

# Living in Ungoverned Space: Pakistans Frontier Crimes Regulation

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## Abstract

Why do substantial swathes of territory remain ungoverned for long periods of time? We explore this question using a unique set of legal institutions in Pakistan that clearly demarcate spaces that are to be left ungoverned. During colonial rule, the British divided Pakistan into two distinct regions. The first was the Raj, where the British built modern political and bureaucratic institutions. In the second region, the British put a small number of political agents in charge of tribal areas and codified pre-colonial institutions in the Frontier Crimes Regulation (FCR). Legal decisions were left to customary law carried out by local tribal councils, or jirgas. Though the area under FCR has steadily decreased, FCR is still in place in the tribal areas of Pakistan today. This makes Pakistan a prime case study in the choice by both colonial and modern governments to leave territory ungoverned in an environment of broadly weak institutions. We use primary legal documents to create a dataset of when and where FCR applied in Pakistan between 1901 and 2012 at the sub-district level. We then exploit the differential impact of the Green Revolution on potential land revenue at the sub-district level empirically model this choice to leave territory ungoverned. We find that sub districts that we predict would see a disproportionate increase in potential land revenue as a result of the Green Revolution are disproportionately more likely to have FCR removed following the advent of the Green Revolution, relative to before.

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# 1 Introduction

Territory with little or no effective state presence—ungoverned space—persists in many developing countries. In addition to having few state services, these areas also provide room for terrorists, smugglers, drug manufacturers, and criminals to operate, creating negative externalities locally and globally. Pakistan is one such country, and has been for over a century, as both a British colony and an independent nation. This ungoverned space in North-Western Pakistan has been set forth in the Frontier Crimes Regulation (FCR) of 1901, a system under which governance was largely left under tribal control. This law cleanly delineates areas with and without institutions, providing an opportunity to study the determinants of state control. We study one key predictor of the extent of the FCR jurisdiction—potential agricultural revenue—thereby contributing to the understanding of how and when states absorb ungoverned tracts.

During colonial rule, the British divided Pakistan into two distinct regions. The first was what we think of as the Raj—areas where the British built modern political and bureaucratic institutions. This included a modern legal system, a tax system, a civil service, and an army. The second region was governed according to the Frontier Crimes Regulation (FCR). The British put a small number of “political agents” in charge of large tribal areas with almost no colonial institutions backing them. Instead of the Raj system, institutions already in existence were given the force of law, and traditional local councils, or jirgas, made most legal decisions. As a result of the British division, independence and subsequent partition left roughly half of modern-day Pakistan effectively ungoverned by the state. Over time, all of Pakistan has been removed from the FCR except for the Federally Administered Tribal Areas (FATA) and a few Provincially Administered Tribal Areas (PATA).<sup>1</sup>

There have been many empirical attempts to understand the choice to govern a space during colonial times, or more broadly to understand why specific institutions were put in

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<sup>1</sup>These areas provide safe haven to domestic and international terrorists. Training facilities operate openly and with impunity.

place. There are several competing hypothesis: (i) the availability of resources, and the ease with which they could be extracted, determined the initial set of institutions (Diamond, 1998; Gallup et al., 1999; McArthur and Sachs, 2001; Acemoglu et al., 2001). Specifically, it was optimal from the perspective of British colonizers to set up extractive institutions in these areas; (ii) natural terrain, and the military advantage it afforded indigenous groups, made full colonization impractical (Fearon and Laitin, 2003; Nunn and Puga, 2012); (iii) it was more efficient and easier to maintain order in these regions through a system of indirect governance (Padro i Miquel and Yared, 2012; Scott, 2009).<sup>2</sup>

There are also several additional hypothesis pertaining to why a state may maintain ungoverned space over time. Acemoglu et al. (2013) put forth a model in which individuals and/or parties push to add or remove areas from the formal state based on a vote cost-benefit analysis. Similarly, a literature on constrained kleptocracies examines situations in which it is optimal for kleptocrats to not control their entire territory (Berman et al., 2011; Grossman and Noh, 1990, 1994).

We test a hypothesis that falls more broadly into (i)—specifically, did the economic benefits of developing full institutions in FCR regions to the colonizer, through taxation and resource extraction, outweighed the costs of implementation? And when did those benefits outweigh the costs enough for independent Pakistan to roll back FCR? We will focus on one of the primary resource values of land in Pakistan—agriculture. Using crop suitability data from the Food and Agriculture Organization of the United Nations, we first analyze the choice by the British to apply FCR to over half of Pakistan in 1901. We find that sub-districts more suitable to agriculture were more likely to be put under FCR.

This first result is correlational, and runs counter to our hypothesis that increased potential revenue should have increased the British’s desire to govern many parts of Pakistan. We are in the process of collecting data to control for several important omitted variables to

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<sup>2</sup>Note Scott (2009) points out that peripheries of countries in South East Asia are typically poorer than the core areas of the country. In Pakistans FATA, however, households in ungoverned space have high incomes relative to the country average (Blair et al., 2013).

see if the result holds.<sup>3</sup> If this result holds up to controlling for omitted variables, it would imply that the costs to governing areas with FCR in the first half of the 20th century must have been differentially higher than those areas without FCR, to more than counterbalance the additional land value.

