,000 women aged 15 to 49, after the ceasefire relative to the rest of municipalities. This effect is equivalent to 0.07 SD ($=0.04/0.598$), or to 2.6% ($=0.04/1.55$) of the mean

TFR and is statistically significant at 1%. The magnitude and the statistical significance are robust -for the continuous measure- to estimating the more demanding models, which include departmentxtimes fixed-effects (Column 2), and differential changes parametrised by pre-ceasefire controls (Column 3).

Next, in Table 4 we split the total fertility rate on the age-specific fertility rates for the five-year age groups to analyze the increase in fertility.¹¹ There is an increase across the board in the five-year age groups except for women aged 45 to 49, and the majority of the increase (0.08 SD) is on the women aged 20 to 24, which historically has been the group with the highest age-specific fertility rate in Colombia (MinSalud and Profamilia, 2015). Also, we can observe that a one-standard-deviation increase in the number of FARC attacks per 10,000 inhabitants over the period 2011-2014, causes a statistically significant increase in early childbearing (Columns 1-2) of 1.63 births per 1,000 girls aged 15 to 19, after the ceasefire relative to the rest of municipalities. This effect is equivalent to 0.06 SD (1.63/28.19).

The results on TFR are aligned with the micro-level studies that found a baby boom in the regions exposed to conflict when the conflict ends (Curlin et al., 1976; Verwimp & Bavel, 2005; Heuveline & Poch, 2007; Schindler & Bruck, 2011; Rutayisire, 2014; Kraehnert et al., 2018). Conversely, regarding the findings in early childbearing, our results differ with the scarce literature, which has found that reduced levels of violence reduce the likelihood of having children at early ages (Sanchez-Cespedes, 2018).

Even though these findings may seem small, it must be taken into account that long-lasting conflicts, as the Colombian one, are more likely to affect macro-level conditions which can not be tackled in the post-conflict short-term.

6.2 Identifying assumption. To assess the validity behind our empirical strategy, that in the absence of the ceasefire the TFR in municipalities with FARC attacks would have evolved similarly than the TFR in other municipalities, we report in this subsection our

¹¹In Figure 4 we show the increase on ASFR as a proportion of their 2013 level of fertility.

results.

Dynamic difference-in-differences. We first report the coefficients from estimating equation 3 in the Figure 5, where we plot the point estimates associated with the interaction of interest, together with the 95% confidence interval. Panel (a) shows the results with municipality and year fixed effects, while Panel (b) controls for departmentxtimes fixed effects. It can be seen in both panels that before the ceasefire the coefficients are not statistically significant, and the point estimates move around 0. This points to the absence of differential trends in TFR before the ceasefire between municipalities that were exposed to FARC violence and places that were not. Thus, this supports our choice of a *difference-in-differences* empirical strategy. The Panels also show that the point estimates increase in magnitude and become significant after the start of the permanent ceasefire.

6.3 Robustness. We now present robustness to our choice of using weights by the number of live births in the period before the ceasefire, the civil registration of births, and a placebo exercise.

First, in Table A.2 and Table A.3 we present the results obtained from estimating equation 2 without weights. The coefficient can be interpreted as the average effect of the ceasefire on TFR across municipalities. We show that the results are similar to the baseline in magnitude (0.05 SD vs 0.04).

Second, we corroborate that our main finding, namely that TFR increased differentially after the start of the ceasefire in municipalities previously affected by FARC attacks, comes from an increase in the number of live births and not from an increase in civil registration. For this purpose, we analyze the ceasefire association with medical support in the delivery because in Colombia the process of birth registration is based on the certificate of live birth issued by an authorised health professional.¹² In the cases that a traditional midwife or others attend the delivery, the birth can be registered based on a sworn statement by

¹²The live birth certificate serves itself to statistical purposes.

two witnesses present at the birth or with direct and reliable news of the birth (Toro Roa et al., 2019). If the increase in civil registration mainly drove the results, then we should find significant effects in the births attended by health professionals. Alternatively, if the behaviour regarding children registration does not change with the ceasefire, then we should find no effects. Table 5 shows the latter is indeed the case.

Finally, for the placebo exercise, we use the year 2013 because on the 26th May 2013 the Government and the FARC-EP reached an agreement on the rural reform, the first point of the peace process agenda. The regression follows the structure of equation 2 but instead of a *Cease* time indicator we include the *Placebo Cease* one, which takes the value one for the years 2013 and 2014. To capture pre-ceasefire effects, we focus on the sample period between 2011 and 2014. The results are shown in Table A.4, where we find that there is no differential change in TFR in areas exposed to FARC attacks relative to the other areas. These results are consistent with the absence of differential pre-trends before the ceasefire and support that the ceasefire drives the differential evolution of TFR between these two types of municipalities.

7 Mechanisms

In this section, we explore the empirical relevance of several potential mechanisms through which the absence of violent conflict increases TFR in municipalities previously affected by FARC violence. We explore the health and survival chances of newborns, the FARC's ex-members baby boom, and the role of the overall victimization of civilians in areas affected by FARC violence. Understanding the potential mechanisms is essential for developing policy responses to take advantage of the positive effects of the ceasefire and to minimize the adverse effects.

7.1 Health and survival chances of newborns. Taking into account the conceptual framework, we consider the ceasefire association with the survival chances of the newborn. As before, we report the *difference-in-differences* coefficients from estimating equation 2 to analyze the changes that could be associated with the main finding. In this equation, we are not assessing the validity of parallel trends because we are not searching for causality. Results are displayed in Table 6. First, we observe no differences on low birth weight (columns 1-2) or neonatal mortality (columns 3-4). Second, we find a statistically significant decrease in infant mortality of 0.58 deaths after the ceasefire relative to the rest of municipalities. This effect is equivalent to 0.02 SD and is statistically significant at 10%. This could be because there is a change on the composition of the mothers relative to the non-FARC areas, which can be seen in Figure 3.

7.2 FARC’s ex-combatants baby boom. It has been documented that the FARC interfered in the private lives of their members, including determining whether couples remain together and even deciding if they can have or raise their children (Arjona & Kalyvas, 2008). After the demobilization of FARC’s ex-combatants, the possibility of having and raising their children could be one of the reasons why there was a baby boom by the rebels of FARC’s army.¹³ We explore if this baby boom explains our findings using the two databases provided by the Colombian Reintegration Agency: the number of live births conceived by FARC ex-combatants between 2014 to 2018 and the municipalities where the ETCR are located.

Our test of whether the FARC’s ex-combatants baby boom explained our results is twofold. First, we analyse how many babies were conceived by FARC’s ex-combatants in the municipalities that suffered attacks from FARC before 2014, and what is the percentage of the *FARC baby boom* in our results. We find that between 2015 to 2018, there were 4,348 babies conceived by FARC’s ex-combatants, of this 2,071 were born in municipalities that faced

¹³See <https://www.theguardian.com/world/2017/feb/10/farc-peace-deal-baby-boom-pregnancy-ban> (last accessed 18/11/2019)

FARC violence. In the year 2018, there were 832,249 women between 15 to 49, so it was 2.49 babies conceived by FARC’s ex-combatants per 1,000 women aged 15-49 years old, which is 1.6% of our increase in 0.04 births.

As a second test, we explore heterogeneous effects estimating equation 4 using the ETCR as a municipality characteristic. The results are reported in Column 1 of Table 7. We find that there is no differential increase on TFR in municipalities with ETCRs.

Taken together, these results show that the FARC’s ex-combatants baby boom does not explain our results, and there are other mechanisms more relevant empirically that we will analyze in the next subsection.

7.3 The reduction in victimization. Armed groups influence many domains of local life, permeating politics, economics, social relations, and even private life. In Colombia, armed actors often regulate mobility, establishing rules about when civilians could be outside their homes, travel, or enter a municipality, limiting their extent of social interactions (Arjona, 2016). These regulations are quite relevant for our results, taking into account that Colombia’s five-decade-long conflict left 8.910.526 victims to 2019 according to the Victims’ Registry (RUV),¹⁴ which is over 17% of the country’s population. Also, armed actors have considered health services as strategic objectives of political importance (INS, 2017). Consequently, medical personnel were subjected to death threats, assassinations or arbitrary detentions; hospitals and health centres were looted or destroyed, and the delivery of supplies or provision of any services to enemies was prevented (CNMH, 2013).

