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Incentives War: The Consequences of Announcing a Substitution Policy on Coca Cultivation in Colombia

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POLICY COMMENTARY



ABSTRACT

How do alternative development programs, designed to diminish the presence of illicit crops, might cause unexpected consequences? This article studies how the announcement about an alternative development program, following the signing of the peace agreement in Colombia, resulted in an increase in coca cultivation. Employing a difference-in-differences methodology, this document evaluates the impact of the National Comprehensive Plan for the Substitution of Illicit Crops (PNIS – for its acronyms in Spanish) on the incentives to cultivate coca crops. Our empirical findings show that the announcement of this program led to a substantial average increase of 791 ha of illicit crops per municipality. This increment equates to 40,341 additional hectares, constituting approximately 53% of the overall surge in illicit crop cultivation during the year following the program's announcement. In our exploration of underlying mechanisms, we discuss the interplay of economic incentives for both coca and non-coca cultivators and the electoral motivations of the FARC political party.

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Colombia, the world's leading producer of coca leaf and cocaine, has grappled with the challenges of combating the illegal drug trade for decades. Since the late 1980s, different governments and the international community have applied different strategies for the reduction of illicit crops. These programs have primarily focused on the forced eradication of crops – manual and aerial – or on alternative development strategies at the local level.

However, each of these policies has produced diverse outcomes and unintended consequences. For instance, some studies suggest that aerial eradication led to significant replanting and the displacement of illicit cultivation to special management zones (Rincón-Ruiz et al. 2016), in addition to adverse effects on the health of people living in coca-growing areas (Camacho & Mejía 2017). Furthermore, it incurred substantial economic costs: during *Plan Colombia* (2000–2008), when forced eradication was intensified, the country allocated 1.1% of its national GDP annually to this policy (Mejía 2016).¹ Nonetheless, this policy, overall, appears to be less effective compared to strategies involving seizures and the destruction of infrastructure for reducing the cocaine supply (Zuleta 2019).

Other studies have shown that alternative development programs have not been successful in reducing illicit crop cultivation (Buxton 2015)² and have increased violence against target populations (Marín Llanes 2022). Mainly because the focus has been short-term (Lupu 2004), in small territorial spaces (Vargas 2011), and has been integrated into the security agenda, instead of to a broader development policy (Garzón & Gélvez 2018). Therefore, this type of policy should not be an anti-drug program, but a social and rural development strategy (Babor et al. 2010). In contrast, the literature has revealed that interdiction – including the destruction of drug laboratories³ – can lead to an 8- to 10-ha reduction in coca cultivation within the subsequent 2 years (Cote 2022). These findings suggest that changes in drug policies, shifting from eradication to interdiction, may partly account for the increase in coca fields.

Despite the various policies that have been implemented and their diverse effects, Colombia has not succeeded in reducing its total number of hectares dedicated to illicit crops. This situation has sparked discussions about the need for alternative policies that could be more effective in reducing coca cultivation in the country (Gutiérrez Sanín, Machuca Pérez & Cristancho 2019).

In this context, and as part of the peace process with the FARC, Point IV of the Peace Agreement established the National Comprehensive Program for the Substitution of Crops for Illicit Purposes (*Programa Nacional Integral de Substitución de Cultivos de Uso Ilícito y Desarrollo Alternativo – PNIS*). The policy, spearheaded by the Presidency of the Republic, aims to create improved living conditions for communities affected by illicit crops (Oficina del Alto Comisionado para la Paz 2016). Moreover, the program includes the participation of the FARC as an advocates for the substitution policy (Garzón & Bernal 2017).

Although during the peace process held in La Havana, there was no discussion of cash transfers, in practice the *PNIS* became a conditional subsidy, as it provides benefits to families living in coca-growing areas, if they meet the program's requirements. For this purpose, families that had illicit crops must eradicate while the National Government oversees the provision of a series of payments, coordinates the delivery of technical assistance, and promotes the start of productive projects. It should be noted that the program was aimed at families with small crops that lived in these areas, therefore, the *PNIS* also benefits families without illicit crops (Gutiérrez Sanín, Machuca Pérez & Cristancho 2019).