Second, we exploit the differential impact of the Green Revolution by crop suitability to understand Pakistan's decisions to continue to apply or to roll FCR back across parts of the country throughout the 1960s and 1970s. In this case, we are able to isolate a plausibly causal effect of agricultural land value on FCR application. Our results suggest a large effect of land value on FCR application. Exploiting a panel dataset on FCR application and the Green Revolution's differential impact on potential crop yields by crop suitability, we see that a one unit increase in crop suitability is associated with a 8.4 percentage points differential increase in the likelihood that FCR continues to be applied to a sub-district following the Green Revolution.

Thus a increase in crop suitability from 'medium' to 'good' increased a sub-district's probability of being left ungoverned by over ten percent following the Green Revolution, relative to before. Though counter intuitive like the first result, this is actually consistent with the fact that the Green Revolution mitigated the importance of crop suitability and thus caused lower-suitability sub-districts to 'catch-up' to other districts in potential revenue extraction. Thus lower-suitability districts were more likely to switch from expected revenue negative to positive as a result of the Green Revolution, and these districts were relatively more likely to have FCR removed.

We see these results as important not just because they provide microeconomic evidence on the importance of extractable land value to the choice to govern land, and because they provide additional evidence on the importance of the Green Revolution in South Asia, but also because they provide evidence that technological chance can lead to ungoverned spaces

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<sup>3</sup>We are in the process of coding up tax revenue data to control for one large potential omitted variable. We will also account for distance to the Afghanistan border, to control for differential security concerns, and for historical tribal settlement locations, to control for differences in customary laws.

being folded into country's cores without civil war or serious violence. The parts of Pakistan that still have FCR today are, of course, the most resistant to government control, but so were many parts of the sub-districts that were brought into the government in the 1970s. Yet what was stopping them from integrating was, at least in part, a simple cost-benefit calculation.

This paper proceeds as follows. Section 2 will expand on the background of FCR, Section 3 will provide information on the data that we will use for our analysis, Section 4 will provide the empirical specifications we will use on our data, Section 5 will provide results, and Section 6 will conclude.

## **2 Background**

### **2.1 The Frontier Crimes Regulation, Through Independence (1901-1947)**

In the 1840s, the British began to replace the Sikh government in Punjab with the same colonial institutions that were taking hold across the British Raj—tax collectors, police, a modern legal system, and other bureaucratic structures. However, they met limited success in what was to become the North Western Frontier Province (NWFP)<sup>4</sup>, in at least two important ways. First, much of the area was operating at a deficit due to limited crop yields and heavy security expenses. Second, the British legal system, being codified throughout India at the time through the 1860 Indian Penal Code and the Code of Criminal Procedure, was vehemently resisted by local Pakhtun clan leaders and other established elites in favor of a customary legal system. Among other major differences, this customary system forgave crimes for honor reasons, including killings. These differences were highly publicized as well,

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<sup>4</sup>Initially, these areas were the districts of Hazara, Peshawar, Kohat, Bannu, Dera Ismail and Dera Ghazi Khan in the Punjab province. These and several other districts were then made into the NWFP in November, 1901

especially cases involving women.<sup>5</sup>

In this region, after multiple decades of struggle, the British eventually decided to stop fighting the customary legal system but rather to appropriate it in what would be codified in 1901 as the Frontier Crimes Regulation (FCR). This regulation put a single ‘political agent’, appointed by the local Governor, in charge of the entire region. Criminal cases were to be first sent to a local council of elders, or Jirga, for trial. The political agent would then approve of the Jirga’s ruling or could overturn it. Convicted criminals were not allowed appeals. And importantly, Jirgas could not sentence anyone to death. The Jirgas and the political agent could, however, pass collective judgment on communities, or punish relatives of those convicted, rulings that were very much customary and would not be allowed in the modern British legal system.

Perhaps of equal importance, with this unique legal system in the NWFP came a profound lack of other institutions. Tax collection was minimal (the political agent was also in charge of this and had limited enforcement capacity despite absolute authority), though the army was present near the borders, there were few police, and other public services were non-existent. Local tribal communities were left more-or-less untouched, so long as crime reports remained acceptable. At the same time, more trouble regions were brought under FCR—including large parts of the Balochistan and Sindh provinces.

Over the next half-century, FCR changed very little. Besides extending it to additional regions, the legal systems and lack of other institutions remained fixed. The British had found an acceptable solution in dealing with these areas.

## **2.2 The Frontier Crimes Regulation Since Independence (1947-2012)**

Perhaps surprisingly, after independence FCR was not revoked from most of modern-day Pakistan. In fact, again the language of the regulation was left intact for over half of a

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<sup>5</sup>Nichols (2013).

century. Political agents were still appointed, now by the head of the Punjab Province. Cases still went to Jirgas. In fact, shortly after the country's independence, FCR was extended to an even wider swath of Pakistan, and it was only over the course of several decades that it was slowly rolled back to the tribal areas that are still under FCR today. We detail these geographic changes in section 3 below.

Throughout this time period, FCR stopped being about controlling criminal activity and became more a choice to not extend the new government to tribal areas. For example, the debate in recent decades has shifted much more towards representation, as it was not until 2013 that Pakistanis in FCR regions were even granted representation in the national legislature.