Overall, people living in conflict-affected areas faced a non-negligible risk of victimization. We assess whether our main results are driven by the substantial reduction of victimization

¹⁴The RUV was created as a mechanism to guarantee the attention and adequate reparation of the victims from armed conflict (except for victims linked to an armed outlaw group). The system brings together people who individually or collectively have suffered from homicide, massacres, kidnapping, forced disappearance, torture, antipersonnel mines, unexploded ammunition and improvised explosive device, terrorist acts, fighting, confrontations and harassment, forced displacement and forced dispossession of land crimes against freedom and sexual integrity in the conflict context. Victim’s data is partial because the legal framework only recognizes victims as of January 1, 1985

and the subsequent optimism following the ceasefire. To that end, we estimate equation 4 to explore if there are any heterogeneous effects in municipalities that suffered particularly high levels of violence before the ceasefire. We do so by looking at the violence perpetrated by other armed groups (in addition to FARC), as well as at episodes of the explosion of land mines, forced displacement, the potential mitigating effect of profitable economic opportunities and a triple interaction between the poverty index, the infant mortality and the victims related to anti-personnel mines.

The results from these test are reported in Table 7. They suggest that, indeed, the increase in TFR following the start of the ceasefire are more substantial in municipalities that faced more violence during the period 2011-2014. Specifically, the increase in TFR is larger in places that have anti-personnel mines victims before the ceasefire (Column 3),¹⁵ where inhabitants were expelled by forced displacement (Column 4) and in the more marginalized municipalities with high poverty index, infant mortality and victims from anti-personnel mines (Column 7).

After the ceasefire, the control points, the rules about mobility, the permission to leave the municipality, and the victimization to the medical personnel no longer exist. In the post-conflict period, there is a positive atmosphere to raise the children, send them to the school and offer them to grow in a safer environment, which we argue that contribute to the increase in fertility.

8 Conclusion and discussion

In this paper, we study the short-term effects of Colombia's FARC ceasefire on TFR using municipal-level vital statistics, and the conflict dataset originally compiled by Restrepo

¹⁵By 2014, Colombia remained the second country with the most accidents registered with antipersonnel mines with 570 people affected by these devices, only behind Afghanistan. In 2015 the Government and FARC signed an agreement on cleaning and decontamination of land mines presence, intending to generating safety conditions for the inhabitants in risk areas. The agreement contributed to the fact that by 2018, Colombia drops to the tenth place.

et al. (2003), in order to estimate a difference-in-differences model. Our estimation strategy exploits the temporal variation given by the ceasefire and analyzes potential heterogeneous effects by municipal-level variation across specific characteristics.

Our findings show that the permanent ceasefire declared by the FARC guerilla triggered a small but precisely estimated increase in the TFR, in the areas previously affected by FARC attacks before the ceasefire, relative to other areas. This is in a general context of declining fertility in the country. Specifically, we find a statistically significant increase of 0.04 births per 1,000 women aged 15 to 49 (0.07 SD of the TFR), which corresponds to a 2.6% of the mean TFR. We find evidence that the substantial reduction of victimization and the subsequent optimism following the ceasefire influence post-ceasefire fertility outcomes. We find that the increase in TFR is larger in places that had victims of land mines before the ceasefire, and where there were more people expelled by forced displacement. Also, we find an increase in the survival chances of newborns which suggest that the absence of attacks by the armed actor induced changes in the municipal demographic conditions that creates a better environment to raise the children.

We conclude that the short-term impact of the ceasefire varied between the more and less affected municipalities of the country, as well as across different socio-economic municipal conditions, and these variations are likely to mark the course of the future demographic transition. Colombia's long-lasting but low-intensity armed conflict induces fundamental and multifaceted changes in the population and imprint -at least partially- not only its current demographic behaviour and structure but its future demographic trends.

Our analysis also highlights the differential effects of the ceasefire in terms of age cohorts. The ceasefire has significant positive effects for all age groups except for the eldest. In particular, our results show an increase in ASFR for adolescent women aged 15 to 19.¹⁶

¹⁶Early childbearing is considered a public health issue because most adolescent girls (10 to 19 years old) have immature reproductive organs for pregnancy and are not psychologically prepared, which is the reason why they have potentially poor obstetric and neonatal outcomes (Salihu et al., 2006; Branson et al., 2015). According to Dixon-Mueller (2008), the complete physical maturity of rural adolescent women in Latin

Bearing in mind that complications of pregnancy and childbirth are the leading cause of mortality among girls of those ages globally (WHO, 2016), and that Colombia ASFR for girls aged 15 to 19 is above the average in Latin America and the Caribbean,¹⁷ we argue that the increase in early childbearing constitutes an unintended negative consequence of the peace process. Which was not accompanied by an effort to provide comprehensive sex education (Kohler et al., 2008), formal educational opportunities for girls (Vargas Trujillo et al., 2019), decrease in the cost of birth control (WHO, 2012) and optimize health services, taking advantage of the new scenario generated by the peace negotiation.

America is achieved between their 18th and their 20th birthday, about six years after their first period. Also, some authors claim that the problem of early parenthood is related more to adolescents' cognitive immaturity than to their bodily immaturity, and that cognitive maturity is reached one decade after puberty or more, usually after the age of 24 (Breinbauer & Maddaleno, 2005). Besides, women who have children at early ages tend to have worse economic outcomes than those who delay first births (Branson & Byker, 2018).

¹⁷Colombia ASFR for girls aged 15 to 19 is 66.7 for the period 2015-2020 (UN, 2019), whereas for Latin America and the Caribbean is 63, and the average across countries of the OECD is at just 11.8 (OECD, 2019)

References

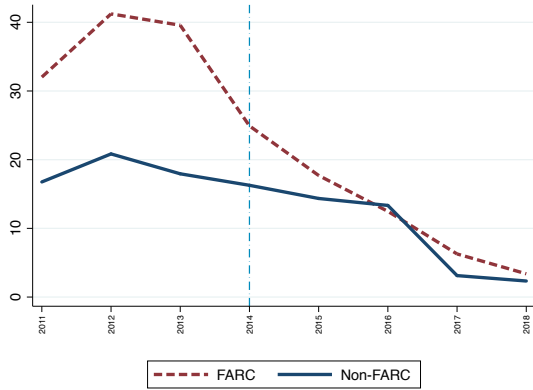
- Agadjanian, V. & Prata, N. (2002). War, peace, and fertility in angola. *Demography*, 39, 215–31.
- Arjona, A. (2016). *Rebelocracy: Social Order in the Colombian Civil War*. Cambridge Studies in Comparative Politics. Cambridge University Press.
- Arjona, A. M. & Kalyvas, S. (2008). Una mirada micro al conflicto armado en colombia. resultados de una encuesta a desmovilizados de guerrillas y grupos paramilitares. *Argumentación, negociación y acuerdos*, 293–362.
- Bardey, D. & Buitrago, G. (2017). Supplemental health insurance in the colombian managed care system: Adverse or advantageous selection? *Journal of Health Economics*, 56, 317–329.
- Barro, R. J. & Becker, G. S. (1989). Fertility choice in a model of economic growth. *Econometrica*, 57(2), 481–501.
- Becker, G. (1960). An economic analysis of fertility. In *Demographic and Economic Change in Developed Countries* (pp. 209–240). National Bureau of Economic Research, Inc.
- Becker, G. S. & Barro, R. J. (1986). Altruism and the economic theory of fertility. *Population and Development Review*, 12, 69–76.
- Ben-Porath, Y. (1976). Fertility response to child mortality: micro data from israel. *Journal of Political Economy*, 84(4, Part 2), S163–S178.
- Branson, N., Ardington, C., & Leibbrandt, M. (2015). Health outcomes for children born to teen mothers in cape town, south africa. *63*(3), 589–616.
- Branson, N. & Byker, T. (2018). Causes and consequences of teen childbearing: Evidence from a reproductive health intervention in south africa. *Journal of Health Economics*, 57, 221 – 235.
- Breinbauer, C. & Maddaleno, M. (2005). *Youth: Choices and change: Promoting healthy behaviors in adolescents*, volume 594. Pan American Health Org.
- Brück, T. & Schindler, K. (2009). The impact of violent conflicts on households: What do we know and what should we know about war widows? *Oxford Development Studies*, 37(3), 289–309.
- Cain, M. (1981). Risk and insurance: Perspectives on fertility and agrarian change in india and bangladesh. *Population and development review*, 435–474.
- Camacho, A. & Mejía, D. (2014). Consecuencias de la aspersión aérea en la salud: evidencia desde el caso colombiano. *Costos Económicos y Sociales del Conflicto en Colombia: ¿Cómo construir un posconflicto sostenible?*, 117–138.