Despite the objectives of the program, coca cultivation in Colombia increased to more than 171,000 ha in 2017, the highest number on record by that time (UNODC 2022). Both politicians⁴

¹ It is noteworthy that the United States' contribution, amounting to nearly \$10 billion since 2000, represents only 5% of Colombia's total expenditure on Plan Colombia (The White House, 2016).

² Some studies, however, have shown positive effects of alternative development in other regions. The research by Diskul et al. (2019), for example, presents the "Thai approach" as a successful case of alternative development specifically within the context of Thailand.

³ By drug laboratories we mean drug production facilities where typically are used for the illicit manufacture of drugs, such as methamphetamine, cocaine, or other controlled substances.

⁴ '(...) The rural population thought: "A voluntary crop substitution will take place here, there will be benefits for cultivating coca leaf, so we will do so and crops went up"' Juan Manuel Santos, former president of the Republic of Colombia (La República, 2018).

and researchers (Mejía, Prem & Vargas 2023) assure that the increase in illicit crops could be related to the incentives generated by the substitution program.

Given the magnitude of the subsidy and FARC's support to the program, this research seeks to test whether the announcement of monetary transfers provided by the substitution program influenced the cultivation of coca crops. Specifically, this study presents the results of the impact evaluation that determines the effect on coca leaf crops of announcing the municipalities that would benefit from the *PNIS*. Using the differences in differences methodology, we used municipalities participating in the *PNIS* at the end of 2017 ($n = 51$) as the treatment group, and municipalities that had illicit crops but did not participate in the program ($n = 326$) served as the control group. As a result of announcing the illicit crop substitution program, we found that the average number of hectares of coca leaf present in municipalities increased by 791.

Unlike other articles, such as López et al. (2022), which primarily focus on studying the effects of programs aimed at reducing coca crops, our research takes a unique perspective. Instead of evaluating the program's outcomes, we scrutinize the announcements made regarding which municipalities would benefit from it. In doing so, this study makes a valuable contribution to the existing literature that delves into the root causes of the increase in illicit crops.

In this context, our paper enriches the broader understanding of the intricate interplay between illicit economies, development, and policy choices. It underscores the necessity of adopting a multidisciplinary approach to tackle these issues effectively. It emphasizes that successful drug policies should be firmly grounded in evidence-based practices and consider the broader socio-political context.

Our paper also holds important public policy implications. Governments worldwide are constantly contending with the enduring challenges presented by armed groups and illicit drug production. Initiatives like *PNIS* have received substantial attention in this struggle. Notably, the significance of drug policy remains particularly relevant in the present context, as the current Colombian government has shown interest in developing similar programs (Thornton 2022). Consequently, the insights derived from this study maintain their pertinence and continue to provide valuable guidance in the ongoing efforts to address the issues surrounding drug production and development in Colombia.

This document is organized as follows: Section 2 explains the context, detailing the substitution program, the role of the FARC, and how incentives may have influenced the increase in the number of hectares of coca crops. Section 3 discusses the data and methodology used, while Section 4 presents the results. Concluding remarks and limitations are provided in Section 5.

2. CONTEXT

2.1. HOW DOES THE ILLICIT CROP SUBSTITUTION PROGRAM WORK?

As part of the peace process with the FARC, point IV of the Agreement '*Solution to the problem of illicit drugs*' established the Comprehensive National Program for the Substitution of Crops for Illicit Purposes (*PNIS*). The *PNIS* is a chapter of the Comprehensive Rural Reform which is responsible for coordinating and executing the process of voluntary substitution of illicit crops, while seeking to comprehensively transform the living conditions of rural communities (Oficina del Alto Comisionado para la Paz 2016).

Thus, the substitution program is based on collective and participatory development using community assemblies, with the aim of identifying the needs of the different program participants. As such, it is a requirement for the program's implementation to create and sign agreements with the communities, where they agree not to replant, and not to participate in the illegal marketing of raw materials derived from illicit crops. At the same time, the government commits to providing the established monetary transfers, as well as to provide technical assistance.

2.2. WHAT BENEFITS WOULD BE GIVEN TO FAMILIES PARTICIPATING IN THE PROGRAM?

The program is divided into two components: the comprehensive community-based and municipal plans for the substitution of illicit crops and alternative agrarian development (*Plan Integral comunitario y municipal de Sustitución y Desarrollo Alternativo – PISDA*) and the

immediate attention plan and development of rural productive projects (*Plan de Atención Inmediata – PAI*).