## **3 Data**

### **3.1 FCR Application, 1901-2012**

In order to understand both the British and later Pakistani's decisions to apply FCR to and continue to maintain FCR in large parts of Pakistan, we use primary legal documents to create a dataset of when and where FCR has applied in modern-day Pakistan between 1901 and 2012 at the sub-district (tehsil) level. Basic summary stats are presented in Table 1 and in Figure 1. The years selected in the table and figure were intentional. The first two years demonstrate that there was very little change in FCR application between 1901 and Pakistan's independence from the British in 1947. The following three years follow the three largest changes in FCR application to-date—in 1956, a large part (by area) of northern Pakistan was added to FCR. In 1965, the biggest roll-back in FCR thus far occurred. Another large rollback occurred in 1977. The last year demonstrates that FCR application has not changed since 1977.

## 3.2 Crop Suitability and the Green Revolution

For an exogenous, time-invariant measure of potential crop yields, we utilize crop suitability data from the Food and Agriculture Organization of the United Nations (FAO, 2012). The FAO provides us with sub-district level indices of agro-climactical suitability for by far the most common crop in Pakistan around the time of the Green Revolution—wheat.<sup>6</sup> These indices are based on exogenous factors such as location-specific geography, rainfall, and temperature over the period 1961-1990. Our measure of crop suitability is the average of these FAO indices across different potential input levels.

Figure 2 shows the extent of geographic variation in crop suitability. You can see that while most of Pakistan falls in the medium to not suitable categories of crop suitability, there is a fair amount of geographic variation within the support, especially in areas that at one point had or have FCR.<sup>7</sup>

Though the data used to create these FAO indices come from much more recently than many of the years in our analysis, we believe that this data can be considered exogenous across this time period given that geography has been more or less fixed and given that rainfall and temperature are highly auto-correlated and not subject to manipulation until fairly recently.

Importantly, we have also documented the point at which the Green Revolution took hold in Pakistan—1965. This is driven by wheat, which was the most important Green Revolution Crop in Pakistan. We find that, for wheat, the first high-yielding varieties were introduced in Punjab in 1965.<sup>8</sup> In Western Pakistan, from 1966 to 1969 wheat production

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<sup>6</sup>For robustness, we also look at average crop suitability across the five most common crops—wheat, pearl millet, gram (a pulse crop), oil-seeds, and cotton (in order of area devoted to these crops across a sample of 10 districts between 1870 and 1910). We prefer the wheat suitability measure because wheat is the largest crop in share, and by far the most relevant crop during the Green Revolution.

<sup>7</sup>Note that the FAO crop suitability data is provided in raster images with various resolutions depending on the crop. Sub-district-level means for each input level are extracted from each raster images, and then these means are averaged to form a single index.

<sup>8</sup>See Dowswell (1989). Using similar data, the International Maize and Wheat Improvement Center (CIMMYT) reports that the 118156 wheat variety, the basis for the most important Green Revolution varieties, was first released in 1966 (Lantican et al., 2012).



increased by 79 percent, with a peak growth rate of agricultural output of 15 percent during fiscal 1967-68 (Child and Kaneda, 1975).

As the Green Revolution is characterized by increased crop yields among the staple crops of South Asia with little to no required changes in input technologies, labor to capital ratios, or irrigation, we will consider it to mitigate the importance of crop suitability. This is consistent with Foster and Rosenzweig (1996) and with Child and Kaneda (1975).<sup>9</sup>

## 4 Empirical Specifications

We conduct two complementary analyses of the choice to apply, and then maintain, FCR provision in regions of Pakistan. First, we correlate fixed, sub-district-level crop suitability with the initial decision that the British made to select roughly half of Pakistan for FCR in 1901. Second, we exploit the differential impact of the Green Revolution by crop suitability to understand Pakistan's decisions to roll FCR back across parts of the country throughout the 1960s and 1970s.

### 4.1 Initial FCR Application in 1901

For our first analysis, we will use a simple empirical specification:

$$\text{FCR\_applied\_1901}_t = \alpha + \beta \text{Crop\_suitability}_t + \Gamma_t + \epsilon_t \quad (1)$$

Where  $\text{FCR\_applied\_1901}_d$  is a dummy for whether FCR was initially applied to sub-district  $t$  (for tehsil) in the 1901 FCR legislation,  $\text{Crop\_suitability}_t$  is that sub-district's crop suitability measure, and  $\Gamma_t$  are sub-district covariates. Note that FCR was originally applied at the district level, so we cluster the standard errors by district. We leave the specification at the sub-district level, however, to avoid having to aggregate up the geo-specific crop suitability

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<sup>9</sup>Note that we are unable to provide district-specific trends in Green Revolution take-up for Pakistan as Foster and Rosenzweig (1996) do for India due to a lack of available data.

measure any more than has already been done.

This analysis will give us a correlation. We only have one sub-district covariate—area, which is likely a proxy for density in terms of people and natural resources, as well as for terrain conditions. We do not have pre-1901 data to control for potential omitted variables such as differential time trends, or other time-invariant covariates of a sub-district that fixed effects would capture. As such, we will only consider results from this analysis as suggestive. Note we are in the process of coding up tax revenue data to control for one large potential omitted variable. We will also account for distance to the Afghanistan border, to control for differential security concerns, and for historical tribal settlement locations, to control for differences in customary laws.

## 4.2 FCR Application and the Green Revolution

For our second analysis, our primary specification will be as follows:

$$\text{FCR\_applied}_{ty} = \alpha + \beta_1 \text{Crop\_suitability}_t + \beta_2 \text{Post\_GR}_y + \text{Post\_GR\_Crop\_suitability}_{ty} + \delta_t + \delta_y + \epsilon_{ty} \quad (2)$$

Here  $\text{FCR\_applied}_{ty}$  is a dummy for whether FCR continued to apply to sub-district  $t$  in year  $y$ ,  $\text{Crop\_suitability}_t$  is our crop suitability measure of sub-district  $t$ , and  $\text{Post\_GR\_Crop\_suitability}_{ty}$  is the linear interaction of the the two terms.  $\delta_t$  and  $\delta_y$  are sub-district and year fixed effects. Note that we will not be able to separately identify  $\beta_1$  from sub-district fixed effects.