- CERAC (2016). Un año de desescalamiento: conflicto casi detenido, pero que se resiste a desaparecer. Technical report, Centro de Recursos para el Análisis de Conflictos.
- Clifford, D., Falkingham, J., & Hinde, A. (2010). Through civil war, food crisis and drought: Trends in fertility and nuptiality in post-soviet tajikistan. *European Journal of Population/Revue européenne de Démographie*, 26(3), 325–350.
- CNMH (2013). Basta ya. colombia: Memorias de guerra y dignidad. Technical report, Grupo de Memoria Histórica.
- Colombia Implementation Working Group (2018). Colombia: A strategy to improve the registration and certification of vital events in rural and ethnic communities. crvs country perspectives. Technical report, Bloomberg Philanthropies Data for Health Initiative, Civil Registration and Vital Statistics Improvement, the University of Melbourne.
- Curlin, G. T., Chen, L. C., & Hussain, S. B. (1976). Demographic crisis: The impact of the bangladesh civil war (1971) on births and deaths in a rural area of bangladesh. *Population studies*, 30(1), 87–105.
- De Walque, D. (2006). The socio-demographic legacy of the khmer rouge period in cambodia. *Population studies*, 60(2), 223–231.
- Dixon-Mueller, R. (2008). How young is too young? comparative perspectives on adolescent sexual, marital, and reproductive transitions. *Studies in family planning*, 39(4), 247–262.
- Echandía Castilla, C. (1997). Expansión territorial de la guerrilla colombiana: geografía, economía y violencia. *Paz Pública, Documento de Trabajo*, (1).
- Fargues, P. (2000). Protracted national conflict and fertility change: Palestinians and israelis in the twentieth century. *Population and Development Review*, 26(3), 441–482.
- Heuveline, P. & Poch, B. (2007). The phoenix population: Demographic crisis and rebound in cambodia. *Demography*, 44(2), 405–426.
- INS (2017). Consecuencias del conflicto armado en la salud en colombia. Technical report 9, Instituto Nacional de Salud and Observatorio Nacional de Salud, Bogotá D.C.
- Kohler, P. K., Manhart, L. E., & Lafferty, W. E. (2008). Abstinence-only and comprehensive sex education and the initiation of sexual activity and teen pregnancy. *Journal of adolescent Health*, 42(4), 344–351.
- Kraehnert, K., Brück, T., Di Maio, M., & Nisticò, R. (2018). The effects of conflict on fertility: Evidence from the genocide in rwanda. *Demography*.
- Lindstrom, D. P. & Berhanu, B. (1999). The impact of war, famine, and economic decline on marital fertility in ethiopia. *Demography*, 36(2), 247–261.
- Mejía, D. & Restrepo, P. (2013). Bushes and bullets: illegal cocaine markets and violence in colombia. *Documento CEDE*, (2013-53).

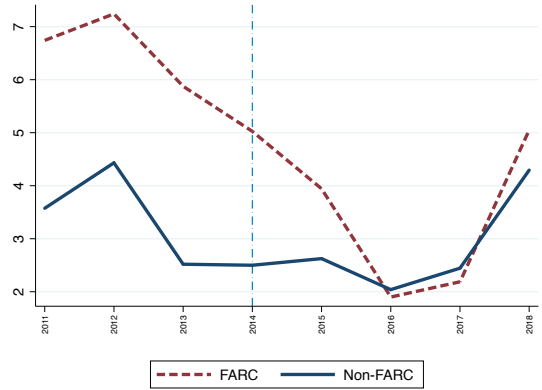
- MinSalud (2019). Cifras de aseguramiento en salud. Technical report, Ministerio de Salud y Protección Social.
- MinSalud and Profamilia (2015). Encuesta nacional de demografía y salud.
- Namen, O., Prem, M., & Vargas, J. F. (2019). The human capital peace dividend. *Available at SSRN 3424863*.
- Nugent, J. B. (1985). The old-age security motive for fertility. *Population and Development Review*, 11(1), 75–97.
- OECD (2019). OECD family database.
- Palloni, A. & Rafalimanana, H. (1999). The effects of infant mortality on fertility revisited: New evidence from latin america. *Demography*, 36(1), 41–58.
- Prem, M., Rivera, A., Romero, D., & Vargas, J. (2019). Civilian selective targeting: The unintended consequences of partial peace. *Available at SSRN, 3203065*.
- Prem, M., Saavedra, S., & Vargas, J. F. (2019). End-of-conflict deforestation: Evidence from colombia’s peace agreement. *Available at SSRN 3306715*.
- Restrepo, J. A., Spagat, M., & Vargas, J. F. (2003). The dynamics of the colombian civil conflict: A new data set.
- Richani, N. (1997). The political economy of violence: the war-system in colombia. *Journal of Interamerican Studies and World Affairs*, 39(2), 37–81.
- Rutayisire, P. C. (2014). Changes in fertility decline in rwanda: A decomposition analysis. *International Journal of population research*, Volume 2014, 10.
- Sah, R. K. (1991). The effects of child mortality changes on fertility choice and parental welfare. *Journal of Political Economy*, 99(3), 582–606.
- Salihu, H., Sharma, P., Ekundayo, O., Kristensen, S., Badewa, A., Kirby, R., & Alexander, G. (2006). Childhood pregnancy (10-14 years old) and risk of stillbirth in singletons and twins. *The Journal of pediatrics*, 148, 522–6.
- Sanchez-Cespedes, L. M. (2018). Armed conflict and adolescents’ early transition to child-bearing. *The Journal of Development Studies*, 54(10), 1719–1736.
- Schindler, K. & Bruck, T. (2011). The effects of conflict on fertility in Rwanda. Policy Research Working Paper Series 5715, The World Bank.
- Schultz, T. P. (1969). An economic model of family planning and fertility. *Journal of Political Economy*, 77(2), 153–180.
- Schultz, T. P. (1976). Interrelationships between mortality and fertility. *Population and development: The search for selective interventions*, 239–289.

- Schultz, T. P. (1997). Demand for children in low income countries. *Handbook of population and family economics*, 1, 349–430.
- Shemyakina, O. (2009). The marriage market and tajik armed conflict. *Brighton, UK: Households in Conflict Network (HiCN). Working Paper*, 66.
- Tabeau, E. & Bijak, J. (2005). War-related deaths in the 1992–1995 armed conflicts in bosnia and herzegovina: A critique of previous estimates and recent results. *European journal of population/Revue européenne de Démographie*, 21(2-3), 187–215.
- Toro Roa, J. P., Iunes, R. F., & Mills, S. (2019). Achieving health outcomes in colombia: Civil registration and vital statistics system, unique personal identification number, and unified beneficiary registry system for births and deaths.
- Torres, A. F. C. & Urdinola, B. P. (2019). Armed conflict and fertility in colombia, 2000-2010. *Population Research and Policy Review*, 38(2), 173–213.
- UN (2019). World population prospects 2019.
- Vargas, I., Vázquez, M. L., Mogollón-Pérez, A. S., & Unger, J.-P. (2010). Barriers of access to care in a managed competition model: lessons from colombia. *BMC health services research*, 10(1), 297.
- Vargas Trujillo, E., Florez Nieto, C. E., Cortés Cortés, D., & Ibarra Avila, M. C. (2019). *Embarazo temprano: Evidencias de la investigación en Colombia*. Ediciones Uniandes-Universidad de los Andes.
- Verwimp, P. & Bavel, J. (2005). Child survival and fertility of refugees in rwanda. *European Journal of Population / Revue europeenne de Demographie*, 21, 271–290.
- WHO (2012). Preventing early pregnancy and poor reproductive outcomes among adolescents in developing countries: What the evidence says. Technical report, World Health Organization.
- WHO (2016). Global health estimates 2015: Deaths by cause, age, sex, by country and by region, 2000-2015. Technical report, World Health Organization.
- Woldemicael, G. (2008). Recent fertility decline in eritrea: Is it a conflict-led transition? *Demographic Research*, 18, 27–58.

