Choosing Ungoverned Space: Pakistan's Frontier Crimes Regulation *

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This Version: February 26, 2015

Abstract

Why do substantial swathes of territory within the boundaries of administratively competent sovereign states remain ungoverned for long periods of time? We explore this question in the context of 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. Pakistan therefore offers a prime case in why governments leave certain territory ungoverned. Using primary legal documents we 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 to empirically model the choice to leave territory ungoverned. We find that sub districts that we 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.

* *Authors' Note*: The authors thank colleagues at UC San Diego and Denver University for helpful comments. Shapiro acknowledges support from AFOSR, grant #FA9550-09-1-0314.

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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 has many such areas, and has 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 state institutions, and allows for documenting how these areas have changed over time, providing an opportunity to study the determinants of state control. We study one key predictor of the extent of the FCR jurisdiction over time—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 small Provincially Administered Tribal Areas (PATA).[1]

There have been many empirical attempts to understand the initial choice to govern a space during colonial times. Several competing hypotheses have been offered to explain the

[1] These areas provide safe haven to domestic and international terrorists. Training facilities operate openly and with impunity.

broad patterns in the historical record: (i) the availability of resources, and the ease with which they can be extracted, determine the initial set of institutions (Diamond, 1998; Gallup et al., 1999; McArthur and Sachs, 2001; Acemoglu et al., 2001); (ii) natural terrain, and the military advantage it affords indigenous groups, make full colonization impractical in some regions (Fearon and Laitin, 2003; Nunn and Puga, 2012); and (iii) it is both efficient, and easier, to maintain order in such regions through a system of indirect governance (Padro i Miquel and Yared, 2012; Scott, 2009).[2] All three perspectives are consistent with the British decision to set up minimal governance institutions in areas initially under the FCR.

Turning to how state presence changes over time, there are several additional hypothesis pertaining to why a state may maintain or roll-back 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 (Grossman and Noh, 1990, 1994). And even well-intentioned governments may chose not to contest rebel control when the expenditures required to efficiently do so are high relative to the costs rebels can impose (Berman et al., 2011) or when there are rents to gained from having limited ungoverned space within one's territory (Felter, 2006; Bapat, 2011).

None of these approaches, however, parsimoniously explain the time path of integration of peripheral areas into the state or provide testable implications for how states' decision calculus will change in the face of technological innovations. We test a simple explanation for ungoverned space that falls broadly into hypothesis (i) above. Our theory posits a simple cost-benefit analysis in which the cost of implementing full institutions is relatively static while the benefits of doing so can shift quickly due to technological changes. In such settings it is the places where the technological change has the largest marginal impact on benefits

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

that will be incorporated into the state first, and not necessarily the most-productive places in absolute terms. Given the static nature of the costs of imposing institutions those places would have already have been brought in if the costs to doing so were low.

We test this argument in two stages. First, we make use of geo-spatial information and crop suitability data from the Food and Agriculture Organization of the United Nations to study why the British chose to apply FCR to over half of modern-day Pakistan in 1901. Once we condition for proxies for local productivity and the cost of imposing state institutions we find no correlation between a sub-district's crop suitability for wheat (the main crop influenced by the Green Revolution in Pakistan) and the initial British choice to apply FCR. This first result is correlational. It would be consistent with our hypothesis that increased potential revenue should have increased the British's desire to govern many parts of Pakistan if it was the costs of implementing institutions that was much more binding initially. Preliminary analysis suggests this may be the case. While the unconditional correlation between crop suitability for wheat and FCR application is positive, the conditional correlation is zero once we control for proxies for the costs and benefits of exercising control. We are in the process of collecting additional data to directly measure productivity in the late-19th century to confirm this result holds.

Next, 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. The Green Revolution in South Asia is widely understood to have increased productivity for wheat more in marginal areas than in already-productive regions, it mitigated the importance of crop suitability and thus caused lower-suitability sub-districts to 'catch-up' to other districts in potential revenue extraction. Because the FCR's original application was conditionally-independent of crop-suitability, the Green Revolution created a plausibly exogenous differential increase in agricultural land value. Places that were marginally suitable for wheat saw their value increase more at a specific point in time than areas which were highly suitable for wheat.

Exploiting this various we find that an increase in crop suitability from 'medium' to 'good' increased a sub-district's probability of being left ungoverned by over 20 percent following the Green Revolution relative to before. 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. And our results suggest a large effect of land value on FCR application. A one unit increase in crop suitability is associated with a 20.5 percentage points differential increase in the likelihood that FCR continues to be applied to a sub-district following the Green Revolution. This result has a causal interpretation to the extent that: (i) the initial decision to apply the FCR was conditionally-independent of wheat crop suitability (which it appears to have been); and (ii) the timing of the Green Revolution varietals' introduction in Pakistan was exogenous to planned changes in the extent of the FCR.

These results are valuable because they provide microeconomic evidence on the importance of extractable land value for the choice to govern and because they provide additional evidence on the importance of the Green Revolution in South Asia. But they are especially important because they provide evidence that technological change 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 the government from integrating them was, at least in part, a simple cost-benefit calculation.

This paper proceeds as follows. Section 2 provides additional background on the FCR, Section 3 presents a simple model to give us intuition on the choice to govern, Section 4 outlines our data, Section 5 describes our empirical strategy, Section 6 presents results, and Section 7 concludes.

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), in at least two important ways.[3] 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 Pashtun 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. Such differences were highly publicized, especially in cases involving women.[4]

After multiple decades of struggle, the British eventually decided to stop fighting the customary legal system in favor of appropriating 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.

