The Political Economy of Land Institutions, Tenure and Agricultural Productivity[1]

SABRIN BEG,[‡]

[‡]Yale University (e-mail: sabrin.beg@yale.edu)

October 22, 2014

Abstract

Unequal initial asset distribution can shape the identity and incentives of elites, which in turn affect public goods and development. I study the effect of land inequality and presence of landed elites on electoral competition and public goods provision in the context of Pakistan. Landowners can make transfers to share cropping tenants at a low cost, allowing them to win electoral support and sway policy in their favor. Household data from Pakistan is used to show that when an election is introduced after a military regime, politician landlords offer concessions on input costs to their tenants, while landlords with no political incentives do not. Technical change increases the cost of tenancy in the presence of moral hazard, attenuating landlords electoral advantage. I use electoral data to test the effect of an exogenous shift in productivity in areas where originally landlords were politically influential, i.e. initial land concentration is high. Exploiting innovations due to high yielding variety seeds as a shock to agricultural productivity, and colonial land distribution as a proxy for land concentration, I show that technical change alters the identity and incentives of the political elite; it lowers likelihood of land-owning politicians in office, improves electoral competition and shifts the composition of public goods (lowering the public goods preffered by land owners, while increasing others). Thus, development itself can influence the interplay of inequality and elite capture.

Keywords: Land Inequality; Clientelism; Public Goods; Colonial Institutions; Electoral Competition; Political Economy.

[1]Preliminary Draft. Please do not cite

1 Introduction

Colonization left many developing countries with high inequality and population heterogeneity, which persisted and restricted the evolution of institutions and investment considered conducive to growth (Engerman and Sokoloff 2005). In general, while inequality is a prominent theme in the study of development, the theoretic and empirical evidence is mixed (Keynes 1920, Kuznets 1963, Barro 2002, Deninger and Squire 1998, Forbes 2000)[2]. One potential channel through which the effects of inequality are manifested is the identity and incentives of the holders of de-facto political power. Deninger and Squire (1998) emphasize that an initial unequal distribution of assets leads to lower long-run growth. The initial distribution of assets determines the distribution of political power and the identity of policy makers, which in turn determines the public goods provided.

If initial asset distribution matters, the historical land distribution must play a key role, land being a salient asset historically. Indeed, Galor et al. (2003) document the negative impact of historically unequal distribution of land ownership on investment and public expenditure in modern times; Banerjee and Iyer (2005) find similar negative effects due to the salience of landed elites (landlord dominated revenue systems) in parts of British India. In this paper I try to understand how initial distribution of assets, specifically land, can translate into political power. The incentives and preferences of the political elites induce policies, which eventually determine the path of growth. Economic growth can in turn reinforce or undermine the power of these elites.

Specifically, I ask three questions: firstly, how historical land distribution and presence of landed elites affects the balance of political power in in a predominantly agricultural economy; secondly, how does the interaction of land distribution and political power affect electoral competition and public goods provision. Lastly, I consider the response of the relationship between land distribution and political power to changes in development; particularly, how does the landlords' political influence shift with permanent shifts in agricultural productivity and what implications this shift has for electoral and public goods outcomes. While a considerable portion of the literature on inequality examines its impact on development, the effect in the reverse direction has not received the same attention. This paper's contribution is thus two-fold: pinning down more precisely micro-founded mechanisms to understand the impact of land inequality on development

[2]Keynes (1920) and Smith (1776) postulate the view that rich have higher propensity to save. When income distribution is unequal the resources are in disproportionately higher control of the rich leading to greater savings and investment. More recent models predict a negative relationship between inequality and investment and growth. These models argue that inequality discourages investment if there is credit rationing and asset poor are unable to make lumpy investments like education because of lack of collateral

outcomes; moreover, the theoretic and empirical evidence here-in sheds light on the fact that development itself can alter the channels through which the effects of land inequality are manifested.

To study the research questions I use insights from the literatures on contractual arrangements in agriculture (Stiglitz 1974, Braverman & Stiglitz 1982, Braverman & Srinivasan 1981) and on political clientelism (Dixit & Londregan 1996, Robinson & Verdier 2002). Using a canonical model of sharecropping I show that landowners can transfer utility to tenants by offering them concessions on input cost shares; this is cheaper for the landlord to do so relative to offering a lump sum transfer. I argue that when land concentration is high, an oligarchy of landowners can coordinate to capture vote share using their ability to make cheap transfers to landless or smallholder tenants. Thus candidates representing the landowning class will have an electoral advantage relative to a candidate who does not have this ability to offer cheap transfers. I incorporate this electoral advantage into an election model where candidates offer both private transfers and public goods to voters; public goods may differ in how they benefit landowners, i.e. some public goods can directly benefit landowners e.g. rural facilities like irrigation. I find that a landlord politician will capture a greater vote share, due to the above-mentioned electoral advantage, and will offer a greater quantity of the public good that benefits landowners. The share-cropping contract entails lower input intensity and output due to moral hazard; technical change shifts the optimal contract away from sharecropping (Stiglitz 1974, Eswaran and Kotwal 1982). Having fewer sharecropping tenants attenuates landlord's electoral advantage, and thus her probability of win. This contrasts with a 'wealth story' due to which technical change should improve the landowners chances of winning.

I test my model using household and constituency level data from Pakistan. Pakistan is well-suited to the model because many regions in the country are proximate to an environment described above; where an oligarchy of land owners interact with a large group of small-holders or landless households; this economic asymmetry translates into an asymmetric distribution of political power. The landlords are not just traditionally dominant, but have been able to retain their political influence for generations. In a rural household survey conducted in 2000 in sample of villages across the country about 13% of tenant-households reported having a landlord who is a politician, while of the over 500 seats in the provincial assembly, on average 65% are held by politicians who report having agricultural land. The roots for these specific agrarian structures stem from colonial and pre-colonial institutions (as I elaborate later); the colonial and pre-colonial governments offered large land grants to local chiefs in return for their allegiance. The land grants perpetuated the prestige of the grantees, who were already influential in their localities. We know from the experience of chiefs in African countries (Acemoglu et al. 2014) that elite effects persist into post-colonial era.

The main empirical challenge in studying landlord politicians' contracts with tenants is that landlords who are politicians may differ from other landlords in observable and unobservable characteristics, and so do their tenants. I exploit the introduction of an election in 2002, preceded by a military regime. Using a difference-in-difference specification with tenant fixed effects, I show that after the election landlord politicians offer sharecropping contracts with lower input share but higher output share for tenants, relative to other landlords and relative to landlord politicians before the election [3]. Landlord politicians are also more likely to have offered loans on extremely lenient terms after the election. Thus, I establish that landlord politicians make transfers to their tenants to accumulate votes.

Technical change lowers tenancy, restricting the traditional land-owning politicians' vote base. I exploit the plausibly exogenous technology of high yielding variety (HYV) seeds, comparing areas with high suitability for HYVs to areas with low suitability, to test the impact of productivity on landlord politicians winning probability and public goods provision. The identification relies on the fact that certain natural characteristics of an area make it more or less suitable for gains from introduction of high yielding varieties (Foster and Rosenzweig 1996). These characteristics coupled with the time-varying availability of HYV provide a plausibly exogenous source of variation in the land productivity across areas and over time. The model derives testable predictions about the electoral outcomes with landlord politicians when technical change happens. Since land distribution is endogenous, I use colonial land grants to proxy for land concentration. Using colonial land settlement reports I construct a measure of prevalence of large land grants across areas, which captures the historic distribution of land. To the extent that this distribution is persistent, it can be used to proxy for high land concentration after independence.

I find support for the fact that when productivity is low landowners in areas with high land concentration are able to employ tenants and retain their political support; the winning probability of landowning politicians is high and public goods favored by landowners are also high. Using the measure of exogenous productivity shift, I show that the rate of sharecropping tenancy goes down with technical change. In areas with high land concentration, where landlords were traditionally politicians, technical change resulted in shifting power away from the landlords. This is in line with the prediction that technical change attenuates landlords ability to capture votes cheaply, and indicates that the wealth effect of technical change are small. The results show that electoral competition improves and public goods composition shifts with the technical change. Public goods favored by landowners and their voter-base move down relative to other public goods.

[3]Survey households who are tenants report if their landlord is a politician. In the round post-election this implies the landlord won in the last election, while in the round before election it implies the landlord had run in an election before the introduction of the military regime

The paper contributes to a key question in development economics and political economy about the performance of democracy across levels of development; developing countries are commonly faced with corrupt politicians who target funds and efforts to narrow groups of voters, and hence the provision of broad public goods is not optimal (Persson and Tabellini 2000). The theoretical and empirical evidence in this paper links land concentration and tenancy with the electoral process, showing how landlords can retain political support; an exogenous shift in land productivity lowers tenancy, attenuates the landlords' political advantage, improving electoral competition and transitioning the economy from a clientelist to more democratic regime. These results corroborate the research documenting the persistence of institutions (Dell 2012, Nunn 2009, Acemoglu et al 2001), highlighting the political economy mechanism (Acemoglu et al 2008). Although traditional elites are commonly viewed as despotic and unaccountable (Acemoglu et al 2014), the implications for public goods show that they are able to amass significant political support by providing more to their voter base. When the balance of power shifts towards non-traditional elites, the rural areas, where the traditional elites exercised most control, are likely to be worse off. Lastly, the paper makes a significant contribution by pointing out that while inequality and elite capture undeniably matter for welfare, economic development can itself modify the extent of elite capture.

The rest of the paper is structured as follows: Section 2 gives a literature review, Section 3 describes some of the institutional background in the context of Pakistan, Section 4 presents the model, Sections 5 and 6 discuss the data and the empirical strategy and results, and finally Section 7 concludes.

