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# State and Power in Rural Africa: Evidence from Madagascar<sup>\*</sup>

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## Abstract

Despite the presumed importance of a strong state in the development process, there has been very little empirical work assessing the state's ability to exercise power in isolated areas and understanding the means through which the state exerts that power. This paper begins to fill this gap in the literature by examining the relationship between state power and isolation using several proxies for state power with a rich panel data set from Madagascar. We find strong evidence that the extent of state power is severely limited in isolated areas.

Keywords: State, State Power, Africa, Sub-Saharan Africa

## 1. Introduction

In his essay "Politics as a Vocation," Weber (1919) famously defined the state as "a human community that (successfully) claims the monopoly of the legitimate use of physical force within a given territory." Although Weber's theoretical definition is consistent with the empirical notion of state in most Western industrialized and democratic countries, it is seemingly at odds with the state as it exists in most of sub-Saharan Africa, where state power is highly unevenly distributed within a typical country's borders. In this paper, we address the lack of empirical work in this area and test several proxies of state power using a nation-wide data set from Madagascar.

In his seminal monograph, Herbst (2000) demonstrates how the reach of the typical African state is usually limited to the areas immediately surrounding the capital city, and sometimes to the areas surrounding other big cities such as regional capitals.<sup>1</sup> Moreover, since the wave of African independence in the 1960s, colonial conceptions of the African state as the all-powerful *bula matari* ("crusher of rocks") have been replaced by a post-colonial conception of the African state as an emasculated apparatus which, though it may enjoy international recognition, is often unable to carry

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<sup>1</sup> Even then, it is not necessarily the case that the state can broadcast its power in regions surrounding regional capitals. This is especially so when the seat of power – and thus the state – has traditionally been controlled by a given ethnic group, and regional capitals are controlled by other ethnic groups, as is the case in the country studied in this paper and in several other African countries.

out some of the critical functions of government, such as maintaining law and order and providing public goods, within its own borders (Young, 1997).

If African states can only broadcast their power within short distances from their capitals and other big cities, this can have direct implications for the welfare of the millions of Africans who live in remote areas. The failure of the state to ensure security over land and property and establish the conditions for economic integration within the country (through, for example, providing transportation infrastructure and guaranteeing free trade) dampens individual incentives. Furthermore, both macroeconomic and microeconomic policy may not have the desired effects because the reach of any policy is limited by the reach of the state. This is akin to how transaction costs can drive a wedge between market prices and the effective prices paid by buyers and received by sellers, and thus limit market access and constrain economic activity, ultimately decreasing the welfare of many economic actors (de Janvry et al., 1991; Bellemare and Barrett, 2006).

The consequences of weak states are well-known to development economists: a state that cannot broadcast its power also has difficulty resolving market failures (Besley and Persson, 2009 and 2010).<sup>2</sup> When market failures – incomplete markets, market power, transaction costs, externalities – are the norm, the First Fundamental Theorem of Welfare ceases to hold, competitive equilibria are no longer Pareto-efficient, markets fail to attain their potential, and the welfare of individuals falls far short of what it could be. In other words, the lack of state power is one of the causes of economic and social underdevelopment.<sup>3</sup>

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<sup>2</sup> Instead of state power, economists are more inclined to discuss state capacity (Besley and Persson, 2009 and 2010).

<sup>3</sup> In his classic *Peasants into Frenchmen*, Eugen Weber (1976) recounts how France modernized and developed as a consequence of the French state broadcasting an increasing amount of power throughout its territory between the Franco-Prussian war of 1870 and the beginning of the Great War in 1914.

Despite the importance of a strong state and of non-extractive institutions in the development process (Acemoglu and Robinson, 2012), and despite the growing empirical literature on the importance of institutions in economic development (Acemoglu and Johnson, 2005; Acemoglu, Johnson, and Robinson, 2001 and 2005), there has been very little empirical work assessing the state's ability to exercise power in isolated areas and understanding the means through which the state exerts that power.