The first of these components, *PISDA*, is the result of a grassroots construction process with community assemblies, representatives of the national, departmental, and municipal governments, the FARC, and social organizations in the territory. This will include plans for rapid execution of social infrastructure works, environmental sustainability and restoration, formalization of property, among others (Alta Consejería para el Posconflicto 2017).

The second component, the *PAI*, is the actions and resources that the Government will urgently implement to guarantee the incomes of families that will substitute illicit crops, which, according to the Ministry of Justice of Colombia (2022), includes:

1. Six bimonthly payments of two million COP (500 USD) for 12 months for crop substitution activities.
2. A one-time \$1.8 million COP (450 USD) for the implementation of self-sustainability and food security projects.
3. A payment of nine million COP (2,250 USD) for the adaptation and implementation of short-cycle and fast-track projects.
4. 10 million COP (2,500 USD) in productive projects and/or labor
5. One million COP (250 USD) per month for one year for collectors who engage in and carry out community-oriented activities.⁵

In addition to this, the Government provides a special soft line of credit to support voluntary substitution processes as well as productive projects. It also provides comprehensive technical assistance (CTA) throughout the process for each of the beneficiary families.⁶

That is, a beneficiary family could access a \$36 million COP (close to \$9,000 USD) subsidy during the two years of program implementation.⁷

2.3. FARC's PARTICIPATION IN THE SUBSTITUTION PROCESS

Although FARC's participation and commitments were not explicit in the Peace Agreements, government documents show that the former guerrilla played an active role in promoting the *PNIS* in municipalities where it had a former presence (Consejería Presidencial para la Estabilización y la Consolidación 2017). The FARC's interest in participating in the program may have been motivated by its political interests through more influence in the rural population who lived off coca to join the program, which capitalize on their political aspirations in the peace-building zones (Balcázar, Varela & Barbosa 2018; Gelvez & Johnson 2023). However, the non-involvement of the guerrilla group as a promoter of the program could affect the legitimacy of the *PNIS* (Bernal, Gelvez & Garzón 2022), so this was a risk that had to be assumed.

Considering the factors mentioned above, it is conceivable that the FARC guerrillas could have advocated for participation in the *PNIS*, ultimately contributing to a surge in illicit crop cultivation. The ambiguity surrounding program beneficiaries may have compelled aspiring recipients to cultivate illicit crops to qualify for the substitution program's benefits. Other agents may have been involved, as Gutiérrez et al. (2020) noted, social leaders encouraged the participation of families and promoted the program despite personal risk. This hypothesis offers a plausible explanation for the escalation of illicit crop production in Colombia.

2.4. INCENTIVES TO CULTIVATE COCA

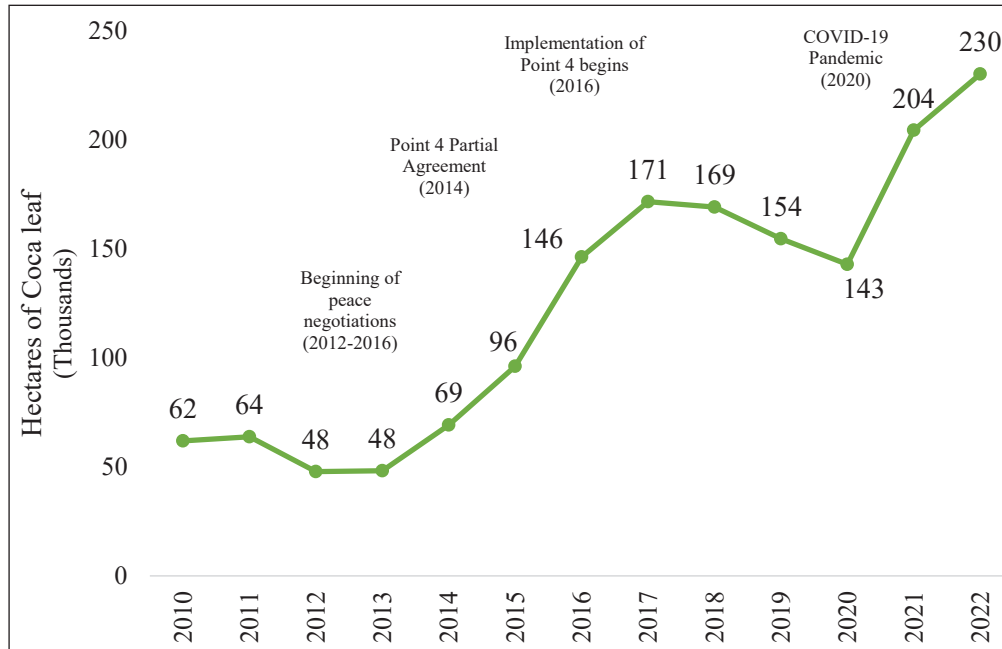
Despite undergoing periods of significant decline, authorities documented the highest number of coca hectares following the implementation of Point IV. Notably, while growth had been steady