2 Literature Review

The work on land institutions and development is widespread in both its volume and scope. A series of papers, including Banerjee & Iyer 2001, Banerjee et. al 2010, Iyer 2010, look at the affect of historic land property rights in colonial India on economic outcomes. Areas in which proprietary rights in land were historically given to landlords have significantly lower agricultural investments, agricultural productivity and investments in public goods in the post-Independence period than areas in which these rights were given to the cultivators. Additional work by Besley& Burgess 2000 argues that a large volume of legislated land reforms are associated with poverty alleviation. A salient feature of the contributions of these papers is linking restrictive property rights and skewed land distribution and development outcomes. However, the mechanisms behind these links are not documented in great detail. Dell (2012) suggests land tenure and public goods as plausible channels of institutional persistence using the context of Peru.

There is also a substantial amount of work on the effect of institutions specifically on public goods. The particular institutions examined include property rights (Field 2005, 2007), ethnic divisions (Alesina et al 1997) social fragmentation (Banerjee and Somanathan 2001, Banerjee et al 2005), and politician incentives (Martinez-Bravo et al 2012, Keefer and Khemani 2005, Wang and Yao 2007). Again the studies aimed at establishing the impact on public goods far outweighs those addressing the underlying mechanisms of the effects. I aim to determine more precise micro-foundations, which can explain the impact of institutions on public goods.

One specific way which links historical institutions, particularly historic distribution of economic and political power, and modern public goods, is through the presence of traditional elites ("Chiefs" in the African context, Acemoglu et al 2014). Indirect rule by colonial governments endowed chiefs with great institutional powers (Boone, 1994; Chanock, 1985; Mamdani, 1996; Merry, 1991; Migdal, 1988; Roberts & Mann, 1991). The traditional elites are known to exert significant economic and political influence in modern times, even despite the adoption of democratic systems (Logan 2011). This paper speaks to a question that springs up within this literature - if elites are unaccountable, how are they able to maintain political influence. I also examine how the process of development may corrode the traditional influence exerted by elites.

The theoretical and empirical work in the paper also on a relatively recent literature on political clientelism and politician incentives in clientelist countries. The academic view on clientelism is that it can be bad for development, because it deters the politician from providing broad public goods which are socially optimal (Diaz-Cayeros and Magaloni 2003). Many developing countries are clientelist (when politicians are able to make transfers to only a certain group of voters). These papers aim at understanding the nature of patron client networks (Robinson & Verdier 2002, Keefer& Valaicu 2008) and the subsequent impact for policy. The literature focuses on the distinctive cases of a clientelist regime or a non-clientelist/fully democratic one. There is a need of studying the variation within clientelist regimes; in other words understand the factors, variations across which can lead to a high or lower incidence of clientelism. By doing so, the academic and public policy community can hopefully shed more light on the path to democracy for developing countries; by disentangling the nature of patron-client relationships and the factors which perpetuate clientelism, we can aim at identifying the pertinent policy instruments which can set economies towards a transition to a more efficient democracy.

Lastly, the paper ties into another literature within the realm of clientelism which looks at land owners and their clientelist relations with tenants and/or . ((Powell 1970, Scott and Kerkvliet 1976, Mason

1986). While several of these papers are old, Baland and Robinson (2008, 2012) highlight the interlinkage of patron-client networks with economic relations in the clientelist environment of Chile in 1950s.

3 Pakistan: Institutional and Historical Background

3.1 Land Distribution

There are two features of the agrarian structure, which provide the context for the paper. Firstly, the land distribution is skewed, and highly so in some parts of the country. There have been a few attempts at instituting Land Reforms, but their success is not considered extensive (Gazdar 2009). At the time of independence, more than 80%of the cultivated land in Sind, more than 50% in the Punjab and a little less than 50% in the North-West Frontier was owned by big landlords (Ahmad 1959). A half century later, in 2000, the top 1% of owners still own between 30-70% of the total area in several districts.

Figure 1 can be used to visualize the patterns of land distribution across districts, specifically look at the large landlords that are studied in this paper. Figure 1 shows the number of large holders (owning 150 acres or more) relative to total farm households who are landless or holding 12.5 acres or less. There can be up to a 1000 large holdings per district, however in around 70% of districts, these are fewer than 200. In these districts, these large holders comprise less than 1.5% of the farm households, and control on average 200-8,000 acres per holding; average holding is around 500 acres. Together the large holders can control well over 50% of the entire area in some districts. Thus, in several districts, fewer than 200 large landowners (even fewer land owning families) interact with 50 to 200 thousand small-farm households (0.5 to 2 million individuals). In Figure 2, the polarization between the large and small landholders is more pronounced. As Figure 2 shows, in many districts these large holders comprise the top 1% of landowners, while over 70% of the remaining landowners are small; in other words the percentage of medium sized farms is very small.

Figure 1: Few Large Landowners interact with Large Group of Landless/Small-holders

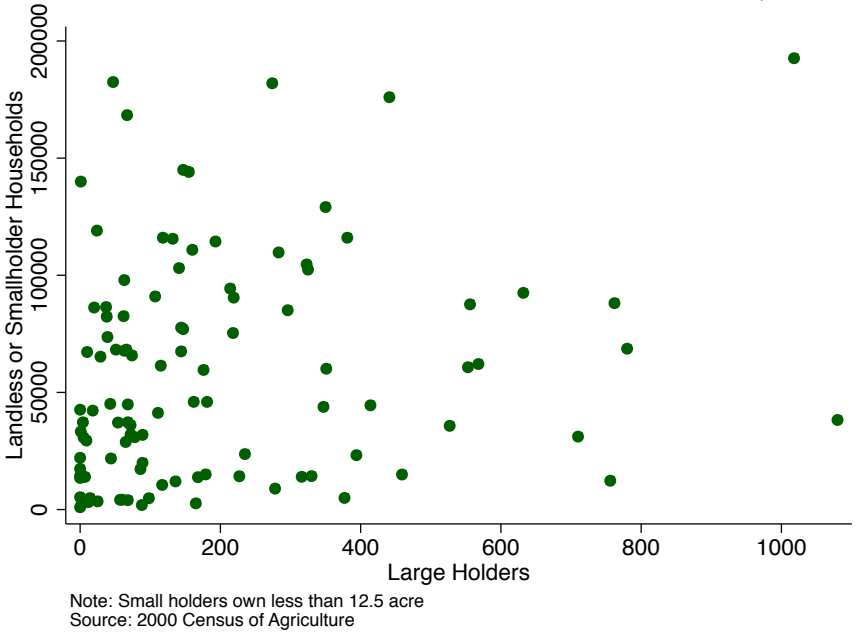


Figure 2: Divide between Large and Small Holders

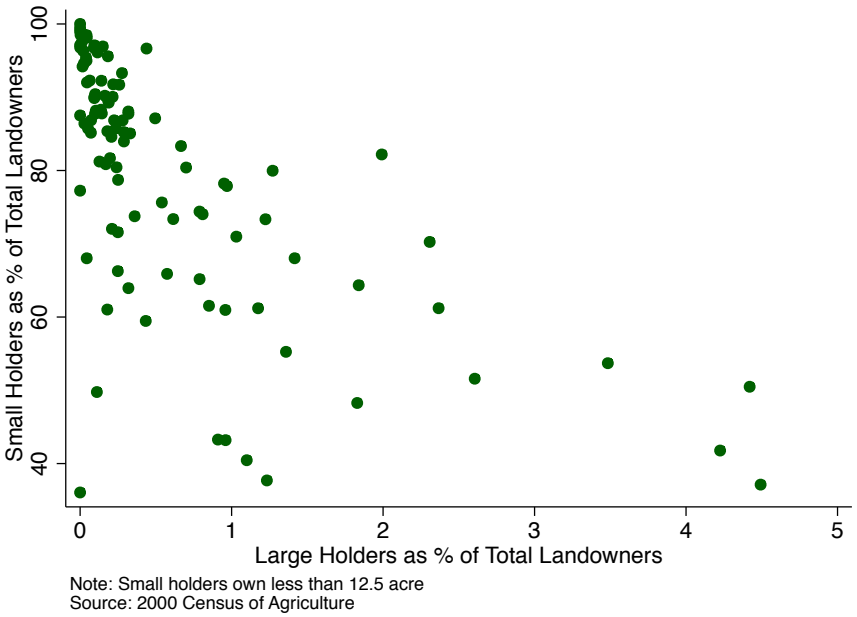
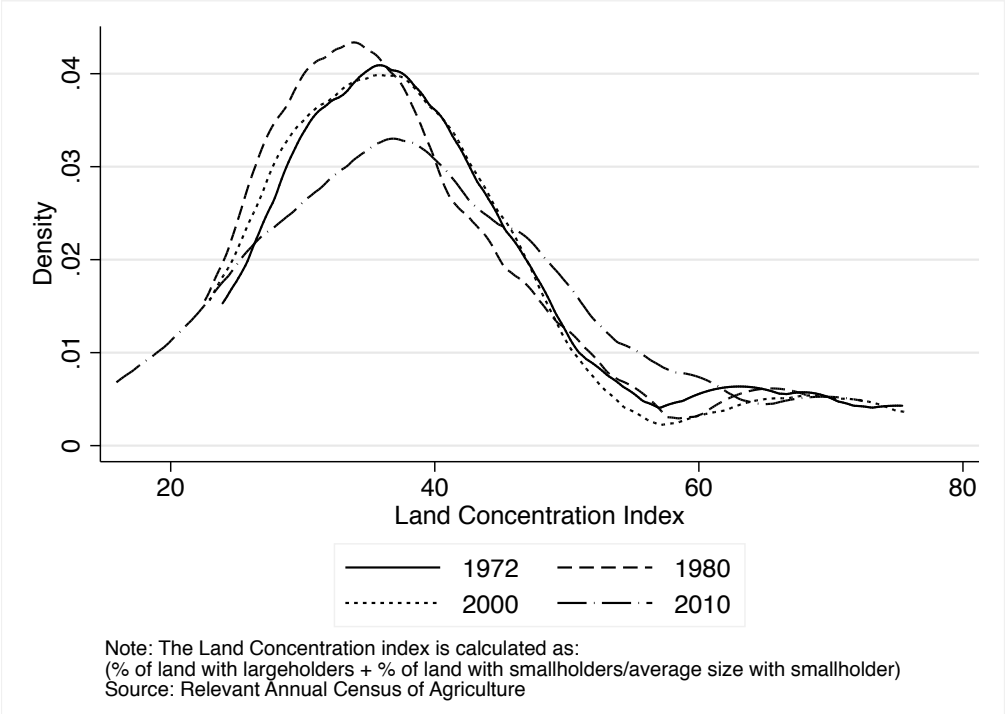