This paper begins filling this gap in the literature by examining the relationship between state power and isolation using several alternative measures of state power with a rich panel data set from Madagascar. Using data from two rounds of a census of Malagasy communes conducted in 2001 and 2007,<sup>4</sup> we look at whether there is a negative association between various proxy measures of state power – measures of crime, land titling and registration and trust in and use of the court system – and travel time to the country's capital, Antananarivo. For some of our proxy measures of state power, we can exploit the fact that our data are longitudinal, which allows controlling for commune-level fixed effects.

Our results generally support Herbst's hypothesis that state power is distributed unevenly. Our estimates suggest that the power of the Malagasy state is a decreasing function of the distance between a commune and the seat of power in the capital. Specifically, communes further away from the capital tend to have higher murder rates, lower proportions of registered and titled plots, and lower levels of trust in the court system.

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<sup>4</sup> A commune in Madagascar is roughly equivalent to about three census tracts in the United States. The average population of a Malagasy commune is about 14,000, whereas the average population of a US census tract is 4,000. The commune is an intermediate administrative entity between the district and the municipality. The number of communes can increase with population, so the numbers of communes is not fixed over time.

The rest of this paper is organized as follows. Section 2 presents our data and discusses some descriptive statistics. In section 3, we discuss our estimation strategy and the various identification strategies. In section 4, we present and discuss our estimation results. Section 5 concludes.

## **2. Data and Descriptive Statistics**

We seek to test Herbst's (2000) theory of state power in Africa by examining the relationship between proximity to the seat of power and the state's hold on power. Because Madagascar is an island nation, it differs from most other sub-Saharan African countries in that it has clearly defined borders, and it was a unified nation with a clearly identified population prior to colonization. This means that even if the Malagasy state cannot perfectly broadcast its power within its borders, it faces no immediate or easily identifiable threat from without.

The Malagasy state nevertheless shares many of the same problems exerting power over its territory with continental African states. Recall that in Herbst's (2000) theory of state power, it is the interaction of remoteness and low population density that prevents African states from broadcasting their power. Roads are poor or non-existent; the paved (total) road density in Madagascar is 10 km (89 km) per 1,000 km<sup>2</sup>, compared to 49 km (152 km) for Sub-Saharan Africa as a whole (Yepes et al. 2009). Madagascar's population density is approximately 34 inhabitants per km<sup>2</sup>, very close to the average for Sub-Saharan Africa, and some of the more remote parts of the country are largely lawless areas where cattle theft and related violence are common.

The data come from two rounds of the Madagascar Commune Census in 2001 and 2007. The goal of the commune census was to conduct an inventory in each of the roughly 1400 communes (administrative units roughly equivalent to counties or townships) in the country to assess the availability of public goods and services, local prices, transportation cost and availability, crime, and

other issues. Except for statistics (such as crime) kept by public officials, questions are answered by a focus group of commune residents. After merging the two rounds of the census and losing some observations due to missing data, the complete data set includes over 90 percent of all communes, or more than 2500 observations.

## **2.1 Measures of State Power**

A crucial question to this paper and in the related literature is how to measure state power. A clear line must be drawn between measures of actual state power or control over an area and the means by which the government tries to broadcast that power. We argue that the measures of state power should be within direct control of the government and require engagement of the local population. For example, land titling, taxation, and crime would all fall into this category. Likewise, building roads, providing electricity and police presence would be examples of the means through which the government might extend its reach.

Because state power cannot be measured directly, Herbst (2000) focuses on two proxy measures for state power: (i) tax revenue, and (ii) the prevalence of land titling. However, as in much of Africa, tax collection is not widespread in Madagascar. Efforts were made in the country to encourage local governments to raise their own revenue, but it is not clear that revenue generated and spent locally would be correlated with state power at the federal level, and one could argue that local governments with less interaction with the central government would rely more heavily on local revenue. Land titling and registration might therefore be a better measure of engagement with the state for the case of Madagascar. According to government's estimates only 330,000 titles have been issued over the last 100 years while new titles were being issued at a rate of only about 1,000 per year and changes to existing titles were rarely recorded despite a heavy demand for land titles (Government of Madagascar, 2005; Bellemare, 2012). Figures 1 and 2 show the proportion of land registered and titled per commune, respectively. These are categorical variables ranging from 1 (0%) to 6 (over 50%). Over 70 (80) percent of

communes have five percent of land or less registered (titled), and only 8 (3) percent of communes have more than 50 percent.