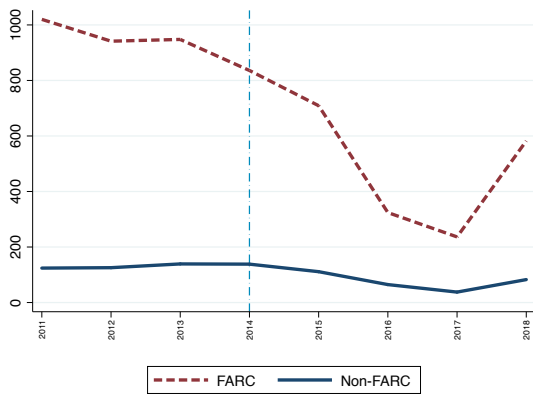
Figure 1: Evolution of conflict



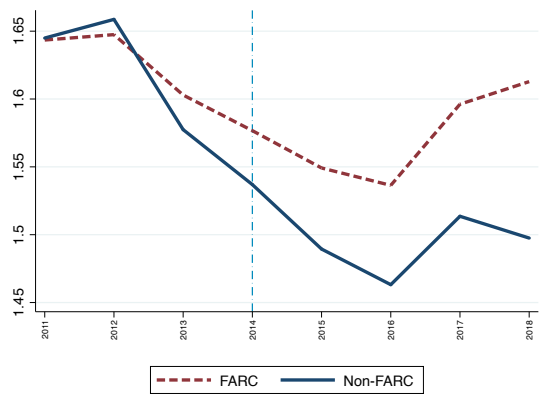
(a) Violent cases



(b) Mines victims



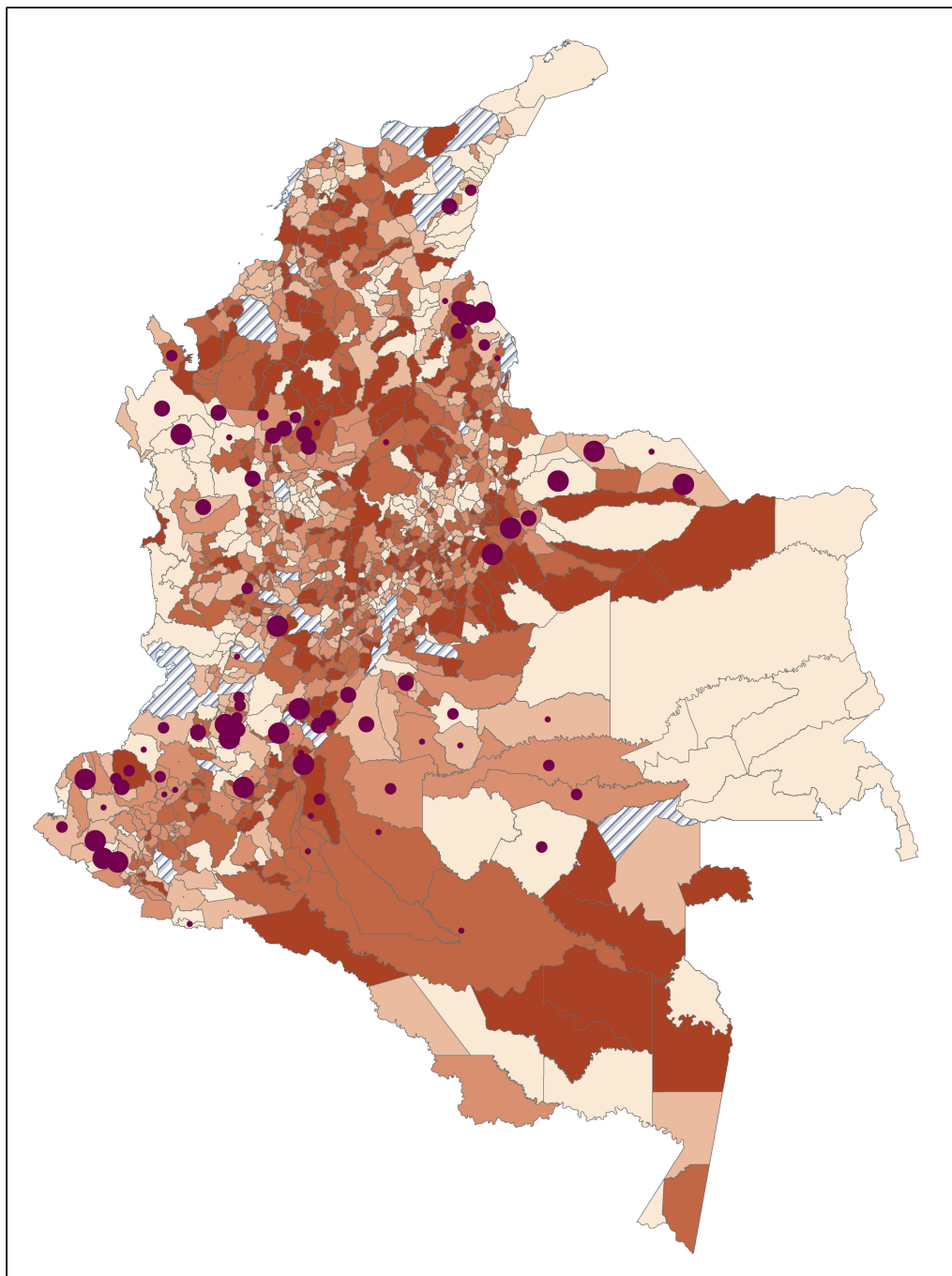
(c) Forced displacement



(d) TFR

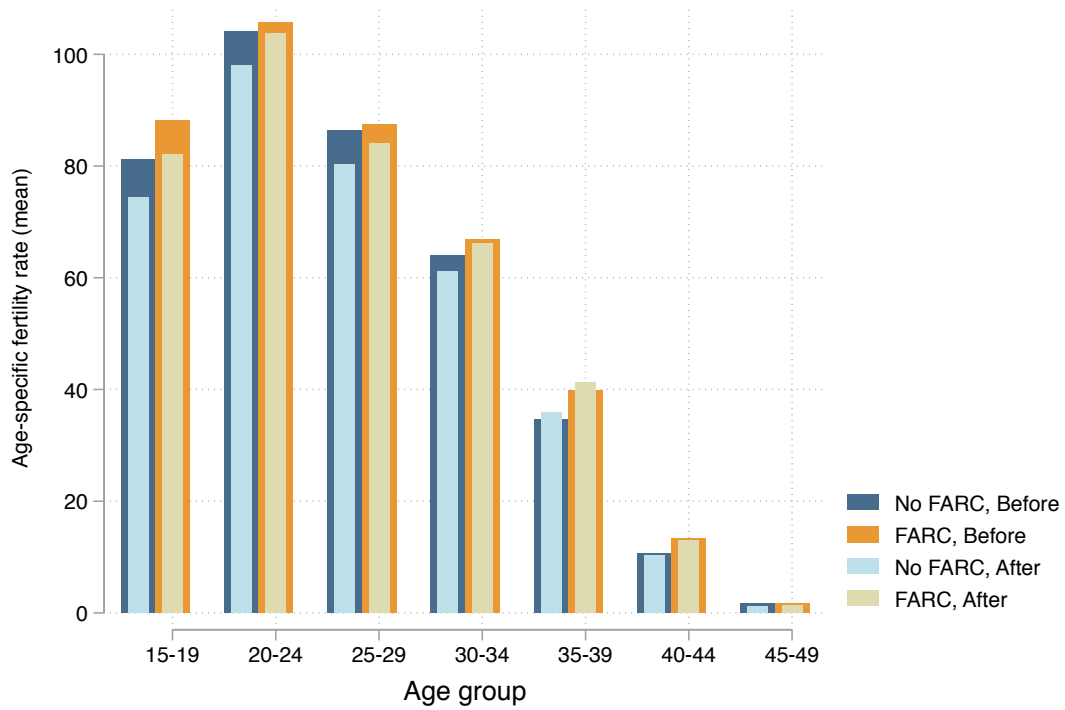
Notes: This figure presents the evolution of conflict for exposed and non-exposed municipalities to FARC attacks. Panel (a) presents the average number of violent cases in a municipality (including selective murders, attacks on populations, terrorists attacks, damage to property and civilians, forced disappearance, massacres, kidnappings, sexual violence and recruitment) as recorded by the Centro Nacional de Memoria Historica. Panel (b) presents the average number of victims from anti-personnel mines and unexploded ammunitions in a municipality, as recorded by the Office of the High Commissioner for Peace. Finally, Panel (c) presents the average number of victims expelled from a municipality due to forced displacement as estimated by CEDE, based on information provided by the Victim's register.