[3]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. NWFP was renamed Khyber-Pakhtunkhwa in 2010.

[4]Nichols (2013).

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 troubled 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 a few 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; the language of the regulation was left intact for over half of a century. Political agents were still appointed, now by the head of the Punjab Province. Cases still went to Jirgas. In fact, several years after the country's independence, FCR was extended to including additional parts of Balochistan and, briefly, new areas in Punjab and Sindh. It was only over the course of several decades that it was slowly rolled back to the tribal areas which remain under FCR today. We detail these geographic changes in Section 4 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 1997 that Pakistanis in FCR regions were even granted representation in the national legislature. Party-based elections were only introduced to areas under the FCR in 2013, decades after the rest of the country.

3 Model

Consider a government that prioritizes the governance of some regions over others. Its territory is unit mass ordered in terms of potential income, I. Define $I(\phi)$ with $\phi \in [0,1]$ to be the income from any given point in the territory so that $I' > 0$ at all points. Assume the government can tax that income at cost k so that net revenue at any point, R, is equal to $I - k$. Figure 1 illustrates control of territory for that government, where the vertical axis measures income and the horizontal axis captures the priority of space, increasing priority from left to right. In the figure, that logic would yield a frontier, ϕ^*, at which net income becomes zero, beyond which the government would optimally choose to leave space ungoverned.

Citizens in the regions captured in Figure 1 have a choice between paying taxes and receiving a resulting public good g, or resisting through non-payment or perhaps open rebellion.[5] To have uncontested governance in a given region taxation must leave the representative individual in any region at least as well off as they would be without government.[6] That is, it must be that $g \geq i$, where i is the representative individual's share of a region's I under the next best alternative. Assume no transfers between regions and that public goods provision is functional so that $g'(R) > 0$ for all $R > 0$–i.e. government can always meet the revolution constraint in areas with positive revenue where there is no competition.[7] Finally, assume $g''(R) > 0$ so the government has economies of scale in public goods provision, but $g(R(1)) < R(1)$ so there is no free lunch. This describes the generic setting where public good provision is correlated with revenue, $I - k$, but must lie below the revenue curve across all governed territories.

Now allow for informal local governance in low-income areas, perhaps by tribes or clans. Such informal governance, which might use traditional norms such as Pashtunwali and security provided by local militias, is simple and low-cost, making it efficient to use in areas where tax potential is minimal. Moreover, it can be financed through informal taxes on agri-

[5] This is similar to the tradeoff of a constrained kleptocrat modeled in Grossman and Noh (1990, 1994).
[6] We can think of governance here as a "contingent consent" equilibrium, in the sense of Lake (2010).
[7] This is an obvious simplification but is useful for fixing intuition.

cultural goods unable to reach markets and requires fewer formal institutions. This makes tax collection easier by informal groups than by government. We formalize this intuition by assuming tribes pay a lower cost to tax, $k_T < k$ so that net tribal revenue is greater than government revenue. But, consistent with the literature on efficient production requiring strong institutions we assume that tribes are not as good at providing public goods as the government. Formally define $g_T(R)$ such that $g'_T < g' \forall R$ and assume $g(I(1) - k) > g_T(I(1) - k_T)$ so that at high levels of income the government is a better provider of public goods than the rebels. Figure 2 represents this interaction and the intersection of g and g^T defines a frontier $\hat{\phi}$, to the left of which tribes will control territory, because residents prefer to receive public services from tribes than from government. If the government attempts to collect taxes in this area residents will revolt.

Given this simple set-up, we can proceed to analyze the effects of an increase in the value of land in some or all areas in the state. In the specific case of the Green Revolution, we can imagine that the introduction of high-yielding variety seeds will yield an increase in taxable income I but not necessarily shift the relative costs of taxation.[8] This would come with an increase in the amount of g available to maintain the contingent consent equilibrium between citizens and the government. This shift up in g can be seen in Figure 3. As we can see, this will lead to shifts up in revenue under either party's control, shifts up in both parties' public goods provision, but a net shift down in the proportion of ungoverned space in the country from $\hat{\phi}$ to $\tilde{\phi}$ as government has greater economies of scale to public goods provision. Given government's comparative advantage in public goods provision a shift up in income will necessarily lead to shift out in the governed frontier.

This simple model leads to two predictions that correspond to the two questions we ask in this paper: (i) an increase in potential land revenue for the government relative to tribes will (weakly) lead to an increase in the proportion of the country governed; and (ii) a larger increase in potential land revenue in one ungoverned region relative to another (weakly)

[8] A more subtle model would allow for shifts in the ability to tax. For simplicity we assume a simple income shock.

increases the probability of the former region becoming governed relative to the latter. This second prediction is not shown in our figures but intuitively follows from Figure 3. If one area gains more potential land revenue than the other, it will move up in priority and be more likely to end up to the right of the new frontier $\tilde{\phi}$.[9]

Note this very simple model makes predictions that several other simple models do not. One competing model could be that the extent of ungoverned space in a country over time is simply a function of capacity constraints—the government may only have the military capacity, for example, to bring one area into formal government at a time. Another set of competing models could be those with the same mechanics but different costs and benefits driving the governments choice. For example, the government might care more about the changing strategic value of land domestically and/or internationally (Atzili 2012), or leaders may only care about available rents to be captured, including votes (Acemoglu et al., 2013). Neither of these models predicts that the initial choice to govern will be independent of crop suitability once we condition out factors influencing the difficulty of taxation and productivity given initial technology (in our case productivity proxies in 1901) and neither predicts that changes in marginal revenue will drive changes in control efforts. We will speak to these specifically in our identification and robustness check sections.