Analysis for Equation 2 is limited to years  $y \in \{1956, 1963, 1964, 1971, 1973, 1977\}$  and to sub-districts that had FCR at the beginning of the study period in 1956, since after 1956, no new districts were added to FCR.<sup>10</sup> The first limitation is to all the years in which one or more sub-districts changed FCR application, within 20 years of the Green Revolution.<sup>11</sup> We limit to these years as an event study of sorts, assuming that there was enough of a

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<sup>10</sup>There were 6 sub-districts at the north of Pakistan that had FCR added in 1956. Our results are robust to coding those sub-districts as a -1 for  $\text{FCR\_applied}_{ty}$ .

<sup>11</sup>And more or less within a much larger window considering the little change in FCR between 1901 and 1956 and the no change in FCR after 1978.

political cost to changing the FCR legislation that it could not be done continuously, so decisions to remove sub-districts from the law happened every so often. There are two more extreme alternatives: (i) leave the data at the yearly level and run the same specification (ii) collapse the data down to a single dummy for each sub-district and run a simple difference of means between pre and post the Green Revolution. We see our specification as superior to (i) because it will not over-emphasize the many zeros that likely did not represent real decisions and to (ii) because it allows for a more accurate accounting for variation across time.

With sub-district and year fixed effects, and with a differences-in-differences estimator, we will consider this analysis to capture the causal differential impact of the Green Revolution, or more generally of a change in a sub-district’s agricultural land value, on the choice by the Pakistani government to maintain or remove FCR. For our identification strategy to hold, we need that there were no time-varying omitted variables that differentially impacted sub-districts before and after 1965. In other words, we need that there were no other major changes other than the Green Revolution happening at or around 1965 that had differential impacts on FCR application by crop suitability. We have not found any important changes in the way that FCR was discussed or handled by Pakistan around this time period, and we consider the Green Revolution to encapsulate all changes in crop technology at the time, so we aren’t concerned about other simultaneous agricultural advances.

## 5 Results

This section presents results from two complementary analyses of the choice to apply, and then maintain, FCR provision in regions of Pakistan. First, we correlate fixed, sub-district-level crop suitability with the initial decision that the British made to select roughly half of Pakistan for FCR in 1901. Second, we exploit the differential impact of the Green Revolution by crop suitability to understand Pakistan’s decisions to roll FCR back across parts of the

country throughout the 1960s and 1970s.

## 5.1 Initial FCR Application in 1901

Table 2 presents results for this analysis. We see that there is a strong positive correlation between crop suitability and the British's initial decision to apply FCR to certain sub-districts. An increase in crop suitability by one point is associated with an increase in the likelihood that a sub-district was extended FCR by 6.9 percentage points, or by 15 percent of an unconditional mean of 45.7 percent. Mean crop suitability in the analysis sample is 1.25, with a standard deviation of 1.54. This means that a one standard deviation increase in crop suitability is associated with a 10.63 percent increase in the likelihood that a sub-district was extended FCR. This is clearly an economically significant correlation. And we see that including a control for sub-district area only strengthens the effect.

This analysis gives us a correlation that runs counter to our hypothesis about the importance of land revenue for FCR application decisions. We interpret it as meaning one of two things. Either (i) we are missing important omitted variables that are positively correlated with crop suitability and negatively with FCR application or vice versa, or (ii) if this result holds up to controlling for omitted variables, it would imply that the costs to governing areas with FCR in the first half of the 20th century must have been differentially higher than those areas without FCR, to more than counterbalance the additional land value. Considerable qualitative evidence and the fact that they were closely monitoring crop yields suggests that (i) is more likely. We could imagine, for example, that more suitable places in Pakistan had wealthier tribes which in turn required stronger customary laws to keep order. Currently we have no way to verify such a story. Note we are in the process of coding up tax revenue data to control for one large potential omitted variable. We will also account for distance to the Afghanistan border, to control for differential security concerns, and for historical tribal settlement locations, to control for potential differences in customary laws.

As a robustness check, in Appendix Table A.1, we vary our definition of crop suitability

to include indices for more crops, in order from most to least planted crops in a subset of sub-districts from ten districts between 1870 and 1920.<sup>12</sup> We can see that including pearl millet crop suitability greatly increases the correlation, though additional crops cause the correlation to drop and become insignificant. This is not surprising as wheat makes up 56 percent of planted area of the total of the first five crops in our data, followed by pearl millet at 17 percent, gram at 13 percent, oil-seeds at 8 percent, and cotton at 6 percent—there is a large drop-off in importance of crops during this time period in Pakistan.

## 5.2 FCR Application and the Green Revolution

Table 3 presents results for our second analysis—exploiting the differential impact of the Green Revolution by crop suitability to understand Pakistan’s decisions to continue to apply FCR across parts of the country throughout the 1960s and 1970s. We first present a simple correlation of sub-district crop suitability and FCR application with and without year fixed effects. Second, we present a simple differences-in-differences specification with and without year fixed effects. Lastly, we present our preferred specification, a differences-in-differences specification with sub-district fixed effects, with and without year fixed effects.

