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Research paper

New answers to an old problem: Social investment and coca crops in Colombia

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ABSTRACT

Background: For more than 30 years, the main strategy to control illicit coca crops has been forced eradication. Despite the importance of social investment and persistent poverty in areas where illicit crops are grown, there is no empirical evidence of the effect of social expenditures on preventing and reducing the expansion of illicit crops.
Methods: This paper analyses how social investment in conjunction with eradication affects new coca crops. The model is tested using a dataset consisting of annual data for 440 contiguous municipalities that had coca in any year between 2001 and 2010. The analysis includes the two main techniques used to control illicit crops, manual eradication and aerial spraying.
Results: Aerial spraying is effective in deterring farmers from increasing the size of their new coca fields, but this effect is small. Social investment, in addition to generating social welfare, has a significant negative relationship with new coca crops, 0.09-hectare reduction in new coca crops per additional 50-cent spent in social investment (human capital and infrastructure) per inhabitant.
Conclusion: Social investment emerges as a complementary and effective strategy to control illicit crops.

Introduction

Forced eradication is the main strategy to control illicit crops (Reuter, 2010). This coercive tactic is implemented worldwide to control cannabis, coca leaf, and opium poppy (UNODC, 2014c).[1] Billions of dollars have been poured into this task. Since 1999, the United States spent nearly USD 5 billion in Colombia trying to control cocaine production and USD 7 billion in Afghanistan trying to control opium poppy (GAO, 2008; Oehme, 2010; SIGAR, 2014b).[2] Despite these investments, as of 2013, opium production in Afghanistan reached the highest area under cultivation since 1993 (SIGAR, 2014a), and the area affected by coca crops in Colombia dropped just 17 per cent over the 2001–2010 period (UNODC, 2014b). Despite the importance of assessing the effectiveness of illicit crop eradication, there has been no systematic evaluation of the strategy in either country.

Existing research assessing the effectiveness of illicit crop eradication on coca cultivation yields contradictory conclusions. Results vary depending on the period of time evaluated and the unit of analysis. Studies based on data from 1988 to 2008 reported that aerial spraying—one of the methods used to eradicate crops—has little impact on illicit crops, or increases the area under coca cultivation (Bogliacino & Naranjo, 2012; Diaz & Sánchez, 2004; Moreno-Sanchez, Kraybill, & Thompson, 2003; Moya, 2005; Reyes, 2011; Tabares & Rosales, 2005). These striking results question the effectiveness of aerial spraying, and imply that there are unintended consequences from the control strategy. Conversely, analyses based on theoretical models calibrated using data from 2000 to 2003 and survey-based experiments using data from 2005 concluded that aerial spraying was effective on reducing the area on illicit crops (Grossman & Mejia, 2008; Ibañez & Carlsson, 2010). Therefore, the debate on the effectiveness of eradication on illicit crop cultivation remains unresolved.

The main limitations of previous studies lie on the use of country-level aggregate data (Moreno-Sanchez et al., 2003), the lack of comparability between surveys used in the analysis

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[1] Forced eradication of cannabis occurs in Italy, the United States, Ukraine, Tajikistan, and the Philippines. Forced eradication of coca occurs in Colombia, Peru, and Bolivia. Forced eradication of opium poppy occurs in Afghanistan, Myanmar, and Mexico (UNODC, 2014c).

[2] According to GAO (2008), 80 per cent of the U.S. funding to Plan Colombia from 2000 to 2008 were spent on counternarcotic and security activities. From 2002 to 2013, the United States spent USD 6.9 billion on counternarcotic activities in Afghanistan (SIGAR, 2013).

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(Moya, 2005; Tabares & Rosales, 2005),[3] and the fact that farmers often locate in areas historically affected by illicit crops (Ibañez & Carlsson, 2010).[4] In this study, I aim to overcome those limitations by: (1) analysing a period of 10 years under a single regime to control illicit crops and based on comparable survey data (UNODC & Gobierno de Colombia, 2011), (2) incorporating social expenditure as a complementary strategy to control illicit crops, and (3) controlling for unobservable factors that may vary across municipalities but do not vary in time. In particular, my analyses simultaneously test the effectiveness of *ex ante* regulations (structural laws and market incentives) and *ex post* penalties (statutory commands) to control coca crops.

Ex ante regulations are more preventive than reactive (Bright, 1992); they control behaviour indirectly by influencing the physical and social arrangements that facilitate the behaviour to occur (Cheng, 2006). *Ex post* penalties, in contrast, regulate behaviour directly by setting specific prohibitions or standards of conduct. Here, *ex ante* regulations are operationalized as social investment in infrastructure, human capital, and alternative development programs, while *ex post* penalties are operationalized using manual and aerial spraying.

To determine if *ex ante* regulations contribute to controlling illicit crops, I use annual data for 440 contiguous municipalities that had coca in any year between 2001 and 2010. I estimate a panel data regression model to assess the effect of investments in infrastructure and human capital on new area of coca. The results suggest that aerial spraying is effective in deterring farmers from increasing the size of their new coca fields, but this effect is small. Social investment, in addition to generating social welfare, emerges as an effective complementary factor to control illicit crops. Additional USD 5.55 spent in social investment (human capital and infrastructure) per inhabitant prevents the appearance of a whole new hectare, which saves around USD 1954 that would have been spent on aerial spraying to reduce cultivation by the same area.