Land titling and registration may be reasonable proxies for state power, but they may also simply reflect the demand for land, which would be higher in urban areas and lower in remote ones. The rule of law is another possible manifestation of state power (Hay et al., 1976; Weingast, 1987). Crime rates seem like a reasonable proxy here. Previous work (Fafchamps and Moser, 2003) has shown that crime is more prevalent in more remote areas of Madagascar. The crime statistics are described in table 1. Murder and burglary numbers are three year averages for the years prior to the survey. Approximately 57 percent of communes report zero murders. The average number of murders per 100,000 residents is 6.18, and the difference between the two years is not statistically significant. The average number of burglaries per capita fell over the period from approximately 28 to 21. This discrepancy between the stable murder rate and the drop in burglaries could be due to a fall in the poverty rate between 2001 and 2007, given that petty crimes such as burglaries respond to economic conditions but murders do not. In the United States, for example, Cook and Zarkin (1985) find that while recessions cause small increases in burglaries, they have little to no effect on murder rates.

Another measure related to the rule of law is the trust in or use of courts in case of dispute. Questions related to this issue were only included in the 2007 questionnaire. The dummy variable for trust in courts equals one if the commune focus group believed that the courts were usually or always just and honest. The variable for the use of courts is a dummy variable that equals one if residents are likely to use the courts in case of conflict (compared to other remedies such as using local or traditional authorities). Thirty-five percent of communes report that the courts are just and honest, but only 7 percent report that residents turn to the courts in case of conflict (table 1). This is consistent with Fafchamps and Minten's (2001) finding that the legal system is slow and costly to use in Madagascar.



## 2.2 The Correlates of State Power

The key hypothesis of this paper is that state power is weaker in more isolated and remote parts of the country. Our most important measure of isolation is travel time to the capital. Given the scarcity of paved roads and the highly variable quality of paved roads, travel time is more relevant than geographical distance measures. Furthermore, unlike distance, travel time changes over time as roads are improved or deteriorate. Investment in roads is considered to be a critical means by which the state can extend and maintain power. Significant investment in road rehabilitation took place between 2001 and 2007, particularly in the national road network in the northern provinces of Antsiranana and Mahajanga. Table 2 shows a dramatic drop of almost 10 hours in the rainy season travel time to the capital. In addition to travel time, accessibility by vehicle might be an important indicator of the government's ability to exert control over an area. We find that 23 (19) percent of communes were not accessible in 2001 (2007).

For land registration and titling, the government of Madagascar has a system of mobile land tribunals (*tribunaux terriers ambulants*) that can assess claims, facilitate registration and help settle disputes. However, the tribunals do not appear to have been very active; only 13 percent of communes reported a visit by such a tribunal in the previous ten years. In 2005, an effort was made to decentralize the process by allowing for communes to create local land offices (*guichets fonciers*) (Government of Madagascar 2005; Bellemare, 2012), but as of the second round of data collection in 2007, only 11 percent of communes reported having such a land office.

Police presence is potentially another indicator of the state's attempt to extend power. Police or gendarmes were present in approximately half of communes. However, it should be noted that military and police presence is likely endogenous to crime measures since police forces can be moved into high crime areas. Governments might also use development projects or national radio broadcasts to tie people closer to the state. More than 82 percent of communes had no ongoing central government

project, and 12 percent of communes reported more than one such ongoing project. Other control variables include population, the estimated percentage of people living in poverty, provincial dummies and, whenever possible, commune fixed effects.

### 3. Empirical Framework

Using the data described in the previous section we estimate the following core equation

$$y_{it} = \alpha + \beta x_{it} + \gamma D_{it} + \delta d_i + \tau_t + \epsilon_{it}, \quad (1)$$

where the unit of observation is commune  $i$  in year  $t \in \{2001, 2007\}$ ;  $y_{it}$  is a measure of state power;  $x_{it}$  is a vector of time-varying controls;  $D_{it}$  is a measure of isolation (i.e., travel time to the capital), which is our variable of interest;  $d_i$  is a vector of commune fixed effects;  $\tau_t$  is a dummy variable equal to one if  $t = 2007$  and equal to zero otherwise; and  $\epsilon_{it}$  is an error term with mean zero.