Figure 2: Change in total fertility rate and exposure to FARC violence



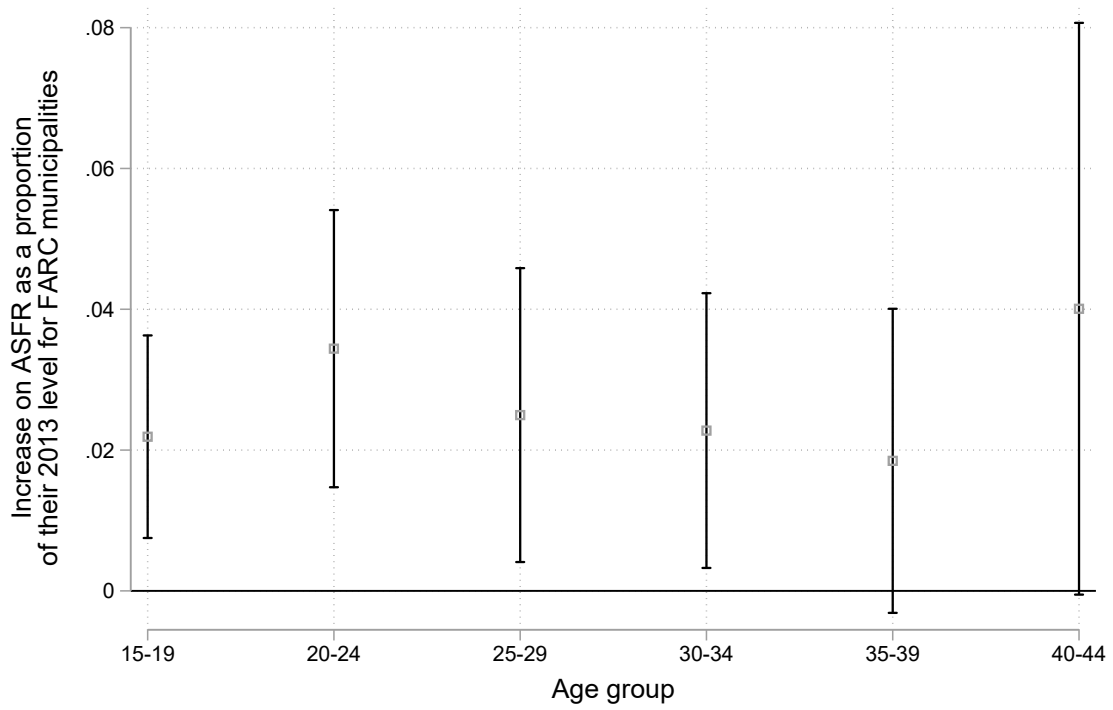
Notes: This map presents the spatial distribution of the change in total fertility rate between 2018-2015 and 2014-2011. The circles represent the spatial distribution of attacks per capita by FARC previous to the ceasefire. A bigger circle means a higher number of attacks per capita, while darker colour means a larger increase in total fertility rate after the ceasefire. The municipalities with diagonal lines are the ones with more than 200,000 inhabitants or without information, which are excluded.

Figure 3: Evolution of age-specific fertility rates



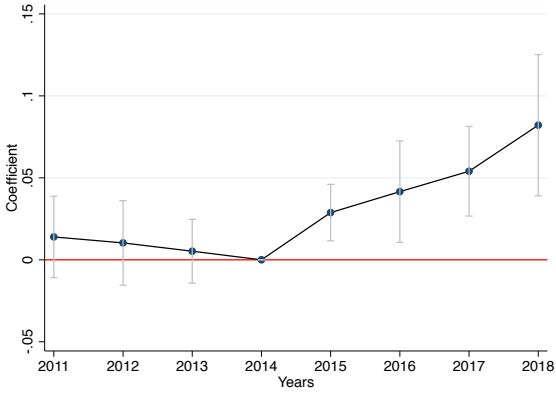
Notes: This figure presents the mean of age-specific fertility rates for municipalities exposed and non-exposed to FARC attacks in the period before (2011-2014) and after (2015-2018) the ceasefire, using the discrete treatment to measure FARC violence.

Figure 4: Effect by age-specific fertility rate

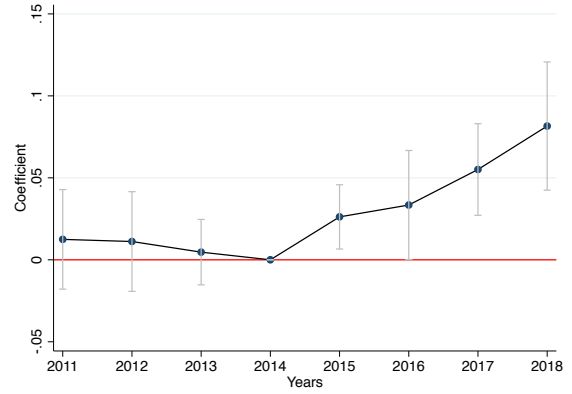


Notes: This figure presents the estimated increase on age-specific fertility rates as a proportion of their 2013 level for FARC municipalities.

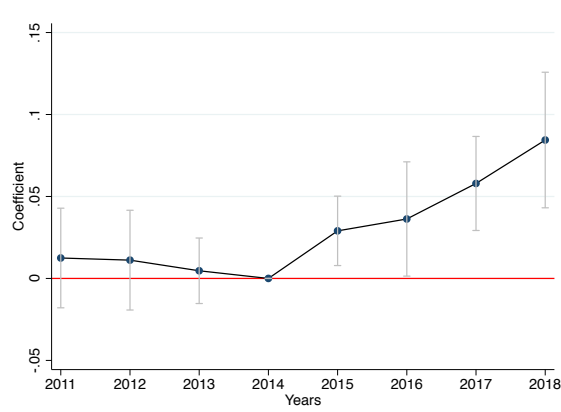
Figure 5: Dynamic difference-in-differences



(a) TFR including municipality and year fixed effects



(b) TFR including municipality, department-year fixed effects



(c) TFR including municipality, department-year fixed effects, and controls

Notes: This figures present the coefficients from our specification presented in equation (3). Panel (a) includes municipality and year fixed effects, Panel (b) includes department-year fixed effects, and Panel (c) includes municipality, department/year fixed effects, and controls. We present the point estimates of the regressions and the confidence of interval at 95%.

