Online Appendix
Expected income and child labor: Evidence from coca production in Colombia

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A Not for publication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 (**?**).

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?"

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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 **?** 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:

$$ln(productivity_{hm}) = \beta_0 + \beta_1 altitude_m + \beta_2 altitude_m^2 + \beta_3 othercrops_m + \beta_4 othercrops_m^2 + \beta_5 water_m + \beta_6 water_m^2 + \beta_7 erosion_m + \beta_8 erosion_m^2$$

Where $productivity_{hm}$ is the productivity of coca field h in municipality m from the representative sample. Using the estimated results, **?** create a measure of expected productivity of coca bushes for 1,052 Colombian municipalities with geographical data following the equation:

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

$suitability_m$ 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 varies across municipalities. Finally, **?** 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 (**?**).

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 (**?**).

A.5 Migrant families

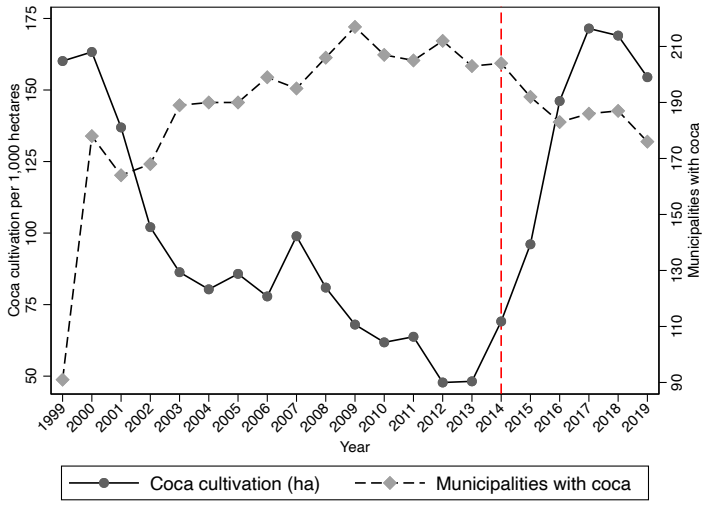
The difference in migration patterns between municipalities with historical coca production and non-coca growing areas could lead to a bias effect of the ICSP announcement on child labor. The Colombian department of statistics (DANE) has included a migration module to the household survey since 2012. 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 **??** presents the estimated parameters using Equation (**??**) 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 (**??**) 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.

