

The impact of a rise in expected income on child labor: Evidence from coca production in Colombia*

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Abstract

Can households' beliefs about future income shocks affect child labor? This paper examines whether the three-year gap between the announcement (in 2014) and the start (in 2017) of the Illicit Crop Substitution Program (ICSP) increased child labor in Colombia. The ICSP is an antidrug strategy that provides farmers with financial support for not planting and harvesting coca leaves – the key input of cocaine. My results from a difference-in-differences model using differences in historical coca production show that due to the ICSP announcement, children became four percentage points more likely to work in municipalities with historical coca production than in non-coca-growing areas. Although the number of working hours increased in coca-growing areas, the hours worked per child declined modestly after the ICSP announcement. Finally, the evidence shows no effect of the announcement on education outcomes.

JEL codes: J13, J22, K42, O13

Key words: Child labor, Coca cultivation, Anticipated effects, Policy announcements

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1 INTRODUCTION

In middle-income countries, one in four children who live in rural areas works ([UNICEF 2019](#)). Previous evidence shows that transitory or permanent income shocks increase child labor ([Beegle et al. 2006](#), [Kruger 2007](#), [Bandara et al. 2015](#), [Bai & Wang 2020](#)). However, can households' beliefs about future income affect child labor? This paper addresses this question by exploiting the increase in *expected* earnings from coca cultivation caused by the announcement of the Illicit Crop Substitution Program (ICSP) in Colombian rural areas.¹ The ICSP provides cash transfers to farmers conditional on reducing the production of illicit crops such as coca bushes, the key input in cocaine production ([UNODC 2020](#)).²

Although the Colombian government announced the ICSP in 2014, for administrative and political reasons, the policy was implemented in 2017.³ The three-year gap between the announcement and the implementation created a surge in coca production since farmers strategically harvested coca leaves to increase baseline so that once the program started, they would receive more money from the government for substituting coca bushes for legal crops ([Mejia et al. 2021](#)).⁴ The ICSP reduced coca production after its implementation, but the decline in coca cultivation did not compensate for the massive increase after the announcement ([Ladino et al. 2021](#)). The ICSP had a slow rollout since only 54 municipalities that concentrated 65% of the national coca cultivation had received aid from the program by 2021 ([UNODC 2022](#)).

In this paper, I test the hypothesis of whether an increase in expected income from the ICSP announcement changes the households' incentives to send children to the labor

¹ICSP in English or *Programa Nacional Integral de Sustitución de Cultivos Ilícitos* (PNIS) in Spanish.

²After 2017, the ICSP prioritized places with FARC-EP presence and large coca areas. Governmental officials negotiate the time for coca eradication with local social leaders. A farmer receives up to USD 7,200 in cash, in-kind assistance, and technical help for two years, conditional on eradicating coca cultivation in 60 days after joining the ICSP ([Gobierno de Colombia 2017](#), [Ladino et al. 2021](#)).

³The administration of former president Juan Manuel Santos (2010–2018) announced the ICPS during the peace negotiation with the FARC-EP (*Fuerzas Armadas Revolucionarias de Colombia*) in 2014. However, the program started one year after the signing of the final peace agreement in 2017 ([UNODC 2019b](#)).

⁴The Colombian government accepted farmers to the ICSP program using coca cultivation as the baseline in late 2016, and early 2017 ([Gobierno de Colombia 2017](#)).

market. My hypothesis does not imply that children must only have worked picking coca leaves. Families could either use more hands to pick up more coca leaves or employ child labor to replace adult labor in other areas of the farm. Adults, for example, could produce coca paste (the intermediate ingredient between coca leaves and cocaine), while children could carry out other rural activities (e.g., feeding animals, trading products, etc.). The trade-off between the time children spend out or in the labor market depends on the expectations over future payments to substitute illicit for legal crops. By 2014, farmers only knew the benefits of producing a kilogram of coca paste but not how much the government would pay for the substitution. My hypothesis focuses on child labor since the literature has shown that working at an early age negatively affects long-run outcomes (e.g., [Bau et al. \(2020\)](#)). However, like child labor, adults decide how much time to allocate to coca growing depending on their beliefs about future income.

To address how the increase in expected earnings created by the three-year gap could impact child labor, I combine household surveys (GEIH for their name in Spanish) with information on coca production at the municipality level between 2009 and 2019. The data provides detailed information on children, parents, and other members of the household.⁵ My empirical strategy consists of a difference-in-differences model exploiting time and cross-sectional variation. The time variation comes from the ICPS announcement in 2014. The cross-sectional variation corresponds to children's residence in areas with and without coca in 1994, the first year in which Colombian municipalities grew coca leaves for the drug industry. In the early 1990s, the harvest of Colombian coca leaves was negligible and not controlled by drug cartels. However, US-led antidrug operations shifted coca cultivation from Bolivia and Peru – the top producers at the time – to Colombia in 1995 ([Zirnite 1998](#)).

My results show that children were nearly four percentage points more likely to work after the ICSP announcement in municipalities with historical coca production than in those without coca cultivation.⁶ This result is in line with the hypothesis that the three-year

⁵Departments are Colombian administrative units similar to states in the US, and municipalities are comparable to counties.

⁶My research design does not feature variation in the treatment time. The time variation is before

gap not only increased coca cultivation but also incentivized child labor. Several tests show that my results are robust. First, my findings hold when I measure coca prevalence at different exogenous time variations. Second, the results do not change after I control for spatial correlation in the error term and use machine learning techniques to select the controls in the model from a large set of individual, household, and municipality characteristics. Third, I find no significant results when I shift the treatment timing in a placebo test (as expected).

As for mechanisms, I test whether child labor depends on the number of children at home, the suitability of land for coca production, or the size of central government transfers. I find that when I compare areas with and without historical coca production post-ICSP, children in households with three or more children were more likely to work than those in homes with one or two. Furthermore, children were more likely to work in places where producing coca is easier given environmental conditions than in areas with low coca suitability. Finally, children were less likely to join the labor force in municipalities receiving central government transfers before the ICSP announcement than in places with less financial aid from the government.

An analysis of heterogeneity by gender and age also reveals differences in the effects of the ICSP announcement on child labor. The impact on boys was larger than that on girls, and older children (16–17 years old) were more likely to work than younger ones (10–15 years old).

Beyond the employment decision (extensive margin), I study children’s weekly number of working hours (intensive margin). Although there was an increase in the probability of working after the ICSP announcement, the working time modestly declined by 2.8 hours per week when I compare municipalities with and without historical coca production. My interpretation is that post-ICSP, total aggregate hours increased but that, given that

and after 2014). My study does not use an intensity treatment. My individual variation is binary (whether a child lives in a municipality with historical coca production). Thus, the possible bias in the difference-in-differences model from different treatment timings as highlighted by Sun & Abraham (2020), Imai & Kim (2020), Goodman-Bacon (2021), Callaway & Sant’Anna (2021) does not arise in my analysis.

more children joined the labor market, the hours per capita declined. The time when the ICSP would start was uncertain by 2014, as well as the financial support amount, the type of transfer (cash or in-kind assistance), and the program duration. To minimize the risk, families did not drastically modify household time allocation. Instead of using a child for three hours a day working in the field, they prefer to use three children for one hour each.

My findings regarding education outcomes reconcile the results from the extensive and intensive margins. After the ICSP announcement, comparing coca and noncoca areas, I find no significant effects on school attendance, on a standard over-age indicator that measures late entry and failure rates, or on educational attainment. These results align with the hypothesis that households use the time between the ICSP announcement and the implementation to increase the baseline coca production expecting to receive more government financial support. But families maximize children's time allocation considering the need for more information about the ICSP implementation. Instead of harming children's human capital accumulation, families allocate children's extra time to collect coca leaves or do other chores on farms. Overall, the results show that children were more likely to work post-2013, but on average, those who worked did not need to spend more time in the field, creating no harm to education outcomes.

The increase in the likelihood of working but not effect on educational outcomes does not mean that the ICSP announcement did not impact Colombian households. Beyond the ethical reasons that policy announcements should not incentives child labor since making children work can be inefficient in the long run (see [Baland & Robinson \(2000\)](#)), working in coca fields might be the first stone to a criminal path. [Sviatschi \(2022\)](#) shows that children who worked in illicit coca farming are 30% more likely to be incarcerated for violent and drug-related crimes as adults. Analyzing how the ICSP announcement affects child labor is also important from a policy design view. Coordination in promoting and implementing a program is essential to reduce the unintended negative effect and boost the program's objectives in developing countries (see [Cabral et al. \(2021\)](#) for another example of the negative impact of leaders' speeches on decision-making).

Many papers exploit exogenous shocks to understand how past income variations affect child labor in the present (e.g., Beegle et al. (2009), Colmer (2021)), but less is known about the effect of policy announcements about the future on current labor outcomes. My research expands the literature by exploring a new channel affecting child labor: changes in *expected* earnings. Families reallocate time in the present to maximize potential future returns. Indeed, my paper relates to that of Edmonds (2006), who shows that child labor declined when South African families were notified that they would receive income from a social pension.

This article also contributes to the study of the unintended effects of conditional cash transfer programs (CCTs) on child development. As a CCT, the ICSP directly provides farmers with financial support conditional on their reducing coca production. Most of the work in this area has focused on studying the direct effects of CCTs on labor outcomes (see De Janvry et al. (2006), Del Carpio et al. (2016), Cahyadi et al. (2020)) and human capital accumulation (see Baird et al. (2011), Glewwe & Kassouf (2012)). Some other studies have shown the negative externalities that CCTs can have on health, education, and welfare (see Nandi & Laxminarayan (2016), Masi (2018), Filmer et al. (2018), respectively). My contribution to this literature is to study unintended effects arising before the actual program is rolled out. In this regard, I study the effect of changes in expected earnings on child labor instead of the program's direct consequences for child development.

The closest research to my paper is the work by Angrist & Kugler (2008), who show that self-employment earnings and teenage boys' labor supply increased in Colombian coca-growing areas during the late 1990s. The main difference between their research and my analysis is the source of exogenous variation. Whereas these authors utilized the international price of cocaine, I use the increase in the expected earnings from harvesting coca leaves after the ICSP implementation.⁷ I also analyze different mechanisms to understand how expected earnings from harvesting coca leaves could affect child labor. Other related studies in the Peruvian context find that a rise in coca prices led to an

⁷Another difference is that Angrist & Kugler (2008) built regions by combining departments while I analyze data at the municipality level, an administrative unit smaller than departments. This disaggregation of the data allows me to compare individuals living in more similar places.

eight percentage point increase in child labor in coca-growing areas (Sviatschi 2022). By contrast, Dammert (2008) finds that a decline in coca production from Peru increased child labor in coca-growing states.

The remainder of the article is organized as follows: Section 2 describes the institutional framework. Section 3 describes the data. Section 4 shows the difference-in-differences strategy and the event study model. Section 5 shows the main results and robustness tests. Section 6 presents the potential mechanism behind the increase in child labor. Section 7 presents the analysis of additional outcomes. Finally, section 8 highlights the implications of the findings for policymakers.

2 INSTITUTIONAL FRAMEWORK

This section describes the cross-sectional and time variation leveraged in my empirical strategy. The main variation at the individual level refers to whether a child lived in a municipality with coca production in 1994. The variation in the time dimension is dichotomous, referring to the periods before and after the ICSP announcement. The Colombian government and the FARC-EP guerilla group announced the creation of the ICSP in 2014. This announcement took place during the peace negotiation process between the Colombian government and the FARC's members. Illegal crops such as coca were on the negotiation agenda since cocaine trafficking is the principal financing source for the FARC-EP and other criminal groups (Felbab-Brown 2005).

2.1 COCA PRODUCTION AND CHILD LABOR

Since the 1990s, the valleys and upper jungles of the Andean region in Bolivia, Colombia, and Peru have accounted for more than 98% of the global area planted with coca leaves (UNODC 2006). Cocaine production starts with the collecting and drying of coca leaves from plants 1.5 to 2 meters tall to convert them into coca base through relatively simple chemical process that takes a few days (UNODC 2010). About 125 kilograms of coca leaves create one kilogram of coca base, the final product of coca growers, but not the

final step in the production chain. Drug cartels buy coca base and refine it into cocaine in more sophisticated laboratories ([UNODC 2010](#)).

Farmers grow coca for several reasons. Coca bushes are more resistant than other crops to poor-quality terrain and weather conditions and better suited to locations with unsophisticated infrastructure. Farmers can collect coca leaves six months after planting the bushes, and coca growers can obtain three to six harvests per year ([Dion & Russler 2008](#)).⁸ Coca growers live on plots of approximately 1.3 to 1.8 hectares, where at least one hectare is dedicated to coca leaves. On average, coca-growing families have five people, and more than two-thirds of their income comes from the production of coca base ([UNODC 2020](#)).

Remote rural areas in Colombia have higher levels of child labor and more farmers harvesting coca leaves than nonrural areas (see [Edmonds \(2007\)](#), [Ibanez & Carlsson \(2010\)](#), respectively). Contrary to popular perceptions in high-income countries, most working children are employed by their parents rather than in businesses ([Edmonds & Pavcnik 2005](#), [Dion & Russler 2008](#)).