We can see that we obtain broadly consistent results—crop suitability positively predicts FCR’s continued application regardless of specification, including in our ideal specification in column (6) which includes year and sub-district fixed effects.

Though counter intuitive like the first result, this is actually consistent with the fact that the Green Revolution mitigated the importance of crop suitability. As mentioned above, the Green Revolution is characterized by increased crop yields among the staple crops of South Asia with little to no required changes in input technologies, labor to capital ratios, or irrigation. Thus places that were once harder to farm became relatively easier, causing lower-suitability sub-districts to ‘catch-up’ to other districts in potential revenue extraction. Thus lower-suitability districts were more likely to switch from expected revenue negative to

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<sup>12</sup>Crop data was hand coded from British District Gazettes. Data available upon request.

positive as a result of the Green Revolution, and these districts were relatively more likely to have their FCR application removed.<sup>13</sup>

Thus in this case, with a much stronger specification, our results are in-line with our hypothesis about the importance of agricultural land value for FCR application decisions. Our results suggest a fairly large magnitude of an effect as well. Sticking with column (6), we see that a one unit increase in crop suitability, from say ‘medium’ to ‘good,’ is associated with a 8.4 percentage points differential increase in the likelihood that FCR continues to apply to a sub-district following the Green Revolution. Here, the positive signs on the un-interacted crop suitability variable support the story as well.

Again as a robustness check, in Appendix Table A.2, we vary our definition of crop suitability. In this case, results remain significant across all definitions.

## 6 Conclusion

In this paper, we test two hypotheses. First, we test that the economic benefits of developing full institutions in FCR regions of Pakistan to the colonizer, through taxation and resource extraction, outweighed the costs of implementation. Second, we test the hypothesis that the Green Revolution caused those benefits to outweigh the costs enough for independent Pakistan to roll back FCR in originally less suitable places. To test these hypotheses, we focus on one of the primary resource values of land in Pakistan—agriculture.

Using crop suitability data from the Food and Agriculture Organization of the United Nations, we first analyze the choice by the British to apply FCR to over half of Pakistan in 1901. We find that sub-districts more suitable to agriculture were more likely to be put under FCR. Second, we exploit the differential impact of the Green Revolution by crop suitability to understand Pakistan’s decisions to continue to apply or to roll FCR back across parts of the country throughout the 1960s and 1970s. We find that sub-districts more suitable to agriculture were more likely to see continued FCR application after the Green Revolution

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<sup>13</sup>This is consistent with Foster and Rosenzweig (1996) and with Child and Kaneda (1975).

raised the relative value of less-suitable sub-districts.

This first result is correlational, and runs counter to our hypothesis that increased potential revenue should have increased the British's desire to govern many parts of Pakistan. We are in the process of collecting data to control for several important omitted variables to see if the result holds. If this result holds up to controlling for omitted variables, it would imply that the costs to governing areas with FCR in the first half of the 20th century must have been differentially higher than those areas without FCR, to more than counterbalance the additional land value.

In the second case, we are able to isolate a plausibly causal effect of agricultural land value on FCR application. Our results suggest a large effect of land value on FCR application. Specifically, a one unit increase in crop suitability from 'medium' to 'good' increased a sub-district's probability of being left ungoverned by over ten percent following the Green Revolution, relative to before. Though counter intuitive like the first result at first glance, this is actually consistent our hypothesis that the Green Revolution mitigated the importance of crop suitability and thus caused lower-suitability sub-districts to 'catch-up' to other districts in potential revenue extraction. Thus lower-suitability districts were more likely to switch from expected revenue negative to positive as a result of the Green Revolution, and these districts were relatively more likely to have FCR removed.

We see these results as important for at least three reasons. First, we provide microeconomic evidence on the importance of extractable land value to the choice to govern land, supporting the hypothesis of a rich macroeconomic development literature. Second, we provide additional evidence on the importance of the Green Revolution in South Asia, not only in increasing land values and growth but in influencing the choice of the Pakistani government to govern large parts of the country that had thus far remained ungoverned. Lastly, we provide heartening evidence that technological chance can lead to ungoverned spaces being folded into country's cores without civil war or serious violence. The parts of Pakistan that still have FCR today are, of course, the most resistant to government control, but so were

many parts of the sub-districts that were brought into the government in the 1970s. Yet what was stopping them from integrating was, at least in part, a simple cost-benefit calculation.