The paper is organized as follows. Section 2 encompasses historical background of illicit cultivation in Colombia with the theoretical approach to control illicit crops. Section 3 describes the strategies to control illicit crops. Sections 4 and 5 introduce the data and analytical strategy. Section 6 presents the results of the panel data regression with municipality and year fixed effects, and Section 7 closes with a discussion of the results, highlighting the some of the limitations of this analysis.

Background and theoretical approach

Old problem, old approach

In Colombia, as 2013, growing illicit crops is regulated mainly by statutory commands, specific prohibitions or standards of conduct that are enforced by police and prosecutors. Growing illicit crops is a felony; crops are destroyed using forced eradication; and in theory, illicit crop growers could face up to 12 years in prison and 400 monthly minimum wages in fines, or around USD 110,000 ("Ley 30 de 1986," 1986).[5] In practice, however, there are municipalities in which the probability of crop eradication is close to zero;[6] there are large numbers of violators; and few are prosecuted.[7] As a result, in illicit crop growing areas, growing illicit crops is socially accepted and noncompliance is rampant.

Statutory commands, such as forced eradication, rely on deterrence to regulate behaviour (Cheng, 2006), but deterrence is difficult to attain with widespread noncompliance, as is the case in illicit crop growing areas of Colombia. To improve deterrence it would be necessary to increase the probability of being caught or implement more severe punishments if caught, or both (Becker, 1968). In the case of coca growing, improving deterrence involves increasing the number of coca growers caught, the number of years in prison, and the number of hectares eradicated. However, given the large number of people involved in growing illicit crops, the few prosecuted, and the large number of hectares already eradicated,[8] increasing the penalties is unlikely to change the supply of coca.

Following the framework of the economic theory of crime (Becker, 1968), farmers weigh the best legitimate work opportunity against the payoff of growing illicit crops. If the payoff of growing coca exceeds the best legitimate opportunity, then crime is committed. Therefore, aggregate stable or increasing area implies that forced eradication (other things being equal) does not generate enough incentives to reduce the area under cultivation. If farmers, on average, are keeping or increasing the size of their fields, their decision must be related to the benefit associated to growing coca, the cost of committing crime, and the best legitimate productive alternative available. Since coca leaf prices have decreased consistently,[9] eradication actions have increased steadily (see Fig. 1), and the punishment if caught is constant (years in prison and fines), then legitimate productive alternatives must help explain why coca cultivation has not declined.

Areas where coca is grown

Coca crops in Colombia are located in remote regions of the country that are isolated by geographic barriers and inclement weather. Most of the municipalities in Colombia do not have coca crops (61 per cent), but those that do, are on average six times larger than municipalities lacking coca crops. Only six per cent of all municipalities in Colombia are located in the Amazon region of the country. However, 15 per cent of the municipalities with coca crops are in the Amazon region, and about 59 per cent of the area affected with coca crops in Colombia is located in this region. These municipalities are covered with thick rainforest and receive, on average, 900 mm more rainfall per year compared to municipalities without coca crops (see Tables 1 and 2).

Due to their geographic location and historical neglect, municipalities with coca crops also have poor infrastructure. On

[3] Moya (2005) and Tabares and Rosales (2005) analyzed 1999-2002 data. However, data after 2000 cannot be compared with data from previous years due to change of methodology to estimate the number of hectares under cultivation (UNODC, 2003). Coca surveys in 1999 and 2000 did not cover the entire country (UNODC, 2009). Coca survey conducted in 1999 covered 12 per cent of the country while coca survey conducted in 2000 covered 41 percent; limiting the sample to areas where the UNODC suspected that coca was present (UNOCD, 2001). Starting in 2001, coca surveys cover the whole country.

[4] Ibañez and Carlsson (2010) used a survey-based experiment of 293 self-selected coca and non-coca farmers from Putumayo, a state in which 80 per cent of its municipalities have areas under coca cultivation (UNODC, 2010). Therefore, it is an extreme case that could not be generalizable.

[5] In 2012, the monthly minimum wage in Colombia was COP 566,700, and the exchange rate COP to USD was around two thousand pesos per dollar.

[6] Author's estimations based on 2001-2010 coca surveys.

[7] It is estimated that in 2009 about 300,000 people were involved in coca cultivation. However, Colombian police reports 855 felonies (Policía Nacional de Colombia, 2010) and only 162 people were prosecuted for this crime. The unusual prosecution made national news (El Tiempo, 2009).

[8] In 2012 a vast portion of the area of coca identified was eradicated; 131,035 hectares were eradicated out of 135,000 hectares affected by coca crops (UNODC, 2014a). However, at the end of the year 48,000 hectares of coca remained. Please note that the UNODC estimates the area affected with coca crops by a geographical sum of the coca crop area from aerial spraying, manual eradication, and the annual coca survey. This method does not take into account that the same hectare could be eradicated more than once.

[9] Coca leaf prices decreased from COP 3,300/kg in 2004 to COP 2,465/kg in 2010 (UNODC, 2011a).