2.2 THE DRUG WAR IN COLOMBIA

Cultivation of coca leaves in Colombia was minimal until 1994. In the late 1980s and early 1990s, Colombia converted coca leaves from Bolivia and Peru into cocaine and exported this drug to the US and Europe ([Mejia 2016](#)). The US government sought to reduce the cocaine supply by blocking air transport of coca leaves from Bolivia and Peru to Colombia. However, import restrictions on coca leaves incentivized the harvest of coca in Colombian territory ([Roncken et al. 1999](#)). As a result of the blockage of coca production in Bolivia and Peru, Colombia became the top producer of coca leaves in 1998 ([UNODC 2006](#)).⁹

Due to this increase in coca production, Colombia and the US government launched *Plan*

⁸In 2018, the internal price in Colombia for coca leaves was \$0.76 per kg ([UNODC 2019a](#)), while for coffee beans, Colombia's most exported legal crop, it was \$1.96 per kg ([FNCC 2018](#)). However, the average cocaine price in the streets from the US is \$84 per gram ([UNODC 2010](#)).

⁹Figure A-1 summarizes the changes in annual coca cultivation in Bolivia, Colombia, and Peru between 1990 to 2019.

Colombia in 2000 (Mejia 2016). This antidrug program consists of manual eradication campaigns, aerial spraying of herbicides, the launch of alternative development projects, and other strategies to reduce the cultivation of illegal drugs (Mejia & Restrepo 2016). In particular, the ICSP is among the development projects aiming to reduce coca production by providing financial support to coca growers who switch to cultivation of legal crops.¹⁰ Since the beginning of the program, the US has provided Colombia with more than \$10 billion (U.S. Government 2021).¹¹

2.3 ICSP ANNOUNCEMENT

Between 2012 and 2016, the Colombian government negotiated with the left-wing guerrilla group FARC-EP to end an internal civil war that had lasted more than 50 years. The negotiation took place in Cuba, a neutral location that allowed tight control of the information shared to the public. In 2014, the parties to the negotiation announced the creation of the ICSP in a media conference. The announcement stated that the government would provide financial assistance to coca growers who substituted to other crops and did grow coca leaves again (Colombian government and FARC-EP 2016).¹² Qualitative and empirical evidence shows that the ICSP announcement was unexpected for communities in rural areas (see Garzón et al. (2019), Mejia et al. (2021), respectively).

Mejia et al. (2021) present compelling evidence that – contrary to the aim of reducing coca production – the ICSP announcement caused a massive increase in Colombian coca production. Farmers increased their coca cultivation expecting to receive more financial support once the ICSP was implemented by the government. Mejia et al. (2021) also show that neither the concomitant increase in coca prices and decline in cocaine supply from Bolivia and Peru nor other announcements related to the peace negotiation seem to be behind the extensive expansion in the Colombian coca cultivation area after 2014.

¹⁰The ICSP is not the first alternative livelihood program seeking to encourage harvesting of legal crops instead of coca (others include, e.g., the Macarena Integral Consolidation Plan (Mejía et al. 2011) and Forest-Guard Families program (Nilsson & Marín 2021)). The alternative programs for coca substitution are complemented by forced eradication (Moreno-Sánchez et al. 2003, Reyes 2014, Mejía et al. 2017).

¹¹In 2020, the US spent \$448 million in aid to Colombia, \$30 million more than in 2019 (Norman 2019).

¹²See section A.1 in the online appendix for the complete press release announcing the ICSP. Figure A-4 summarizes the timeline of the ICSP announcement and implementation.

The first communities in the ICSP joined the program in late 2017 and early 2018 (Ortega Hernández et al. 2022). The program prioritized municipalities with FARC-EP presence, highly dense areas with many coca hectares, and national parks. After signing an agreement, a farmer receives about USD 400 (close to twice Colombian minimum wages) conditional on eradicating coca cultivation in the following 60 days and five additional transfers for the same value every two months. Farmers in the ICSP also receive in-kind transfers of approximately USD 4,160 for alternative development agriculture projects and USD 640 for technical assistance in alternative crops. Both values receive once during the time in the ICSP. Only one person per family can join the program, and she must be a resident-owned land of the community (Ladino et al. 2021).¹³

3 DATA DESCRIPTION AND SUMMARY STATISTICS

This section describes the three principal databases used in my analysis. First, I calculate child labor from the Great Integrated Household Survey (GEIH, its acronym in Spanish), collected by the Colombian Statistics Bureau (DANE, its acronym in Spanish). This database also provides household characteristics and individual controls. Second, I use the number of hectares of coca production, collected by the United Nations Office on Drugs and Crime (UNODC). Third, I control for the geographic conditions of municipalities, transfers from the central government, and conflict exposure. These data come from the Center for the Study of Economic Development (CEDE, its acronym in Spanish) from Universidad de los Andes (Acevedo et al. 2014).

3.1 HOUSEHOLD SURVEY

The GEIH is a nationally representative cross-sectional survey containing demographic and labor information for individuals and households. The sampling covers the 24 department capital cities and their metropolitan areas, other urban areas, rural areas, populated centers, and dispersed rural areas. The final sampling unit is an area that contains an

¹³Once the government signs an agreement to participate in the ICSP with a local community, the government tries to guarantee the community's security conditions, and social leaders participate in the design and implementation of the program (Machuca 2021).

average of ten houses, where DANE interviews everybody in the area.

My definition of the incidence of child labor is the children between 10 and 17 years old who report using most of their time during the last week working. The principal question to measure child labor in the GEIH survey is “What activity did you spend most of your time on last week?” Option A is working.¹⁴ Although individuals are legally adults from age 18 years in Colombia, the legal minimum working age is 15 years. Adolescents between the ages of 15 and 17 can legally work if they have a permit issued by the Ministry of Labor and they receive social benefits and labor protections ([Otero-Cortés 2019](#)).

My concept of child labor differs from the International Labour Organization’s (ILO’s) definition. According to the ILO, child labor does not simply refer to any work done by children. Rather, the type of work must limit the child’s development or put the child at risk ([Noguchi 2002](#)). However, I cannot appropriately disentangle dangerous jobs for children from safe employment. My definition is broader because it eliminates the separation between harmful and benign. Child labor in my research includes any children who work at least one hour during the last week (similar to the literature in child labor such as [Dammert \(2008\)](#), [Beegle et al. \(2006\)](#), [Edmonds \(2006\)](#)).

Figure 1 shows the raw data for children working in urban and rural areas. On average, child labor in rural areas is nine percentage points greater than the rate in urban areas. Between 2009 and 2019, child labor fell by four percentage points in rural areas (from 17% to 14%) and urban areas (from 9% to 5%). The reduction in child labor corresponds to a decline in children reporting that they help with household expenses, pay for education, or are part of a family business ([DANE 2021](#)).

3.2 COCA CULTIVATION

Coca crops are a satellite-based measure estimated annually since 1999 by the Integrated Monitoring System of Illicit Crops (SMICI, its acronym in Spanish) of the UNODC. First, SIMCI uses satellite images to georeference areas with coca production. Second, high-

¹⁴The online appendix [A.2](#) explains in detail the construction of the child labor variable.

definition pictures from helicopter flights validate whether the areas previously classified as having coca by the satellite images have coca bushes. The estimation of coca crops represents the harvest up to December 31st of each year ([UNODC 2007](#)). For 2018, for example, 70% of the satellite images correspond to the period between mid-November of 2018 and late February of 2019. Among the remaining 30% of the satellite data, half of the images are from March and April and the other half from August and November ([UNODC 2007](#)).¹⁵

Figure 2 shows an increase in coca cultivation between 2013 and 2017 from 48,189 to 171,495 hectares. The latter figure corresponds to the largest coca harvesting area observed during the last two decades. For reference, the area with coca cultivation in 2017 was more than double the area of Chicago (60,660 hectares), a city of 2.6 million people. Figure A-2 Panel B shows the spacial distribution of the average coca production from 2009 to 2019.

The 1994 coca cultivation data come from the National Narcotics Directorate (DNE, its acronym in Spanish). This public entity oversaw the administration of drug dealers' assets captured by the Colombian government. Figure 2 shows the number of municipalities with coca cultivation. Between 1994 and 2009, the number of municipalities with coca production increased from 59 to 207. By 2019, the coca cultivation area was concentrated in 176 municipalities.

3.3 EDUCATION OUTCOMES

The GEIH contains self-reported schooling information for children and adults. Following the literature (e.g., [Dammert \(2008\)](#)), I use the school attendance rate, schooling years, and two measures of education lag to estimate the effect of the ICSP announcement on human capital accumulation. The most typical outcomes are a dummy variable equal to one for children who attend school and the number of schooling years.

The rise in expected earnings could incentives getting behind in the schooling years to

¹⁵See [Mejia et al. \(2021\)](#) and [Abadie et al. \(2014\)](#) for more details about how UNDOC measures coca production annually.

spend time working. However, measuring educational lags is not trivial since the number of “correct” years depends on the age and the educational system of each country.¹⁶ The Colombian education system consists of five years of primary school and six years of secondary education. A ten-year-old and a seventeen-year-old teenager should have a minimum of three and nine years of schooling, respectively (Arango & Rodríguez 2016). I create a variable equal to one when children do not meet the minimum years of education according to their age and the Colombian education system.¹⁷

The second educational lag variable is a standard over-age indicator that measures late entry and high failure rates. The variable is one when the ratio between years of education and age minus six is smaller than one. This variable, used by the literature, is comparable between countries with different education systems (e.g., Patrinos & Psacharopoulos (1997)).¹⁸

3.4 OTHER DATA

In the estimations, I include a set of predetermined municipal characteristics such as altitude, land erosion, rainfall index, municipality area, distance to the capital, and the logarithm of government expenditure. These data come from CEDE, which collects the information from different sources such as DANE and governmental agencies (Acevedo et al. 2014). I also control for the average suitability of the land for growing coca at the municipality level, as calculated by Mejia & Restrepo (2015).

The ICSP is not the first policy aiming to reduce coca production. I control for municipalities affected by manual eradication, aerial spraying, and the Forest-Guard Families program (*Familias Guardabosques*), the ICSP’s predecessor (Nilsson & Marín 2021).¹⁹

¹⁶Two children with same years of education but one year difference in age do not translate in one of the children being behind the education year for his or her age. For example, an eleven-year-old child with five years of education could or not be one year lag compared with a ten-year-old with the same time in school. The second child could start primary school earlier for a household decision.

¹⁷The variable is equal to one when a 10 years old child has less of three years of education, 11 years old less than four, 12 years old less than five, etc.

¹⁸(1) I build the age-grade distortion as $SAGE = \left[\frac{\text{years of education}}{\text{age} - 6} \right] \times 100$. $SAGE$ equals 100 for children aged 6 and currently attending school. (2) I set the over-age indicator to one if $SAGE < 100$ and 0 otherwise.

¹⁹The Forest-Guard Families program started in 2006. The public policy promoted the eradication of illicit crops by giving cash payments to families that recovered and protected fragile ecosystems (Cárdenas

3.5 FINAL SAMPLE

After I combine the household surveys and municipality-level annual coca cultivation data, the sample consists of about 20,669 households interviewed monthly in 437 out of 1103 municipalities in rural areas from 2009 to 2019. The regions in the final data are more urban, have fewer hectares, and lower multidimensional index poverty than areas not included in the GEIH. On average, GEIH municipalities have a rural index of 49%, an area of 799 square kilometers, and a poverty index of 66.47. Non-GEIH areas report a rural index of 59%, an area of 1,157 square kilometers, and a poverty index of 71.40. Figure A-2 Panel A presents the spatial distribution of the municipalities in the sample.

The proportions of municipalities with coca production at the national level and in the GEIH sample are similar. Between 2009 and 2019, about 197 out of 1,103 (18%) municipalities produced coca in Colombia, while 82 out of 421 (19%) areas cultivated coca in the GEIH sample. Figure A-3 Panel A shows the same production trends between national coca cultivation and production in GEIH locations. Panel B shows that the municipality area coverage with coca harvesting is not statistically different between the sample with all coca-producing municipalities and the places in the GEIH sample.

The final sample represents about 9 million people in 3 million households in Colombian rural communities (approximately 20% of the Colombian population). The child labor rate is 18%, the average weekly working time for children is 25 hours per week, and the median is 21 hours (see Table A-3 in the online appendix). On average, children work 25 hour per week (median of 21). About 72% of children work in agriculture, 12% in local commerce, and 7% in manufacturing. For occupations, 69% of the children report that they are farmers, ranchers, agricultural workers in general, or agricultural laborers.²⁰ The working children also report field or rural areas (72%), followed by households (14%), as the principal place where they work.

On average, the children are 13 years old, 92% have access to the health system, and

2016).

²⁰The economic activity variable contains ten sectors from the Classification of All Economic Activities (Division 2008). The occupation variable has 82 categories from the Standard Occupational Classification System (Elias et al. 2010).

82% live with their parents. The typical household head is male, not single, and has four years of education (primary school). On average, the households have five individuals, 36% have children younger than five, and 12% have adults older than 65. The average number of children per household is two. Household income per capita is approximately \$50.²¹

As in the literature, I find that child labor increases with age in Colombia. On average, 13% of children who are 10 to 15 years old work, while 33% of the oldest children (16 to 17 years old) report spending most of their time working during the last month.

The household survey data have information on other activities. I focus on the question “In addition to the activities that you informed me of having performed last week, which of the following unpaid tasks did you do?” On average, 78% of children report carrying out household chores last week, and 12% of the children report taking care of children. Only 15% of children working also report carrying out household chores. Indeed, the correlation between engaging in child labor and doing household chores is negative (-0.11).