⁵ Using an exchange rate of \$4000 Colombian peso per US dollar.

⁶ Technical Assistance for Comprehensive and Sustainable Territorial Development is a program that aimed at strengthening the productive capacities of rural, family, and community-based economies. The program invites stakeholders (i.e., local leaders, families, authorities, social organizations, etc.) to learn about successful experiences in comprehensive technical assistance for productive development, the strengthening of organizational and community capacities, sustainable management of natural resources, the adoption of technologies, and above all, the development of local talents and human capital.

⁷ It is worth noting that the substitution program has had notable delays in its implementation, which has generated discontent and hinders the sustainability of the substitution (Garzón et al. 2019).

since 2013, 2016 marked the most substantial increase in the past six years, with the total number of hectares skyrocketing by 52%, representing a 13-percentage point surge from 2015's growth rate. Since then, the number of hectares has witnessed substantial growth, except for a specific period during the pandemic when, primarily due to other criminal activities in the country (Gómez 2020) and the altered priorities of the security apparatus (Gélvez, Aguirre & Rodríguez 2023), there was a notable decrease in illicit crops. Nonetheless, the number of hectares has rebounded, reaching the highest level ever recorded in Colombian history in 2022 (See Graph 1).



Graph 1 Behavior of number of hectares of coca leaf in Colombia (2010–2022).

Source: UNODC (2022).
Authors' elaboration.

Multiple scholars have attributed the increase in illicit crops in 2017 to various factors that exhibit regional variation. These factors include the departure of the FARC and the subsequent restructuring of drug trafficking (Mejía, Prem & Vargas 2023), a decrease in the price of gold (Llorente & Garzón 2018), violence directed at social leaders (Marín Llanes 2022), an uptick in drug seizures, and the low levels of manual eradication in areas with a high crop density (López et al. 2022), among others. Furthermore, the literature has posited that the peace process might have played a role in the escalation of coca cultivation. This hypothesis revolves around the notion that misinformation within communities about the workings of the substitution program led them to believe that their benefits would increase as their illicit crops expanded (Llorente & Garzón 2018; Mejía, Prem & Vargas 2023).

This document presents one of the possible mechanisms that led to the increase in illicit crop cultivation: the announcement of the coca substitution program.⁸

In early 2017, following the signing of the Peace Agreements, the *PNIS* was formally initiated. However, the data suggests that it was in 2016 when incentives for increased coca cultivation were established. As a prerequisite for program participation, communities had to reach an agreement, allowing families to identify the municipalities where the substitution program would be implemented. This, in turn, led to the creation of incentives to receive subsidies, ultimately resulting in a surge in illicit crop cultivation. This hypothesis holds particularly true for seven municipalities that finalized community agreements at the close of 2016 (Garzón & Bernal 2017).

However, these municipalities are not believed to be the only ones with knowledge of their future participation in the program. Given that the decision on which territories would participate in the *PNIS* was taken at discussions between the Presidency and the demobilized group, the FARC was previously aware of this information (Mejía, Prem & Vargas 2023). Therefore, considering that the role of the ex-guerrilla was to promote and motivate families to participate in the

⁸ In this policy paper, it is essential to note that there are several mechanisms we have not addressed, and these areas warrant future research attention. For instance, the suspension of aerial fumigation of coca crops by the National Government and the political processes involved in the selection of *PNIS* municipalities are significant aspects that merit further investigation.

substitution of illicit crops – especially in those places where this group has had influence – it is possible to argue that, through them, certain rural populations were previously aware of their status as possible participants in the program.