To summarize from the previous section, our proxies for state power include:

1. A categorical variable for the proportion of land registered in each commune,
2. A categorical variable for the proportion of land titled in each commune,
3. The number of murders per 100,000 individuals in the commune,
4. The number of burglaries per 100,000 individuals in the commune,
5. Whether the average commune resident would normally resort to using the judicial system to ultimately resolve disputes, and
6. Whether the average commune resident trusts the judicial system.

For the categorical measures (i.e., the proportions of registered and titled plots in the commune on a scale of 1 to 6), we estimate equation 1 by ordered probit and substitute province fixed effects for the commune fixed effects. For the judicial measures, since we only have data for one round of data, we

estimate equation 1 by logit estimation and once again substitute province fixed effects for commune fixed effects. We now turn to discussing our identification strategy.

### 3.1. Identification Strategy

Although a commune's degree of isolation does not *a priori* vary over time, our main measure of isolation is the time it takes to travel from the center of the commune to the capital. Therefore,  $\gamma$  is identified off of the variation in travel time to the capital both between communes and within a given commune over time.

The endogeneity of a commune's isolation relative to state power – that is, the fact that travel time between from the commune to the capital and our proxies for state power are jointly determined and that the former is not randomly distributed across communes – does not allow making a causal statement. However, our ability to use a variety of control variables, our looking at several proxy measures for state power, and our use of commune fixed effects in some specifications allow purging the error term from a great deal of its correlation with travel time between the commune and the capital, our variable of interest, and so to be reasonably confident in our findings. The bulk of this section will thus focus on discussing our identification strategy for those cases where we can fully exploit the panel nature of the data by controlling for the heterogeneity between communes via commune fixed effects, and we encourage the reader to view our other results as merely supporting the evidence from the fixed effects specifications.

In order to discuss the identification of our results, it helps to consider the three possible sources of statistical endogeneity, all three of which can bias our estimate of the relationship between remoteness of the commune and state power:

1. Measurement error in the dependent variables (i.e., proxies for state power) or in the variable of interest (i.e., distance between the commune and the capital),
2. Unobserved heterogeneity between communes, and
3. Reverse causality between our dependent variables and our variable of interest (i.e., possible causal relationships flowing from our proxies for state power and remoteness of the commune).

Because of the way the data were collected, one can be reasonably confident that measurement error is not an issue in these data. Indeed, recall that measurement error is an issue when it is systematic. That is, when a variable is systematically over- or under-reported. But in these data, the survey team visited with a focus group that included the commune mayor, his assistant, and other prominent figures in each commune. Although it can introduce noise, this reliance on focus groups in principle reduces the scope for systematic measurement error since respondents can disagree over an initial answer and correct one another until the correct answer is given (Hill, 1982; Azmitia, 1988).

Unobserved heterogeneity is an important source of endogeneity in this context and we therefore use commune fixed effects whenever possible. An example of this unobserved heterogeneity would be the government deliberately neglecting to invest in certain parts of the country, resulting in poor road infrastructure and high crime and/or fewer land titles. Because commune fixed effects control for everything that remains constant over time within a given commune, those fixed effects purge the error term  $\epsilon$  of a great deal of its prospective correlation with the variables on the right-hand side of equation 1.

The potential causal relationship flowing from a proxy for state power to the time it takes to travel from the commune to the capital – reverse causality – is another potential source of statistical endogeneity in this context. It is possible that an increase in a commune's murder rate over time has

caused the state to want to invest less in the refecton of roads between the commune and the capital, perhaps in an effort to prevent crime from spilling over from the commune to the capital. Likewise, it is possible that bush taxis and other transportation services underserve high-crime areas. Could there be similar reverse causal relationships between our other proxies for state power? One cannot rule them out, but once again, it seems unlikely that the proportion of plots registered or titled within a commune would drive the state's decision to build or repair roads between the capital and the commune, and it seems equally unlikely that trust in or recourse to the judicial system would drive the same decision.