For the educational outcomes, most students attend school (98%). According to the Colombian education system, the academic lag is 47% when using the age and schooling difference. The over-age index, a comparable measure across countries, says that 69% of Colombian students do not have regular progress (in terms of schooling years) relative to their current age. On average, the highest level attained is six years of education, which is analogous to the first year of mid-school in the US category (see Table ?? on the online appendix).

4 EMPIRICAL STRATEGY

The primary obstacle to identifying the impact of the ICSP announcement on the labor market is that coca production locations are not randomly distributed in rural Colombia.

²¹In the online appendix, Figure A-5 presents the distribution of the income per capita in Panel A, the household size in Panel B, and the distribution of children per household in Panel C.

Coca production may be more likely to arise in disadvantaged areas where poverty is high and state presence is extremely low. Thus, a comparison of children living in municipalities with and without coca cultivation could be confounded by correlated municipality characteristics.

My identification strategy exploits the timing of the ICSP announcement and cross-sectional variation in municipalities with coca production in 1994. Formally, I estimate the impact of the ICSP announcement on child labor with the following equation:

$$\begin{aligned} \text{childlabor}_{i,h,m,y} = & \beta_1(\text{coca}_{m,1994} \times \text{Post}_{2014}) + \alpha_m + \eta_y \\ & + X_{i,m,y}\Theta'_1 + X_{h,m,y}\Theta'_2 + \sum_{c \in X_m} \gamma'(c \times \text{Post}_{2014}) + \epsilon_{i,m,y} \end{aligned} \quad (1)$$

Where $\text{childlabor}_{i,h,m,y}$ takes the value of one for an individual i between 10 and 17 years old who works in household h , municipality m and year y . $\text{coca}_{m,1994}$ is a dummy equal to one for municipalities with coca in 1994, and Post_{2014} takes the value of one from 2014 to 2019. $X_{i,m,y}$ is a set of individual controls such as age, gender, access to the health system, and residence with parents. $X_{h,m,y}$ are characteristics of the head of the household such as age, gender, years of education, and single status as well as the number of people in the household and dummies for children younger than five and adults older than 65. X_m are municipality characteristics before the ICSP announcement interacted with Post_{2014} to control for differential changes pre- and post-ICSP. X_m includes the proportion of the rural population, suitability to farm coca, the logarithm of government expenditure in 2005, and the multidimensional poverty index in 2005. I also include homicides per 100,000 inhabitants from 1993 and 1999 and FARC attacks against civilians between 1993 and 2008.

Equation (1) also includes municipality fixed effects (γ_d) and year fixed effects (η_y). These variables control for observable or unobservable shocks affecting municipalities and shocks that affect all the municipalities in a given year (e.g., inflation and changes in international coca prices, respectively). Finally, $\epsilon_{i,m,y}$ is the error term. Drawing on Bertrand et al. (2004), I cluster standard errors by municipality, allowing for correlation of errors over time within each 421-municipality code in the sample.

The main coefficient of interest is β , which captures the average differential change in child labor before and after the announcement in municipalities with historical coca production relative to non–coca-growing areas. Equation (1) includes any relevant municipality characteristics that do not vary over time and any differential trends in child labor that differ across municipalities. I also study heterogeneity in the effect depending on age, gender, and income to explore the mechanisms behind the main impact of the announcement on child labor.

My research design is not subject to the assumption needed to estimate unbiased parameters with two-way fixed effects under continuous or staggered treatment (when the estimator may be biased by violations of the linear additivity assumption or potentially negative weights from staggered treatment).²²

4.1 IDENTIFYING ASSUMPTION

The assumption required to estimate an unbiased difference-in-differences model is that the trends in the outcomes of the treatment and comparison groups would be parallel in the absence of treatment.²³ In this case, the assumption is that in the absence of the announcement, child labor in municipalities with historical coca production would have followed a similar trajectory to that in areas not growing coca in 1994. To partially assess the assumption, I estimate the following nonparametric model:

$$childlabor_{i,h,m,y} = \sum_{i=-4}^{-1} \delta_i(coca_{m,1994} \times Post_i) + \sum_{i=1}^6 \delta_i(coca_{m,1994} \times Post_i) + \alpha_m + \eta_y + X_{i,m,y}\Theta'_1 + X_{h,m,y}\Theta'_2 + \sum_{c \in X_m} \gamma'(c \times Post_{2014}) + \epsilon_{i,m,y} \quad (2)$$

Instead of having one single point estimate showing the effect before and after 2013 (β_1

²²Imai & Kim (2020) show that the ability of the two-way linear fixed effects regression to calculate an estimator that adjusts for unobserved unit-specific and time-specific confounders at the same time relies upon the assumption of linear additive effects. Goodman-Bacon (2021) decomposes the estimated parameter in the difference-in-differences model when units are treated at different times and shows the possibility of weights being negative in two-period DD estimators. Callaway & Sant'Anna (2021) calculate estimators for staggered difference-in-difference setups with variation in the treatment timing.

²³Goldsmith-Pinkham et al. (2020) present a detailed explanation of the critique for *Bartik-type* instruments and the extension to parallel pre-trends. Having similar pretrends is the fundamental stone for the difference-in-differences model.

in Equation (1)), Equation (2) shows all the lags ($\sum_{i=-4}^{-1} \delta_i$) and leads ($\sum_{i=1}^6 \delta_i$) of the parameters. The omitted variable is the interaction for 2013, the year before the ICSP announcement in 2014. The parameters δ_i show the effect of the announcement relative to the outcome in 2013, the year before the time variation. The parallel trends assumption holds when the lags ($\sum_{i=-4}^{-1} \delta_i$) are not statistically significant, which means that the trends in child labor before the announcement in areas with and without coca leaves were not different.

5 RESULTS

5.1 ADDRESSING PARALLEL TRENDS

First, the raw data support the identifying assumption of parallel pretrends in this setting. Panel A in Figure 3 presents the child labor of municipalities with and without coca production in 1994. The solid line marks one year before the ICSP announcement in 2014, and the dashed line in 2017 indicates the policy implementation year. As evidence of parallel trends, the raw data show similar trends in child labor between coca and noncoca areas before 2014.²⁴

Panel B in Figure 3 and Table 1 present the event study coefficients obtained by estimating Equation (2), where 2013 is the omitted category. In line with the parallel pretrends assumption, I find that child labor is not statistically different between areas with and without historical coca production. The coefficient measuring the difference between coca-growing and non–coca-growing municipalities becomes statistically significant in 2016 ($\delta_{2016} = 0.068$), one year before the ICSP implementation, and it remains statistically significant through 2019.

The increase in child labor remained positive even after 2017, when the Colombian government implemented the ICSP. We explain the sustainable growth in children working since the Colombian government still needs to complete the substitution program fully.

²⁴Further analysis of the raw data suggests that rather than being affected by the ICSP announcement, the decline in the number of children working in areas without historical coca production followed the overall Colombian trend of declining child labor (see Figure 1).

The government has implemented about one-third of the program (Machuca 2021). Although farmers substituted about 20% of the coca hectares in 2021, coca cultivation has continuously grown until 2022 (UNODC 2022). There is even evidence that income negatively correlates with receiving aid from the ICSP (e.g., Machuca (2021)).

5.2 MAIN FINDINGS

As previously established, the incidence of child labor refers to individuals between 10 and 17 years old who spent most of their time working during the last week. Table 2 reports the coefficient β_1 from estimating Equation (1). Although each column shows the estimates from different specifications, the four columns include year and municipalities fixed effects. Column 1 includes only this set of fixed effects. Column 2 includes individual and household characteristics. Column 3 replaces these individual and household control variables with municipality characteristics. Finally, Column 4 includes the fixed effects and both sets of controls. The last column presents the baseline model since this specification captures observable and unobservable aggregated changes at the year and municipalities level, individual and household characteristics including gender and age, the number of children in the household, and municipality conditions such as the poverty index and exposure to previous antidrug programs. Table A-3 in the online appendix shows a detailed description of each control variable.

The findings show that after the government announced the ICSP in 2014, children became nearly four percentage points (pp) more likely to work in municipalities with historical coca production than in non-coca-growing areas (Column 4, $\beta_1 = 0.039$). The policy announcement accounts for an increase of 20% ($0.039/0.195$) in the probability of a child working after 2014. Across the specifications in Table 2, the results are similar in magnitude and significantly different from zero.

5.3 ROBUSTNESS

The first test is to vary the definition of treated municipalities. As a reference, Column 1 in Table 3 shows the parameter from the baseline model. Column 2 switches the criterion

for designating municipalities as treated from their coca cultivation status in 1994 to their coca cultivation status in 1999 – one year before the launch of Colombia’s largest antidrug strategy supported by the US government (*Plan Colombia*, which started in 2000).²⁵ Column 3 changes the criterion for designating municipalities as treated from their coca-growing status in 1994 to their coca-growing intensity (above or below the national median coca production in 2013, one year before the policy announcement). After I change the criterion for designating treated municipalities, the results are significantly different from zero and similar in magnitude to the parameter β_1 in the baseline model.

In Column 4, I return to the municipality-level variation based on coca production in 1994 but control for spatial correlation in the standard errors, following Conley (1999, 2010). These adjusted standard errors control for spatial and first-order time correlation. I allow spatial correlation with the closest municipality to ensure that each area has at least one neighbor. In Column 5, I estimate Equation (1) choosing controls by machine learning techniques, following Belloni et al. (2014). I use variable selection models to choose a set of variables that are useful for predicting the outcome (denoted by x_{yi}) and the treatment of residence in a municipality with historical coca production (denoted by x_{di}). The final set of controls is the union of x_{yi} and x_{di} . In Column 6, I run a placebo test where the treatment timing is set to 2011, one year before the official beginning of the Colombian peace process.

The standard errors in the model that controls for spatial correlation are similar to those in the baseline model. The coefficient from the model using the machine learning controls is 1.2 pp smaller than the baseline estimated parameter, but the estimates are not statistically different from each other. The placebo test shows no differential effect of the “placebo” ICSP announcement on child labor between municipalities with and without coca production.

In Column 7, I replace child labor as the dependent variable with an indicator for labor

²⁵The coca production correlation between 1994 and 1999 is 0.46. Colombia had 18 coca-growing areas in 1994 and 39 in 1999. In both years, 13 municipalities had coca production, 26 in 1999 only, and five in 1994 only.

force participation, defined as children working or seeking employment. The coefficient is positive and significantly different from zero ($\beta_1 = 0.044$).

The effect of the ICSP announcement on child labor is also robust to keeping only households that report that they have always lived in the same municipality in the sample. Section A.5 in the online appendix shows that the results for nonmigrant families are somewhat higher in magnitude than the results for the full sample for which I have data for migration ($\beta_1 = 0.055$).

In sum, my results comparing municipalities with and without coca cultivation in 1994 show that the ICSP announcement increased the probability of children working in the former municipalities.

6 MECHANISMS

The three-year gap between the ICSP announcement and its implementation incentivized child labor in rural areas. The results also document that child labor did not fall to preannouncement levels once the ICSP started operating. In this section, I explore how the social and environmental conditions faced by children affect their probability of joining the labor force.

6.1 HOUSEHOLD SIZE, ENVIRONMENT, AND GOVERNMENTAL TRANSFERS

Beyond the ICSP announcement, some characteristics explaining the increase in child labor include family structure, geographical conditions, and central government transfers. Figure 4 shows the raw data on child labor for the following categories: 1) households with one or two children and families with three or more kids; 2) children in municipalities below/above the median index of coca suitability, where the index sorts municipalities from best to worst environmental conditions for growing coca (e.g., altitude, soil erosion, rainfall index, and an index of suitability for common crops based on soil nutrients, minerals, and topography)²⁶; and 3) children in places with higher and lower central

²⁶Section A.3 in the online appendix describes in detail the construction of the coca suitability variable based on Mejia & Restrepo (2015).

government transfers in 2005 (above and below the median, respectively). Allocations from the national government to departments and municipalities (local entities) are based on a fixed rule depending on the population lacking access to services (DNP 2001).²⁷

Figure 5 reports the coefficients that result from estimating the nonparametric Equation (2) for the three categories listed above. The figures support the parallel trends assumption since the coefficients are not statistically different from zero before 2014.

To analyze the mechanisms of household size, coca suitability, and transfers ($mechanism_i$), I estimate a triple difference-in-differences model following the equation:

$$\begin{aligned}
 childlabor_{i,h,m,y} = & \beta_1(cocam_{,1994} \times Post_{2014} \times mechanism_i) \\
 & + \beta_2(cocam_{,1994} \times mechanism_i) + \alpha_m + \eta_y \\
 & + X_{i,m,y}\Theta'_1 + X_{h,m,y}\Theta'_2 + \sum_{c \in X_m} \gamma'(c \times Post_{2014}) + \epsilon_{i,m,y}
 \end{aligned} \tag{3}$$

where $mechanism_i$ is a dummy variable that takes the value of one depending on the mechanism (i.e., in three separate regressions): (i) $mechanism_i$ is equal to one when child i lives in household h with three or more children; (ii) $mechanism_i$ is one when child i lives in a municipality above the median of the coca suitability index; and (iii) $mechanism_i$ is one when child i lives in a municipality receiving central government transfers in 2005 above the median.

