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The role of land property rights in the war on illicit crops: Evidence from Colombia

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ABSTRACT

This paper examines the effect of the formalization of land property rights in the war against illicit crops, using the case of Colombia. We argue that as a consequence of the increase in state presence and visibility, municipalities with a higher level of formalization of their land property rights witnessed a greater reduction in the area allocated to illicit crops. We hypothesize that this is due to the possibility of obtaining more benefits in the newly installed institutional environment when land is formalized, and the increased cost of growing illicit crops on formal relative to informal land. We find that a one-standard-deviation increase in the formality index for smallholders is related to a reduction in the share of municipal area allocated to coca crops of 0.101 percentage points. That is, the formalization of one additional hectare of land with respect to small landholders in an average municipality in the year 2000 is associated with a decrease of approximately 1.4 hectares of land allocated to coca within that particular municipality, ceteris paribus. These results remain robust to a number of sensitivity analyses. Our findings contribute to empirical evidence on the positive effects of formal land property rights and effective policies in the war on drugs.

1. Introduction

The distribution and definition of land property rights play a crucial role in the transition from an agricultural to an industrial economy (Barraclough, 1970; Easterly, 2007). In most western economies, a more formalized scheme of land property rights has been associated with higher levels of investment, income growth, accumulation of human and physical capital and poverty reduction, among other social and economic outcomes (Banerjee, Gertler, & Ghatak, 2002; Besley & Burgess, 2000; Dercon & Krishnan, 2010; Deininger & Nagarajan, 2009). By contrast, high levels of informality might represent an important hindrance to the development process (Acemoglu & Robinson, 2006; Barraclough, 1970; Dercon & Krishnan, 2010). Many scholars have suggested that a lack of formal land rights could hinder law enforcement by government bodies, increase social tensions, facilitate illegal recruitment, forced displacement and land appropriation, and boost illegal activities in conflict areas (André & Platteau, 1998; Grossman & Kim, 1995; Ibanez & Carlsson, 2010). Despite the empirical evidence on the social and economic outcomes associated with either formal or informal land property rights systems, relatively little attention has been placed on the relationship between the strength of land property rights and illicit activities.

In Colombia, on average, approximately 22 percent of all private rural land has no formal title, of which 89 percent are small plots of less than 20 hectares – ha. These territories are characterized primarily by weak law enforcement, an abundance of natural resources, and a high prevalence of poverty, which creates a perfect breeding ground for illegal activities such as coca cropping (Dávalos et al., 2011). During the 1990s, Colombia became the largest coca producer in the world (Angrist & Kugler, 2008). In response, the Colombian and US governments launched the program *Plan Colombia*, which was intended to strengthen the military power, social cohesion and justice. As a result, Colombia became a major recipient of US military assistance (Dube & Naidu, 2015). Nonetheless, despite the billions of dollars spent, the coca production economy seemed hardly damaged. Instead, because of the adaptive behavior of the coca growers, in 2009 nearly the same amount of cocaine was being produced on only half of the land that was being used for the cultivation of coca crops before the beginning of *Plan Colombia* (GAO, United States Goverment

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Accountability Office, 2008; Mejía, 2010b). This context demonstrates the need to thoroughly understand which strategies were more effective in reducing coca production, and under which circumstances.

In this paper, we analyze the role of the level of formality of land property rights in the "War on Drugs" in Colombia. We argue that the low presence of the state in most of the Colombian regions before 2000 boosted the spread of coca crops throughout the territory. Once the rule of law increased, attempts to reduce coca crops were more effective in those municipalities with more formalized land property rights. Two main mechanisms might explain this relationship. First, improved institutional conditions due to the increased state presence (e.g., *Plan Colombia*), could have been more attractive to peasants with legal titles because they were able to benefit more from alternative programs (both within *Plan Colombia* and outside the scope of this counter-drug policy), for example by using land as collateral to obtain credit, or by substituting illegal crops for low-risk cash crops, among others. We call this the substitution mechanism. Second, there is an increase in the cost of cultivating coca due to more severe sanctions. On the one hand, formal ownership implies criminal responsibility for landholders that grow coca on their land plot. On the other hand, land titles inherently increase land value, *ceteris paribus*. Hence, as the government expropriates landowners with coca crops from their land, the cost associated with expropriation rises. This operates as a standard deterrence mechanism as proposed by Becker (1968). In sum, we argue that improved land rights create microeconomic incentives to change risk-taking behavior once law enforcement increases.