In the final analysis, our use of observational data prevents us from making causal statements about the relationship between remoteness and state power. That is, one limitation of the results in this paper is that it is not possible to determine whether the distance between a commune and the capital prevents the state from broadcasting its power in the commune. Our use of multiple proxies for state power, while not perfect, allows triangulating the relationship between state power and remoteness. In other words, if our estimates show a consistent statistical relationship between remoteness and state power, this should constitute additional evidence in favor of Herbst's claim that the state has difficulty broadcasting its power over thinly populated space in Africa.

## **4. Estimation Results and Discussion**

We present two estimations for each of our six dependent variables. In each case, model 1 excludes the potentially endogenous controls for police presence and for the number of government projects, whereas model 2 includes them.

We begin with the fixed-effects estimates for murders in table 3. Consistent with theoretical expectations, travel time to the capital is positively associated with murders. In other words, the further the commune is from the capital, the greater the number of murders. More specifically, for every

additional hour of travel time between the commune and the capital, a commune experiences 0.27 more murders per 100,000 inhabitants on average. Moreover, the average murder rate has increased significantly between 2001 and 2007, as the average commune reports over six more murders in 2007 than it did in 2001.

Travel time between the commune and the capital, however, is not associated with a higher number of burglaries (table 4). Whereas murders are frequently associated with the *dahalo*, rural crime organizations whose main business is cattle theft in Madagascar, it is likely that burglaries are committed by small-time thieves, and therefore less likely to be associated with the lack of state power. In the data, there is in fact a very weak correlation between murders and burglaries (a correlation coefficient of 0.079). Acemoglu et al. (2009), for example, show that in Colombia, paramilitary organizations compete with the state for the local monopoly of violence. Furthermore, note that whereas the murder rate has increased in the averaged commune between 2001 and 2007, the number of burglaries appears to have decreased.

Tables 5 and 6 present pooled ordered probit estimates for the proportion of land titled and registered, respectively. In both cases, travel time to the capital has the expected negative association with the proportion of titled lands. In other words, it once again looks as though state power is a decreasing function of the travel time between a commune and the capital. Consistent with this finding, land titling and registration are significantly lower when a commune lacks vehicle access, and both appear to be positively associated with increases in the mechanisms by which the state can expand its power, i.e., radio, mobile titling offices, police and gendarmes presence, and the number of ongoing government projects in the commune. Lastly, the proportion of plots titled and registered appears to fall between 2001 and 2007, likely as a result of plots being broken down and passed from one generation to the next (Bellemare, 2012).

Our final two tables (7 and 8) show the logit model results for the 2007 variables related to the use of and trust in the court system. We find no effect of isolation on the likelihood that commune residents use the courts in case of conflict. However, more isolated areas do appear to have less trust in the court system.

These empirical findings, although they do not allow making the claim that distance weakens state power, seem to support the hypothesis that African states imperfectly broadcast their power over their territory, and that the degree of that power is negatively associated with distance from the seat of power.

## 5. Conclusion

When a state cannot exert power over its entire territory, the resulting lack of security, public goods, and services and market integration stifle development. These problems are particularly felt in remote areas with low population density and poor infrastructure. Despite the presumed importance of a strong state in the development process, there has been very little empirical work assessing the state's ability to exercise power in isolated areas and understanding the means through which the state exerts that power. This paper begins to fill this gap in the literature by examining the relationship between state power and isolation using several alternative measures of state power with a rich panel data set from Madagascar.

We find strong evidence that state power, as measured by the murder rate, land titling and registration, and trust in the court system, is weaker in more isolated areas. While the results of this paper cannot be viewed as establishing a causal relationship between isolation and the extent of state power, the robustness of the results offer support for the hypothesis that African states, although they might enjoy external recognition from other states and from international organizations, have difficulty asserting their power on their own territory.