Table 4 reports the coefficient β_1 from estimating Equation (3) for the mechanisms. In addition to the expected incomes coming from the three-year gap, family size matters in the decision of who joins the labor market. Households with more children have higher incentives to send children to the labor force to earn money to cover family expenses (e.g., Ponczek & Souza (2012)). My result confirms the hypothesis that larger families are more prone to choosing child labor. Post-2014, children were more likely to work in households with three or more children (Column 1, $\beta_1 = 0.021$).²⁸

²⁷Section A.4 in the online appendix summarizes the central government transfer system, called the General Participation System (*Sistema general de participation* or SGP). The results are robust to using transfers in 2001 or average transfers in the last 10 years.

²⁸I also found that post-ICSP, children are more likely to work in bigger families (with more than

The variation in Colombian geographic conditions makes coca production more cost-efficient in some municipalities than in other areas (Dest 2021). Table 4 shows that environment characteristics such as altitude, soil erosion, and a rainfall index matter for child labor. Post-2014, children were more likely to work in areas more suitable for coca production (municipalities above the median coca suitability index) than in places where growing coca is challenging (Column 2, $\beta_1 = 0.008$).

Poverty is one of the root causes of child labor in rural areas (Ersado 2005). Central governments provide local areas with transfers to promote public policies in education, health, infrastructure, and other dimensions (Lustig et al. 2013). Table 4 shows that the increase in child labor after the ICSP announcement was lower in municipalities with more transfers from the central government in 2005 (Column 3, $\beta_1 = -0.010$).

6.2 AGE AND GENDER

The literature shows that age and gender determine who joins the labor force within a household (e.g., Edmonds (2007)). Figure 6 presents the raw data and point estimates for child labor rates for two subsamples: children 10–15 years old (in Panel A and F) and 16–17 years old (in Panel B and G). The four panels show that the parallel trends hold in the subsamples since child labor was not different between municipalities with and without historical coca production before 2014 in any age group.

Table 5 shows two triple difference-in-differences models by gender and age using a version of Equation (3). My findings comparing areas with and without coca production post-2014 confirm the hypothesis that boys are more likely to work than girls (Column 1, $\beta_1 = 0.032$). Furthermore, older children (16–17 years old) face a higher probability of joining the labor market than younger children (Column 2, $\beta_1 = 0.010$).²⁹

four members) than smaller households (non-presented).

²⁹Table 1 provides evidence supporting the parallel trends assumption for boys and girls.

6.3 UNPAID ACTIVITIES

Income shocks or changes in expected future income affect not only the labor market – exogenous changes could also affect the time allocation to domestic tasks (e.g., [Zapata et al. \(2011\)](#)). The hypothesis states that households face a trade-off between sending children into the labor market or increasing the time spent on activities at home.

Figure [A-6](#) in the online appendix shows the raw data and point estimates for two dummy variables: completing household chores (Panels B and E) and taking care of children (Panels C and F). In the four panels, the parallel trends assumption seems to hold for both types of domestic activities.

Table [A-6](#) presents the results of estimating Equation [\(1\)](#) for these two new dependent variables. After the ICSP announcement, children became more likely to do household chores in coca-growing areas than in non–coca-growing areas. The coefficient is also positive for taking care of children but not statistically different from zero.^{[30](#)} By running a version of Equation [3](#), Table [A-6](#) also shows that boys are more likely to clean at home than girls ($\beta_1 = 0.049$) but have a lower probability of taking care of children ($\beta_1 = -0.057$).

7 MORE OUTCOMES

7.1 INTENSIVE MARGIN

In this subsection, I study the effect of the ICSP announcement on the standardized working hours in the last week (the intensive margin). In online appendix Figure [A-6](#), Panels A and D show the raw data and point estimates for weekly working hours, respectively. Both panels support the parallel trends assumption for weekly working hours. The raw data (Panel A) also show that working hours declined before the ICSP announcement in places with and without coca production.

³⁰I do not find a coefficient statistically different from zero in six models using as dependent variables the following variables: raising animals, cleaning other homes, taking care of older people, making clothes for family members, self-constructing housing, and engaging in community or volunteer work (estimates not reported). Interpretation of these exercises should be done with caution because the parallel trends assumption might not hold in these six specifications.

Column 1 in Table A-5 shows the effect of the ICSP announcement on standardized weekly working hours using Equation (1). On average, post-ICSP, children worked nearly three hours less per week in coca-growing areas than in non-coca-growing areas (17.3×0.16). This result shows that to increase coca cultivation, more children worked in rural areas but did not spend more time working. An increase in the number of hands working reduces the average time that each child needs to work.

For robustness, I estimate a matching difference-in-differences model to eliminate from the postannouncement sample working children who are too different in observable variables from children in the preannouncement sample. I run the model in three steps: (i) I calculate the predicted values (propensity score) of a probit model where the dependent variable is a dummy equal to one for working children in the post period and the independent variables are age, gender, access to health care, a dummy for the agricultural sector, and a dummy for occupation as a farmer for working children only; (ii) I use the propensity score to match a working child in the post period with a working child in the pre period; and (iii) I estimate Equation (1) only for children with matches (the restricted sample).

Figure A-7 Panel A shows that the propensity score distribution of children in the pre period is different from that of children in the post period. However, after the matching process, the propensity score distribution of the children in the pre period is not statistically different from that of the restricted sample in the post period (a Kolmogorov–Smirnov test rejects the null hypothesis). The nondifference between the two distributions suggests that the restricted sample has working children with more similar characteristics in the pre and post periods.

Column 2 in Table A-5 shows the result of estimating Equation (1) for the restricted sample. Post-ICSP, children worked 1.5 hours per week less in municipalities with coca cultivation than in noncoca areas, but the coefficient is not significantly different from zero. The overall results evidence that the ICSP announcement had a modest decline or null effect on the working hours of children.

7.2 EDUCATION OUTCOMES

The ICSP announcement changes children's time allocation in and out of the labor market (e.g., taking care of children). In this subsection, I analyze the effect of the announcement on self-reported education outcomes from children in rural areas. Figure 7 presents the raw data (Panels A to D) and the point estimates (Panels E to H) for the four variables listed above. The raw data show stable patterns for pre- and post-ICSP announcement educational outcomes. The point estimates are around zero and not statistically different from zero. Both results show that the assumption of parallel trends hold for education outcomes. Table 6 uses Equation (1) to estimate the changes in education outcomes post-ICSP. I find that compared with those in noncoca areas, children in coca areas faced lower attendance rates and a higher probability of lagging in their grade for their age. However, the differences in both variables are not different from zero.

The null results for education outcomes relate to the evidence of a rise in the probability of working (extensive margin) and a reduction in the average number of hours worked (intensive margin). The increase in expected earnings created by the ICSP announcement pulled more children into the labor market, but it did not increase the need to work more hours. That is why the increase in the likelihood of working did not affect education outcomes. These results are in line with Prem et al. (2021), who show that the ceasefire during the peace negotiation between Colombian and FARC members improved children's academic outcomes, but the improvements are attenuated in coca-growing areas. My results show that, as the ceasefire, the ICSP announcement in the middle of the peace negotiation did not affect educational outcomes in areas with historical coca cultivation.³¹

7.3 ADULT LABOR

In this subsection, I explore the labor market among adults. Table 7 shows the results for adult labor using Equation (1).³² The model shows that after 2014, adults were 2 pp

³¹I run a version of Equation (1) using educational data from dropout, math and languages scores. The results show no effect of the ICSP announcement on these academic variables. However, I do not present these results since the parallel trends assumption does not hold for these outcomes.

³²The raw data and point estimates for adult labor in Figure 6 show that the parallel trends assumption holds for adults. As in the case of child labor, Column 1 in Table 7 includes only year and municipalities

more likely to work in municipalities with historical coca production than in non-coca-growing areas (Column 4, $\beta_1 = 0.022$). In the online appendix, Table A-7 presents adult labor impacts by age and gender. As in the children's case, the post-2014 impact was larger in older adults than in younger ones (Column 2, $\beta_1 = -0.035$). However, unlike in the children's case, men became less likely to work than women post-2014 (Column 2, $\beta_1 = -0.035$). This evidence confirms the idea that labor was provided by inactive groups such as children, women, and older adults.

The findings present a change in the labor market where children and women, individuals with low employment rates, are more likely to work after 2014. In the control period (2009 to 2013), on average, 87% of men work, but only 39% of women and 19% of children work. Therefore, the ICSP announcement raises individuals' probability with time to work rather than employers already in the fields.

8 CONCLUSION

Households' decisions depend on current income and their *expected* earnings. When deciding who works or studies within homes, families include current and expected revenues to smooth consumption. Governments could affect decisions only by promising subsidies, aid, or assistance. Providing evidence of the possible side effects of announcing programs with unknown implementation time is essential to understand how families react to official messages. The standard political agenda includes constant communication that, without precautions, can harm citizens who receive the transmission. The three-year gap between the ICSP announcement and implementation is an example of how poor coordination in the government negatively affected the population.

The ICSP is a traditional illicit substitution program that provides financial support to farmers to reduce the cultivation of illegal crops. In essence, the ICSP is a conditional cash transfer type program where households receive cash and in-kind assistance from the government conditional on reducing the coca production. Beyond the failure of the illicit

fixed effects, Column 2 adds individual and household controls, Column 3 replaces the individual with municipality characteristics, and Column 4 includes all the controls.

substitution programs to reduce coca production, the three-year gap provides families with time to increase the baseline of coca bushes expecting to receive more money from the government. Farmers understood from the announcement that the government would provide more financial support for having three hectares than one hectare. Promoting the ICSP raised the expected earnings of coca cultivation.

This paper shows how a gap between announcing and implementing rural policies can increase child labor. In the setting considered here, households adjusted children's time allocation depending on their expected earnings. In particular, to receive money from the ICSP for reducing their coca production, farmers needed to show that they produced coca in the first place. This incentive to grow coca increase children's likelihood of joining the labor market. The ICSP announcement needed more details about the money amount or when the program will start in Colombian rural areas. The message was unclear, and the expected income was highly uncertain. Farmers maximized the time allocation to collect coca leaves among all the household members despite the announcement's uncertainty. Thus, children and women with low employment rates increase the probability of joining the labor market, while men, who already worked in the fields, did not change their time at work.

The uncertainty of the messages explains why the findings show a modest decline in the average number of weekly working hours post-ICSP. The decline in hours came mainly from girls and women who spent time working in unpaid activities at home. The ICSP changed the time allocation in the labor market and home production. Farmers could face several challenges from the ICSP, such as receiving insufficient financial support or having a slow implementation of the program (as it happened). Instead of massively increasing the time of all children in the labor market, families minimized the risk by sending more children to work and reducing the time each child spends in coca fields.

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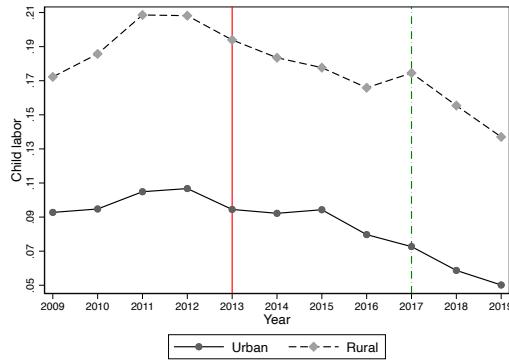
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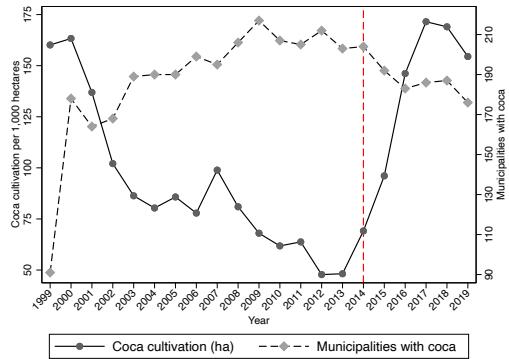
10 FIGURES

Figure 1: Child labor in levels



Notes: Own calculations using Great Integrated Household Survey (GEIH). 2013 is one year before the Colombian government and FARC members announced in a press released the National Program for the Substitution of Crops for Illicit Use (ICSP). The Colombian government started the program in 2017.

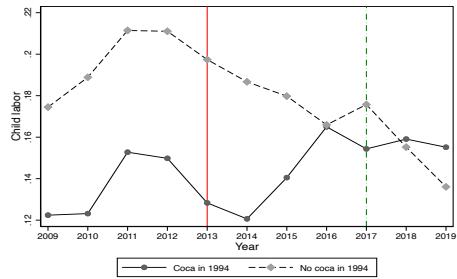
Figure 2: Coca production by municipalities



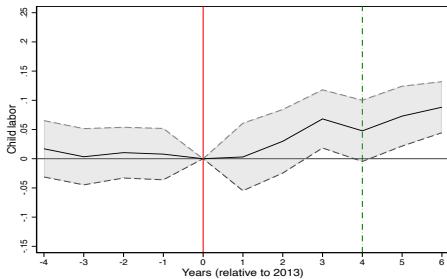
Notes: The line in 2013 shows a year before the Colombian government and FARC members announced the Illicit Crop Substitution Program (ICSP). The government started the program in 2017.