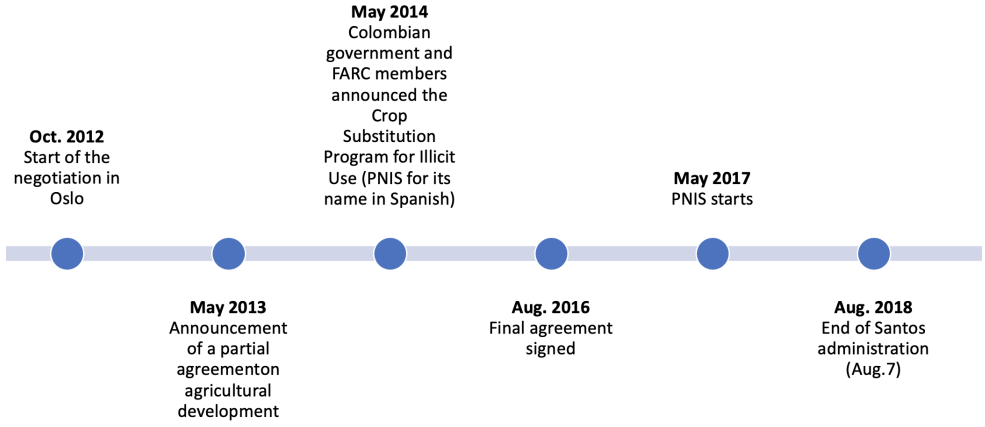
A.6 Online Figures

Figure A-1: Coca production by municipalities



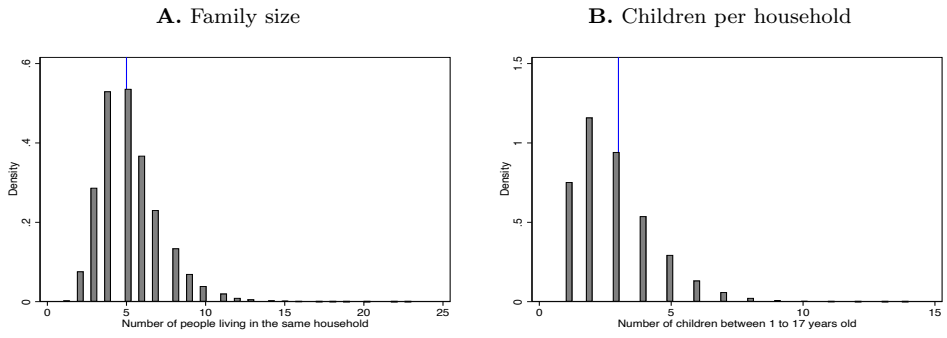
Notes: The line in 2013 shows a year before the Colombian government and FARC members announced the Illicit Crop Substitution Program (ICSP). The government started the program in 2017.

Figure A-2: Timeline for most relevant events



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

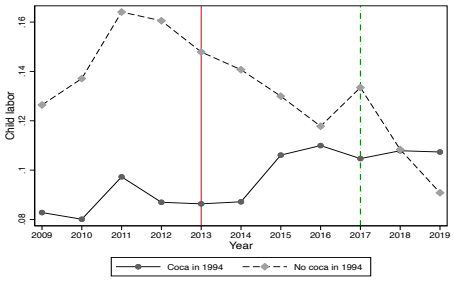
Figure A-3: Household size



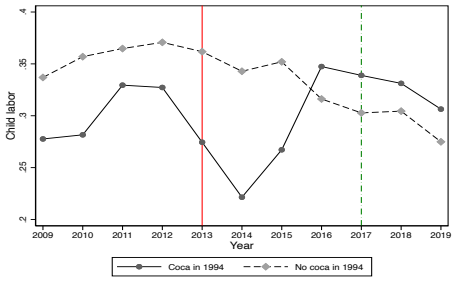
Notes: Panel A shows the distribution of the household. Panel B is the distribution of the number of children in one household.

Figure A-4: Trends in employment by ages

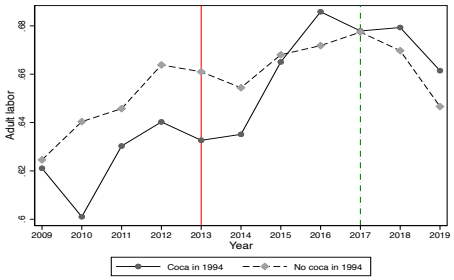
A. Raw data for 10 - 15 years old



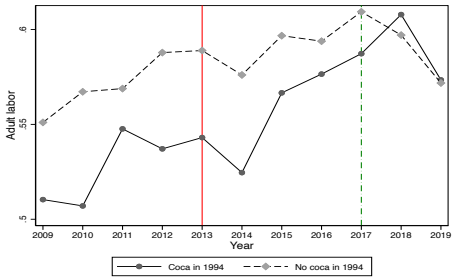
B. Raw data for 16 - 17 years old



C. Raw data for adults - all ages

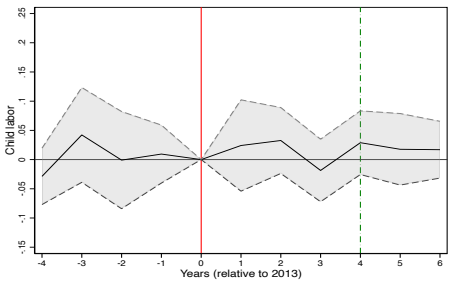


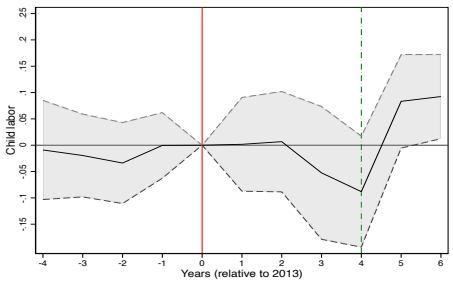
D. Raw data for 18 - 25 years old



E. Raw data for 26 years old or more

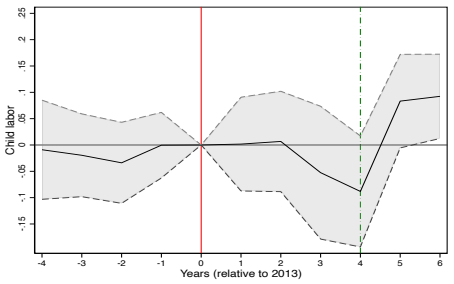
F. Point estimates for 10 - 15 years old