## References

- Acemoglu, Daron, James A Robinson, and Rafael J Santos**, “The monopoly of violence: Evidence from colombia,” *Journal of the European Economic Association*, 2013, 11 (s1), 5–44.
- , **Simon Johnson, and James A Robinson**, “The colonial origins of comparative development: an empirical investigation,” *American Economic Review*, 2001, 91 (5), 1369–1401.
- Berman, Eli, Jacob N Shapiro, and Joseph H Felter**, “Can hearts and minds be bought? The economics of counterinsurgency in Iraq,” *Journal of Political Economy*, 2011, 119 (4), 766–819.
- Blair, Graeme, C Christine Fair, Neil Malhotra, and Jacob N Shapiro**, “Poverty and support for militant politics: Evidence from Pakistan,” *American Journal of Political Science*, 2013, 57 (1), 30–48.
- Child, Frank C and Hiromitsu Kaneda**, “Links to the green revolution: a study of small-scale, agriculturally related industry in the Pakistan Punjab,” *Economic Development and Cultural Change*, 1975, pp. 249–275.
- Diamond, Jared M**, *Guns, germs and steel: a short history of everybody for the last 13,000 years*, Random House, 1998.
- Dowswell, Christopher R**, *Wheat research and development in Pakistan*, CIMMYT, 1989.
- Fearon, James D and David D Laitin**, “Ethnicity, insurgency, and civil war,” *American political science review*, 2003, 97 (01), 75–90.
- Food and Agricultural Organization of the United Nations**, “Global Agro-Ecological Zones (GAEZ v3.0),” 2012. Available at <http://gaez.fao.org>.
- Foster, Andrew D and Mark R Rosenzweig**, “Technical change and human-capital returns and investments: evidence from the green revolution,” *The American economic review*, 1996, pp. 931–953.
- Gallup, John Luke, Jeffrey D Sachs, and Andrew D Mellinger**, “Geography and economic development,” *International regional science review*, 1999, 22 (2), 179–232.
- Grossman, Herschel I and Suk Jae Noh**, “A THEORY OF KLEPTOCRACY WITH PROBABILISTIC SURVIVAL AND REPUTATION\*,” *Economics & Politics*, 1990, 2 (2), 157–171.
- and – , “Proprietary public finance and economic welfare,” *Journal of Public Economics*, 1994, 53 (2), 187–204.
- i Miquel, Gerard Padro and Pierre Yared**, “The political economy of indirect control,” *Quarterly Journal of Economics*, May 2012, 127 (2), 947–1015.

**Lantican, M.A., H.J. Dubin, and M.L. Morris**, *Impacts of International Wheat Breeding Research in the Developing World, 1988–2012*, International Maize and Wheat Improvement Center (CIMMYT), 2012.

**McArthur, John W and Jeffrey D Sachs**, “Institutions and geography: comment on Acemoglu, Johnson and Robinson (2000),” Technical Report, National bureau of economic research 2001.

**Nichols, Robert**, *The Frontier Crimes Regulation: A History in Documents*, Oxford University Press, 2013.

**Nunn, Nathan and Diego Puga**, “Ruggedness: The blessing of bad geography in Africa,” *Review of Economics and Statistics*, 2012, 94 (1), 20–36.

**Scott, James C**, *The art of not being governed: An anarchist history of upland Southeast Asia*, Yale University Press, 2009.

## 7 Tables and Figures

Table 1: FCR Application Summary Statistics

	% of Sub-districts under FCR	% area under FCR ( $km^2$ )
<i>Year:</i>		
1901	42.93	52.08
1946	42.43	50.07
1957	43.42	58.15
1966	23.33	21.43
1978	11.91	2.97
2012	11.91	2.97
<i>Mean, 1901 - 2012</i>	30.61	33.05
<i>SD, 1901 - 2012</i>	[14.58]	[23.48]

*Notes:* Percentage sub-districts (tehsils) under FCR based on a total of 403 sub-districts. Area under FCR based on a total area of 872,027 square kilometers.

Table 2: Crop Suitability and Initial FCR Application

	FCR applied initially in 1901 (=1)	
	(1)	(2)
Sub-district Crop Suitability	0.069** (0.033)	0.083** (0.033)
Sub-district Area (Square KM / 1000)		0.030*** (0.008)
Mean of Dependent Variable	0.457	0.457
# Observations	346	346
# Clusters	116	116
R-Squared	0.045	0.079