4 Data

4.1 FCR Application, 1901-2012

In order to understand both the British and later Pakistan'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 between 1901 and 2012 for all 403 sub-districts (tehsils) in Pakistan. Basic summary stats are presented in Table 1 and

[9] In both cases in a richer model the predictions would be weakly positive because it could be that a change in potential land revenue is not enough to move the frontier at all, or that the costs of collecting such revenue offset the benefits.

in Figure 4. 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, including all of the disputed Kashmir region. In 1965, the biggest roll-back in FCR thus far occurred. Another large rollback occurred in 1977. The last year figure shows that FCR application has not changed since 1977.

4.2 Crop Suitability and the Green Revolution

For a 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 a variety of crops. We focus on wheat which was by far the most common crop in Pakistan around the time of the Green Revolution and the crop that would overwhelmingly benefit from the new technologies. The FAO indices are based on 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 5 shows the extent of geographic variation in crop suitability for wheat. While most of Pakistan falls in the medium to not suitable categories, there is a fair amount of geographic variation, especially in areas that at one point had or have FCR.[10]

Though the data used to create these FAO indices include more recent weather information than many of the years in our analysis, we believe that the cross-sectional variation applies across this time period given that the geographic are fixed and that rainfall and temperature are very slow to change.

Importantly, we have also documented the point at which the Green Revolution first

[10] 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 for each crop.

began in Pakistan—1965. These changes were driven by the technological changes in wheat production, which was the most important Green Revolution Crop in Pakistan. And with wheat the key changes were not in terms of inputs. Rather, the key change was the introduction of new high-yielding varieties first introduced in Punjab in 1965.[11] In Western Pakistan, wheat production increased by 79 percent from 1966 to 1969, with a peak growth rate of agricultural output of 15 percent during fiscal 1967-68 (Child and Kaneda, 1975).[12]

The Green Revolution in South Asia was characterized by increased crop yields among the staple crops. With wheat there were few required changes in input technologies, labor to capital ratios, or irrigation. We will therefore consider the Green Revolution to mitigate the importance of crop suitability for wheat.[13] This is consistent with Foster and Rosenzweig (1996) and with Child and Kaneda (1975).[14]

5 Empirical Approach

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 characteristics, including 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.

[11] See Dowswell (1989). Using similar data, the International Maize and What 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).

[12] We are currently collecting data on when Green Revolution varietals were introduced in each sub-district which will make our estimates of the onset of the Green Revolution more precise.

[13] This is different from Southeast Asia where the introduction of new rice varieties effected both input requirements (more fertilizer) as well as the modes of cultivation and distribution of returns (see e.g. Scott, 1977).

[14] 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.

5.1 Initial FCR Application in 1901

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

$$\text{FCR\_applied\_1901}_t = \alpha + \beta\, \text{Crop\_suitability}_t + \Gamma_t + \epsilon_t \tag{1}$$

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 Γ_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 measure any more than has already been done.

This analysis will give us a correlation. What is informative is that while sub-district geographic characteristics that proxy for productivity at the time of territorial demarcation (which happened over the latter half of the 19th century), the challenge of exerting control, and transportation costs all correlate in the expected direction with FCR application, FCR application is conditionally independent of crop suitability for wheat. We proxy for initial productivity with sub-district area because administrative units were sized to capture similar populations during the initial demarcation in the mid-19th century and more productive places were more densely populated at the time. We therefore expect productive areas to have had physically smaller administrative units. We proxy for the challenge of exerting control with the standard deviation of elevation. It is well established that rougher terrain is harder to police given modern military technologies and this was certainly true in a time before mechanized transportation. We also proxy for transportation costs with the distance to the Karachi, the main port at the time for areas that would become Pakistan, because wheat was an important export crop. The value of controlling territory where it was produced was therefore likely related to the costs of moving it to market. We do not have pre-1901 data to control for potential omitted variables such as differential time trends in productivity, or for specific time-invariant covariates of a sub-district. 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.

5.2 FCR Application and the Green Revolution

For our second analysis we exploit pre-existing cross-sectional variation in the marginal impact of Green Revolution wheat varieties on productivity with an exogenously timed technological change (the introduction of those varieties) to identify incentives for rolling back the FCR. Our primary specification will be as follows:

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

Here 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. δ_t and δ_y are sub-district and year fixed effects. Note that we will not be able to separately identify β_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.[15] 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.[16] We limit to these years as an event study of sorts, assuming that there was enough of a political cost to changing the FCR legislation that it could not be done continuously. This approach matches the historical record in that decisions to remove sub-districts from the law happened episodically and in groups. There are two more extreme alternatives: (i) leave the data at the yearly level and run the same specification; or (ii) collapse the data down

[15] 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 FCR_applied_{ty}.

[16] 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.

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.[17]

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 an exogenously timed change in a sub-district's agricultural land value, on the choice by the Pakistani government to maintain or remove FCR.[18] 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. Nevertheless, we perform a series of robustness checks meant to rule out the presence of other correlated changes in the following section.

6 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

[17]Note that if we take the conservative approach and run analysis on data for all 15 years before and after the Green Revolution as in (i), we obtain coefficients with 1/3 to 1/2 of the magnitude and the same level of significance. These are still very meaningful magnitudes. Results available upon request.