Figure 3: Child labor: raw data and point estimates

A. Raw data



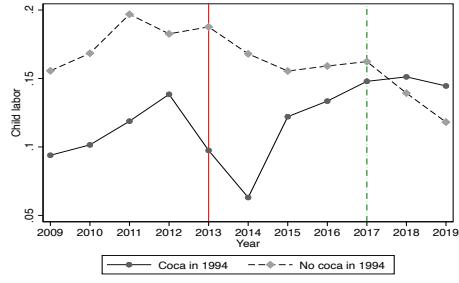
B. Points estimates



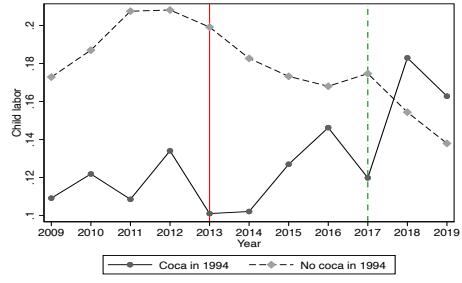
Notes: Panel A presents child labor using the Great Integrated Household Survey (GEIH). Panel B presents the estimated coefficients and 95% confidence intervals for the year interaction in Equation (2). The interaction in 2013 is the omitted category. The solid line in 2013 shows a year before the Colombian government and FARC members announced the Illicit Crop Substitution Program (ICSP). The government started the program in 2017.

Figure 4: Raw data dynamics for potential explanations

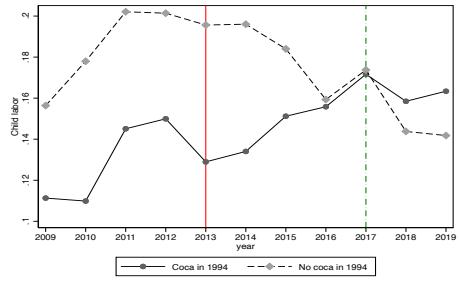
A. One to two children



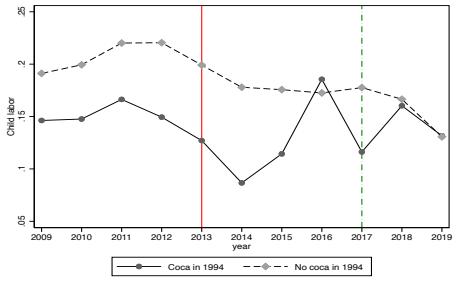
B. Three children or more



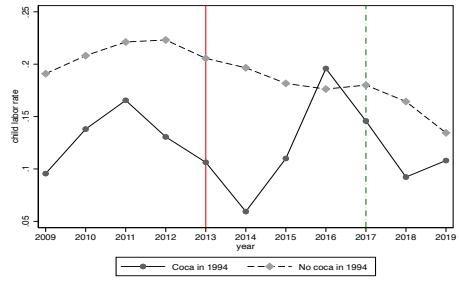
C. Below the median suitability



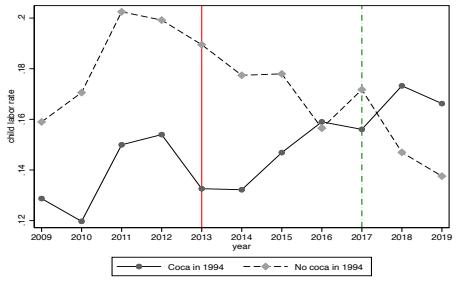
D. Above the median suitability



E. Below the median National transfers to territories



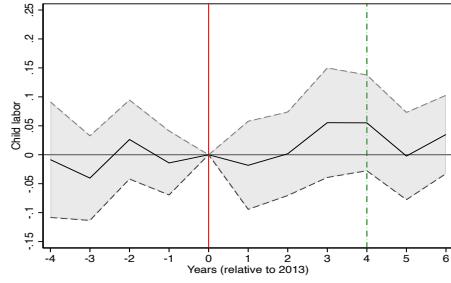
F. Above the median National transfers to territories



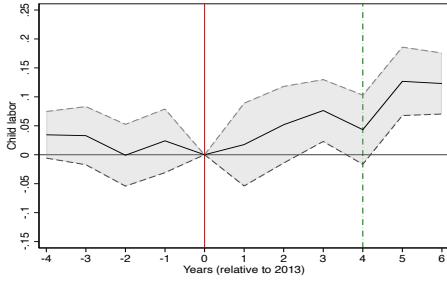
Notes: This figure presents the raw data of child labor divided into municipalities with and without coca cultivation in 1994 by the following categories: number of children at home, coca suitability index, and the national transfer the central government gives to municipalities in 2005.

Figure 5: Dynamics specification for potential explanations

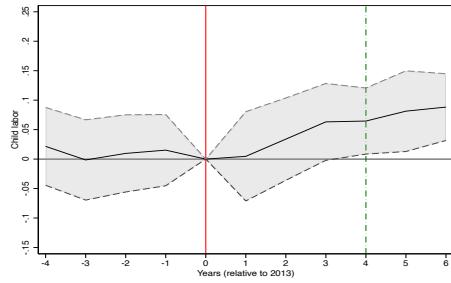
A. One to two children



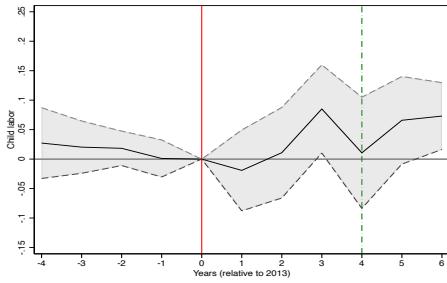
B. Three children or more



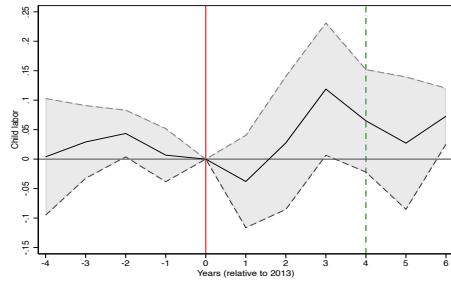
C. Below the median suitability



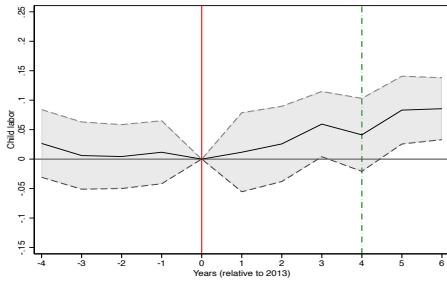
D. Above the median suitability



E. Below the median National transfers to territories



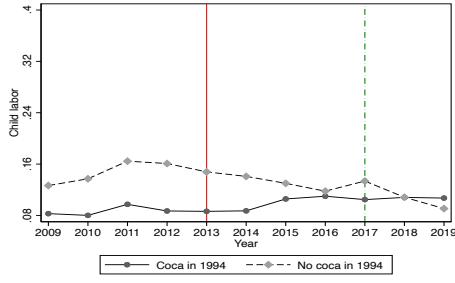
F. Above the median National transfers to territories



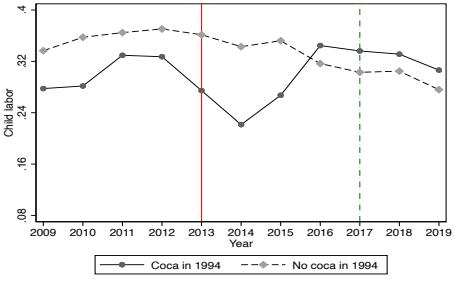
Notes: This figure presents the estimated coefficients and 95% confidence intervals from the dynamic specification in Equation (2) by the following categories: income, number of children at home, coca suitability index, and the national transfer the central government gives to municipalities in 2005.

Figure 6: Being employed by ages: raw data and point estimates

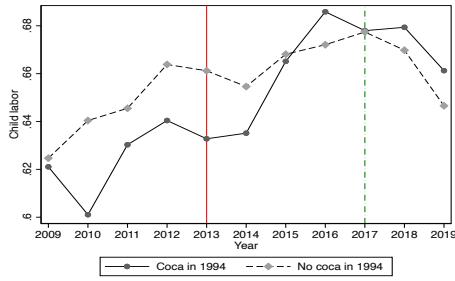
A. Raw data for 10 - 15 years old



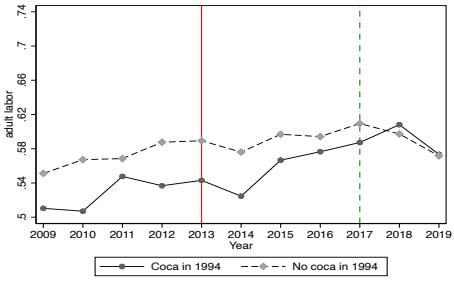
B. Raw data for 16 - 17 years old



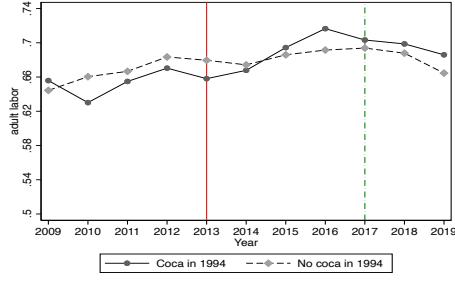
C. Raw data for adults - all ages



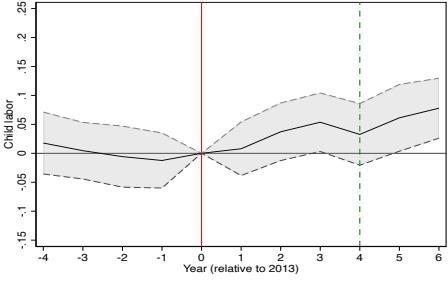
D. Raw data for 18 - 25 years old



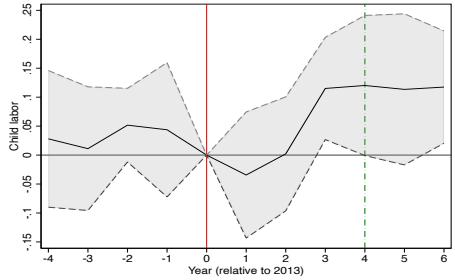
E. Raw data for 26 years old or more



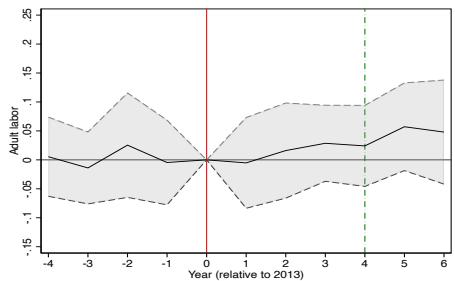
F. Point estimates for 10 - 15 years old



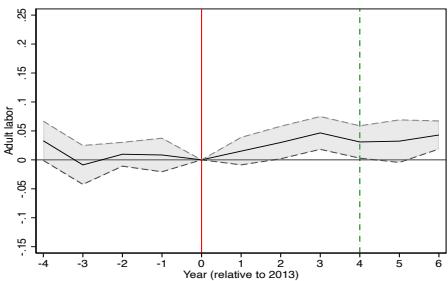
G. Point estimates for 16 - 17 years old



I. Point estimates for 18 - 25 years old



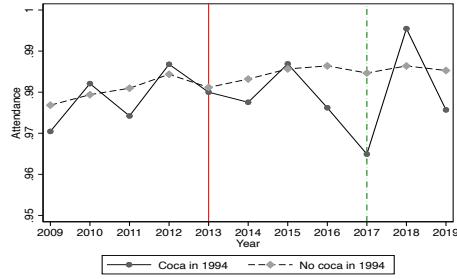
J. Point estimates for 26 years old or more



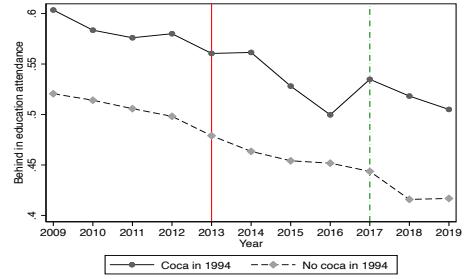
Notes: Panels A to E shows the raw data for the child labor per year. Panel F to J presents the estimated coefficients and 95% confidence intervals from the dynamic specification in Equation (2) with dependent variables is a dummy equal to one for employees and zero otherwise by the same age categories mentioned before.