PNIS also includes families that do not grow illicit crops, but that inhabit territories where these are present (Marín Llanes 2022). However, the transfers for these families are smaller than the ones for coca-growing families (Bernal, Gélvez & Garzón 2022), inducing families that were previously out of the market to cultivate. Given this, a family that lives in areas with illicit crops but does not participate in the illegal economy may have been encouraged to grow coca, even if the *PNIS* also accepts families without coca crops.

Considering that the monetary transfer provided by the program represents more than 150% of the annual income of an average *PNIS* family – which is the weakest part of the drug trafficking chain and is significantly poorer than an average rural family (Garzón & Gélvez 2018) – the incentives for families to grow coca for monetary reasons were large.

Additionally, qualitative research contends that in regions with illicit crops, specific families were incentivized to engage in coca cultivation. Ideas for Peace Foundation, for example, argued that households already involved in illicit crop production believed that participating in the *PNIS* would yield greater benefits with an expanded coca area. In departments like Putumayo, for example, Garzón and Gélvez (2018) documented instances of families dividing their land, and in some cases, even going through divorces with the aim of securing duplicated benefits.

Hence, the rise in illicit crops might be attributed to incentives affecting two distinct groups of households: those without coca crops prior to the announcements who sought to access *PNIS* benefits; and families who already cultivated coca. The latter, misled by program misinformation, believed that increasing their illicit crop production would lead to greater financial gains.

3. DATA AND METHODOLOGY

To ascertain the impact of the substitution program announcement on coca cultivation per municipality, we conducted an impact assessment employing the Difference-in-Differences (DiD) methodology. This statistical approach involves comparing changes in outcomes over time between a treated group and a control group, both before and after the intervention. In our study, the treatment group comprises municipalities designated as beneficiaries of the *PNIS* by the end of 2017, while the control group consists of municipalities with existing coca crops but without program participation. The analysis encompasses the periods before and after 2017. To conduct this assessment, we drew upon four primary sources of information:

First, information was available from the Integrated Illicit Crops Monitoring System (SIMCI) of the United Nations Office on Drugs and Crime (UNODC), which annually records the number of hectares of coca in each of the country's municipalities. This database is built with satellite images and the data is validated by aerial recognition (UNODC 2022). The cut-off date is December 31 of each year, from 2001 to 2017. Second, information on manual eradication and aerial spraying was also used at the municipal level. These open data are published by the Drug Observatory of the Ministry of Justice and come from the Anti-Narcotics Police and the Ministry of National Defense.

The third source of information is the Consolidated Executive Report published by UNODC. This document presents the results of the monitoring and verification of illicit crop substitution commitments of the *PNIS*. The information taken from this report was regarding the municipalities that participated in the substitution program as of December 2017.

Lastly, panel data for 1040 municipalities in the country between 1993 and 2017 were obtained from the Center for Economic Development Studies of the Universidad de Los Andes (CEDE). This database has information on the municipality's altitude, distance to the department's capital, distance to Bogotá, and an index of FARC's presence,⁹ among other municipal characteristics that may explain the number of hectares of coca cultivation in a municipality and, therefore, could bias the estimate.

⁹ Index was developed by the authors. This takes a value of 1 if the municipality had any sort of armed action by the FARC between 2001 and 2012, and 0 otherwise.

With this information, observations were separated into the treatment group, which corresponds to 51 municipalities¹⁰ that were associated with the *PNIS* by December 2017; and the control group, which refers to the 326 municipalities that had coca cultivation between 2001 and 2017 but had no participation in the *PNIS* by the end of 2017.

Based on this, the difference between the two groups was analyzed, before and after 2016, the year in which the families – through the FARC – might have been able to know which municipalities would be beneficiaries of the program and which would not. Thus, the methodology eliminates the pre-existing differences between the municipalities and ensures that the difference found is explained only by the treatment; that is, by having been announced as a beneficiary municipality of the substitution program.