Figure 1-2 capture the divide between the large holders and the remaining agricultural population. While some districts seem equal, others are closer to the representation of the asymmetric land distribution described in Powell (1970) and Scott (1972, 1976); where a small oligarchy of large land owners (less than

1% of land owners) interact with a large group of landless/small-holder population. This bifurcation of land ownership across the agricultural population can be captured in a measure used in Brockett 1992 [20] to compare land concentration across Latin and Central American countries. The measure of land concentration is given by: $(\%\ of\ land\ with\ largeholders + \frac{\%\ of\ land\ with\ smallholders}{avg\ size\ of\ smallholder})$. Another measures to capture the bifurcated land inequality (Muller et al. 1989) is calculated as $(\%\ of\ land\ with\ smallholders \times \frac{avg.\ size\ of\ largeholder}{avg\ size\ of\ smallholder})$. I use the former in my analysis, but the results are robust to using both measures. I plot the distribution of the former land concentration measure across districts and years from 1960 to 2010 in Figure 3. The chart shows some persistence in the land holdings distribution; the dispersion increases slightly over the 5 decades, but the mean stays more or less stable. The persistence of land distribution leads one to believe that indeed the initial land distribution, in this case, shaped by the prevalence of permenant land revenue assignments during the colonial era, impressed upon post-colonial and modern outcomes (see Section 3.3).

Figure 3: Distribution of Land Concentration across Districts



The above discussion presents an aggregate picture of the land distribution across districts, and may obscure the patterns within villages or village-clusters, which more reasonably represent an independent market. Examining a village survey conducted in 2000 in about 150 villages across Pakistan, the presence

of dominant landlords and the extent of their control become more apparent. In the sample, 20% of villages have large land owners (defined to match the census, i.e. holding over 150 acres), with average holdings up to 800 acres. Three quarter of these report having 5 or fewer of these landlords, owning on average 50% of the total land in the village; in 15% of villages, the top 5 landlords control over 75% of the entire village. One village had 2 landlords (owning over 750 acres each) who controlled the entire village. Thus within a local market, the large landholders can be considered to have a monopsonist status. On the more aggregate level, the large landholders/landholding families contitute an oligarghy; the implications of the pre4sence of this oligarchy, their control of the productive asset and their incentives is studied in this paper.

The second feature of the Pakistani context, which I highlight, is that tenancy, in particular sharecropping, is common. In 1960, average rate of tenancy across districts was 50% , and on average 90% leased plots were sharecropped. By 1980 the rate of leasing was still over 35% of the area and sharecropping rate was 80%. In 2000, over 70% of leased plots are still sharecropped, though the rate of tenancy has dropped to below 30% [4]. This is in contrast to other countries in South Asia; in India the tenancy rate was less than 5% even in the 1970s and is at less that 1% according to the latest census in 2010. The rate of tenancy in Bangladesh is slightly higher, at 13% (2008 Agricultural Census). Just as the land reforms were relatively ineffective in breaking up the holdings of prominent local landlords, they didnt succeed in altering the extent of tenancy to a great extent. Joshi (1970) states Pakistan's, agrarian policy was less sharply aimed at curtailing land ownership by big landlords and at discouraging tenancy, in comparison to India's.

3.2 Landowners and Politics

Dominant local landlords enjoy not just economic but also political influence. An interview with Mumtaz Ali Bhutto, member of the well-known Bhutto family, in the Time (2008) describes how the family "with some 10,000 acres of land being cultivated by a vast network of thousands of sharecroppers dependent on [them],... can count on a large turnout of supporters at the polls... [the] family has owned this patch of fertile land alongside the Indus River for nearly half a millennium". In the election rounds of 2002, 2008 and 2013, 65% of the members of the Provincial Assemblies, declared as owning an agricultural land, and the average holding among landowning politicians is about 220 acres. While the majority hold under 50 acres, the holding of the top 7% of land owning politicians are between 500-10,000 acres. As I elaborate in section 3.3 the influence associated with land ownership is partly characteristic of a predominantly agrarian society

[4]The statistics are from the relevant decennial Agricultural Census

and also stems from the institutions established in colonial and pre-colonial times.

The landowners political motives have also existed since even before the colonial rulers left; the Unionist Party was a pro-British group of Hindu and Muslim members of the landed gentry (Gazdar 2009). Since after the end of colonial rule, the landowners continued to be politically active. By having an overwhelming representation in both the lower and upper houses of the government, the landed elites have managed to stall the successful implementation of land reforms, as well as keep agricultural taxes very low. The reforms of 1959, 1972, and 1977, have all largely failed to achieve the objective of alleviating the concentrated land holdings (Gazdar 2009, Joshi 1970, Rashid 1985). Additionally, Pakistans government revenue amounted to less than 13 percent of gross domestic product in 2009, compared with 28 percent for emerging market and developing economies as a group, according to the International Monetary Fund. These specific agendas of obviating land reforms and agricultural taxes leads one to view the landowning elites as representing a class with a common goals of protecting their interests.

To achieve their political agenda, landowners count on electoral support from tenants on their lands. When land concentration is high, this can amount to a considerable electoral support. As discussed above, in areas with high land concentration, large landlords can act as a monopsonist within the local market. In a bigger region like an electoral constituency, these landowners comprise an oligarchy; given the overlapping interests of landowners, we expect the small group of landowners to act in conjunction to amass tenants' votes their in favor. Indeed, well-known land owning families are commonly known to inter-marry to form political and other alliances (Times of Karachi). Referring back to the case of Bhutto mentioned earlier, the politician's family is also supported by a vast network of tenants in its electoral endeavours.

> "Sharecroppers till the lands, exchanging half they produce rice, wheat and sugarcane for a place to live, seeds and fertilizer. And patronage. "If my tenants are happy with me, they work more efficiently on the lands," says Bhutto. "You help the people and they will help you." (TIME 2008 interview with Mumtaz Bhutto)

Th tenants support any candidate their landlords put up. As Bhutto reports in his interview, that while he ran in the past, its now his son who would be running in the upcoming election, but will continue to get the same support from their tenants.

How do the landlords get support when the ballot is secret? Baland and Robinson (2008, 2012) show how landlords in Chile are able use threats to withdraw rents to tenants to control their political behaviour.

Historically in other contexts, landowners are known to procure political support through threat of eviction, or coercion (Ricardo 1824, Powell 1970, Scott and Kerkvliet, 1976).In the context of Pakistan, though, the ballot is secret. However a study by Chaudhry and Vyborny (2013) notes that the rural voters seem to be strongly convinced that their vote is not secret. Hence, it is possible the landlords are able to stipulate tenants' vote as part of the contract between them. But there are various other ways a landlord can ensure tenants' support to some extent with using coercion or threats. The landholding family and villagers are involved in a recurring relationship[5]; tenants are directly involved on the landlord's land, but other farmers even of working on their own farm may still rely on the dominant landlord for access to canal water [6], and seeds etc. In such cases, since enforcement is more possible in both directions, landlords will be more likely to make credible promises to their tenants, than to other voters who do not have a relationship with the landlord. Political economy models push information asymmetries and inability of making credible promises as a reason for clientelism (Keefer 2007). Since landlords will be likely better informed about tenants' and rural voters' preferences, and tenants are also better informed about landlords, the information transmission can be another mechanism through which landlord running in an election is able to secure votes of tenants.

However the argument I use here is that that landowners secure support, not forcefully, but by actually having the ability to make tenants better off. The sharecropping model I develop later formally shows that landlords can transfer private utility to tenants cheaply, by offering them concessions on cost shares in the contract. The landlord is also one of the main sources of agricultural credit according to the survey data, and landlord-to-tenant loans are commonly interest-free and extremely lenient in their terms. Even with a secret ballot a landlord has an effective technology of delivering promises to tenant-voters. These inter-linkages of the land and electoral markets gautantees a large rural electoral base for landowning families.

Regardless of the mechanism the above discussion shows that landowner politicians have an incentive to keep tenancy high, in order to maintain a loyal rural voter base. The Pakistan Rural Household Survey shows that landlord politicians have more tenants per acre relative to other landowners. To understand the electoral advantage of the landowners, I do a brief thought experiment here: The election I study is a provincial election held in 577 constituencies across the country, each of which constitutes on average 120,000 voters. Given an average 44% turnout, a candidate needs on average 26,000 votes to win for sure. The landlords described as large in the village survey have about 100 tenants each [7]. Using an average

[5]In Section 3.1 I discuss that large majority of tenants have been with the same landlord throughout their farming career

[6]It is common for a plot to not have direct access to canal water and the farmer needs to drain the water onto his plot through other landowners' fields

[7]This is a reasonable number, given the large holder category in the census have around 500 acres each; leasing out 5 acre plots would get us the same figure

household size of 4 adults, we get that every landowner described as large, would be employing over 400 voters. An average constituency has 30 large landholders; a collaboration among them, some of who could be in the same family, would constitute 12,000 voters, which is over 40% of the votes needed for absolute majority. In the model I show that when land concentration is high, landowners would find it optimal to chose one of them to represent their interests and support his campaign, and can, in expectation, round up considerable political support using their influence over tenants.