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**Table 1. Measures of state power**

Variable	2001		2007		Total		Observations
	Mean	(Std. Dev.)	Mean	(Std. Dev.)	Mean	(Std. Dev.)	
Number of murders	0.61	(1.40)	0.74	(2.93)	0.672	(2.27)	2614
Murders per 100,000 residents	5.93	(17.54)	6.45	(41.68)	6.182	(31.77)	2614
Number of burglaries	3.18	(8.18)	3.70	(17.83)	3.426	(13.60)	2542
Burglaries per 100,000 residents	27.70	(66.67)	20.77	(89.22)	24.390	(78.32)	2542
Percent of communes in which residents believe the courts are fair and just (2007 only)			34.73	(0.476)			1380
Percent of communes reporting that residents use courts to settle major disputes(2007 only)			7.25	(0.259)			1382

**Table 2. Explanatory variables**

Variable	2001		2007		Total	
	Mean	(Std. Dev.)	Mean	(Std. Dev.)	Mean	(Std. Dev.)
Travel time to the capital in the rainy season (hours)	40.926	(45.117)	30.811	(34.207)	35.707	(40.175)
No vehicle access to commune seat (dummy)	0.231	(0.422)	0.193	(0.395)	0.212	(0.409)
Estimated percent of population living in poverty	52.368	(27.017)	44.921	(26.116)	48.645	(26.825)
Population	13648.210	(12615.170)	17463.120	(16985.840)	15588.740	(15116.500)
Number of radio stations received	2.706	(3.099)	5.323	(5.076)	4.015	(4.403)
Police or gendarme presence (dummy)	0.544	(0.500)	0.452	(0.500)	0.498	(0.500)
Number of government projects active in the commune	0.109	(0.311)	0.325	(0.654)	0.217	(0.524)
Mobile land tribunal visited in previous ten years (dummy)	0.155	(0.362)	0.113	(0.317)	0.164	(0.317)
Local land office established (dummy)	0.000	(0.000)	0.110	(0.313)	0.055	(0.228)

**Table 3. OLS Estimation for the Number of the Murders Per 100,000 Residents**

Variable	(1)			(2)		
	Coefficient		(Std. Err.)	Coefficient		(Std. Err.)
Travel time to the capital	0.267	***	(0.039)	0.266	***	(0.039)
No Vehicle Access	0.383		(2.887)	0.417		(2.895)
Poverty Rate	-0.002		(0.036)	-0.002		(0.036)
Population	0.000		(0.000)	0.000		(0.000)
Radio Reception	-0.324		(0.397)	-0.388		(0.405)
Police Presence				1.260		(2.536)
Active Government Projects				1.297		(1.736)
Year 2007	6.388	***	(1.959)	6.434	***	(1.987)
Intercept	-0.013		(4.347)	-0.458		(4.533)
Number of Observations	2572			2572		
Commune Fixed Effects	Yes			Yes		
p-value (Joint Significance)	0.000			0.000		

Note: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 4. OLS Estimation for the Number of Burglaries Per 100,000 Residents**

Variable	(1)		(2)	
	Coefficient	(Std. Err.)	Coefficient	(Std. Err.)
Travel time to the capital	0.039	(0.100)	0.040	(0.100)
No Vehicle Access	-3.892	(7.525)	-3.811	(7.539)
Poverty Rate	0.209	(0.095)	0.208	(0.095)
Population	0.000	(0.001)	0.000	(0.001)
Radio Reception	3.677 ***	(1.019)	3.787 ***	(1.038)
Police Presence			-4.308	(6.721)
Active Government Projects			-1.974	(4.440)
Year 2007	-16.131 ***	(5.140)	-16.466 ***	(5.217)
Intercept	2.674	(11.264)	4.612	(11.786)
Number of Observations	2500		2500	
Commune Fixed Effects	Yes		Yes	
p-value (Joint Significance)	0.000		0.000	

Note: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 5. Ordered Probit Estimation for the Proportion of Titled Plots in the Commune**