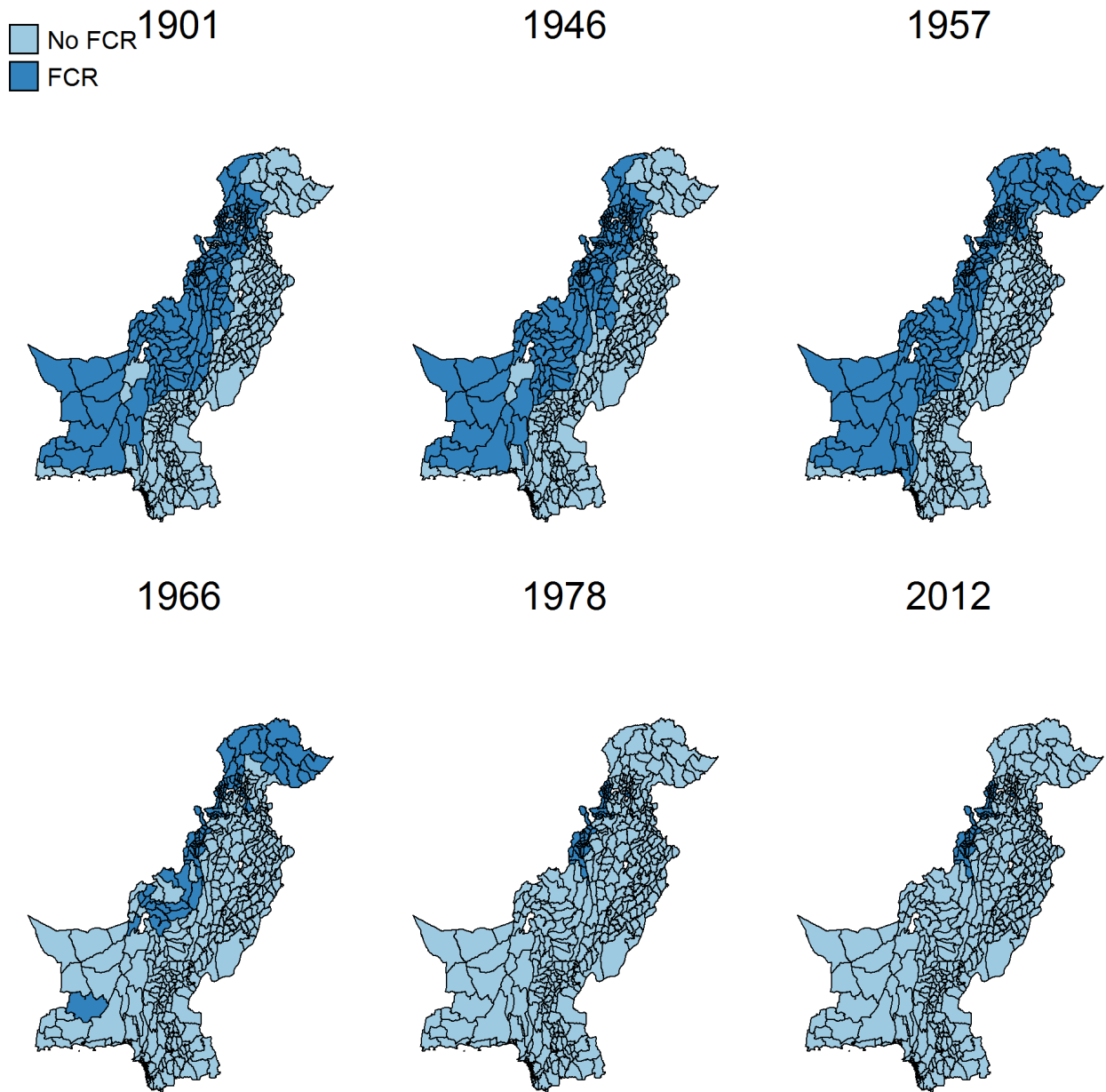
*Notes:* \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ . Standard errors clustered at the district level reported in parentheses. Crop suitability scores are as follows: 0 is not suitable, 1 is very marginal, 2 is marginal, 3 is moderate, 4 is medium, 5 is good, 6 is high, and 7 is very high.

Table 3: Crop Suitability and FCR Application Before and After the Green Revolution

	FCR applied (=1)					
	(1)	(2)	(3)	(4)	(5)	(6)
Sub-district Crop Suitability	0.047*	0.037	0.031	0.024	.	.
	(0.026)	(0.028)	(0.030)	(0.033)	.	.
Post Green Revolution (=1)			-0.021	.	-0.316***	-0.668***
			(0.075)	.	(0.070)	(0.150)
Crop Suitability * Post Green Revolution			0.052	0.060	0.082***	0.084***
			(0.035)	(0.038)	(0.023)	(0.026)
Mean of Dependent Variable	0.791	0.791	0.791	0.791	0.791	0.791
# Observations	632	632	632	632	632	632
# Clusters	69	69	69	69	69	69
R-Squared	0.021	0.096	0.032	0.102	0.401	0.541
Year FEs?	NO	YES	NO	YES	NO	YES
Sub-district FEs?	NO	NO	NO	NO	YES	YES

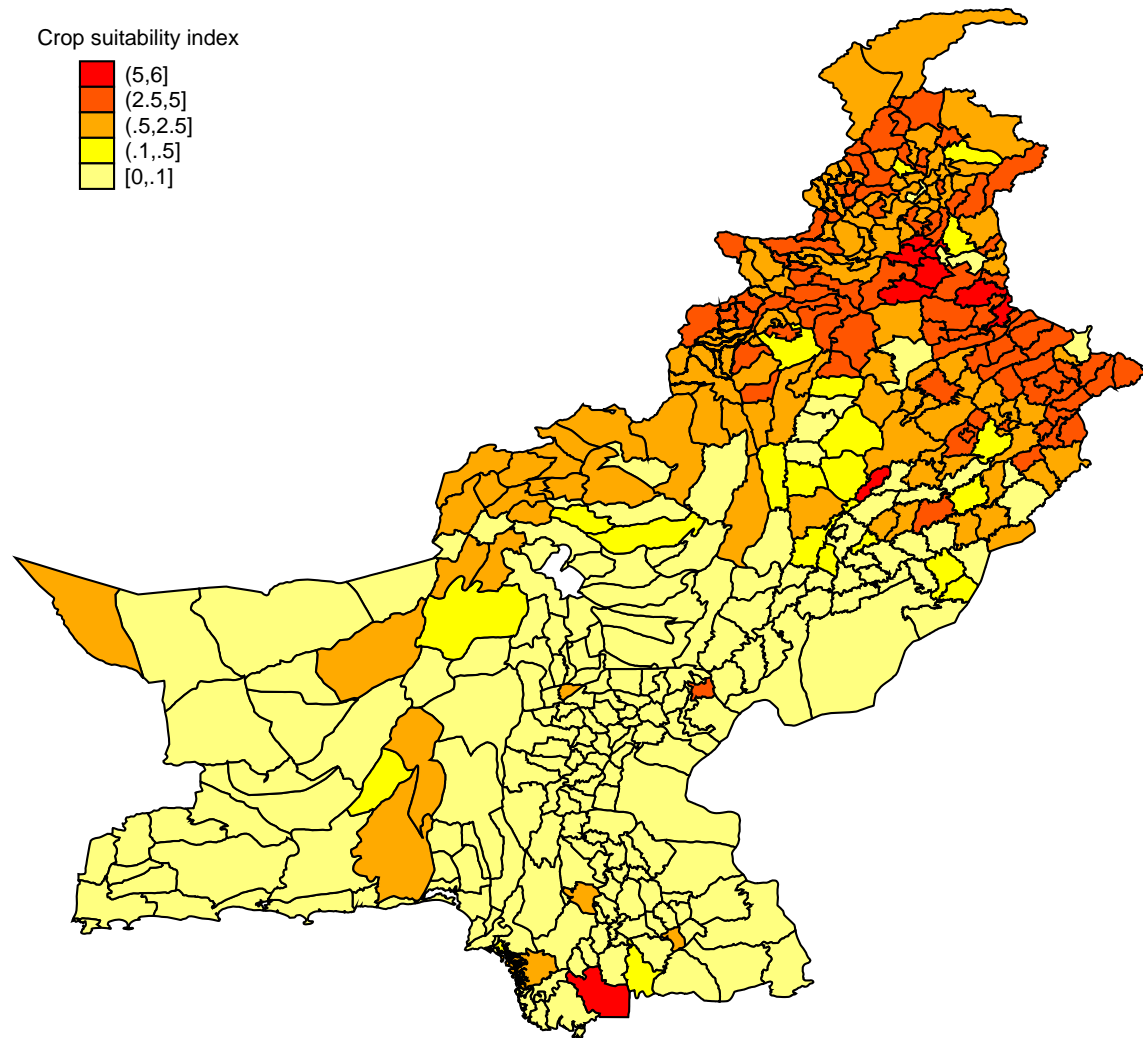
*Notes* : \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ . Standard errors clustered at the district level reported in parentheses. Crop suitability scores are as follows: 0 is not suitable, 1 is very marginal, 2 is marginal, 3 is moderate, 4 is medium, 5 is good, 6 is high, and 7 is very high. Post Green Revolution is a dummy for years after 1964. Years in analysis limited to those years where any sub-district had FCR removed—1956,1963,1964,1971,1973,1977.