While traditionally, the land owners have been able to retain electoral support through tenants, there is a recent view that "The balance of power has shifted from landowners to the moneymakers" (Abida Hussain, member of a political party in Pakistan). One reason could be that as farming becomes capital intensive, the land owners have fewer tenants whose votes they can count on. Commenting on a unexpected win from a candidate who didn't belong to the traditional political gentry in the 2013 elections , an analyst notes that "'vacuums' [are] formed as labour-intensive plantations decline, cotton farming modernises and old families lose clout." (The Economist 2013). Who are the electoral competitors of landlords. The table below, reproduced from Shafqat (1998) highlights the overwhelming representation of landllords in the National Assembly and that industrialists and urban professionals are the emerging political class.

Table 1: The Political Elites (Members of National Assembly over time)

	1985	1988	1990	1993	1997
Landlords and Tribal	157	156	106	129	126
Businessmen/Industrialists	54	20	38	37	39
Urban Professionals	18	9	46	26	32
Religious Leaders	6	15	11	8	3
Retired Military Officers	0	7	3	5	2
Other	3	0	3	3	2
Total	238	207	207	207	207

Source: (Shafqat 1998)

3.3 Colonial Institutions - Jagirs

A Jagir is defined in the colonial documents as an assignment of land, with or without conditions, to an individual for services rendered to the State. The jagirdars were alternately called feudatories, i.e. one holding lands by feudal tenure. They were recipients of land grants made by the pre-colonial governments

(Talpur Dynasty, Kalhora Dynasty, Sikh Rulers, Mughals) as well as British. They usually consisted of a villages to several villages, or entire subdistrict. The jagirs were granted in return for allegiance to the rulers, for military services and as gifts to friends/family of the ruling dynasty. The turbulent and exposed tracts, like Hashtnagar and Mlranzai, were made over in jagir to the local chieftains, who enjoyed an almost complete independence. While the British government awarded jagirs to their compliant and loyal local supporters, the practice was commonplace during the pre-colonial era. The British government acknowledges the rights of those estates-holders. After the battle of Miani in 1987 the British government declared that All Jagirdars who offered their allegiance to the British Government within a specified time after the battle of Miani, would be confirmed in the possession of their estates. (Hughes 1986). Jagirdars enjoyed considerable influence in their jagir, and often were the sole Zamindar (landowner). The jagirdars were in some forms local chiefs (Acemoglu et al. 2014), and enjoyed administrative power and the right to land revenue.

The 'jagirs' were an institution from the Mughal times (hence a larger prevelance in the Mughal dominated areas, which were later alloted to present day Pakistan). The 'jagirdars' were invested with authority from the emperor to collect revenue from a group of villages. He was entitled a part of the land revenue, but he could be transferred to another location to play the same role. (Hussain 1979). The British government, on the other hand, made these assignments permenant, given their interest in creating a new class loyal to the empire. The 'jagirdars' were also the 'zamindar' in the zamindari system of revenue collection described in Banerjee and Iyer (2002, 2008).

The political and economic influence enjoyed by 'jagirdars' and 'zamindars' persisted into post-independence times. Areas where big jagirs were granted happen to still exhibit the features of a semi-feudal structure where land distribution is concentrated, a majority of agricultural households are landless, and sharecropping is high. As I show later, the presence of large land grants is associated with high land concentration; I use a dummy for large estate as an instrument for initial land concentration. The prevalence of large land grants is also associated with the likelihood of a landlord politician. Majority of the members elected to the two houses who held the largest amount of agricultural land [8] came from regions which were historically held by a single feudatory or family as a major estate/jagir. The electoral competition is also lower in these areas, presumably due to the fact that traditional land-owning elites have dominated the political scene.

[8] Owning close to 2000 acres or more

4 Model

The aim of the model is three-fold:

(a) Explain why landowners are able to maintain influence in politics. As described in Section 2, there can be numerous means through land owners' maintain political influence. Using the model, I describe one testable way in which a landowner can have an electoral advantage relative to a non-landed candidate

(b) Illustrate the implication of landowners politicians for interesting political economy outcomes, namely electoral competition and policy

(c) Illustrate the equilibrium effects of permanent shifts in land productivity

I build on a 2 canonical models: first is a basic model of tenure choice in agriculture (Stiglitz 1974, Braverman and Stiglitz 1982) and secondly, and a basic election model of redistributive politics (Persson and Tabellini 2000). I show that in a sharecropping contract[9] a landlord can transfer utility to the tenant cheaply by offering concession the on cost share borne by the tenant; 'cheaply' here implies that the cost incurred by a landlord of offering this concession is less than the cost of offering a lump sum transfer which makes the tenant equally better off. The ability of landlords to raise the welfare of tenants in an inexpensive way allows them to gain their electoral support cheaply. Thus landlord, who wants to implement her preferred policy, will have an incentive to run and have an advantage relative to a non-landed competitor in an election, when land concentration and tenancy is high. I incorporate this landlord advantage into an election model where candidates make promises for both private transfers to voters and public goods. I show the implications for policy and electoral competition when a landlord is elected and derive the effect of permanent shifts in land productivity.

4.1 Setup

4.1.1 Market for Land

I assume risk neutral landowners and risk averse tenants. Normalizing plot size to 1, the production function for land as is $g\tau f(e,x)$ where g is a random variable with $E(g) = 1$, τ is productivity,e is the effort or efficient labor input, and x is other inputs. The literature on contractual arrangements sets forth three types of contracts between land owners and tenants: self-cultivation using fixed wage labor, fixed rent contract, or

[9]This is a contract in which the tenant and landlord share the output and input at a ratio set by the contract

a sharecropping contract, which are explained below.

1. Fixed Wage Contract: The land owner choses optimal labor and inputs given their prices to maximize profits; however this entails a supervision cost. The landlord solves:

$$\underset{x,e}{max}[g\tau f(e,x) - qx - we - c]$$

where w is the market wage and p is the price of x, and c is the cost of supervision, which the land owner faces. It can alternately be interpreted as the opportunity cost of being present on the farm, which is what the land owner would have to do in this case to ensure the laborers are not shirking. The landowner takes up all the risk in this case, and since she is risk neutral the inputs are applied until the marginal product equal the price.

2. Fixed Rent Contract: The land owners offers her land to a tenant and allows him to farm it in return for a fixed fee r. In this case, the tenant solves:

$$\underset{x,e}{max}[U(g\tau f(e,x) - qx - r, e)]$$

where U is a concave utility function, increasing in income, and decreasing in labor or effort e. The landlord would then offer the maximum r such that the incentive compatibility constraint is satisfied i.e. r^* is such that

$$U(g\tau f(e,x) - qx - r^*, e) \geq \bar{U}$$

where $\bar{U}$ is the reservation utility of tenants. The landlord might like this contract because she doesn't have to pay the monitoring cost. However in this case, the tenant takes all of the risk; since the tenant is risk averse the landlord would have to pay the 'risk premium' to have the tenant accept the contract, and the rent may be too low. The sharecropping contract deals with this problem, by allowing the landlord to take up a part of the risk associated with the farm output.

3. Share-cropping Contract: This contract is given by (α, β) where α is the output share and β cost share of the tenant. Conversely, the landlord receives $1 - \alpha$ of the output produced by the tenant, and pays $1 - \beta$ of the cost of the physical input x, which tenant supplies. The tenants problem can be written as follows:

$$\underset{e,x}{max} U(\alpha g\tau f(e,x) - \beta px, e)$$

The Land owners problem is:

$$\underset{\alpha,\beta}{max}(1-\alpha)g\tau f(e,x) - (1-\beta)px$$
$$\text{st. } U(\alpha g\tau f(e,x) - \beta px, e) \geq \bar{U}$$
$$\text{and } (e,x) \in \underset{e,x}{argmax} U(\alpha g\tau f(e,x) - \beta xp)$$

The above is a standard principal agent problem with a risk averse agent. In this case the tenant supplies the inputs, but doesn't have to bear all the risk. This contract may dominate the fixed rent one in the absence of the market for insurance. It dominates the fixed wage contract if supervision costs are high for the landlord. However, the agency problem poses a tradeoff; since the tenant consumes only a fraction of the output, he has lesser incentive to exert the optimal inputs.

Another rationale for having the sharecropping contract is the absence or imperfection of some factor markets, e.g. markets for management, supervision or family labor (Bell and Zusman, 1979, Eswaran and Kotwal 1985). If the tenants' competitive advantage is in supervision (family labor) and landlords' is in managerial ability, the sharecropping contract allows pooling of skills while providing incentives.

The contractual literature studies the conditions under which any of the above contracts may be optimal (Cheung 1969, Eswaran and Kotwal 1985, Stiglitz 1974). In each case the tenant gets at least his reservation utility; the tradeoffs between incentives, monitoring costs and risk sharing can lead to one contractual arrangement dominating the other. The landlord choses the contract which maximizes her payoff subject to the participation constraint of the tenant. A hybrid of the above three options is also possible depending on factors like the type of crop, the level of technology, the development of markets, social factors, as well as a combination of these factors.

My main aim here is not to determine the optimal contract, so I reckon on the vast literature discussing tenurial decision in agriculture. I work with the premise that for any land owner with total land L, at any level of productivity τ, there is an optimal contract given by:

$$\Pi^{\star}(\tau) = max\{\Pi^{W}(\tau), \Pi^{SC}(\tau), \Pi^{F}(\tau)\}$$

Π^{W}, Π^{F} and Π^{SC} are the maximized profits from the wage contracts, fixed rent contracts and sharecropping contract, respectively, for a plot of size 1. For a landlord with L plots, the total profits are given

by $L\Pi^{\star}$. If the landlord deviates form the optimal contract on any plot, her profits from that plot are lower. Suppose the optimal contract is the wage contract (i.e. $\Pi^W > \Pi^{SC}$ and $\Pi^W > \Pi^F$), and landlord choses to rent out F plots on fixed rent, and T plots on share cropping basis, then her profits are given by: $\Pi^W(L-T-F) + T\Pi^{SC} + F\Pi^F$, which are lower than Π^W and decreasing in T and F.