Figure 7: Trends in education outcomes

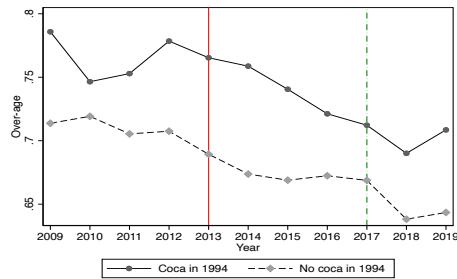
A. Raw data for attendance



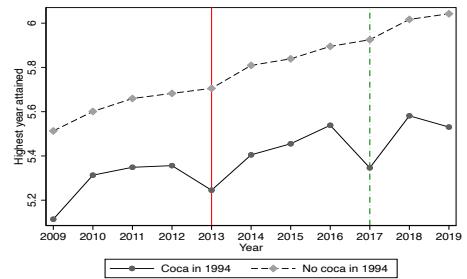
B. Raw data for behind in education attendance



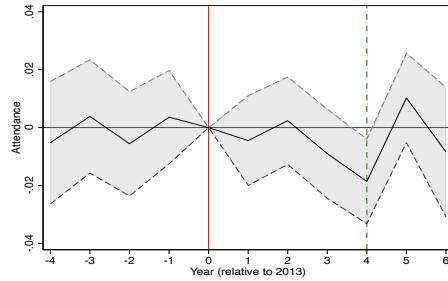
C. Raw data for over-age



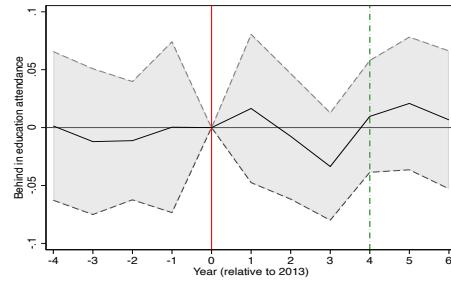
D. Raw data for highest year attained



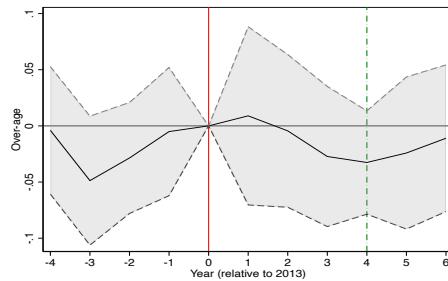
E. Point estimates for attendance



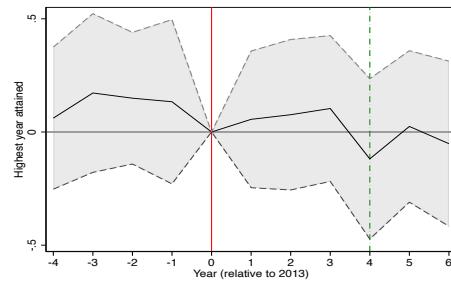
F. Point estimates for behind in education attendance



G. Point estimates for over-age



H. Point estimates for highest year attained



Notes: Panels A to D show the raw data for each education outcome per year. Panel F to H present the estimated coefficients and 95% confidence intervals from the dynamic specification in Equation (2) with each education outcome as dependent variables.

Tables

Table 1: Event study by sub-samples

Dep. Var.	Being employed	Youth	Girls	Boys	Adults
		10 - 17 years old		18 and more	
		(1)	(2)	(3)	(4)
2013 is the reference year					
2009 X coca in 1994		0.019 (0.025)	0.018 (0.019)	0.016 (0.036)	0.027 (0.017)
2010 X coca in 1994		0.008 (0.024)	0.002 (0.019)	0.015 (0.034)	-0.008 (0.013)
2011 X coca in 1994		0.014 (0.022)	0.009 (0.025)	0.014 (0.030)	0.015 (0.015)
2012 X coca in 1994		0.008 (0.022)	0.044 (0.028)	-0.025 (0.036)	0.005 (0.017)
2013 X coca in 1994		-	-	-	-
2014 X coca in 1994		0.003 (0.030)	0.019 (0.018)	-0.008 (0.048)	0.010 (0.015)
2015 X coca in 1994		0.033 (0.028)	0.038* (0.021)	0.025 (0.042)	0.026 (0.016)
2016 X coca in 1994		0.068*** (0.025)	0.019 (0.016)	0.097** (0.044)	0.043*** (0.014)
2017 X coca in 1994		0.048* (0.027)	0.060** (0.028)	0.041 (0.044)	0.029** (0.014)
2018 X coca in 1994		0.074*** (0.026)	0.043** (0.020)	0.097*** (0.037)	0.038** (0.018)
2019 X coca in 1994		0.088*** (0.022)	0.077*** (0.025)	0.104** (0.043)	0.043*** (0.015)
Observations		137,843	65,390	72,453	521,186
<i>Dep. Var.</i>					
Mean (2009 to 2013)		0.195	0.095	0.278	0.645
SD (2009 to 2013)		0.397	0.293	0.448	0.479

Notes. This tables presents the estimated coefficients and robust standard errors shown in parentheses clustered at the municipality level for the treatment-group year interaction variables in equation 2. The interaction in 2013 is the omitted category. 2013 is one year before the Colombian government and FARC members' announced in a press released the National Program for the Substitution of Crops for Illicit Use (PNIS for its name in Spanish). The government started the program in 2017. *** is significant at the 1% level, ** is significant at the 5% level, * is significant at the 10% level.

Table 2: Child labor and coca production

	Dep. Var. Being employed			
	(1)	(2)	(3)	(4)
Post 2013 X coca in 1994	0.034*** (0.008)	0.043*** (0.013)	0.036** (0.015)	0.039*** (0.013)
Observations	137,843	137,843	137,843	137,843
Mean DV (2009 to 2013)	0.195	0.195	0.195	0.195
SD DV (2009 to 2013)	0.397	0.397	0.397	0.397

<i>Controls:</i>	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Department FE	Yes	Yes	Yes	Yes
Individual and household	No	Yes	No	Yes
Municipality controls X Post 2013	No	No	Yes	Yes

Notes. *Individual controls:* age, age squared, sex, having health insurance, and living with the parent. *Household controls:* sex of the head in the house, her or age, and education, the number of people per house, kids younger than five years old, and adults older than 65. *Municipality controls:* meters above sea level, the proportion of the rural population, erosion, the logarithm of annual rainfall, suitability to farm coca, suitability to harvest legal crops, the logarithm of municipality area in hectares, distance to the capital (km), the logarithm of government expenditure, and the multidimensional poverty index in 2005. I also include a dummy for municipalities with manual eradication in at least one year between 2009 and 2019, another dummy variable for areas with aerial spraying in at least one year between 2009 and 2015, another dummy for municipalities with ICSP between 2017 and 2018, and a dummy variable for areas with *Familias Guardabosques* program in at least one year between 2003 and 2013. Finally, I add the number of homicides per 100,000 people and the total of FARC attacks against civilians between 1993 and 2008. Robust standard errors shown in parentheses are clustered at the municipality level *** is significant at the 1% level, ** is significant at the 5% level, * is significant at the 10% level.

Table 3: Robustness exercises for child labor

	Dep. Var. Being employed						
	Baseline	Coca in 1999	Median coca in 2013	Conley (1999)	ML controls	Placebo	+ Seek employment
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Post 2013 X coca in 1994	0.039*** (0.013)			0.039*** (0.013)	0.027** (0.012)		0.044*** (0.013)
Post 2013 X coca in 1999		0.033** (0.015)					
Post 2013 X coca in 2013			0.038** (0.018)				
Post 2010 X coca in 1994						0.020 (0.016)	
Observations	137,843	137,843	137,843	137,843	137,843	137,843	137,843
Mean DV (2009 to 2013)	0.195	0.195	0.195	0.195	0.195	0.189	0.214
SD DV (2009 to 2013)	0.397	0.397	0.397	0.397	0.397	0.392	0.410

Notes. This table presents the results from the main specification in Equation (1). Each column includes the set of controls, department fixed effects, and year fixed effects. Robust standard errors shown in parentheses are clustered at the municipality level *** is significant at the 1% level, ** is significant at the 5% level, * is significant at the 10% level.

Table 4: Triple difference for potential explanations

	Dep.	Var.	Being employed
	(1)	(2)	(3)
Post 2013 X coca in 1994 X (=1 HHs with three or more children; =0 HHs with two or less children)	0.021*** (0.002)		
Post 2013 X coca in 1994 X (=1 above the median suitability of land for growing coca; =0 below the median)		0.008*** (0.002)	
Post 2013 X coca in 1994 X (=1 above the median of the Central Government transfers to municipalities in 2005; =0 below the median)			-0.010*** (0.002)
Observations	137,843	137,843	137,843
Mean DV (2009 to 2013)	0.195	0.195	0.195
SD DV (2009 to 2013)	0.397	0.397	0.397

Notes. This table presents the results from the main specification in Equation (3). The suitability of land for growing coca comes from Mejia & Restrepo (2015). The suitability measure consists of the altitude above the sea level, soil erosion, aptitude (an index of suitability for common agricultural crops based on soil nutrients, minerals, and topography), and precipitation rainfall index at the municipality level. In the final sample, the correlation between the suitability index for growing coca and having coca crops is 0.15. Among the no-coca-growing municipalities, 51% and 49% are below and above, respectively, the median suitability index for growing coca. From coca-growing areas, 36% and 64% are below and above, respectively, the median suitability index. In 2009 (2019), for example, 146 (141) no-coca areas are *above* the median of suitability of land for growing coca. See Online appendix A.3 for details about how the suitability of coca-growing is built. The *SGP* stands for General System of Participation that consists of the resources that the Colombian government transfers to the territorial entities, for the financing of education, health, and sanitation system (DNP 2001). See Online appendix A.4 for details about how the national sources are assigned to municipalities. Each column includes the set of controls, department fixed effects, and year fixed effects. Robust standard errors shown in parentheses are clustered at the municipality level. *** is significant at the 1% level, ** is significant at the 5% level, * is significant at the 10% level.

Table 5: Triple difference by gender and age

	Dep.	Var.	Being employed
	(1)	(2)	
Post 2013 X coca in 1994 X (=1 for boy; =0 for girl)	0.032*** (0.001)		
Post 2013 X coca in 1994 X (=1 for 16-17 years old; =0 for 10-15 years old)		0.010*** (0.002)	
Observations	137,843	137,843	
Mean DV (2009 to 2013)	0.195	0.195	
SD DV (2009 to 2013)	0.397	0.397	

Notes. This table presents the results from the main specification in Equation (3). Each column includes the set of controls, department fixed effects, and year fixed effects. Robust standard errors shown in parentheses are clustered at the municipality level. *** is significant at the 1% level, ** is significant at the 5% level, * is significant at the 10% level.

Table 6: Education outcomes and coca production

Dep. Var.	School attendance	Behind years of education	Over-age index	Highest year attained
	(1)	(2)	(3)	(4)
Post 2013 X coca in 1994	-0.003 (0.003)	0.014 (0.015)	0.012 (0.015)	-0.057 (0.052)
Observations	144,486	144,486	144,486	144,486
Mean DV (2009 to 2013)	0.980	0.507	0.710	5.614
SD DV (2009 to 2013)	0.138	0.500	0.454	2.450

Notes. This table presents the results from the main specification in Equation (1). Each column includes the set of controls, municipality fixed effects, and year fixed effects. The dependent variable in column (1) is one for children attaining school. Column (2) is one when the number of education years is less or equal to three years. It is also one when a child who is 12-year-old (13-years-old) has four (five) or fewer years of education, and it is one when a child who is 14-year-old (15-years-old) has six (seven) or fewer years of education. Finally, it is one when a child who is 16-year-old (17-years-old) has eight (nine) or fewer years of education. The variable is zero otherwise. Column (3) is equal to one when $SAGE = \left[\frac{\text{years of education}}{\text{age} - 6} \right] * 100$, and 0 if $SAGE < 100$ and 0 otherwise. Column (4) is the number of education years attained. Robust standard errors shown in parentheses are clustered at the municipality level *** is significant at the 1% level, ** is significant at the 5% level, * is significant at the 10% level.

Table 7: Adult labor and coca production

	Dep. Var. Being employed			
	(1)	(2)	(3)	(4)
Post 2013 X coca in 1994	0.026** (0.011)	0.024** (0.012)	0.027** (0.011)	0.026** (0.012)
Observations	546,031	546,031	546,031	546,031
Mean DV (2009 to 2013)	0.693	0.693	0.693	0.693
SD DV (2009 to 2013)	0.461	0.461	0.461	0.461

Controls:

Year FE	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes	Yes
Individual and household	No	Yes	No	Yes
Municipality controls X Post 2013	No	No	Yes	Yes

Notes. This table presents the results from the main specification in Equation (1). Each column includes the set of controls, municipality fixed effects, and year fixed effects. Robust standard errors shown in parentheses are clustered at the municipality level *** is significant at the 1% level, ** is significant at the 5% level, * is significant at the 10% level.

A ONLINE APPENDIX (NOT FOR PUBLICATION)

A.1 ICSP ANNOUNCEMENT

The Colombian government and FARC's members announce the ICSP creation in the following press released:

“(...) Regarding the first sub-point, Programs for the substitution of crops for illicit use, we have agreed that the National Government will create and launch a new Comprehensive National Program for the Substitution of Crops for Illicit Use-ICSP, as part of the structural transformation of the field that it seeks the Comprehensive Rural Reform, and in order to generate material and immaterial conditions of well-being and good living for the populations affected by crops for illicit use, in particular for rural communities living in poverty that currently derive their subsistence from these crops , and thus also find a sustainable and definitive solution to the problem of illicit crops and all the problems

associated with them in the territory (...)." Joint dispatch No. 36. Havana, May 16, 2014 consulted on May 31, 2021 in the following link ([El Tiempo 2016](#)).

A.2 CHILD LABOR DEFINITION

I classify a child between 10 to years old as an employee using four variables asked consecutively. First, "what activity did you spend most of your time in last week?" Multiple option question: a. Working. b. Seeking employment. c. Studying. d. Household duties. e. Permanently unable to work. f. Other activity. Second, "In addition to the question above (first question), did you do any paid activities last week for an hour or more?" 1 Yes 2 No. Third, "even though you did not work in the past week, for an hour or more on a paid basis, did you have a job or business that earned you income during that week?" 1 Yes 2 No. Fourth, did you work in a business last week for one hour or more without getting paid? 1 Yes 2 No. A child working either chooses A in the first question or Yes in at least one of the other three questions. I use the same four questions for adult labor.

In the sample, all the children choose an option in the first question. Only 7% of the children report information for the other three questions. Therefore, the first question is the principal component to calculate child labor.

On average, 7% of the children report that they work most of their time in the last week. From those children answering the second, third, and fourth questions, 7% of the final sample, 2% of them report doing pay activities in the last week for an hour or more. Less than 0.01% of children say that even though they do not work in the past week, they receive money from a business. Finally, 7.5% of the children report that they work in a firm last week for one hour or more without getting paid.