The model that represents the estimate is then:

$$Hec_coca_{i,t} = \beta_0 + \beta_1 PNIS_i + \beta_2 Post_t + \beta_3 PNIS \times Post_{i,t} + X_{i,t} + \varepsilon_{i,t} \quad (1)$$

where $Hec_coca_{i,t}$ is the number of cultivated hectares of coca in municipality i in year t ; $PNIS_i$ is a dichotomic variable that takes the value of 1 if the municipality participates in the program (treatment group) and 0 if it does not (control group); $Post_t$ takes the value of 1 if the year is after 2016, when the program was announced, and 0 if not; $PNIS \times Post_{i,t}$ is the interaction between the two variables previously described; $X_{i,t}$ is the vector of municipality characteristics that may be affecting the number of hectares of coca cultivated, specifically, hectares sprayed, hectares eradicated manually, distance to the capital of the department, distance to Bogotá and FARC's presence; and $\varepsilon_{i,t}$ is the error. Thus, the variable of interest will be $PNIS \times Post_{i,t}$ and, therefore, β_3 will be the coefficient that shows the impact of the program on the number of hectares under coca cultivation.

The differences in differences model only shows a causal effect when both groups show parallel trends prior to treatment; in other words, if their behavior, in the absence of the intervention, would have been the same. This would imply that the groups are comparable and, therefore, that the difference between the two, before and after treatment, would only be caused by having participated in the treatment.

To test this assumption, Table 1 shows the estimates using years 2014 and 2015 as placebo; that is, verifying whether there was a significant difference between the groups during the two years prior to the treatment.

VARIABLES		MODEL (1)
PMS	1,192*** (41-8)	826.9*** (43.1)
PNISx2014	-281.1 (174.2)	-58.38 (163.6)
2014	-67.1 (74.4)	-79.4 (70.6)
PNISx2015	35.8 (174.4)	269 (163.8)
2015	-25.5 (74.9)	-26.87 (71.0)
Controls	No	Yes
R-squared	0.158	0.262
Observations	4.927	4.927

Table 1 Parallel trends test.

Standard errors in parentheses.

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

Column 1 shows that there is no significant difference in the number of hectares of coca between the groups for 2014 and 2015. This result is robust to the inclusion of control variables (Column 2). Thus, it is possible to state that the parallel trend assumption is valid for these

¹⁰ See Appendix 1 for complete list of beneficiary municipalities.

years and, therefore, it is possible to find, through the differences in differences methodology, a causal effect.

4. RESULTS

Using the differences in differences methodology, we estimated the effect of being selected as a municipality to receive the benefits of the substitution program. Table 2 shows the results of the estimation explained in Equation 1.

VARIABLES	MODEL	MODEL	MODEL
	(1)	(2)	(3)
Post	125.6*** (48.6)	153.4*** (44.6)	195.5** (79.8)
PMS	967.3*** (38.1)	563.8*** (37.5)	592.3*** (141.0)
PNISxPost	901.4*** (110.3)	1,141*** (99.9)	791.3*** (192.3)
Controls	No	Yes	Yes
Year > 2014	No	No	Yes
R-squared	0.184	0.345	0.389
Observations	4.519	4.519	1,066

Column 1 shows, with 99% confidence, that on average, municipalities announced as beneficiaries of the substitution program cultivated 901 more hectares of coca compared to the control group. This effect remains significant and positive even after accounting for other relevant variables, demonstrating an increased magnitude of 1141 ha in Column 2. Finally, in Column 3, the estimation focuses solely on the period from 2014 to 2017, where the assumption of parallel trends was verified. It was then established that, as a consequence of being designated as a *PNIS* beneficiary, there was an average increase of 791 ha in coca cultivation.

Between 2015 and 2017, Colombia witnessed a total increase of 75,410 ha of coca crops. Of this, 53% (equivalent to 40,341 new hectares) might be attributed to the incentives generated by the program.

It is crucial to emphasize that we do not assert that the entire surge in coca crops can be solely attributed to the program announcement. There are alternative factors that may have influenced the increase in coca leaf cultivation, such as the substitution with illegal gold mining, a decrease in gold prices, the devaluation of the Colombian peso, or the suspension of aerial glyphosate spraying, as indicated by López et al. (2022). Nevertheless, our study demonstrates that the program indeed created incentives that led to an expansion in the number of hectares dedicated to coca cultivation, thereby contributing to the overall rise in illicit crops within the country.