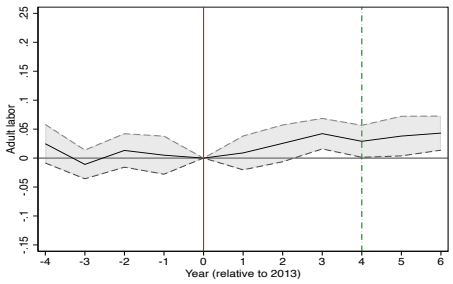




G. Point estimates for 16 - 17 years old

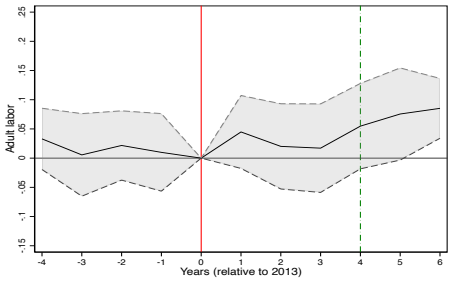
H. Point estimates for adults - all ages

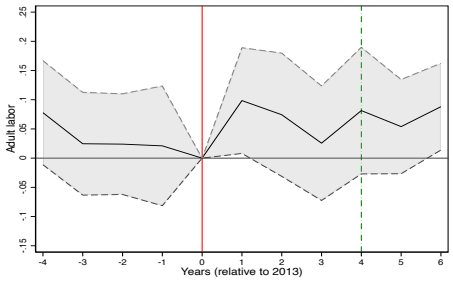




I. Point estimates for 18 - 25 years old

J. Point estimates for 26 years old or more

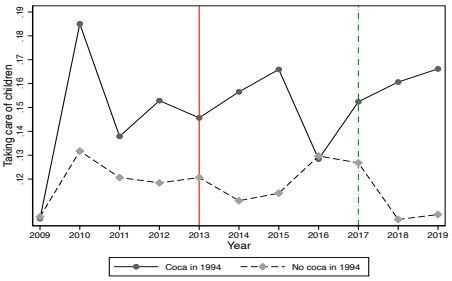




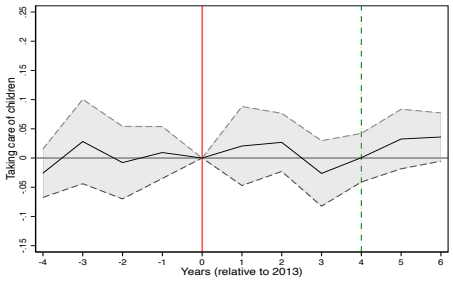
Notes: Panels A to E shows the raw data for the child labor per year. Panel F to J presents the estimated coefficients and 95% confidence intervals from the dynamic specification in Equation (**??**) with dependent variables is a dummy equal to one for employees and zero otherwise by the same age categories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

Figure A-5: Treinds in taking care of children

A. Raw data



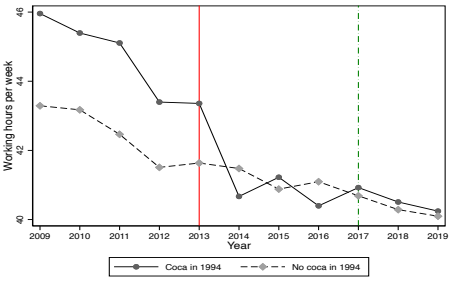
B. Points estimates



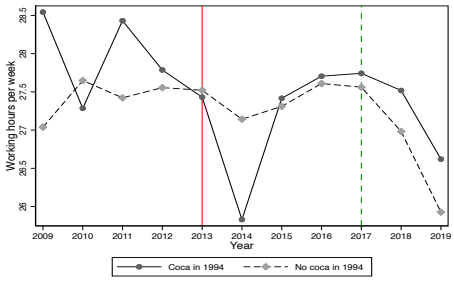
Notes: Panel A presents taking care of children using the Great Integrated Household Survey (GEIH). Panel B presents the estimated coefficients and 95% confidence intervals for the year interaction in Equation (**??**). The interaction in 2013 is the omitted category. The solid line in 2013 shows a year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