[18]In the context of our theory we have a one-time shock which impacts I but not k or k_T.

country throughout the 1960s and 1970s.

6.1 Initial FCR Application in 1901

Table 2 presents results for this analysis. In-line with our model, column (1) shows that the British applied FCR in less productive places (under our assumption that sub-district area was negatively correlated with productivity), column (2) shows that that places which were more costly to tax due to rough terrain were more likely to be in the FCR, and column (3) shows that places with higher transportation costs (and thus lower revenue potential given productivity) were more likely to be included. Column (4) shows that all results remain significant in a fuller model. Column (5) shows that once these factors are accounted for the sub-district suitability for wheat is uncorrelated with initial FCR application. Finally, column (6) shows that none of these correlations are robust to the inclusion of province fixed-effects.

Table 3 begins with the last correlation from the previous table in column (1), and then shows that as you add crop suitability measures for other important crops in Pakistan at the time (gram, cotton) or crops that would become important with the Green Revolution (maize), the coefficient on wheat crop suitability stays insignificant and close to zero.[19] Note that we use residual crop suitability measures for each of these additional crops from a regression of the crop suitability measure on wheat crop suitability. This is because the measures are are highly correlated. In columns (2) through (4), these residual measures of other crop suitability are each negatively predictive of the initial assignment of FCR. We will not read much into this given the other crops small shares in total agricultural output and that none of the variables remain significant when put in the same regression in column

[19]Using sub-district-level reported areas of cultivated crops from a sample of British Gazettes published around 1901, we find that wheat was by far the most cultivated crop in Pakistan at this time, with 47 percent of total cultivated area. Gram and Cotton, accounted for eleven and five percent respectively and were the third and fifth most cultivated crops in our sample. The second most cultivated crop accounting for eleven percent of our sampled area, pearl millet, has no variation in crop suitability in Pakistan. The fourth most cultivated crop accounting for seven percent of our sampled area, rapeseed, has a crop suitability measure almost perfectely correlated with wheat (.98 correlation).

(5), but we do ensure that suitability for these other crops could not account for our Green Revolution results below in our robustness checks.

Thus we argue that initial assignment to the FCR is plausibly exogenous to wheat crop suitability once we condition for proxies for local productivity and the cost of imposing state institutions.

6.2 FCR Application and the Green Revolution

Table 4 presents results for our second analysis—exploiting the differential impact of the Green Revolution by crop suitability to understand Pakistan's decisions to maintain 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 and year fixed effects.

We can see that we obtain consistent results for the coefficient of the interaction term between crop suitability and a dummy for post Green Revolution—crop suitability differentially positively predicts FCR's continued application after the Green Revolution relative to before, regardless of specification, including in our ideal specification in column (5) which includes year and sub-district fixed effects. And in all cases, the estimated coefficient is very large—18.7 to 20.5 percentage points. These results are confirmed visually in Figure 6, where we group sub-districts into above and below median crop suitability and show mean FCR application levels over time for all those sub-districts that FCR in 1945. We see that after the Green Revolution low suitability districts became much less likely to have FCR maintained, and this effect increased over time.

This result is 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 positive as a result of the Green Revolution, and these districts were relatively more likely to have their FCR application removed.[20]

Our results suggest a fairly large magnitude of an effect as well. Using our preferred specification in table (4) column (5), we see that a one unit increase in crop suitability, from say 'medium' to 'good,' is associated with a 20.5 percentage points differential increase in the likelihood that FCR continues to apply to a sub-district following the Green Revolution.

6.3 Robustness Checks

We present two robustness checks to our Green Revolution result. First, we conduct a placebo check in which we add to our main specification the interaction of a dummy for post Green Revolution with crop suitability levels for other crops that were not impacted by the Green Revolution in Pakistan, including cotton, gram, and maize. Results are presented in Appendix Table A.1. All of these crops were either important crops in Pakistan prior to the Green Revolution or important for the Green Revolution in other countries. In all cases, our results remain completely driven by wheat crop suitability. This assures us that our results are not driven by some correlate of wheat suitable sub-districts that has nothing to do with potential land revenue—if such was the case it seems unlikely such a spurious result would exist with crop suitability for wheat but not other groups. This helps rule out alternative models discussed above.

Second, we conduct a placebo check in which we vary the year in which the Green Revolution supposedly took place. If there were pre-existing trends in low- relative to high-suitability sub-districts, such a placebo check should pick them up. Results are presented in

[20] This is consistent with Foster and Rosenzweig (1996) and with Child and Kaneda (1975). For an alternative definition of crop suitability that highlights the potential gain to technological inputs as a result of the Green Revolution, see Beg 2014. Appendix Table A.3 shows that our main result remains consistent if we use this alternative definition.

Appendix Table A.2. As you can see, we only get results when we use the true year of the Green Revolution in Pakistan. This is encouraging.

7 Conclusion

In this paper, we showed that the trajectory of state presence within the borders of modern day Pakistan is consistent with a model in which states extend governance to areas where the economic benefits of developing full institutions through taxation and resource extraction outweigh the costs of doing so extending state present. Using crop suitability data from the Food and Agriculture Organization of the United Nations, we show first that the choice by the British to apply FCR to over half of Pakistan in 1901 was conditionally uncorrelated with crop suitability. We then exploit the fact that Green Revolution had a greater marginal effect in areas of low crop suitability to understand Pakistan's decisions to selectively roll FCR 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 raised the relative value of less-suitable sub-districts.