Table 1: **Summary Statistics**

	(1)	(2)	(3)	(4)	(5)	(6)
	Mean	Mean unweighted	Standard deviation	Median	Min	Max
Total fertility rate	1.90	1.61	0.59	1.83	0.00	8.06
ASFR for girls aged 15-19	82.27	67.46	26.18	80.70	0.00	208.33
ASFR for girls aged 20-24	104.26	84.36	34.04	100.11	0.00	275.00
ASFR for girls aged 25-29	86.55	71.78	30.41	81.75	0.00	379.31
ASFR for girls aged 30-34	64.45	55.43	23.37	61.48	0.00	450.00
ASFR for girls aged 35-39	35.40	30.80	14.65	33.33	0.00	200.00
ASFR for girls aged 40-44	10.95	10.29	6.44	9.80	0.00	100.00
ASFR for girls aged 45-49	1.77	1.02	2.54	1.04	0.00	71.43
Average of antenatal care visits	5.78	5.69	0.95	5.84	0.00	8.51
Births attended by health professional	98.08	97.26	5.58	99.59	0.00	100.00
Births attended by tradi- tional midwife	1.92	2.74	5.58	0.41	0.00	100.00
Percentage of low weight at birth (<2500 grs)	7.76	7.79	2.43	7.51	0.00	100.00
Neonatal mortality rate	7.61	7.54	5.76	6.99	0.00	136.36
Infant mortality rate	24.77	25.23	16.56	22.81	0.00	545.45
FARC attacks per 10,000 inhab	0.11	0.12	0.47	0.00	0.00	9.80
Victims of mines	7.18	4.88	10.93	3.00	1.00	52.00
Rural share	0.42	0.59	0.25	0.41	0.02	1.00
Straight line distance to capital	81.57	83.32	63.45	65.63	0.00	493.08
Percentage of population in poverty	64.97	70.35	19.39	68.77	14.27	100.00
Ln Population	59,949.32	21,434.20	52,581.85	38,498.00	298.00	217,343.00
Municipalities		1092				

Notes: This table presents summary statistics for the main variables of interest before 2014. All the columns present weighted (by the number of live births between 2011 to 2014 for each age group) versions of the summary statistics, except for Column 2. *FARC attacks* is a continuous measure of the total number of FARC attacks over 10,000 inhabitants from 2011 to 2014 in a municipality. *Rural share* is the percentage of the population outside the urban centre. *Distance to capital* is the linear distance to the state's capital. *Poverty index* is the proportion of people in poverty according to the multidimensional index.

Table 2: Municipality characteristics by exposure to FARC violence before the ceasefire

	(1)	(2)	(3)
	Avg without FARC presence	Exposure to FARC violence	
		Continuous	Discrete
Total fertility rate	1.88 (0.57)	0.01 (0.01)	0.11 (0.07)
ASFR for women aged 15-19	81.21 (26.19)	2.11*** (0.53)	6.95*** (1.90)
ASFR for women aged 20-24	104.05 (33.83)	-0.81 (0.79)	1.58 (3.51)
ASFR for women aged 25-29	86.41 (30.06)	-1.55** (0.62)	1.07 (3.75)
ASFR for women aged 30-34	64.09 (22.39)	-0.63 (0.43)	2.78 (3.38)
ASFR for women aged 35-39	34.70 (13.91)	0.76*** (0.29)	5.20*** (1.95)
ASFR for women aged 40-44	10.58 (6.32)	0.70*** (0.17)	2.77*** (0.64)
ASFR for women aged 45-49	1.77 (2.65)	0.03 (0.06)	-0.03 (0.14)
Average of antenatal care visits	5.85 (0.94)	-0.19*** (0.02)	-0.52*** (0.06)
Births attended by health professional	98.28 (5.71)	-0.81*** (0.12)	-1.42*** (0.30)
Births attended by traditional midwife	1.72 (5.71)	0.81*** (0.12)	1.42*** (0.30)
Percentage of low weight at birth (<2500 grs)	7.86 (2.51)	-0.24*** (0.04)	-0.71*** (0.13)
Neonatal mortality rate	7.42 (5.77)	0.33*** (0.12)	1.32*** (0.34)
Infant mortality rate	24.19 (16.57)	1.25*** (0.35)	4.14*** (0.92)
Victims of mines	1.02 (4.69)	6.91*** (1.71)	21.73*** (4.92)
Rural share	0.41 (0.25)	0.04*** (0.00)	0.07*** (0.02)
Straight line distance to capital	79.31 (62.74)	4.47*** (1.57)	16.23** (6.80)
Percentage of population in poverty	63.69 (19.89)	3.33*** (0.43)	9.19*** (1.23)
Ln population	10.52 (0.98)	-0.06*** (0.02)	0.28*** (0.08)

Notes: This table presents univariate regressions based on municipality characteristics before the ceasefire. Column 1 presents the average of each variable before the ceasefire for municipalities non-exposed to FARC violence. Column 2 and 3 present estimated coefficient and standard errors from univariate regressions for the continuous and discrete treatment.

Table 3: TFR and ceasefire

Dependent variable: Total fertility rate

	(1)	(2)	(3)	(4)	(5)	(6)
	Continuous measure			Discrete measure		
Cease \times FARC	0.04*** (0.01)	0.04*** (0.01)	0.04*** (0.01)	0.05 (0.04)	0.07** (0.03)	0.08* (0.04)
Observations	8,736	8,736	8,736	8,736	8,736	8,736
Municipalities	1,092	1,092	1,092	1,092	1,092	1,092
R-squared	0.899	0.919	0.921	0.898	0.919	0.921
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	No	Yes	No	No
Dept-Year FE	No	Yes	Yes	No	Yes	Yes
Controls	No	No	Yes	No	No	Yes
Municipalities	1092	1092	1092	1092	1092	1092
Mean Dep. Var.	1.551	1.551	1.551	1.551	1.551	1.551
Std. Dev. Dep. Var.	0.598	0.598	0.598	0.598	0.598	0.598

Notes: This table presents the results from the main specification in equation (2). All regressions are weighted by the number of live births between 2011 to 2014 for each age group. *Cease* is a dummy that takes the value for the period after 2014. *FARC* is a continuous measure of the total number of FARC attacks over 10,000 inhabitants from 2011 to 2014, and is standardized by the mean and standard deviation to ease interpretation. Columns 3 and 6 add predetermined municipal controls interacted with the ceasefire dummy. These controls include infant mortality rate, number of victims related to anti-personnel mines, share of rural population, distance to the department capital, poverty index and logarithm of the population in 2010. Clustered robust standard error at the municipality level is in parenthesis. * p is significant at the 10% level, ** p is significant at the 5% level, *** p is significant at the 1% level.

Table 4: Age-specific fertility rates and ceasefire

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	ASFR	ASFR	ASFR	ASFR	ASFR	ASFR	ASFR	ASFR	ASFR	ASFR	ASFR	ASFR	ASFR	ASFR
		15-19	20-24	25-29	30-34	35-39	40-44	45-49						
Cease × FARC	1.63*** (0.55)	1.32** (0.58)	2.83*** (0.83)	2.75*** (0.89)	1.70** (0.73)	2.22*** (0.77)	1.18** (0.51)	1.45*** (0.56)	0.57* (0.34)	0.92*** (0.35)	0.48* (0.25)	0.57** (0.26)	-0.04 (0.09)	-0.05 (0.09)
Observations	8,712	8,712	8,700	8,704	8,704	8,704	8,680	8,680	8,690	8,690	8,690	8,690	5,676	5,676
Municipalities	1,089	1,089	1,088	1,089	1,089	1,089	1,085	1,085	1,087	1,087	1,087	1,087	710	710
R-squared	0.864	0.866	0.885	0.887	0.858	0.862	0.826	0.828	0.761	0.765	0.628	0.631	0.400	0.410
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Dept-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Mean Dep. Var.	67.58	67.58	84.66	84.66	71.92	71.92	55.77	55.77	30.99	30.99	10.33	10.33	1.565	1.565
Std. Dev. Dep. Var.	28.19	28.19	34.69	34.69	32.25	32.25	26.75	26.75	16.82	16.82	8.540	8.540	3.004	3.004

Notes: This table presents the results from the main specification in equation (2). All regressions are weighted by the number of live births between 2011 to 2014 for each age group. *Cease* is a dummy that takes the value for the period after 2014. *FARC* is a continuous measure of the total number of FARC attacks over 10,000 inhabitants from 2011 to 2014, and is standardized by the mean and standard deviation to ease interpretation. The controls included in columns 2, 4, 6, 8, 10, 12, and 14 are: infant mortality rate, number of victims related to anti-personnel mines, share of rural population, distance to the department capital, poverty index and logarithm of the population in 2010. Clustered robust standard error at the municipality level is in parenthesis. **p* is significant at the 10% level, ***p* is significant at the 5% level, ****p* is significant at the 1% level.