5. CONCLUDING REMARKS AND LIMITATIONS

The article explores the unintended consequences of incentives within alternative development programs in regions where illicit coca crops are prevalent. Our findings challenge conventional wisdom by demonstrating that the information dissemination about the alternative development program, which followed the signing of the peace agreement in Colombia, had a counterproductive effect. Instead of diminishing coca cultivation, it paradoxically led to an increase. Specifically, our analysis indicates that the prior announcement of the *PNIS* supported by the former FARC with vested political interests, resulted in an average rise of 791 ha of illicit crops per municipality.

Table 2 Effects of the *PNIS* announcement on the number of hectares of coca.

Standard errors in parentheses.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Our estimation does not delve into the program's actual impact or the degree of compliance among beneficiary families. Rather, it focuses on the influence of the announcement on cultivation incentives. In this context, other forms of alternative development programs may not yield the same increase in illicit crop production if policymakers and politicians remain cognizant of the potential unintended consequences of their announcements and incentive structures.

Our findings hold significant implications for the field of public policy literature and offer valuable insights for public officials tasked with designing and evaluating policies related to illicit economies. While our study does not delve into the intricacies of implementation or the various political and social factors at play (for a comprehensive analysis of *PNIS* implementation challenges, refer to [Gutiérrez et al. 2019](#)), we suggested that the political incentives, both from the national government to showcase progress in the peace agreement's development, and from the FARC to establish their political party, may have influenced both coca and non-coca farmers to increase their cultivation. Therefore, future research should prioritize the political and social effects of implementing such peace programs (for instance, see [Gélvez & Johnson 2023](#), for insights into the impact of peace-building institutions on left-wing coalition votes).

Our findings have a few assumptions and limitations. First, we operate under the assumption that both groups would exhibit similar behavior in the absence of treatment. While this assumption holds for the two years leading up to treatment, establishing parallel trends prior to 2013 proves challenging due to the influence of other drug policies that targeted regions with high coca cultivation in preceding years. Also, our study faces limitations due to the absence of an initial list of beneficiary municipalities before 2017. The concrete evidence pinpointing the exact information source that alerted families to *PNIS* inclusion is lacking, making it challenging to draw definitive conclusions about this aspect of our research. Additionally, families in municipalities not designated as beneficiaries of the program may have increased coca cultivation in the hope of later becoming beneficiaries. However, this potential bias might lead to a lower estimate, implying that our current findings represent a conservative bound.

DEPARTMENT	MUNICIPALITY	DEPARTMENT	MUNICIPALITY
Antioquia	Anorí	Guaviare	San José Del Guaviare
Antioquia	Briceño	Meta	La Macarena
Antioquia	Caceres	Meta	Mapiripán
Antioquia	Taraza	Meta	Mesetas
Arauca	Arauquita	Meta	Puerto Concordia
Bolívar	Cantagallo	Meta	Puerto Rico
Bolívar	Santa Rosa Del Sur	Meta	Uribe
Caqueta	Belen De Los Andaquies	Meta	Vista Hermosa
Caqueta	Cartagena Del Chaira	Nariño	Ipiales
Caqueta	Curillo	Nariño	Tumaco
Caqueta	El Doncello	Norte De Santander	Sardinata
Caqueta	El Paujil	Norte De Santander	Tibú
Caqueta	La Montañita	Putumayo	Mocoa
Caqueta	Puerto Rico	Putumayo	Orito
Caqueta	San Jose Del Fragua	Putumayo	Puerto Asís
Caqueta	San Vicente Del Caguan	Putumayo	Puerto Caicedo
Cauca	Argelia	Putumayo	Puerto Guzman
Cauca	El Tambo	Putumayo	Puerto Leguizamo
Cauca	Miranda	Putumayo	San Miguel
Cauca	Piamonte	Putumayo	Valle Del Guamuez
Córdoba	Montelíbano	Putumayo	Villagarzon
Córdoba	Puerto Libertador	Valle Del Cauca	Bolívar
Córdoba	San José De Uré	Valle Del Cauca	Dagua
Guaviare	Calamar	Valle Del Cauca	El Dovio
Guaviare	El Retomo	Vichada	Cumaribo
Guaviare	Miraflores		

Appendix 1 Municipalities that participated in the *PNIS* by the end of 2017.

Source: UNODC (2022).
Author's elaboration.

The authors have no competing interests to declare.

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