Because the timing of the Green Revolution in Pakistan was exogenous to local politics 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 twenty percent following the Green Revolution, relative to before. Though counter intuitive 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.

These results are important for at least four 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 when applied at the sub-national level. 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. Third, we present microeconomic evidence in support of the idea of Fearon (2008) and Besley and Persson (2011) of *ungoverned-by-choice* space. 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.

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8 Tables and Figures

Table 1: FCR Application Summary Statistics

	% of Sub-districts under FCR	% area under FCR (km^2)
Year:		
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
Mean, 1901 - 2012	30.61	33.05
SD, 1901 - 2012	[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)	(3)	(4)	(5)	(6)
Area (Square KM / 1000)	0.021**			0.018***	0.018***	0.006
	(0.009)			(0.007)	(0.006)	(0.006)
SD of Height Above Sea Level (FT / 100)		0.043***		0.036***	0.038***	0.006
		(0.005)		(0.006)	(0.006)	(0.006)
Distance to Karachi (KM / 1000)			0.548***	0.275**	0.170	-0.005
			(0.103)	(0.108)	(0.144)	(0.334)
Wheat Crop Suitability					0.032	0.011
					(0.036)	(0.039)
Mean of dependent variable	0.455	0.455	0.455	0.455	0.455	0.455
# Observations	347	347	347	347	347	347
# Clusters	116	116	116	116	116	116
R-Squared	0.017	0.370	0.163	0.403	0.407	0.676
Province Fixed Effects?	No	No	No	No	No	Yes

Notes: Unit of observation is the sub-district (tehsil). $*p < 0.1$, $**p < 0.05$, $***p < 0.01$. 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. Karachi was the capital at independence and the main export port in the late-1900s.

Table 3: Other Crop Suitability and Initial FCR Application

	FCR applied initially in 1901 (=1)				
	(1)	(2)	(3)	(4)	(5)
Wheat Crop Suitability	0.011	-0.001	0.007	-0.008	-0.005
	(0.039)	(0.035)	(0.035)	(0.034)	(0.035)
Gram Crop Suitability (Residual)		-0.182***			-0.008
		(0.057)			(0.064)
Cotton Crop Suitability (Residual)			-0.156***		-0.046
			(0.054)		(0.058)
Maize Crop Suitability (Residual)				-0.193***	-0.149
				(0.058)	(0.094)
Sub-district Area (Square KM / 1000)	0.006	0.009	0.008	0.009	0.009
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Distance to Capital (KM / 1000)	-0.005	0.135	0.090	0.205	0.191
	(0.334)	(0.316)	(0.319)	(0.309)	(0.312)
Tehsil SD of height above sea level (FT / 100)	0.006	0.004	0.003	0.003	0.003
	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)
Mean of dependent variable	0.455	0.455	0.455	0.455	0.455
# Observations	347	347	347	347	347
# Clusters	116	116	116	116	116
R-Squared	0.676	0.700	0.699	0.706	0.707
Province Fixed Effects?	Yes	Yes	Yes	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. Gram, cotton, and maize crop suitabilities reported are residuals from regressions of the crop suitabiity meaure of each crop on wheat crop suitability and a constant.

Table 4: Crop Suitability and FCR Application Before and After the Green Revolution

	FCR maintained (=1)				
	(1)	(2)	(3)	(4)	(5)
Sub-district Crop Suitability	0.028**	0.022	-0.008	-0.012	
	(0.013)	(0.016)	(0.013)	(0.014)	
Post Green Revolution (=1)			-0.429***		
			(0.078)		
Crop Suitability * Post Green Revolution			0.187***	0.183***	0.205***
			(0.035)	(0.030)	(0.028)
Mean of dependent variable	0.874	0.874	0.874	0.874	0.874
# Observations	1098	1098	1098	1098	1098
# Clusters	70	70	70	70	70
R-Squared	0.012	0.166	0.125	0.244	0.336
Year FEs?	NO	YES	NO	YES	YES
Sub-district FEs?	NO	NO	NO	NO	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 1963. Years in analysis limited to those years where any sub-district had FCR removed—1922,1937,1947,1956,1963,1964,1971,1973,1977.