Using results from Eswaran and Kotwal 1985 and Stiglitz 1974, I assert that Π^{SC} is lower with technical change. In other words technical change causes a shift away from share tenancy to either fixed rent or to fixed wage contracts, depending upon the type of technical change. If the technical change increases agricultural risk, the wage contract becomes more likely. Labor augmenting technical change allows landlord to supervise easily (wage contracts), while land augmenting technical change leads her to provide stronger incentives (fixed rent contract). Similarly, Eswaran and Kotwal 1985 argue that if technical change leads to lesser need for supervision (mechanization), wage contracts become optimal.

4.1.2 Electoral Market

There is a co-existing electoral market, which is setup following the basic model from Persson and Tabellini 2008 (Chapter 8). There are N voters, distributed according to their ideological preferences. Let σ_i represent the ideological bias of voter i towards candidate B (WLOG); in other words voter i gets additional utility σ_i if B wins. I assume a uniform distribution of σ_i, such that $\sigma_i \sim U[-\frac{1}{2\phi}, \frac{1}{2\phi}]$. The median voter thus has an ideological bias of 0. Voters get utility from private income and public goods offered by a candidate, as well as from their ideological affinity for the candidate. I assume for this analysis, there are two candidates, denoted by $j = \{A, B\}$. Each candidate j offers two types of public goods G_1^j and G_2^j, from which the entire population benefits, and private transfers f^j which can only benefit one voter at a time. There is also an ideological shock $\delta \sim U[-\frac{1}{2\psi}, \frac{1}{2\psi}]$, which shifts the vote in favor of B (WLOG). Candidates know the distribution of preferences but not the position of any voter along that distribution, thus the pledge of private transfer f cannot be made specific to any voter. In practice, a candidate could pick some of the N voters at random and offer a private transfers to only those voters; however since she cannot differentiate voters by type she offers the same amount to each one. In the analysis below, I assume the candidates make the same private transfer promise to all of the N voters. Allowing the candidate to target some voters does not change the analysis in any way; this is because the transfers are promises and voters cannot reveal their type in any way before the election.

I assume credibility and truthful voting, with no strategic behavior on part of the voters. Thus voter

i will vote for candidate A if:

$$U(f^A) + H_1(G_1^A) + H_2(G_2^A) > U(f^B) + H_1(G_1^B) + H_2(G_2^B) + \sigma_i + \delta.$$

Given the distribution of σ and δ, we get the expression for the total vote share of A, $\pi_A = \frac{1}{2} + \phi[W_m^A - W_m^B - \delta]$ and A's probability of win $Pr(\pi_A > \frac{1}{2}) = \frac{1}{2} + \psi(W_m^A - W_m^B)$, where $W_m^j = U(f_m^j) + H(G_1^j) + H(G_2^j)$. These expressions are symmetric for candidate B. Note that the winning probability is just a function of the total utility that any candidate offers to the voters. The winner gets non-pecuniary rents from office denoted by χ, and funding from central government of R, which is used to fulfill the candidates promises of G_1, G_2 and f if he wins. Note that that χ are interpreted more like the bureaucratic connections that an office holder can get access to (the benefits of which are large but not immediate), as opposed to monetary benefit which could be used in combination with R to fulfill promises. While it is possible to use bureaucratic connections to benefit voters, e.g. through offering public sector employment (Robinson and Verdier 2002), I abstract from that dimension of office rents and restrict the ability of the politician from using χ towards voters; this makes the problem tractable, although including this ability will not change results in any substantial way. However, I do allow candidates to use their private wealth to pay for f and G. The wealth consists of accumulated wealth and profits; since I am not interested in the effect of candidates' initial wealth, and always assume candidates are equally wealthy, I restrict my focus on just candidates' profits as they may differ for landlord candidates[10]. Candidates maximize expected pay-off, subject to the feasibility of the payments f and G. Thus the candidates problem is defined by:

$$\max_{P,G_1,G_2,f,\Pi} (\chi + \Pi^j - P^j) Pr(\pi_j > \tfrac{1}{2}) + \Pi^j Pr(\pi_j < \tfrac{1}{2}) - C$$

$$\text{st. } R + P^j = G_1^j + G_2^j + Nf^j$$

$$\text{and } 0 \leq P \leq \Pi$$

Π^j is the private income of candidate j , of which she choses to spend P^j on election promises. The candidate also optimizes over a set of choices to maximize private profits Π; when these choices are independent of the policy choices, these can be made separately. To incorporate this choice without introducing further notation I write the problem allowing the candidate to chose the maximized private profits Π. The

[10]Including assets in the budget does not change the marginal problem, so having assets or not having them is effectively equivalent as long as they are the same for both candidates

total money available to fulfill campaign promises is thus $R + P^j$. If she wins, the politician's payoff is the office rents and the share of income left after paying for f and G; if she loses she does not have to pay anything to voters, and gets no political rents, so the payoff in the case of loss is just private income Π^j. Think of G_1 and G_2 as the different types of public goods; in this context G_1 are investments that make land more productive and hence benefit land owners or farmers, like irrigation. On the other hand, G_2 are investments that have no direct effect on profits from land, eg. public schooling. In the case of a land owner with land L, I write her private pay-off as a function of both farm profits and G_1, given by $L\Pi^{contract} + K(G_1)$, where $L\Pi^{contract}$ are total farm profits depending on the choice of contract and K represents the land owners private benefit from G_1. For example, better irrigation helps the landlord to get higher profits later. In the case of the land owner, she optimizes over the set of available contracts, and the contract terms.

I consider two cases: 1) Equal land distribution, i.e. there are no landlords or tenants 2) Land concentration is high; I allow landlord to run in election. Case 2 represents an environment with high land concentration as described above, thus an oligarchy of land owners control a significant portion of the land, and have access to tenants (large population of landless or small-holders). As argued above, the members of the oligarchy act as a single entity, which I refer to as the landlord candidate in case 2. I assume that all candidates are otherwise alike. Later, I also assume log functional form for $U(f)$ and $H(G)$ to get closed form expression for the policy platforms. I am interested in analyzing how the policy platform and electoral outcome is different in these cases; and also how these change in response to shifts in land productivity τ.

4.2 Timing

The timing of the model is as follows:

1. Landlord choses whether or not to run
2. If landlord runs, she choses the optimal contract for farming her L plots and (f, G_1, G_2, P); competing candidate choses $(\underline{f}, \underline{G}_1, \underline{G}_2, \underline{P})$
3. If landlord is not running, she choses the optimal contract to maximize total profits; candidates chose (f, G_1, G_2, P)
4. Election happens
5. Production happens

6. Winner delivers promises, payoffs are realized

4.3 Backward Induction

The above model is solved by backward induction. The payoffs to landlord and tenants is as described in the setup of the contracts, while the voters payoff is described in the election model setup. I now solve steps 1-3 in the timing.

4.3.1 Solving the candidate problem in the case of non-landlord candidate (Step 3)

Consider the problem of a non-landlord politician j. She maximizes her expected profits given by: $(\chi+\Pi^j - P^j)Pr(\pi^j > \frac{1}{2}) + \Pi^j Pr(\pi^j < \frac{1}{2}) - C$. Simplifying this, omitting the candidate superscript and substituting the expression for winning probability $w = Pr(\pi > \frac{1}{2})$, the non-landlord candidate's problem can be written as:

$$\underset{P,G_1,G_2,f}{max}(\chi - P)\{\tfrac{1}{2} + \psi(U(f) + H_1(G_1) + H_2(G_2) - W^{comp})\} + \Pi - C$$

$$\text{st. } R + P = G_1 + G_2 + Nf$$

$$\text{and } \ 0 \leq P \leq \Pi$$

where W^{comp} is the voter welfare promised by the competitor. The first order conditions are the following (λ is the Lagrange multiplier on the budget constraint)

f: $(\chi - P)\frac{\psi}{\phi}U'(f) = \lambda N$

G_1: $(\chi - P)\frac{\psi}{\phi}H_1'(G_1) = \lambda$

G_2: $(\chi - P)\frac{\psi}{\phi}H_2'(G_2) = \lambda$

Assuming log functional form for U, H_1 andH_2 , we get $G_1 = G_2 = G$ and $f = \frac{G}{N}$; substituting the platforms into the budget constraint gives $G = \frac{R+P}{3}$, which can be use to write the winning probability, w, in terms of P.

$$w = \tfrac{1}{2} + \tfrac{\psi}{\phi}(3log(\tfrac{R+P}{3}) - logN - W^{comp}).$$

To get the optimal P, I just take first order conditions with respect to P: i.e. solve $\underset{P}{max}(\chi - P)w + \Pi - C$, to get:

$$(\chi - P)\frac{dw}{dP} + w(-1) = 0$$

The cost of increasing P marginally is that the candidate looses those additional dollars if she wins (to fulfil the promises). Thus the marginal cost of P is just unity times the probability of win, w, and the marginal benefit is the increased chance of getting the office rents, $(\chi - P)$. Thus she equates the marginal benefit to the marginal cost, to get the optimal $P = \frac{3\psi\chi - wR}{3\psi + w}$. It can be seen that P is decreasing in w and R, and increasing in χ and marginal benefit to the politician of the public goods. If χ is sufficiently large the candidate sets $P = \Pi$.

In case 1, when the candidates are identical, both candidates have the same platform and same P and winning probability is equal to one half.

Now suppose the landlord decides to run. The analysis of the landlord problem is in the sub-section after next. But first I show that if the landlord wants to makes a private transfer to a sharecropping tenant, it will be cheaper to do so by altering the contract in favor of the tenant than by offering a lump sum transfer to the tenant.