Variable	(1)			(2)		
	Coefficient		(Std. Err.)	Coefficient		(Std. Err.)
Travel time to the capital	-0.006	***	(0.001)	-0.007	***	<b>(0.001)</b>
No Vehicle Access	-0.386	***	(0.057)	-0.328	***	<b>(0.057)</b>
Poverty Rate	0.001		(0.001)	0.001		(0.001)
Population	0.000	***	(0.000)	0.312	***	<b>(0.036)</b>
Radio Reception	0.056	***	(0.007)	0.057	***	<b>(0.007)</b>
Mobile Land Titling Program				0.321	***	<b>(0.063)</b>
Police Presence				0.091	***	(0.047)
Active Government Projects				0.079	***	(0.042)
Year 2007	-0.336	***	(0.048)	-0.347	***	<b>(0.050)</b>
Cutpoint 1	-1.280		(0.128)	-1.154		<b>(0.126)</b>
Cutpoint 2	0.232		(0.126)	-0.840		<b>(0.106)</b>
Cutpoint 3	0.601		(0.127)	-0.503		<b>(0.116)</b>
Cutpoint 4	1.018		(0.129)	-1.006		<b>(0.110)</b>
Cutpoint 5	1.431		(0.133)	-1.155		<b>(0.101)</b>
Number of Observations	2659			2659		
Province Fixed Effects	Yes			Yes		
Pseudo R-square	0.08			0.08		
p-value (Joint Significance)	0.000			0.000		

Note: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 6. Ordered Probit Estimation for the Proportion of Registered Plots in the Commune**

Variable	(1)			(2)		
	Coefficient		(Std. Err.)	Coefficient		(Std. Err.)
Distance from the Capital	-0.005	***	(0.001)	-0.005	***	(0.001)
No Vehicle Access	-0.381	***	(0.056)	-0.006	***	(0.056)
Poverty Rate	0.002	*	(0.001)	-0.322	**	(0.001)
Population	0.000	***	(0.000)	0.002	***	(0.036)
Radio Reception	0.091	***	(0.007)	0.239	***	(0.007)
Mobile Land Titling Program				0.091	***	(0.063)
Police Presence				0.404	***	(0.047)
Active Government Projects				0.106	***	(0.042)
Year 2007	-0.553	***	(0.048)	0.125	***	(0.050)
Cutpoint 1	-1.143		(0.126)	-1.127		(0.126)
Cutpoint 2	0.191		(0.124)	0.212		(0.125)
Cutpoint 3	0.503		(0.125)	0.525		(0.125)
Cutpoint 4	0.820		(0.125)	0.843		(0.126)
Cutpoint 5	1.168		(0.127)	1.192		(0.127)
Number of Observations	2652			2652		
Province Fixed Effects	Yes			Yes		
Pseudo R-square	0.10			0.10		
p-value (Joint Significance)	0.000			0.000		

Note: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.



**Table 7. Logit Estimation for the Determinants of Recourse to Tribunals, 2007**

Variable	(1)			(2)		
	Coefficient		(Std. Err.)	Coefficient		(Std. Err.)
Distance from the Capital	-0.001		(0.004)	-0.001		(0.004)
No Vehicle Access	-0.228		(0.292)	-0.238		(0.292)
Poverty Rate	-0.002		(0.004)	-0.001		(0.004)
Population	0.000	***	(0.000)	0.000	***	(0.000)
Radio Reception	0.013		(0.034)	0.016		(0.034)
Police Presence				0.270		(0.226)
Active Government Projects				-0.185		(0.185)
Intercept	-2.521	***	(0.542)	-2.557	***	(0.544)
Number of Observations	1377			1377		
Province Fixed Effects	Yes			Yes		
Pseudo R-square	0.04			0.05		
p-value (Joint Significance)	0.001			0.001		

Note: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 8. Logit Estimation for the Determinants of Trust in Tribunals, 2007**

Variable	(1)			(2)		
	Coefficient		(Std. Err.)	Coefficient		(Std. Err.)
Distance from the Capital	-0.006	**	(0.003)	-0.007	**	(0.003)
No Vehicle Access	-0.117		(0.155)	-0.149		(0.155)
Poverty Rate	0.000		(0.002)	0.000		(0.002)
Population	0.000		(0.000)	0.000		(0.000)
Radio Reception	-0.069	***	(0.017)	-0.062	***	(0.018)
Police Presence				-0.166		(0.124)
Active Government Projects				-0.281	***	(0.099)
Intercept	-0.613	*	(0.335)	-0.563	*	(0.337)
Number of Observations	1377			1377		
Province Fixed Effects	Yes			Yes		
Pseudo R-square	0.04			0.05		
p-value (Joint Significance)	0.00			0.00		