Figure 1: Ungoverned by Choice

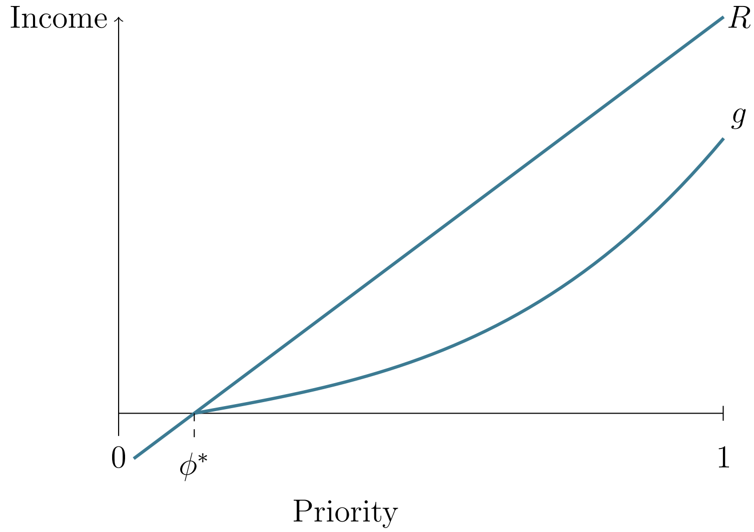


Figure 2: Competition for Provision of Public Goods

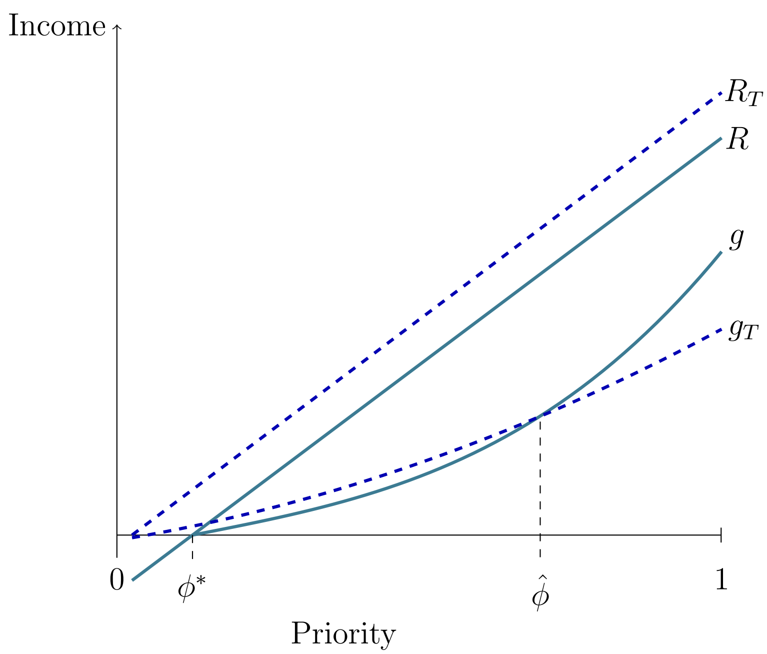