4.3.2 Landlord can make transfers to share croppers cheaply

I rewrite the landlord and tenant problems from the share-cropping contract described above.

The tenants problem can be written as follows:

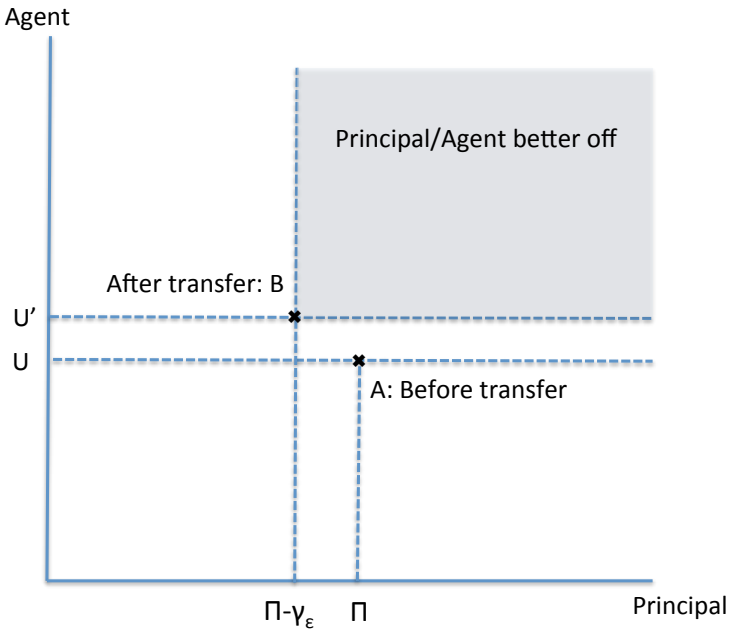
$$\underset{x,e}{max} U(\alpha g \tau f(e,x) - \beta p x, e)$$

The Land owners problem is:

$$\begin{gathered}\underset{\alpha,\beta}{max}(1-\alpha)g\tau f(e,x) - (1-\beta)qx \\ \text{st. } U(\alpha g\tau f(e,x) - \beta px, e) \geq \bar{U} \\ \text{and } (e,x) \in \underset{e,x}{argmax} U(\alpha g\tau f(e,x) - \beta px)\end{gathered}$$

p is the price the tenant/agent pays for x, while the landlord could pay $q \leq p$. One can think of this as use of a tractor where the landlord owns one, and marginal cost of usage is lower than the rental cost which the tenant may face if he does not own one.

Suppose the landlord wants to offer a private transfer She can alternately offer to lower the cost share such that it's monetarily equivalent with inputs staying at the same level (e, x), i.e $\beta_\varepsilon qx = \gamma_\varepsilon$. So β_ε is equivalent to γ_ε if inputs are not allowed to change with the change in β. Now if inputs were allowed to change then by a revealed preference argument, the agent is indifferent or better off. See illustration below.



The transfer makes tenant better off, shifting him to a higher utlity U. With the lower cost share, using revealed preference, the tenant is weakly better off than U. To argue that lower the cost share is cheaper for landlord relative to offering γ_ε, I must ensure that in the scheme where the cost share is $\beta - \beta_\varepsilon$, the landlord is weakly better off relative to compared to $(\Pi - \Pi_\varepsilon)$; in other words the new equilibrium is in the shaded area of the illustration. I note here that while the proof is presented using a decrease in the cost share, it can be equivalently thought of as an increase in the output share of the tenant; however in the data the output share is traditionally fixed at one half. Hence I conduct the analysis in terms of the cost share.

To ensure the landlord is not worse off compared to $(\Pi - \Pi_\varepsilon)$ we must need the following condition to hold: $(1-\alpha)\tau\{f(e+e_\varepsilon, x+x_\varepsilon) - f(e,x)\} - (1-\beta)qx_\varepsilon - \beta_\varepsilon q(x+x_\varepsilon) \geq -\gamma_\varepsilon = -\beta_\varepsilon qx$

or

$$(1-\alpha)\tau\{f(e+e_\varepsilon, x+x_\varepsilon) - f(e,x)\} \geq \{(1-\beta)(x_\varepsilon) + \beta_\varepsilon x_\varepsilon\}q \geq 0$$

That is, the net cost to landlord of changing the cost share, after the tenant alters the effort e and input x exerted in response to the new cost share, is lower than the lump sum transfer γ_ε. e_ε and x_ε represent the change in inputs applied by tenant when the cost share is changed. Ignoring the double differential the LHS can be reorganised and written as:

$$(1-\alpha)\tau\{f(e+e_\varepsilon, x+x_\varepsilon) - (1-\beta)(x_\varepsilon + x)q\} - \{(1-\alpha)\tau f(e,x)\} - (1-\beta)xq\} \geq$$

$$(1-\alpha)\tau\{f(e, x+x_\varepsilon) - (1-\beta)(x_\varepsilon + x)q\} - \{(1-\alpha)\tau f(e,x)\} - (1-\beta)xq\} = \frac{\partial \Pi^*}{\partial x}$$

Where $\frac{\partial \Pi^*}{\partial x}$ is the rate of change of the profits Π with respect to x evaluated at the optimal x^* chosen by the tenant. So it will be cheaper to lower β than offering a lump sum transfer if $\frac{\partial \Pi^*}{\partial x} > 0$. i.e. ex post the principal would want the agent to use more input. We must check if that is the case. The principal's (landlord's) optimal x is given by $f_x^P = \frac{1-\beta}{1-\alpha}q$, but the agent (tenant) chooses x^* such that $f_x^A = \frac{\beta p}{\alpha \rho}$, where $\rho = \frac{E((U_1 g)}{EU_1} < 1$ for a risk averse agent.

Now, $f_x^P < f_x^A \Leftrightarrow \frac{1-\beta}{1-\alpha}q < \frac{\beta p}{\alpha \rho}$. Substituting $\alpha = 1/2$, the last condition is true if $\beta > \overline{\beta} = \frac{q\rho}{p}$; that is, smaller q relative to p and more risk averse tenant, allow the landlord to lower the cost share in order to make the tenant better off, cheaply. The above discussion demonstrates that the landlord can lower the cost share paid by the tenant (thus bearing an additional cost), without lowering his output share; this incentivizes the tenant to supply more input, but does not raise the risk borne by him. Since the landlord shares a share of the increased output, the net cost borne by him is lower.

4.3.3 Solving the candidate problem in the case of landlord candidate (Step 2)

As shown above the landowner has a cheaper way of transferring utility to a tenant by offering him a better tenancy contract. This can translate into an electoral advantage for the land owner, when the tenants are also voters. I account for the electoral advantage of the land owner candidate by assuming that offering an extra dollar as private transfer to a tenant costs the landlord $\eta < 1$. I will analyze the problem of the landlord politician (i.e. a landowner who choses to run) and solve for the landlords optimal choices. The

non-landlord candidates offers are referred to with a lower bar $\{\underline{f}, \underline{G}_1, \underline{G}_2\}$. Given the above result, landlord may chose to have plots under sharecropping, $T > 0$ even if sharecropping is not the optimal contract. Additionally the landlord's payoff consists of direct utility from G_1, which she choses directly if elected and is given by $K(G_1)$. Assuming the tenants' ideological preferences are also distributed in the same way as the total voters, then the landlord politician's problem can be simplified to:

$$\underset{T,\Pi^\star,P,G_1,G_2,f_t,f}{max}(\chi - P + K(G_1))w + \Pi + (1-w)K(\underline{G}) - C$$

$$\text{st. } R + P = G_1 + G_2 + (N-T)f + T\eta f_t$$

$$w = \tfrac{1}{2} + \tfrac{\psi}{N}(TU(f_t) + (N-T)U(f_{-t}) + NH_1(G_1) + NH_2(G_2) - NW^{comp})$$

$$0 \leq T \leq L$$

$$0 \leq P \leq \Pi$$

$$\Pi = \Pi^\star(L-T) + T\Pi^{SC}$$

Now the candidates have the ability to discriminate between voters, based on being a tenant. The subscript t denotes tenants and $-t$ denotes all other voters. The nonlandlord competitors problem is symmetric, but she only choses $\{\underline{P}, \underline{f_t}, \underline{f_{-t}}, \underline{G}_1, \underline{G}_2\}$. Firstly, we get that the competitor must have $\underline{f_t} = \underline{f_{-t}} = \underline{f}$ and $\underline{G}_1 = \underline{G}_2 = \underline{G}$. If office rents are sufficiently high the candidate sets $\underline{P}$ equal to profits. Referring to step 3 above we have $G = \frac{R+\Pi}{3}$ and $f = \frac{G}{N}$.

Again, similar to Step 3 above the first order conditions with respect to the electoral platform f_t, f_{-t}, G_1, G_2 gives $U'(f_t) = \eta U'(f_{-t}) < U'(f_{-t})$ and $U'(f_{-t}) = NH_2'(G_2)$. The former expression leads to the conclusion that $f_t > f_{-t}$. In the log utlity case this leads to: $f_{-t} = \frac{G_2}{N}$ and $f_t = \frac{f_{-t}}{\eta}$. The first order condition with respect to G_1 gives $\frac{1}{G_2} - \frac{1}{G_1} = wK_G$, where $K_G > 0$ is the marginal benefit for landlord of G_1. Thus, $G_1 = \frac{G_2}{1-wG_2K_G} > G_2$. Repeating the steps above, I substitute the policy platforms into the budget constraint and winning probability, to get the objective function in terms of P.

The optimal choice of P is given by:

$$(\chi - P + K(G_1))\tfrac{dw}{dP} + w(-1) + wK_G\tfrac{dG_1}{dP} = 0$$

Because the landlord politician also gains from the additional benefit of imposing her preferred public good if she wins, the marginal benefit of P is higher for the landlord. So if the office rents are sufficiently high, both the landlord and non-landlord candidate set $P = \Pi$. In this case, the total budget of the landlord candidate and an equally wealthy competitor is the same. From the budget constraint and the expressions for the platforms, it follows that $G_1 + 2G_2 = R + \Pi = 3\underline{G}_2$. Since $G_1 > G_2$, it must be the case that $G_2 < \underline{G}_2 = \underline{G}$.