Our identification strategy exploits the plausibly exogenous variation in the level of formalization of land property rights at the municipal level provided by the "Program for Land Titling and Modernization of the Registry of Deed and Cadastre." This program was a joint effort by the Colombian Government and the Inter-American Development Bank (IDB). This initiative was intended to increase the coverage of cadastral information and the level of formalization of land property rights across the Colombian territory. The program was implemented between 1995 and 2000 in about one-fifth of the Colombian municipalities, leading to a plausible exogenous source of temporal variation in the level of formalization in these municipalities for the following reasons. First, it started a supply-driven formalization process for landowners whose titles were not formally registered. Second, this process was centralized and implied a minimum level of involvement by the landowner. Third, the duration of the process until the resolution of the formalization process was driven by factors that are arguably exogenous to unobserved characteristics that can be correlated with the presence of coca crops in a municipality. Importantly, since these municipalities were all subject to the same program, for our sample the quality of the land tenure information is reliable. Also, we expect measurement errors not to be correlated with unobservables either.

There are several threats to our identification strategy. First, increased levels of formalization could lead coca growers to migrate to other municipalities where the formalization process is slower to grow coca there, which would confound our effect. Second, there may be omitted time variant productivity conditions at the municipal level that might also explain the change in coca crops. Third, the level of formalization of the land property rights is correlated with the development process itself, and so our results could be capturing a broader social phenomena that is also time variant at the municipal level. Fourth, the government may have deliberately targeted those municipalities that experienced an improvement in land formalization through their other counter-drug policies. In such a case, those policies would be confounding our results. We provide empirical evidence to rule out these threats, as well as additional sensitivity analyses using alternative independent variables.

Additionally, we provide empirical evidence on a transmission mechanism that could explain the relation: improved institutional conditions allow peasants to benefit more from alternative legal activities (i.e. substitution). We test this mechanism in two different ways. First, by using information on coffee cropping, the most important cash crop in Colombia, we test whether the change in the level of formality of land property rights is positively correlated with coffee growing. Such a correlation would suggest peasants might be benefiting from this alternative crop. Second, we test whether alternative development programs that were universally implemented in coca growing municipalities persisted more in places with improved land rights. Such a situation would strengthen the argument that peasants could be benefiting more from legal alternatives.

We use a data set of Colombian municipalities from 2000 to 2009. As a proxy for the level of formalization of land property rights, we build an index based on the share of small plots ($\leqslant 20$ ha) without legal deeds. We create the index using plot-level census data from the Colombian Geographical Institute Agustín Codazzi–IGAC, *Spanish acronym*–. We focus primarily on these smaller plots, as the vast majority of coca is found to be produced on such land[1] (Mejía & Rico, 2010). Often, the strength or safety of property rights is measured through an index based on the risk of expropriation (Acemoglu, Johnson, & Robinson, 2001; Knack & Keefer, 1995). Although having a formal title or deed does not guarantee that a person is protected from becoming a victim of expropriation when law enforcement is weak, we argue that titling allows for the possibility of resorting to formal mechanisms to regain lost land through judicial institutions. In addition, we use information on coca crops provided by the United Nations Office on Drugs and Crime–UNODC–and the Colombian Government.

We estimate a fixed effects model for the sample of municipalities where the "Program for Land Titling and Modernization of the Registry of Deed and Cadastre" took place and either have natural conditions for cropping coca (i.e., an altitude of 500 to 2000 meters above the sea level) or ever had coca crops during the period from 2000 to 2009. In addition to controlling for time-invariant municipal characteristics, this specification allows us to introduce different linear and non-linear time trends that could bias our estimates. Because of the highly endogenous relationship between the "War on Drugs" and coca production, we cannot directly include controls for law enforcement. Although this issue is partially addressed by the inclusion of municipal-level fixed effects, we also include the interaction between the time trend and the presence of military bases of the government. One characteristic of the US military aid in Colombia is that it is disbursed to specific military units that operate from different military bases. Thus, one may expect that those municipalities with military bases were more exposed to the increase in law enforcement (Dube & Naidu, 2015).

Our findings suggest that stronger property rights structures have a negative effect on the share of land allocated to coca crops. We find that a one-standard-deviation increase in the formality index for small landowners is associated with a decrease in the share of municipal area allocated to coca crops of 0.101 percentage points, on average. To put these numbers into perspective, they imply that the formalization of one additional hectare of land with respect to small landholders in an average municipality in the year 2000 is associated with a decrease of approximately 1.4 hectares of land allocated to coca within that particular municipality, *ceteris paribus*. This is a local effect for the sample

[1] According to Mejía and Rico (2010), the average size of a coca field in 2002 was 2.2 ha, in 2008 around 0.6 ha. This implies that around 166,000 rural household were involved in coca crop cultivation in 2008.