Figure 3: Increase in Value of Land

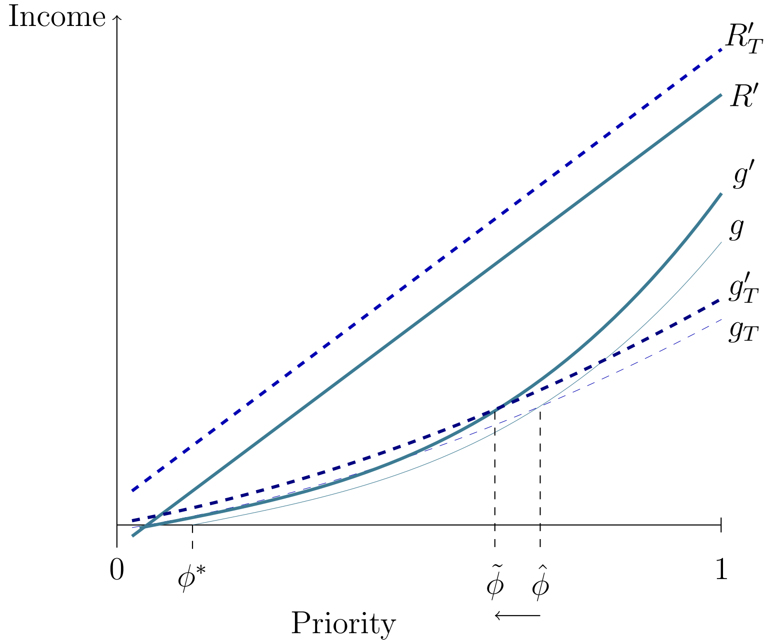
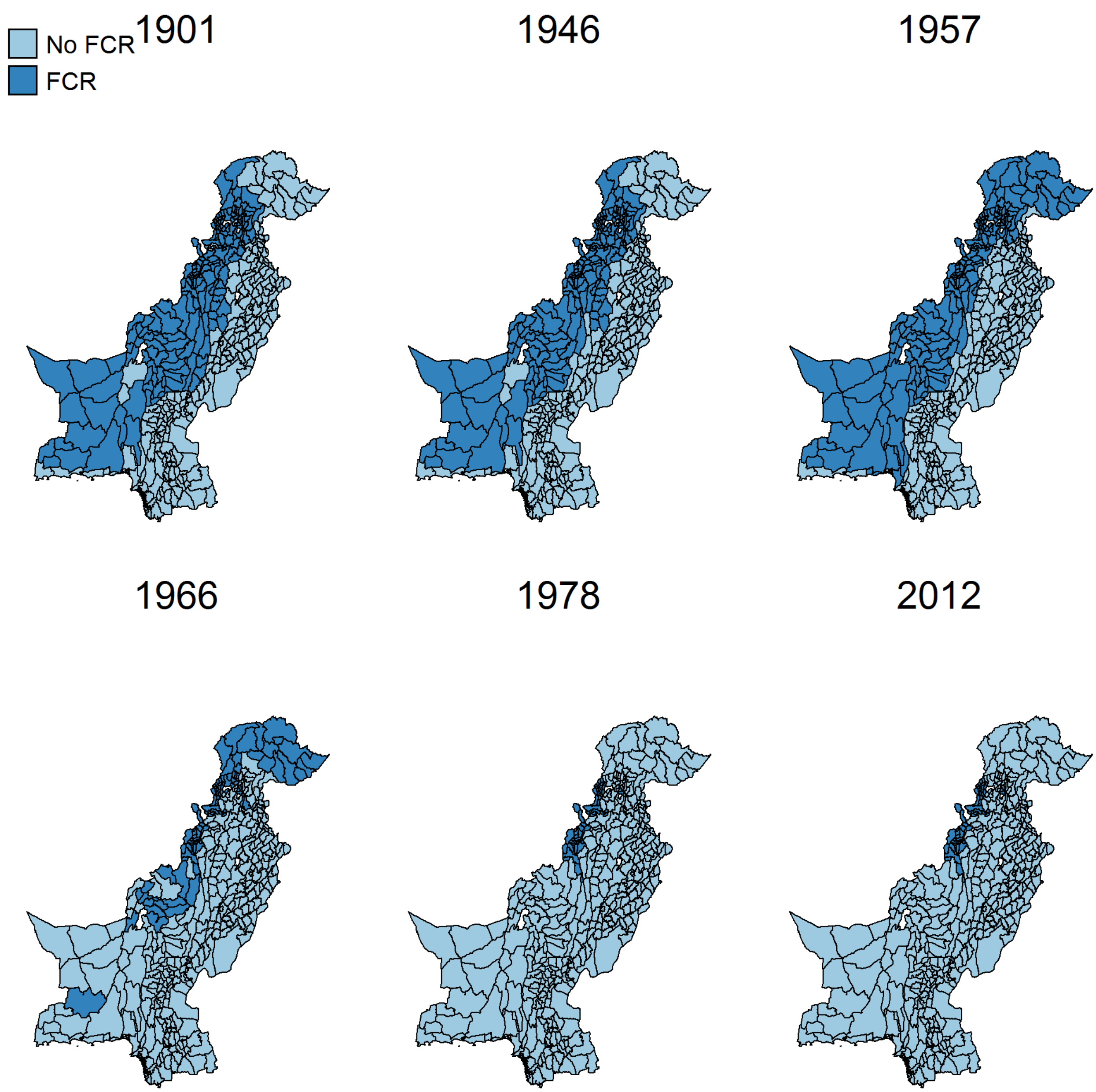
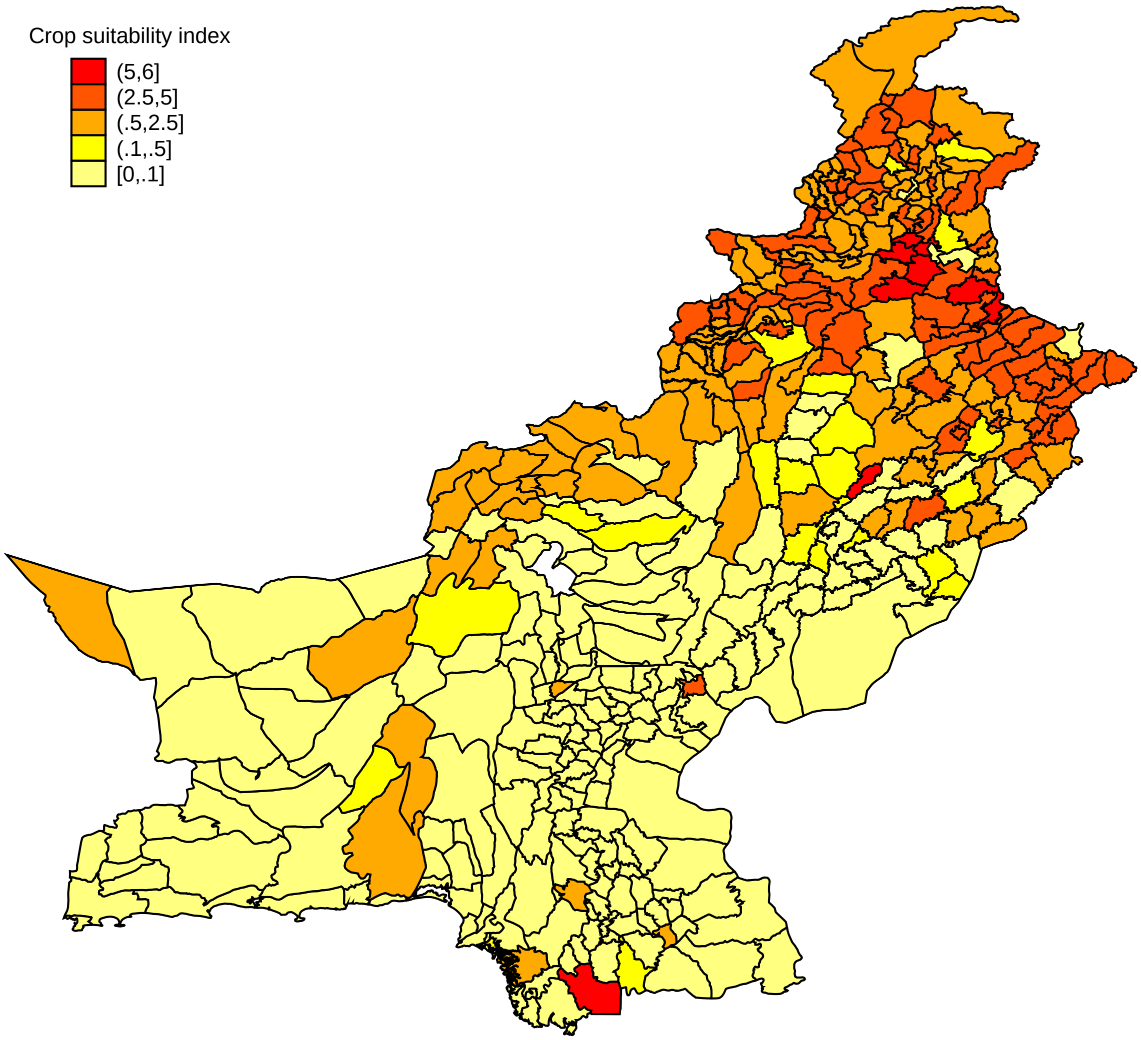