Additionally, I also note that if the landlord offers the same platform as the competitor, she will have some resources left over if she has some tenants (since to the transfers to tenants cost her less). Thus, the landlord can always offer more than her competitor. And she will do so, if office rents are sufficiently high amd any candidate has an incentive to increase their vote share. The above discussion leads to following proposition:

Proposition 1 *If landlord runs in the election:*

(a) Landlord selects policies such that $G_1 > G_2$ and $G_2 < \underline{G}_2 = \underline{G}$, i.e. she over provides her preferred public good.

If $T > 0$, i.e the landlord has some share cropping tenants

(b) The landlord's vote share and probability of win exceeds the competitor's

(c) Landlord offers higher private transfers to tenants, $f_t > f_{-t}$. Thus at any level of ideological preference, a tenant is more likely to vote for the landlord candidate relative to another voter with the same ideological preference.

Now consider the choice for T. If $\Pi^\star = \Pi^{SC}$, then the optimal choice for any land owner is to set $T = L$. i.e. sharecrop all her land.

Now suppose $\Pi^\star \neq \Pi^{SC}$. The first order condition for T if T is interior is given by:

$$\frac{\psi}{N}(\chi - P + K(G_1) - K(\underline{G}))(U(f_t) - U(f_{-t})) = \Pi^\star - \Pi^{SC}$$

That is, the candidate choses T so the marginal benefit of each tenant, (which the increased chance of getting the payoff from winning) equates the marginal cost, which is the extra farm profits per plot she could make if she chose the optimal contract. Using this result, and the result from the previous sub-section,

I propose:

Proposition 2 *Landlord politicians, who have incentive to offer private transfers, are more likely to offer sharecropping contracts, and offer contracts more favorable to tenants (by paying higher cost share).*

The RHS of the above expression is increasing in $U(f_t) - U(f_{-t})$, which is increasing in η (the higher the η the larger the difference between the transfers made to tenants versus non tenants). Thus, T is increasing in η. The RHS is also increasing in $K(G_1) - K(\underline{G})$, i.e. a larger marginal benefit of G_1 to the landlord implies she would want more tenants. Similarly, the larger the gap $\Pi^\star - \Pi^{SC}$, the lower the optimal T. It can be shown that $\frac{d(\Pi^\star - \Pi^{SC})}{d\tau} > 0$ if $\Pi^\star \neq \Pi^{SC}$, so as τ goes up the RHS of the above equation goes up. At the original choices of the candidate, the cost of share cropping tenants exceeds the benefit, so the landlord candidate must lower T. Thus, $\frac{dT}{d\tau} < 0$. This leads to the proposition:

Proposition 3 *When the optimal contract is share cropping the landlord sets $T = L$. If the optimal contract is not share cropping, the landlord candidate sets $0 < T \leq L$ as long as $\Pi^\star - \Pi^{SC}$ is small. In this case the optimal choice of T is larger if:*

(a) η is large (b) $\frac{dK}{dG_1}$ is large (c) $\Pi^\star - \Pi^{SC}$ is small

With technical change the landlord candidate hires fewer share croppers.

The intuition is that as land productivity increases, it is increasing costly to have sharecropping tenants on one's land. Moreover, profits are higher regardless of the contract, so the landlord doesn't need tenants any more to increase her vote share. So landlord farms more of her land under the optimal contract (wage or fixed rent).

The overall platform of the landlord is thus dependent on the level of productivity τ. When τ is small, landlords profits are small relative to χ, so landlord sets $P = \Pi$. T is high, so there is a large fraction of voters who vote for the landlord, who then has higher winning probability.

As τ increases, there is a direct income effect due to higher overall profits, so offers are higher. There is also an opposing indirect effect, due to the lower number of tenants. Offering private transfer is relatively costlier, causing a negative income effect due to which public and private goods fall.

Suppose τ rises enough that it is optimal to set $T = 0$, i.e. the optimal contracts are either fixed rent or fixed wage; will the landlord still want to run? As long as the office rents χ and marginal benefit of G_1 is

high, the landlord still wants to run. It will still be true that $G_1 > \underline{G}$ and $G_2 < \underline{G}$, but the landlords winning advantage will no longer exist; given that an equally wealthy candidate is competing with the landlord, the landlord's vote share and winning probability will be lower.

Technical change has a direct income effect and an indirect effect by reducing share cropping tenant. The fall in tenancy:

a) Lowers the landlord's platform

b) Reduces landlord's vote share and winning probability; improves electoral competition

and vice versa for the income effect

The rigorous empirical analysis in this paper determines which channel prevails in the data.

Even though I argue that in an environment with high land concentration we can treat the oligarchy of landowners as a single entity, one might wonder about a third case, where there is competition between landlords. I make a case in the background that landlords represent a single class, have common interests and often belong to the same extended family (through inter marriage etc), it is reasonable to model them as cooperating, without modeling the cooperation game amongst them. However, it is possible to consider the case with two landlords who can run against each other. It can be shown (see appendix) that if the optimal T for any landlord candidate is interior, she weakly prefers to cooperate with the other landlord. And moreover, if the optimal T leads to a corner solution, she strictly prefers to cooperate. Thus it suffices to consider the case with the monopsonist landlord.

4.3.4 Landlord choice for running (Step 1)

The landlord will run as long as the expected pay off from running exceed that ofnot running. i.e.

$$(\chi - P + K(G_1))w + \Pi + (1-w)K(\underline{G}) - C >$$

$$max\{\Pi^W(\tau), \Pi^{SC}(\tau), \Pi^F(\tau)\}$$

When τ is low and the optimal contract is SC, then $T = L$; the landlord has a high electoral advantage with the large number of tenants. The incentive for running are the highest. As productivity rises, the tenancy advantage is lower, however the income of landlord is higher; the expected rent from office may still

be high enough for the landlord to pay the fixed cost of running C. If the optimal contract is fixed rent and office rents are high relative to farm profits, the landlord will run for chance to get the additional office rents as well as set the optimal G_1. If the optimal contract is contract is fixed wage, and productivity is high enough that landlord sets $T = 0$ even when running, then the landlord has to pay the fixed cost of supervision, cL. The landlord only runs if the fixed cost of supervision is low relative to the fixed cost of running.

Thus as productivity shifts up, the landlords electoral incentives become weaker, all else equal. The actual effect could go either way; for instance if the value of G_1 goes up with productivity the incentives to run would be stronger, and vice versa.

4.4 Testable Predictions

I can directly test proposition 2 and part of proposition 3, which give the following testable predictions:

1. Landlord politicians, who have incentive to offer private transfers, offer more sharecropping contracts, and offer contracts more favorable to tenants (by paying higher cost share)

2. Technical change lowers sharecropping.

I don't have exogenous introduction of landlord politicians so I cannot test proposition 1, directly. However, I can test the effect of an exogenous productivity shock on the probability of landlord getting elected, electoral competition and composition of public goods. This will be a test for two things; firstly, is landlords' political influence due to a 'wealth story', implying land owners are able to win because they constitute the wealthier class rather than through their ability to transfer utility to tenants? Secondly, it will be an indirect test of proposition 1.

The testable prediction is then:

3. If technical change lowers (raises) landowners probability of win, then on average:

(a) Electoral competition is better (worse)

(b) Public goods favored by landlord are lower (higher)

(c) Other public goods are higher (lower)

5 Data Description

I use two rounds of the Pakistan Rural Household Survey (PRHS 2000 and PRHS 2003) to study landlord politicians[11] and the contractual terms they offer. The agricultural module of the PRHS consists of plot level data on plot characteristics, leasing status, and characteristics of the responding households. Information about the landlord is obtained if the household is leasing-in a plot, and similarly information about tenants is obtained in the case the household is leasing out their plot. This allows me to have plot level data set, with plot characteritics and contract under which it is cultivated (self-cultivation of fixed wage contract, sharecropping or fixed rent). If a plot is owner-cultivated, the land owners demographics are available as well as specifics of cultivation. If the plot is not owner-cultivated, the landlord and tenant's characteristics are available as well as the terms of the rental contract (e.g. in the case of sharecropping contract, the input and output share is reported). Households are surveyed in both years; thus the data comprises a household-level panel, which consists of tenants and landlords and self-cultivators.

The data for agricultural land distribution, crop areas and yields, and HYV seeds is obtained from various issues of the Agricultural Census and Agricultural Statistics of Pakistan (Government of Pakistan). The data for the politicians assets and voting outcomes at electoral constituency level comes from the election commission of Pakistan. Due to a bill in 2002, all office holders are required to declare all assets and liabilities. I use only the politicians who have been elected by a direct election.

The historical data for compiling the estate grants comes from a variety of sources including the province and district gazetteers and land settlement reports. The information on 'zamindars' (landowners) and 'jagirdars' (feudatories or individuals to whom land revenue from a land grant was assigned) in each district was collected during the settlement process and recorded in various forms. In some cases the record is detailed and exhaustive, while for other districts, only the biggest estates are reported. Additionally, an extensive list of aristocrats was maintained by the colonial authorities, presumably to keep track of the key personalities of influence whose allegiance was valuable. This compilation, "The Punjab Chiefs" (Griffen and Craik 1865), contained names, family histories and other relevent details for these chiefs and their families by district. This was used in combination with district and province gazetteers and settlement reports to compile the noteable jagirs or land assignments by subdistrict level; the different sources are used to verify that no significant "jagirdar" is missed. The measure I use in the analysis is a dummy, which equals 1 if a significant estate was present in any sub-district. These include grants that were significant in size and

[11] These are land owners who are identified as a politician by the tenant

described as notable estates, or the grantee has been reported to be a notable "jagirdar" in the colonial records. For example, some jagirs spanned all or most of the area in the sub-district - those were coded as 1. The estate dummy is intended to capture a high land concentration in post colonial era. Thus sub-districts where numerous small estates were granted were coded as zero, because these represented areas with the land was divided up across several "jagirdar" families and unlikely to have high land concentration after several generations.