Figure 1: FCR Application over Time



Sub-district (tehsil) boundaries marked. White sub-districts are those for which we do not have data, due to changes in sub-district boundaries between 1901 and 2012.

Figure 2: Crop Suitability



Sub-district (tehsil) boundaries marked. Crop suitability scores are as follows: 0 is not suitable, 1 is very marginal, 2 is marginal, 3 is moderate, 4 is medium, 5 is good, 6 is high, and 7 is very high. Data from FAO, 2012.

# A Appendix

Table A.1: Crop Suitability and Initial FCR Application Robustness

	FCR applied initially in 1901 (=1)				
	(1)	(2)	(3)	(4)	(5)
Sub-district Crop Suitability	0.083** (0.033)	0.148** (0.065)	0.078 (0.053)	0.074 (0.050)	0.061 (0.046)
Sub-district Area (Square KM / 1000)	0.030*** (0.008)	0.030*** (0.008)	0.027*** (0.009)	0.027*** (0.009)	0.026*** (0.009)
Mean of Dependent Variable	0.457	0.457	0.457	0.457	0.457
# Observations	346	346	346	346	346
# Clusters	116	116	116	116	116
R-Squared	0.079	0.064	0.038	0.038	0.034
Crop suitability crops	Wheat	+ Pearl Millet	+ Gram	+ Oil-seeds	+ Cotton

*Notes* : \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ . Standard errors clustered at the district level reported in parentheses. Crop suitability scores are as follows: 0 is not suitable, 1 is very marginal, 2 is marginal, 3 is moderate, 4 is medium, 5 is good, 6 is high, and 7 is very high. Each column adds a new crop to the mean crop suitability measure, keeping all previous crops (i.e., column (5) uses the average of crop suitability for wheat, pearl millet, gram, oil-seeds, and cotton as its Sub-District Crop Suitability Measure.

Table A.2: Crop Suitability and FCR Application Before and After the Green Revolution Robustness

	FCR applied (=1)				
	(1)	(2)	(3)	(4)	(5)
Sub-district Crop Suitability	.	.	.	.	.
Post Green Revolution (=1)	-0.668*** (0.150)	-0.668*** (0.150)	-0.656*** (0.143)	-0.652*** (0.140)	-0.659*** (0.141)
Crop Suitability * Post Green Revolution	0.084*** (0.026)	0.167*** (0.051)	0.137** (0.054)	0.125** (0.054)	0.122** (0.047)
Mean of dependent variable	0.791	0.791	0.791	0.791	0.791
Year FEs?	YES	YES	YES	YES	YES
Sub-district FEs?	YES	YES	YES	YES	YES
Crop suitability crops	Wheat	+ Pearl Millet	+ Gram	+ Oil-seeds	+ Cotton

*Notes* : \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ . Standard errors clustered at the district level reported in parentheses. Crop suitability scores are as follows: 0 is not suitable, 1 is very marginal, 2 is marginal, 3 is moderate, 4 is medium, 5 is good, 6 is high, and 7 is very high. Post Green Revolution is a dummy for years after 1964. Years in analysis limited to those years where any sub-district had FCR removed—1956,1963,1964,1971,1973,1977. Each column adds a new crop to the mean crop suitability measure, keeping all previous crops (i.e., column (5) uses the average of crop suitability for wheat, pearl millet, gram, oil-seeds, and cotton as its Sub-District Crop Suitability Measure.