Figure 4: FCR Application over Time



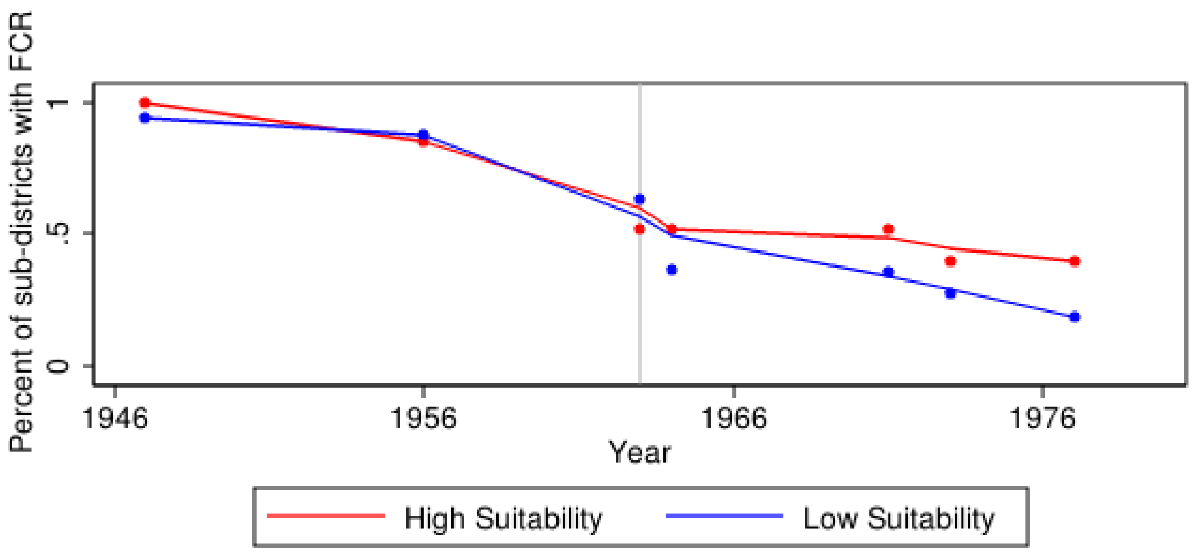
Sub-district (tehsil) boundaries marked. White sub-districts are those for which we do not have data, due to changes in sub-district boundaries between 1901 and 2012.

Figure 5: 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.

Figure 6: FCR application over time by crop suitability



Points show the mean sub-district FCR application dummy values in years used in analaysis within above (high) and below (low) medium wheat crop suitability bins. Lines are fitted using locally weighted scatterplot smoothing.

A Appendix

Table A.1: Placebo check 1

	FCR maintained (=1)					
	(1)	(2)	(3)	(4)	(5)	(6)
Wheat Crop Suitability * Post Green Revolution	0.205***	0.187***	0.218**	0.257***	0.233***	
	(0.028)	(0.060)	(0.086)	(0.052)	(0.081)	
Gram Crop Suitability * Post Green Revolution		0.026				
		(0.080)				
Cotton Crop Suitability * Post Green Revolution			-0.015			
			(0.093)			
Maize Crop Suitability * Post Green Revolution				-0.078		
				(0.071)		
Other Crop Average Crop Suitability * Post Green Revolution					-0.037	
					(0.106)	
Mean of dependent variable	0.874	0.874	0.874	0.874	0.874	
# Observations	1098	1098	1098	1098	1098	
# Clusters	70	70	70	70	70	
R-Squared	0.336	0.336	0.336	0.338	0.336	
Year FEs?	Yes	Yes	Yes	Yes	Yes	Yes
Sub-district FEs?	Yes	Yes	Yes	Yes	Yes	Yes

Notes :*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$. Standard errors clustered at the district level reported in parentheses. Other crop suitability is the average of gram, cotton, and maize crop suitability.

Table A.2: Placebo check 2

	FCR maintained (=1)				
	(1)	(2)	(3)	(4)	(5)
Wheat Crop Suitability * Post Green Revolution	0.205***				
	(0.028)				
Wheat Crop Suitability * Post 1937		0.005			
		(0.022)			
Wheat Crop Suitability * Post 1947			0.006		
			(0.028)		
Wheat Crop Suitability * Post 1956				0.047	
				(0.036)	
Wheat Crop Suitability * Post 1963					0.047
					(0.036)
Mean of dependent variable	0.874	0.874	0.874	0.874	0.874
# Observations	1098	1098	1098	1098	1098
# Clusters	70	70	70	70	70
R-Squared	0.336	0.242	0.242	0.249	0.249
Year FEs?	Yes	Yes	Yes	Yes	Yes
Sub-district FEs?	Yes	Yes	Yes	Yes	Yes

Notes :*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$. Standard errors clustered at the district level reported in parentheses.

Table A.3: Alternate crop suitability

	FCR maintained (=1)	
	(1)	(2)
Wheat Crop Suitability * Post Green Revolution	0.205***	
	(0.028)	
Potential Gains to Tech. Change * Post GR		-0.091***
		(0.021)
Mean of dependent variable	0.874	0.861
# Observations	1098	935
# Clusters	70	69
R-Squared	0.336	0.307
Year FEs?	Yes	Yes
Sub-district FEs?	Yes	Yes

Notes :*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$. Standard errors clustered at the district level reported in parentheses.