Table 5: Ceasefire association with health care services

	(1)	(2)	(3)	(4)
	Antenatal care visits		Births attended by health professional	
Cease \times FARC	-0.01 (0.02)	0.03** (0.01)	-0.14 (0.18)	-0.17 (0.19)
Observations	8,736	8,736	7,628	7,628
R-squared	0.921	0.924	0.889	0.890
Municipality FE	Yes	Yes	Yes	Yes
Dept-Year FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes
Municipalities	1092	1092	1092	1092
Mean Dep. Var.	5.667	5.667	97.21	97.21
Std. Dev. Dep. Var.	1.138	1.138	7.733	7.733

Notes: This table presents the results from the main specification in equation (2). All regressions are weighted by the number of live births between 2011 to 2014. *Cease* is a dummy that takes the value for the period after 2014. *FARC* is a continuous measure of the total number of FARC attacks over 10,000 inhabitants from 2011 to 2014, and is standardized by the mean and standard deviation to ease interpretation. *Ante-natal care visits* is defined as the average of ante-natal care visits in the municipality per 100 live births in the municipality each year. *Births attended by health professional* is defined as the proportion of live births that were attended by a doctors, nurses, health promoters and nursing assistants. Columns 2, and 4 add predetermined municipal controls interacted with the ceasefire dummy. This controls include infant mortality rate, number of victims related to anti-personnel mines, share of rural population, distance to the department capital, poverty index and logarithm of the population in 2010. Clustered robust standard error at the municipality level is in parenthesis. * p is significant at the 10% level, ** p is significant at the 5% level, *** p is significant at the 1% level.

Table 6: Ceasefire association with newborn and infant health

	(1)	(2)	(3)	(4)	(5)	(6)
	Low birth weight		Neonatal mortality		Infant mortality	
Cease \times FARC	-0.07 (0.06)	-0.06 (0.07)	-0.19 (0.13)	-0.23* (0.14)v	-0.58* (0.31)	-0.63* (0.33)
Observations	8,736	8,736	8,736	8,736	8,736	8,736
Municipalities	1,092	1,092	1,092	1,092	1,092	1,092
R-squared	0.562	0.563	0.257	0.258	0.419	0.420
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	No	No	No	No
Dept-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes	No	Yes
Mean Dep. Var.	7.783	7.783	7.531	7.531	25.22	25.22
Std. Dev. Dep. Var.	4.257	4.257	10.46	10.46	29.49	29.49

Notes: This table presents the results from the main specification in equation (2). All regressions are weighted by the number of live births between 2011 to 2014. *Cease* is a dummy that takes the value for the period after 2014. *FARC* is a continuous measure of the total number of FARC attacks over 10,000 inhabitants from 2011 to 2014, and is standardized by the mean and standard deviation to ease interpretation. Columns 2, 4, and 6 add predetermined municipal controls interacted with the ceasefire dummy. This controls include number of victims related to anti-personnel mines, share of rural population, distance to the department capital, poverty index and logarithm of the population in 2010. Clustered robust standard error at the municipality level is in parenthesis. * p is significant at the 10% level, ** p is significant at the 5% level, *** p is significant at the 1% level.

Table 7: Heterogeneous effects by municipality characteristics

	<i>Dependent variable: Total fertility rate</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ETCR	OAG	Mines victims	Forced displacement	Coca suitability	Coca eradication	Triple interaction
Cease \times FARC \times Z	0.06 (0.05)	0.01 (0.01)	0.01** (0.00)	0.02*** (0.01)	-0.01 (0.01)	0.01 (0.01)	0.06*** (0.02)
Cease \times FARC	0.03*** (0.01)	0.04*** (0.01)	0.03** (0.01)	0.03* (0.01)	0.05*** (0.02)	0.04*** (0.01)	-0.01 (0.01)
Cease \times Z	-0.02 (0.05)	-0.01 (0.01)	-0.02*** (0.01)	-0.04*** (0.01)	-0.02 (0.01)	-0.03** (0.01)	0.00 (0.01)
Observations	8,736	8,736	8,736	8,736	8,736	8,736	8,736
Municipalities	1,092	1,092	1,092	1,092	1,092	1,092	1,092
R-squared	0.919	0.919	0.919	0.920	0.919	0.919	0.920
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	No	No	No	No	No
Dept-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	No	No	No	No	No	No
Mean Dep. Var.	1.604	1.604	1.604	1.604	1.604	1.553	1.604
Std. Dev. Dep. Var.	0.598	0.598	0.598	0.598	0.598	0.599	0.598

Notes: This table presents the results from our specification presented in equation 4. *Cease* is a dummy that takes the value for the period after 2014. *FARC* is a continuous measure of the total number of FARC attacks over 10,000 inhabitants from 2011 to 2014, and is standardized by the mean and standard deviation to ease interpretation. *ETCR* is a dummy that takes the value one for municipalities with Territorial Training and Reincorporation Spaces. *OAG* is a measure of exposure to other armed groups as in (Prem et al., 2019). *Mines victims* is a standardized measure of the number of victims related to mines. *Forced displacement* is the number of population expelled or received in a municipality due to forced displacement. *Coca suitability* includes the standardized index for coca suitability from Mejía and Restrepo, 2015. *Coca eradication* is a standardized measure of the total area air sprayed during 2011-2014 over the municipality area. *Triple interaction* is the interaction between the poverty index, the infant mortality and the victims related to anti-personnel mines. Robust standard errors are clustered at the municipality level and presented in parenthesis. Clustered robust standard error at the municipality level in parenthesis, * p is significant at the 10% level, ** p is significant at the 5% level, *** p is significant at the 1% level.

Appendix

Data appendix: Description of variables and sources.

Dependent variables.. The source for creating the fertility and health variables are the integrated system of the Ministry of Health and Social Protection (SISPRO) and Colombia's National Department of Statistics (DANE). The former system receives and processes data, in a single warehouse, from the institutions of the Social Protection sector: health, pensions, professional risks, and social promotion. The latter is in charge of planning, implementing and evaluating processes for the production and communication of statistical information at the national level, which support the understanding and solution of the country's social, economic and environmental problems, and serve as a basis for public and private decision-making.

The rates are computed per year at the municipal level based on the Public Health Surveillance Protocols, the guide that standardizes the criteria, procedures and activities to systematize the surveillance of events of interest in public health by the National Institute of Health (Colombia). It contains the formulas for calculating the indicators based on the criteria established by the World Health Organization.

The violence dataset was originally compiled by Restrepo, Vargas and Spagat (2004), and was updated through 2014 by Universidad del Rosario. This dataset codes violent events recorded in the Night and Fog reports from the NGO Center for Research and Popular Education (CINEP), which provides a detailed description of the violent event, its date of occurrence, the municipality in which it took place, the identity of the perpetrator, and the count of the victims involved in the incident.

Control variables. The data of the children conceived by former FARC combatants was provided by the Agency for Reincorporation and Standardization, which is in charge of the implementation of reintegration and reincorporation policies to promote the coexistence, culture of legality and reconciliation.

The information on municipal characteristics comes from an annual panel of Colombian municipalities, maintained and hosted by the Center For Economic Development Studies (CEDE from the Spanish acronym) a think-tank at Universidad de los Andes.