For the intensive margin, I use the following question: "How many hours a week do you usually work?" The answer is a numeric variable. Individuals have zero in the number of working hours when they do not work. On average, children work 26 hours per week.

A.3 SUITABILITY OF LAND FOR GROWING COCA

The index of suitability to grow coca comes from [Mejia & Restrepo \(2015\)](#) in the following steps. First, the authors calculate the production per planted hectare for coca bushes from a representative sample of coca-growing farmers conducted by UNODC and illicit crop monitoring between 2005 and 2010. The farmers were in 64 out of 1,052 municipalities in Colombia. Second, the authors match the productivity from the sample of coca growing areas with geographical characteristics where coca fields were located. The characteristics are "altitude above sea level, soil erosion, aptitude (an index of suitability for common agricultural crops, based on soil nutrients, minerals and topography), and a precipitation (rainfall) index". Thus, the authors estimate the determinants of the productivity of coca cultivation with the following model:

$$\ln(\text{productivity}_{hm}) = \beta_0 + \beta_1 \text{altitude}_m + \beta_2 \text{altitude}_m^2 + \beta_3 \text{otherscrops}_m + \beta_4 \text{otherscrops}_m^2 + \beta_5 \text{water}_m + \beta_6 \text{water}_m^2 + \beta_7 \text{erosion}_m + \beta_8 \text{erosion}_m^2$$

Where productivity_{hm} is the productivity of coca field h in municipality m from the representative sample. Using the estimated results, [Mejia & Restrepo \(2015\)](#) create a measure of expected productivity of coca bushes for 1,052 Colombian municipalities with geographical data following the equation:

$$suitability_m = \exp\left(\hat{\beta}_0 + \hat{\beta}_1 altitude_m + \hat{\beta}_2 altitude_m^2 + \hat{\beta}_3 othercrops_m + \hat{\beta}_4 othercrops_m^2 + \hat{\beta}_5 water_m + \hat{\beta}_6 water_m^2 + \hat{\beta}_7 erosion_m + \hat{\beta}_8 erosion_m^2\right)$$

$suitability_m$ measure how productive (production per planted hectare) growing coca in an area depending on geographic characteristics. The index does not vary over time, but it varies across municipalities. Finally, Mejia & Restrepo (2015) normalize “the suitability index in terms of standard deviations from the mean to facilitate its interpretation”.

A.4 GENERAL PARTICIPATION SYSTEM IN COLOMBIA

In 2001, the Colombian government created the General Participation System (*Sistema general de participacion - SGP*) for distributing resources from the central government to the territorial entities mainly for education, health services and basic sanitation (Article 4 of Law 715, 2001). From the pool of the national sources, for example, 58.5% goes to education (DNP 2001).

The percentage of the national sources to education has increased since 2001 (1.3%; in 2010, 1.6% during 2011 and 2016, an additional 1.8% in 2017). Education resources are mainly used to finance: i), teachers, teaching directors and administrative staff; ii) Hiring the provision of the educational service; iii) Activities to maintain, evaluate and promote educational quality. The amount for 2017 of the SGP is 5 million of US dollars (20.5 billion Colombian pesos).

The assignation from the national government to municipalities depends on a fixed rule. For education, the rule is based on population served and population to be served in conditions of efficiency and equity (DNP 2001).

A.5 MIGRANT FAMILIES

The difference in migration patterns between municipalities with historical coca production and non-coca growing areas could lead to a bias effect of the ICSP announcement on child labor. The Colombian department of statistics (DANE) has included a migration module to the household survey since 2012. The module asks: “have you always live in this municipality?” 60% of the rural households report that they have always lived in the same area.

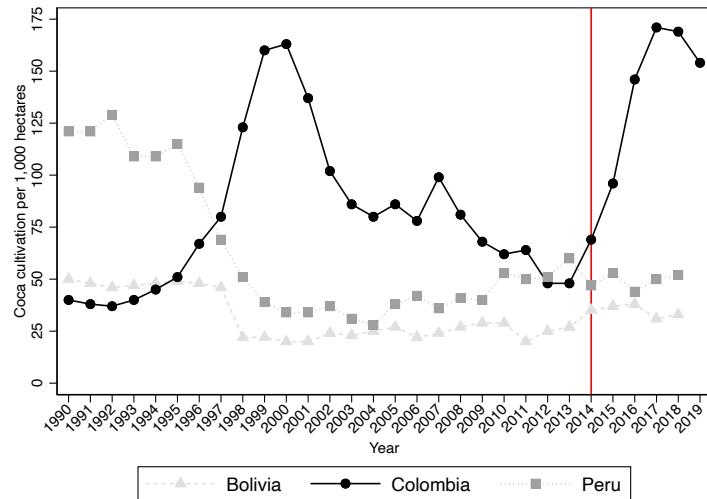
Table A-4 presents the estimated parameters using Equation (1) from 2012 to 2019, eight years of sample. Unfortunately, the household survey does not provide data from 2009 to 2011, three pre-treatment years. Child labor is 20% for the sample of eight years, only one ppt greater than the child labor rate in the full sample between 2009 and 2019. Column 1 shows that children are six ppt more likely to work in municipalities with historical coca production than in no-coca growing areas. The effect is just 0.8 ppt greater than the estimated parameter using the full sample. Column 2 keeps the families saying that they have always lived in the same municipality. The parameter β_1 in Equation (1) is positive and statistically significant from zero. The parameter is two ppt greater than the point estimate in the full sample. Importantly, the coefficient is in the same direction that the hypothesis. Child labor increases in areas with historical production after the ICSP announcement. Columns 3 has only the migrant families. Whereas child labor is 21% similar to columns 1 and 2, the coefficient is not statistically significant from zero.

The interpretation of the results using the migration module are might not causal because the available data only contains two pre-treatment years, 2012 and 2013, and testing

for parallel trends is challenging. However, the evidence suggests that the results from omitting migrant families are somewhat larger than the results using the full sample.

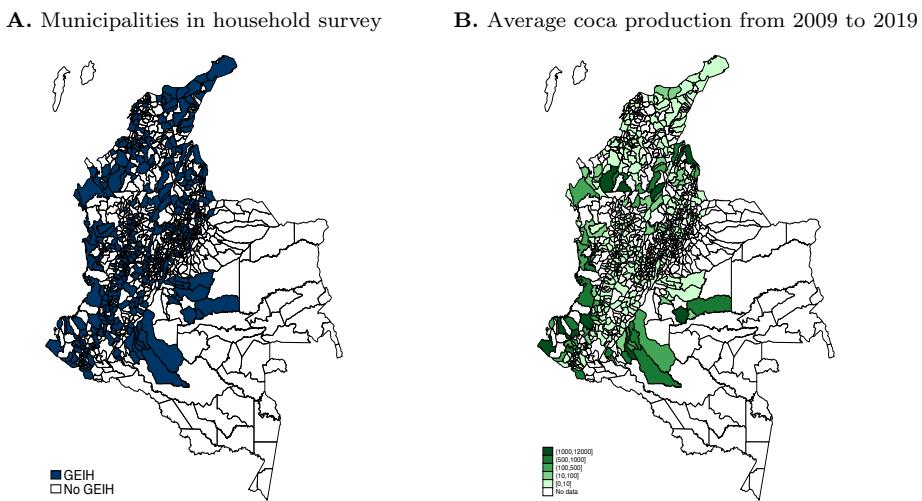
A.6 ONLINE FIGURES

Figure A-1: Coca production in Bolivia, Colombia and Peru



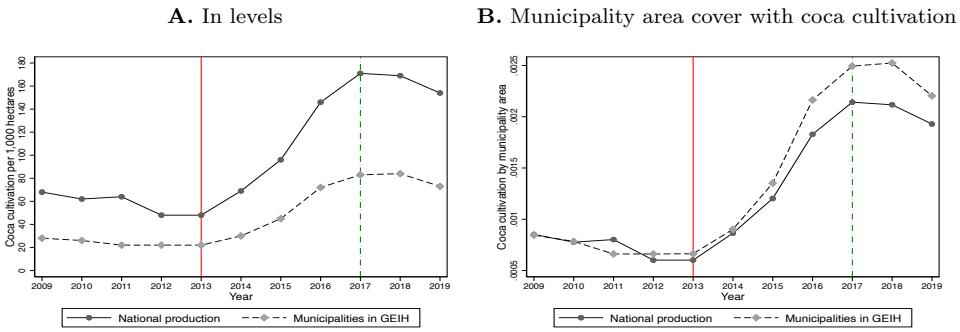
Notes: Own calculations based on UNODC (2020).

Figure A-2: Municipalities in household survey and coca production



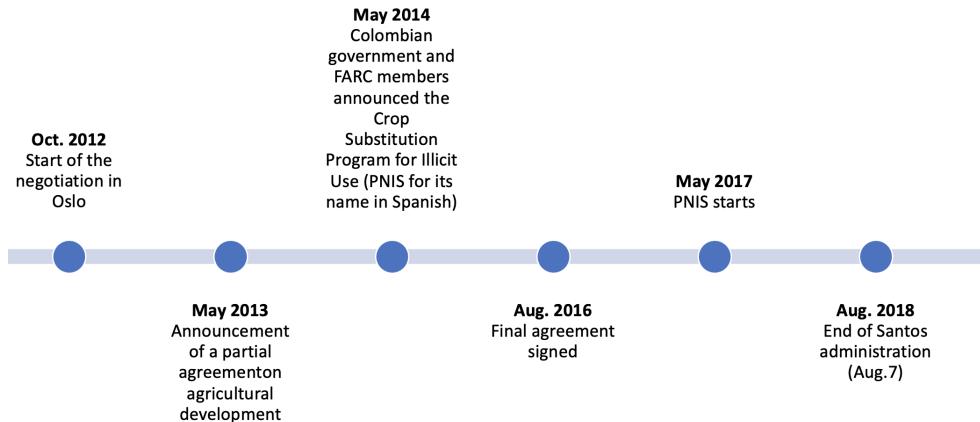
Notes: Panel A presents the panel data of 421 municipalities from 2009 to 2019. Panel B shows the average coca production in the same period in hectares.

Figure A-3: Coca production



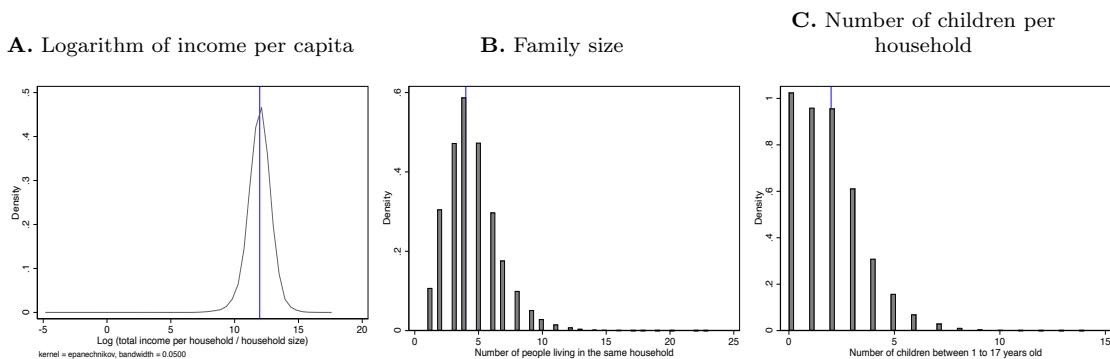
Notes: On average, 197 out of 1,103 (18%) municipalities produce coca at the national level between 2009 and 2019, while 82 out of 421 (19%) areas have coca in the Great Integrated Household Survey (GEIH). The solid line in 2013 shows a year before the Colombian government and FARC members' announced the Illicit Crop Substitution Program (ICSP). The government started the program in 2017. In Panel A, the two-sample Kolmogorov-Smirnov (KS) test rejects the null hypothesis (both distributions are equal) with a p-value of 0.021. In Panel B, the KS does not reject the null hypothesis with a p-value of 0.479.