Figure A-6: Trends in weekly working hours for adults

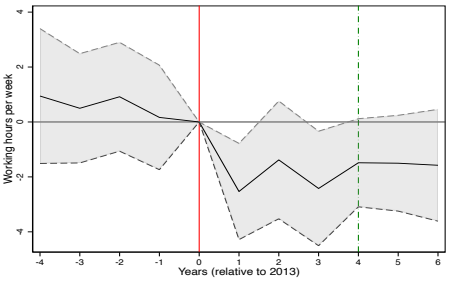
A. Raw data conditional on working hours



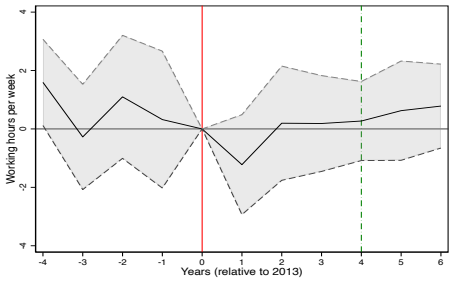
B. Raw data unconditional on working



C. Points estimates conditional on working hours



D. Points estimates unconditional working hours



Notes: This figure presents the raw data for working hours conditional and unconditional on working, panels A and B, respectively. Panels C and D present the estimated coefficients and 95% confidence intervals from the dynamic specification in Equation (**??**).

A.7 Online Tables

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

Panel A: municipalities without coca in 1994								
	Unemployed				Employed			
Year	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								
	Unemployed				Employed			
Year	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: Employment status for adults
Raw data

Year (1)	Unemployed (2)	Variation (3)	Employed (4)	Variation (5)	Total (6)
Panel A: municipalities without coca in 1994					
2009	2,187,528		3,639,431		5,826,959
2010	2,124,244	-3%	3,782,866	4%	5,907,110
2011	2,120,964	0%	3,866,203	2%	5,987,167
2012	2,019,030	-5%	3,987,224	3%	6,006,254
2013	2,060,166	2%	4,017,217	1%	6,077,383
2014	2,120,372	3%	4,015,221	0%	6,135,593
2015	2,066,097	-3%	4,158,040	3%	6,224,137
2016	2,065,795	0%	4,229,072	2%	6,294,867
2017	2,048,763	-1%	4,302,149	2%	6,350,912
2018	2,140,398	4%	4,340,835	1%	6,481,233
2019	2,306,655	7%	4,220,674	-3%	6,527,329
Panel B: municipalities with coca in 1994					
Year (1)	Unemployed (2)	Variation (3)	Employed (4)	Variation (5)	Total (6)
2009	100,092		164,076		264,168
2010	110,137	9%	165,921	1%	276,058
2011	104,773	-5%	178,570	7%	283,343
2012	103,896	-1%	184,915	3%	288,811
2013	103,852	0%	178,855	-3%	282,707
2014	104,108	0%	181,205	1%	285,313
2015	98,011	-6%	194,618	7%	292,629
2016	94,254	-4%	205,736	5%	299,990
2017	96,380	2%	202,838	-1%	299,218
2018	98,962	3%	209,651	3%	308,613
2019	103,929	5%	203,064	-3%	306,993

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

Dependet variables:	Mean	Std. Dev.
Child labor	0.178	0.383
Weekly working hours		
Conditional on working^{+}	24.560	16.631
Unconditional on working	4.393	11.750
Unpaid activities		
Taking care of children	0.119	0.323
Education outcomes		
Attendance rate	0.982	0.131
Educational lag	0.475	0.499
Over-age index	0.685	0.464
Highest level attained	5.753	2.449
Adult labor	0.657	0.475
Weekly working hours^{+}		
Conditional on working^{+}	41.495	16.994
Unconditional on working	27.249	24.039
Individual controls		
Age	13.433	2.264
Female	0.552	0.497
Access to health	0.916	0.277
Living with parents	0.815	0.389
Know how to read and write	0.976	0.154
Dummy for working in agriculture sector^{+}	0.718	0.450
Dummy for occupation as farmers or agricultural workers^{+}	0.676	0.467
Household controls		
Household head is female	0.230	0.421
Household head is single	0.187	0.390
Years of education of household head	4.425	3.599
Age of household head	45.590	12.143
Number of people living in the same household	5.373	2.002
Dummy of younger than 5 years old	0.361	0.480
Dummy of adults older than 65 years old	0.122	0.329
Municipality controls		
Multidimensional poverty index	67.457	18.365
Suitability to farm coca	-0.015	0.884
Rural pop. / Urban pop.	0.469	0.264
Log (government expenditure in 2005)	22.607	1.109
FARC attacks (from 1993 to 2008)	8.056	12.522
Number of homicides (from 1993 to 1999)	3.625	1.308