Table A.1: **Variables description and sources**

Variable	Description	Source
Variables: Total fertility rate and early childbearing		
Total fertility rate	Mean number of children a woman would have by age 50 if she survived to age 50 and were subject, throughout her life, to the age-specific fertility rates observed in each year. It is computed as the sum of age-specific fertility rates weighted by the number of years in each age group, divided by 1,000.	SISPRO and DANE
Age-specific fertility rate	Number of live births to women in the age-group per 1,000 population of women in the same age range in the municipality each year.	SISPRO and DANE
Children conceived by FARC ex-combatants	Total number of live births conceived by FARC ex-combatans.	Agency for Reincorporation and Standardization
Variables: Exposure to FARC violence		
FARC attacks per 10,000 inhabitants	Total number of FARC attacks per 10,000 inhabitants in the municipality, from 2011 to 2014, standardized by the mean and standard deviation from 2014. Attacks are defined according to Restrepo et al., 2003: a violent event in which there is no direct, armed combat between two groups.	Restrepo et al., 2003, updated until 2014 by Universidad del Rosario
Variables: Health care services		
Average of ante-natal care visits	Average of ante-natal care visits in the municipality	SISPRO and DANE
Births attended by health professional	Number of deliveries attended by doctors, nurses, health promoters and nursing assistants per 100 live births in the municipality each year.	SISPRO and DANE

Continued on next page

Variables description and sources, continued from previous page

Variable	Description	Source
Births attended by traditional midwives	Number of deliveries attended by traditional midwives or other people who are not health professionals per 100 live births in the municipality each year.	SISPRO and DANE
Variables: Neonatal and infant health		
Low birth weight	Percentage of live births with weight less than 2,500 grams in the municipality each year.	SISPRO
Neonatal mortality rate	Number of deaths of babies under 28 days per 1,000 live births in the municipality each year.	SISPRO and DANE
Infant mortality	Number of deaths of children under 1 year old per 1,000 live births in the municipality each year.	SISPRO and DANE
Variables: Control variables		
Rural share	Percentage of the population outside the urban centre in the municipality.	Estimates by CEDE, based on information provided by DANE
Straight line distance to capital	Straight line distance to the capital of the department in which the municipality is located.	Estimates by CEDE, based on Agustín Codazzi Geographic Institute
Percentage of population in poverty	Percentage of the population in poverty according to the multidimensional index.	Estimates by CEDE, based on information provided by DANE
Ln population	Demographic projections based on the results of the 2005 Census and the Census Reconciliation 1985 - 2005, as well as the analyzes on the behavior of the variables determining the demographic evolution.	DANE

Continued on next page

Variables description and sources, continued from previous page

Variable	Description	Source
Variables: Municipality characteristics		
ETCR	Dummy that takes the value one for municipalities with Territorial Training and Reincorporation Spaces, which are the places created to train the former FARC's rebels for their reincorporation into civil life.	Colombian Reintegration Agency
Other armed groups	Interaction of the total number of attacks, by armed groups except for FARC, in the municipality during the period 2011-2014, and a vector of (distance-penalized) neighboring municipalities.	Prem et al. 2019
Mines victims	Standardize measure of the number of victims related to anti-personnel mines.	Office of the High Commissioner for Peace - Decontaminate Colombia
Forced displacement	Population expelled in a municipality due to forced displacement.	Estimates by CEDE, based on information provided by the Victims' Registry
Coca suitability	Standardize index for coca suitability from Mejía and Restrepo, 2015.	Mejía and Restrepo, 2015
Coca eradication	Total area air sprayed during 2011-2014 over the the municipality area, standardized by the average and standard deviation.	Estimates by CEDE, based on information provided by the Department of Integral Action against Anti-Personnel Mines

Table A.2: TFR and ceasefire unweighted

Dependent variable: Total fertility rate

	(1)	(2)	(3)	(4)	(5)	(6)
	Continuous measure			Discrete measure		
Cease \times FARC	0.03*	0.03*	0.03*	0.07***	0.06**	0.07**
	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)
Observations	8,736	8,736	8,736	8,736	8,736	8,736
Municipalities	1,092	1,092	1,092	1,092	1,092	1,092
R-squared	0.858	0.876	0.877	0.858	0.875	0.876
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	No	Yes	No	No
Dept-Year FE	No	Yes	Yes	No	Yes	Yes
Controls	No	No	Yes	No	No	Yes
Mean Dep. Var.	1.551	1.551	1.551	1.551	1.551	1.551
Std. Dev. Dep. Var.	0.598	0.598	0.598	0.598	0.598	0.598

Notes: This table presents the results from the main specification in equation (2). *Cease* is a dummy that takes the value for the period after 2014. *FARC* is a continuous measure of the total number of FARC attacks over 10,000 inhabitants from 2011 to 2014, and is standardized by the mean and standard deviation to ease interpretation. Columns 3 and 6 add predetermined municipal controls interacted with the ceasefire dummy. These controls include infant mortality rate, number of victims related to anti-personnel mines, share of rural population, distance to the department capital, poverty index and logarithm of the population in 2010. Clustered robust standard error at the municipality level is in parenthesis, * p is significant at the 10% level, ** p is significant at the 5% level, *** p is significant at the 1% level.

Table A.3: Age-specific fertility rates and ceasefire unweighted

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	ASFR	ASFR	ASFR	ASFR	ASFR	ASFR	ASFR	ASFR	ASFR	ASFR	ASFR	ASFR	ASFR	ASFR
	15-19	15-19	20-24	20-24	25-29	25-29	30-34	30-34	35-39	35-39	40-44	40-44	45-49	45-49
Cease × FARC	0.81 (0.86)	0.77 (0.92)	1.20 (1.08)	1.30 (1.19)	1.24** (0.53)	1.39*** (0.54)	1.41 (0.87)	1.53* (0.94)	0.41 (0.38)	0.47 (0.42)	0.68*** (0.21)	0.73*** (0.22)	0.14 (0.09)	0.14 (0.09)
Observations	8,720	8,720	8,720	8,720	8,720	8,720	8,720	8,720	8,720	8,720	8,720	8,720	8,720	8,720
Municipalities	1,092	1,092	1,092	1,092	1,092	1,092	1,092	1,092	1,092	1,092	1,092	1,092	1,092	1,092
R-squared	0.778	0.779	0.801	0.802	0.733	0.735	0.667	0.668	0.571	0.572	0.414	0.415	0.273	0.274
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Dept-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Mean Dep. Var.	67.63	67.63	84.50	84.50	71.86	71.86	55.53	55.53	30.92	30.92	10.35	10.35	1.020	1.020
Std. Dev. Dep. Var.	28.15	28.15	34.85	34.85	32.31	32.31	26.94	26.94	16.87	16.87	9.011	9.011	2.537	2.537

Robust standard errors in parentheses

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

Notes: This table presents the results from the main specification in equation (2). *Cease* is a dummy that takes the value for the period after 2014. *FARC* is a continuous measure of the total number of FARC attacks over 10,000 inhabitants from 2011 to 2014, and is standardized by the mean and standard deviation to ease interpretation. Columns 2, 4, 6, 8, 10, 12, 14 add predetermined municipal controls interacted with the ceasefire dummy. This controls include infant mortality rate, number of victims related to anti-personnel mines, share of rural population, distance to the department capital, poverty index and logarithm of the population in 2010. Clustered robust standard error at the municipality level is in parenthesis, *p is significant at the 10% level, **p is significant at the 5% level, ***p is significant at the 1% level.

Table A.4: Placebo effect on total fertility rate

	(1)	(2)	(3)
	Total Fertility Rate		
Cease \times FARC	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)
Observations	4,368	4,368	4,368
Municipalities	1,092	1,092	1,092
R-squared	0.937	0.946	0.946
Municipality FE	Yes	Yes	Yes
Year FE	Yes	No	No
Dept-Year FE	No	Yes	Yes
Controls	No	No	Yes
Mean Dep. Var.	1.606	1.606	1.606
Std. Dev. Dep. Var.	0.596	0.596	0.596

Notes: This table presents the results from the main specification in equation (2) but for the pre-ceasefire period, and uses as post period the sign of the first agreement between FARC and the government during the peace negotiation in Havana. All regressions are weighted by the number of live births between 2011 to 2014 for each age group. *Placebo Cease* is a dummy that takes the value one for the period after 2013. *FARC* is a continuous measure of the total number of FARC attacks over 10,000 inhabitants from 2011 to 2014, and is standardized by the mean and standard deviation to ease interpretation. Column 3 add predetermined municipal controls interacted with the ceasefire dummy. This controls include infant mortality rate, number of victims related to anti-personnel mines, share of rural population, distance to the department capital, poverty index and logarithm of the population in 2010. Clustered robust standard error at the municipality level is in parenthesis. * p is significant at the 10% level, ** p is significant at the 5% level, *** p is significant at the 1% level.