Figure A-4: Timeline for most relevant events



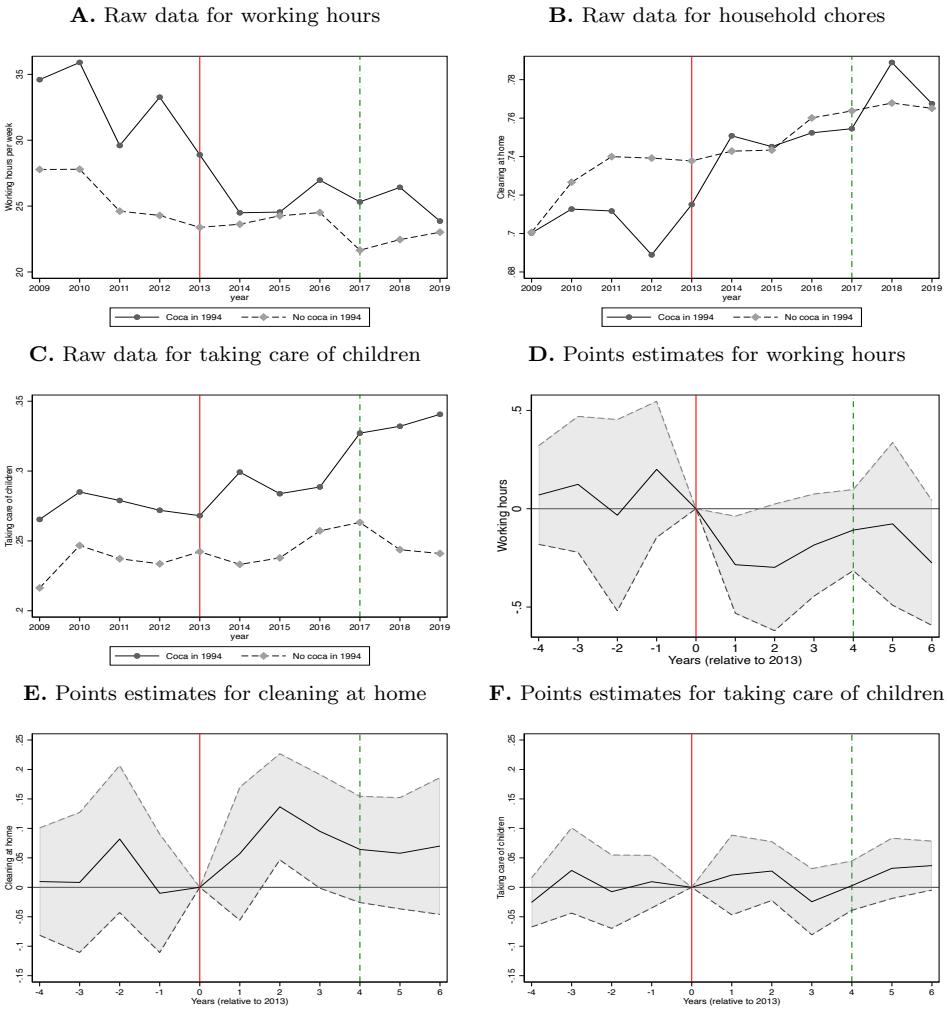
Notes: This figure summarizes the timeline of the PNIS announcement and implementation.

Figure A-5: Income and family size



Notes: Panel A presents the logarithm of the income per capita. The logarithm of the median is 12, about 154,000 Colombian Pesos that is equivalent to 50 dollars. Panel B shows the distribution of the household. Panel C is the distribution of the number of children in one household.

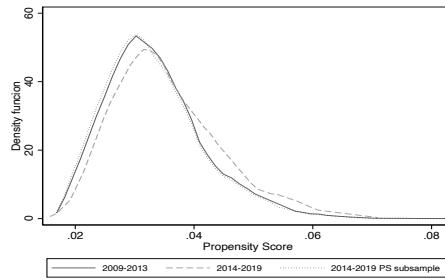
Figure A-6: Weekly working hours and home production: raw data and point estimates



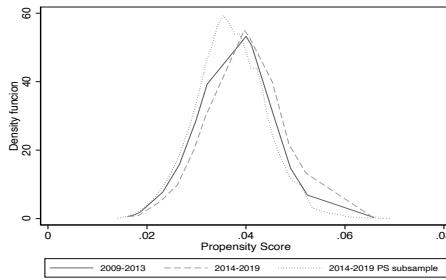
Notes: This figure presents the raw data for working hours for children, children cleaning at home, and children taking care of other children, panels A, B, and C, respectively. The other panels present the estimated coefficients and 95% confidence intervals from the dynamic specification in Equation (2).

Figure A-7: Extensive margin: Propensity score

A. Children



B. Adults



A.7 ONLINE TABLES

Table A-1: Raw data: employment status for children by age

Panel A: municipalities without coca in 1994									
Year	Unemployed				Employed				
	10 to 15	Variation	16 to 17	Variation	10 to 15	Variation	16 to 17	Variation	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
2009	1,223,415	.	274,257	.	177,060	.	139,362	.	
2010	1,180,724	-4%	270,061	-2%	187,641	7%	149,922	8%	
2011	1,126,553	-5%	262,361	-3%	221,099	15%	150,652	0%	
2012	1,147,118	2%	270,268	3%	219,196	-1%	159,225	5%	
2013	1,159,118	1%	261,987	-3%	201,045	-9%	148,496	-7%	
2014	1,174,016	1%	263,694	1%	192,043	-5%	137,589	-8%	
2015	1,156,901	-1%	248,774	-6%	172,656	-11%	135,221	-2%	
2016	1,129,127	-3%	279,431	11%	150,527	-15%	135,137	-4%	
2017	1,100,214	-3%	293,435	5%	169,334	11%	127,401	-2%	
2018	1,106,214	1%	270,615	-8%	134,350	-26%	118,444	-7%	
2019	1,120,442	1%	289,615	7%	111,732	-20%	109,775	-7%	

Panel B: municipalities with coca in 1994									
Year	Unemployed				Employed				
	10 to 15	Variation	16 to 17	Variation	10 to 15	Variation	16 to 17	Variation	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
2009	59,109	.	11,886	.	5,338	.	4,566	.	
2010	64,434	8%	13,678	13%	5,609	5%	5,363	15%	
2011	62,338	-3%	14,535	6%	6,718	17%	7,141	25%	
2012	59,567	-5%	15,546	7%	5,680	-18%	7,559	6%	
2013	66,403	10%	15,151	-3%	6,279	12%	5,727	-32%	
2014	61,646	-8%	17,450	13%	5,886	-7%	4,962	-15%	
2015	67,592	9%	15,309	-14%	8,022	27%	5,582	11%	
2016	65,477	-3%	14,595	-5%	8,090	1%	7,771	28%	
2017	71,162	8%	14,243	-2%	8,319	3%	7,298	-6%	
2018	66,115	-8%	14,690	3%	7,992	-4%	7,275	0%	
2019	59,549	-11%	14,761	0%	7,158	-12%	6,524	-12%	

Notes. Employed is defined by children between 10 and 17 years old saying they occupy most of the time in the last week working. Unemployed is defined by children saying they occupy most of the time in the last week searching for work. Own calculations using Great Integrated Household Survey (GEIH, acronym in Spanish)

Table A-2: Raw data: employment status for adults

Panel A: municipalities without coca in 1994					
Year	Unemployed	Variation	Employed	Variation	Total
(1)	(2)	(3)	(4)	(5)	(6)
2009	2,189,048	.	3,643,326	.	5,832,374
2010	2,125,026	-2.9%	3,784,732	3.9%	5,909,758
2011	2,124,396	0.0%	3,868,599	2.2%	5,992,995
2012	2,021,965	-4.8%	3,992,967	3.2%	6,014,932
2013	2,061,631	2.0%	4,023,855	0.8%	6,085,486
2014	2,122,632	3.0%	4,023,146	0.0%	6,145,778
2015	2,069,267	-2.5%	4,165,871	3.5%	6,235,138
2016	2,068,310	0.0%	4,239,203	1.8%	6,307,513
2017	2,051,778	-0.8%	4,308,658	1.6%	6,360,436
2018	2,141,546	4.4%	4,344,423	0.8%	6,485,969
2019	2,309,070	7.8%	4,224,044	-2.8%	6,533,114

Panel B: municipalities with coca in 1994					
Year	Unemployed	Variation	Employed	Variation	Total
(1)	(2)	(3)	(4)	(5)	(6)
2009	100,111	.	164,095	.	264,206
2010	110,385	10.3%	166,293	1.3%	276,678
2011	104,773	-5.1%	178,570	7.4%	283,343
2012	104,024	-0.7%	185,264	3.7%	289,288
2013	103,920	-0.1%	179,065	-3.3%	282,985
2014	104,108	0.2%	181,205	1.2%	285,313
2015	98,278	-5.6%	195,212	7.7%	293,490
2016	94,318	-4.0%	205,916	5.5%	300,234
2017	96,479	2.3%	203,128	-1.4%	299,607
2018	98,962	2.6%	209,705	3.2%	308,667
2019	104,022	5.1%	203,064	-3.2%	307,086

Notes. Employed is defined by adults who are 18 years old or older saying they occupy most of the time in the last week working. Unemployed is defined by adults saying they occupy most of the time in the last week searching for work. Own calculations using Great Integrated Household Survey (GEIH, acronym in Spanish)

Table A-3: Descriptive Statistics

<i>Dep var:</i>	Mean	Std. Dev.
Child labor	0.182	0.386
Adult labor	0.655	0.475
<i>Individual controls</i>		
Age	13.439	2.264
Female	0.448	0.497
Access to health	0.916	0.277
Living with parents	0.815	0.388
Dummy for working in agriculture sector ⁺	0.722	0.448
Dummy for occupation as farmers or agricultural workers ⁺	0.679	0.467
<i>Household controls</i>		
Household head is female	0.230	0.421
Household head is single	0.187	0.390
Years of education of household head	4.404	3.585
Number of people living in the same household	5.371	2.001
Number of children in the same household	1.822	1.632
Dummy of younger than 5 years old	0.360	0.480
Dummy of adults older than 65 years old	0.124	0.329
Dummy for households with 1 to 5 members	0.602	0.49
Dummy for households below the median	0.456	0.498
<i>Municipality controls</i>		
Distance to the capital of the department (km)	77.538	64.117
Meters above sea level	934.797	902.962
Soil aptitude	2.939	1.249
Soil erosion	1.873	1.007
Suitability of land for growing coca	-0.016	0.907
Suitability of land for growing legal crops	2.939	1.249
Rural pop. / Urban pop.	0.468	0.262
Log (water precipitation index)	15.014	0.175
Log (area in hectares)	10.877	1.145
Log (government expenditure)	23.428	1.215
Total FARC attacks (from 1993 to 2008)	8.412	12.734
Number of homicides	14.262	43.245
Dummy of multidimensional poverty index greater than 83	67.582	17.774
Dummy of aerial fumigation	0.084	0.277
Dummy of manual area eradication	0.242	0.428
Dummy of ICSP (from 2017 to 2019)	0.06	0.237
Dummy of <i>Familias Guardabosques</i> (from 2003 to 2013)	0.142	0.349

Notes. Sample for children between 10 and 17 years old. ⁺ Categories only for working children.

Table A-4: Households always living in the same area

	Dep. Var.	Being employed	
		(1)	(2)
Post 2013 X coca in 1994		0.055*** (0.014)	0.026*** (0.001)
Post 2013 X coca in 1994 X (=1 for HHs always living in the same municipality; = 0 for HHs not always living in the same municipality)			0.040*** (0.002)
Observations		94,969	94,969
Mean DV (2012 to 2013)		0.205	0.205
SD DV (2012 to 2013)		0.404	0.404

Notes. Each column includes all the sets of controls. The GEIH collects migration information since 2012. The pre-treatment period does not contain 2009 to 2011 data. This table presents the results from the main specification in Equation (1) in Column 1 and Equation (3) in Column 3. On average, 57% of the households (HHs) have always lived in the same municipality. Each column includes the set of controls, department fixed effects, and year fixed effects. Robust standard errors shown in parentheses are clustered at the municipality level *** is significant at the 1% level, ** is significant at the 5% level, * is significant at the 10% level.

Table A-5: Intensive margin model

Model:	Dep. Var.	Weekly working hours (SD)			
		Children		Adults	
		Baseline (1)	Matching (2)	Baseline (3)	Matching (4)
Post 2013 X coca in 1994	-0.166** (0.083)	-0.093 (0.087)	-0.121** (0.053)	-0.119* (0.063)	
Observations	23,996	23,422	334,330	334,330	
Mean DV (2009 to 2013)	25.812	25.812	42.357	42.357	
SD DV (2009 to 2013)	17.228	17.228	17.690	17.690	

Notes. This table presents the results from the main specification in Equation (1). Each column includes the set of controls, department fixed effects, and year fixed effects. The matching model uses the Mahalanobis metric following Abadie & Imbens (2016). Robust standard errors in parentheses are clustered at the municipality level. *** is significant at the 1% level, ** is significant at the 5% level, * is significant at the 10% level.

Table A-6: Domestic production

	Dep. Var	Household chores		Taking care of children	
		(1)	(2)	(3)	(4)
Post 2013 X coca in 1994	0.038* (0.022)	0.014* (0.023)	0.018 (0.012)	-0.000 (0.020)	
Post 2013 X coca in 1994 X (=1 for boys; =0 for girls)		0.049** (0.019)		-0.057*** (0.020)	
Observations	137,843	137,843	137,843	137,843	
Mean DV (2009 to 2013)	0.779	0.779	0.121	0.121	
SD DV (2009 to 2013)	0.415	0.415	0.326	0.326	

Notes. This table presents the results from the main specification in Equation (1). Each column includes the set of controls, department fixed effects, and year fixed effects. Robust standard errors shown in parentheses are clustered at the municipality level *** is significant at the 1% level, ** is significant at the 5% level, * is significant at the 10% level.

Table A-7: Triple difference by gender and age for adults

Dep. Var.	Being employed	
	(1)	(2)
Post 2013 X coca in 1994	0.046*** (0.001)	0.029*** (0.001)
Post 2013 X coca in 1994 X (=1 for men; =0 for women)	-0.035*** (0.001)	
Post 2013 X coca in 1994 X (=1 for 26 years old or more; =0 for 18-25 years old)		0.006*** (0.001)
Observations	521,186	521,186
Mean DV (2009 to 2013)	0.693	0.693
SD DV (2009 to 2013)	0.461	0.461

Notes. This table presents the results from the main specification in Equation (1). In the final sample, 51% are men, and 80% of adults are 26 years old or more. Each column includes the set of controls, department fixed effects, and year fixed effects. Robust standard errors shown in parentheses are clustered at the municipality level. *** is significant at the 1% level, ** is significant at the 5% level, * is significant at the 10% level.