Notes. Sample for children between 10 and 17 years old. The children sample is $144,945$. $^{+}$ shows the sample $24,711$ for children working.

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

Dep. Var.	Being employed	
	(1)	(2)
Post 2013 X coca in 1994	0.046***	0.020
	(0.016)	(0.022)
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*
		(0.022)
Observations	100,908	100,908
Mean DV (2012 to 2013)	0.201	0.201
SD DV (2012 to 2013)	0.400	0.400

Notes. Each column includes all the sets of controls. The GEIH collects migration information since 2012. The pretreatment period does not contain 2009 to 2011 data. This table presents the results from the main specification in Equation (**??**) in Column 1 and Equation (**??**) in Column 2. 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: Analysis by age

	Dep. Var. Being employed				
	(1)	(2)	(3)	(4)	(5)
Post 2013 X coca in 1994	0.036**	0.037***	0.036**	0.035***	0.038***
	(0.016)	(0.014)	(0.014)	(0.014)	(0.014)
10-11 years old X Post 2013 X coca in 1994	-0.001				
	(0.013)				
12-13 years old X Post 2013 X coca in 1994		-0.004			
		(0.010)			
14-15 years old X Post 2013 X coca in 1994			0.002		
			(0.013)		
16-17 years old X Post 2013 X coca in 1994				0.003	
				(0.026)	
Age of legal work (15-17 years old) X Post 2013 X coca in 1994					−0.006
					(0.019)
Observations	144,495	144,495	144,495	131,192	144,495
Mean DV (2009 to 2013)	0.194	0.194	0.194	0.194	0.194
SD DV (2009 to 2013)	0.395	0.395	0.395	0.395	0.395

Notes. This table presents the results from the main specification in Equation (**??**). Each column includes the set of controls, municipality fixed effects, and year fixed effects. 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-6: Analysis by gender for adults

Dep. Var.	Being employed		
	Women	Men	Both
	(1)	(2)	(3)
Post 2013 X coca in 1994	0.049***	0.005	0.046
	(0.018)	(0.008)	(0.037)
Male X Post 2013 X coca in 1994			0.002
			(0.027)
Male			0.490***
			(0.008)
Observations	266,345	279,686	546,031
Mean DV (2009 to 2013)	0.393	0.873	0.631
SD DV (2009 to 2013)	0.488	0.333	0.482

Notes. This table presents the results from the main specification in Equation (**??**) in Column 1 and 2, and Equation (**??**) in Column 3. Each column includes the set of controls, municipality fixed effects, and year fixed effects. 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: Intensive margin model for adults

Dep. Var.	Weekly working hours							
	Conditional on working				Unconditional on working			
	Women	Men	Full sample		Women	Men	Full sample	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post 2013 X coca in 1994	−2.088**	−1.308	−1.492**	−0.195	1.060	−0.978	−0.043	−0.411
	(0.839)	(0.922)	(0.758)	(1.114)	(0.651)	(0.871)	(0.648)	(1.292)
Male X Post 2013 X coca in 1994				−1.850*				0.677
				(1.053)				(1.700)
Male				14.031***				28.248***
				(0.282)				(0.369)
Observations	107,568	242,622	350,190	350,190	266,345	279,686	546,686	546,686
Mean DV (2009 to 2013)	31.827	45.640	41.495	41.495	13.238	39.858	27.249	27.249
SD DV (2009 to 2013)	18.439	14.479	16.699	16.699	19.685	20.335	24.039	24.039

Notes. This table presents the results from the main specification in Equation (**??**) in Column 1, 2, 3, 5, 6, and 7, and Equation (**??**) in Column 4 and 8. Each column includes the set of controls, municipality fixed effects, and year fixed effects. 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.