Note: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

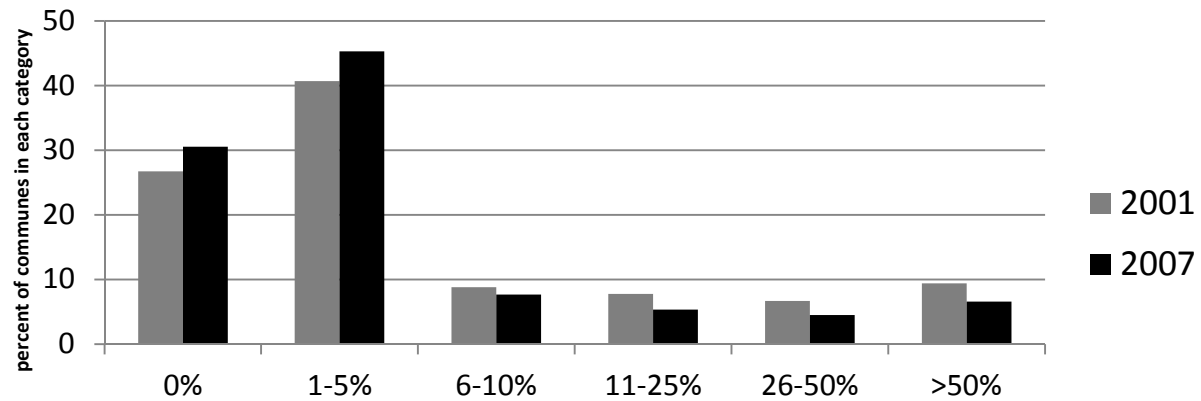


Figure 1. Percent of land registered in the commune

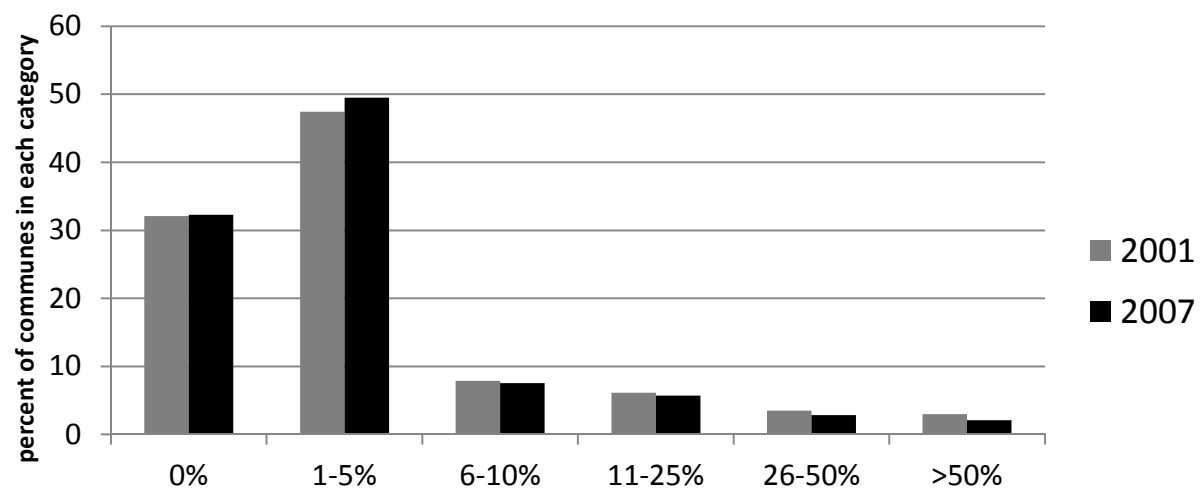


Figure 2. Percent of land registered in the commune