My source of data for constructing the measure of technical change is the Global Agro-Ecological Zones database produced by the FAO, which provides suitability indices and potential attainable yields for all crops by type of irrigation and input technology for a worldwide grid at a resolution of 9.25 x 9.25 km. Potential yields are the maximum yields attainable for a crop in a certain geographical area. They depend on the climatic and agro ecological conditions of that geographical area, and the level of technology available. From FAO-GAEZ database I obtain the suitability for any crop for each grid point under two extreme levels of technological inputs used in production (low and high) and two extreme levels water availability (rain-fed and irrigated). When the level of technology is assumed to be low, agriculture is not mechanized; it uses traditional cultivation and does not use nutrients or chemicals for pest and weed control. When the level of technology is high instead, production is fully mechanized, it uses improved or high yielding varieties and "optimum" application of nutrients and chemical pest, disease and weed control.

In order to match the FAO suitability data with electoral outcomes variables I super-imposed each of the suitability maps with political maps of Pakistan reporting the constituency boundaries . Next, I compute the average suitability of all cells falling within the boundaries of every constituency. I do this for all crops grown in Pakistan and for both levels of input and water technology, though for region I ultimately use suitability for the crop that is most widely grown.

The data on public goods is drawn from 2 sources. The rural public goods come from a quinquennial village census and measure the percentage of rural villages in any sub-district level which have a facility in the year of the survey. This census only includes villages in rural areas. The other source I use is the Pakistan Living Standards Measurement Surveys (PSLM 2004, 2006, 2008). The PSLMs provide public goods at district level, but it is possible to distinguish public goods by rural versus urban location.

6 Empirical Strategy and Results

6.1 Landlord Politicians and Agricultural Tenancy Contracts - Testable Prediction 1

The PRHS data indicates whether for any leased plot the landlord is a politician. Testable prediction 1 states that a landlord with political incentives is more likely to have share cropping tenants Landlord politicians may differ from other landlords in the amount and quality of land they own. The tenants of landlord politicians may also be systematically different from other tenants; they may be poorer or may belong to a specific ethnic group. Thus the contracts between landlord politicians and their tenants are expected to differ from other contracts for all the above reasons. I would like to test that landlords who are politicians provide private utility to tenants through concessions on cost shares, but comparing the contracts offered by landlords who are politicians to those offered by landlords who are not will provide a biased effect. To disentangle the effect of political incentive of the landlord, ideally I would like to compare the contract offered by a landlord who in running to one by same landlord when not running, and to the same tenant.

I use the introduction of an election after a military regime as a natural experiment. Using a difference in difference strategy I am able to compare landlord politicians to other landlords before and after the election. The Pre round of the data is from 2000, and the Post round is from 2003, while the election occurred in 2001. The last general election was held during 1997, however, the government dissolved and a replaced by a military government with a year and few months. Thus in the pre round, there are no directly elected politicians. When tenants report their landlord is a politician, it implies the landlord is a politician elected in the previous general election. However, since the landlord has lost his office holding, there are no incentives for him to offer any extra benefit to tenants beyond what is optimally set in the contract. This incentive does occur in the post round when an election has occurred a year ago, so we expect landlord politicians to offer sharecropping contracts with lenient terms in this round. Since data set does not track the landlords over time, I can treat landlord politician in the last round as a control group. The identifying assumption is that landlord politicians in the round before the election don't have any incentive to offer sharecropping contracts with concessions, but are other wise similar to landlord politicians who are elected into office in the election preceding the Post round. Since the tenants are followed over the two rounds I am able to control for tenant fixed effects in the regression.

Table 3: Summary Statistics: PRHS Data for Testing Prediction 1

	Landlord is not Politician	Landlord is Politician	Difference
Sharecrop	0.896	0.931	0.035***
	(0.306)	(0.256)	
Plot Area	35.74	28.67	-7.07**
	(29.59)	(24.45)	
Plot Irrigated	0.951	0.972	0.021
	(0.216)	(0.165)	
LL Holding	1,447	16,560	15,113***
	(3773.7)	(26489.6)	
Tenant Holding	10.40	15.62	5.22
	(38.01)	(63.16)	
Yield	1236.0	1172.5	-63.5
	(4118.7)	(2481.1)	
Number of Tenants	20.62	69.67	49.05***
	(89.43)	(162.2)	
Share of Output	53.89	50.67	-3.22**
	(12.44)	(9.210)	
Share of harvesting cost	34.04	32.32	-1.72
	(30.79)	(23.89)	
Share of fertilizer cost	50.78	49.65	-1.13
	(17.33)	(9.834)	
Observations	1430	125	1555

The specification I test is the following:

$$y_{i,j,p,t} = \beta_1 LL\_pol_{j,t} + \beta_2 LL\_pol_{j,t} \times Post_t + \beta_3 Post_t + \beta_4 \eta_p + \beta_5 \sigma_j + \beta_6 \varsigma_{i,j} + \kappa_i + \varepsilon_{i,j,p,t}$$

where $y_{i,j,p,t}$ is the contractual arrangement for tenant i, landlord j, plot p in year t. I control for tenant fixed effects, plot characteristics, characteristics of landlord and tenant, as well as other landlord-tenant level controls, including whether they belong to the same caste, length of contract between them. The coefficient of interest is the β_2, which measures the effect of landlord politician interacted with post; it signifies the differences in the contractual terms offered when the landlord is a politician and has an incentive for making electorally motivated transfers. The outcome variables I use include the type of contract (fixed rent versus sharecropping), and within the sharecropped plots, the share of cost provided by landlord for

various inputs, seeds, fertilizer, ground water and harvesting, and the landlord's share of the output.

Firstly, Table 4 shows in the round after the election, the landlords who are politicians are more likely to have tenants on sharecropping contracts. In the first two columns I use respondents who are both tenants and landlords, while in the remaining columns I use only tenants. The rate of sharecropping is generally high in the round after the election, which is in line with the theoretical prediction that landowners are likely to support the politicians landlord's interest. Next I look within the sharecropped plots, to test if the contractual terms change within the sharecropped plots when the landlord has a political motive to do so. As shown in Table 5, the coefficient on $LL\_pol \times Post$ for the input shares is positive and significant implying that the landlord politician offers to pay a greater share of costs in the round after the election, compared to a landlord politician before, when there is no incentive for electoral transfers. Moreover, landlord politicians offer a greater output share to the tenant relative to before the election. Though we note that the coefficient on output share is small and imprecise. These regressions lend support to the model by showing that when landlord politicians have an incentive to gain electoral support, they do so by transferring utility to their tenants.

I also look at loans from landlords to their tenants. In general loans from landlords to tenants are quite common, and have long terms and are typically at zero interest. This is reflective of the semi-feudal systems where tenants are perpetually indebted to landlords in return for which they are also known to offer services at no cost. Using all leased plots, with household fixed effects, I run the same regression as above using a dummy variable indicating whether the tenant has takes a loan from the landlord. I find that tenants are more likely to have taken a loan from a landlords if he is a politician who has been directly elected, relative to a landlord who is politician during the Pre round when he is not running for office.

To test the robustness of the above results I run placebo regression using landlords who hold an influential but non-political position, and large landlords. Non-political positions include those for which the landlord does not have to be directly elected, e.g. a religious leader or a village council head. I find no effects using these placebo effects. Additionally, including a dummy for a non-political position of influence does not alter the results. This gives assurance that the above results are not just driven by the fact that the landlord is influential or has large land holdings, but only that he has an incentive to transfer utility to the tenant for gaining political support.

6.2 Technical Change and Tenancy and Electoral Outcomes - Testable Predictions 2-3

When land concentration is high, large landholding politicians can capture vote share by leasing out land to landless, risk averse tenants on lenient terms. Due to moral hazard and lack of monitoring leasing out results in an efficiency cost to the landlord politician, which is higher when land productivity is high. Thus the model predicts that a permanent shift in productivity leads to fewer large land-owners from entering into politics. Due to the electoral advantage that large land-owning politicians enjoy, electoral competition is expected to be lower when land distribution is concentrated and large landowner is running. Thus I predict that productivity differences across areas and over time will lead to variation in electoral competition and policy outcomes. I test these perditions using voting outcomes and data for politicians' assets data from general elections between 2002-2013. As we suspect, productivity is highly endogenous, and is expected to be correlated with range of outcomes. I construct a measure of exogenous productivity change, using differences in land suitability for high-yielding variety (HYV) seeds. This is in the spirit of Foster and Rosenzweig (1996), where the authors note two important features of productivity gains from high yielding varieties. First, as opposed to industrial growth in the first world, where the technology research and advancement is undertaken by local firms, the technology of HYV seeds, was originally imported from outside the countries which adopted them. Thus the endogeneity of technical change with respect to the human capital or other characteristics of the areas which adopt them is less of a worry (Foster and Rosenzweig 1996). Secondly, the profitability of the improved seeds is heterogeneous across the country because of (exogenous) differentials in local soil and weather conditions (Foster and Rosenzweig 1996).

I exploit this nature of HYV seed technology to construct a measure of exogenous shock to land productivity. I exploit differences in HYV suitability across constituencies within a district, and differences across years in the availability of HYV to construct a measure of productivity shock due to HYV in area j and year t, for crop c, $Prod_{cjt} = (Suit\_h_{cj} - Suit\_l_{cj}) \times HYV_{cpt}$. $Suit\_h_{jt}$ is suitability for crop c in area j with high technology (mechanized inputs and irrigation), while $Suit\_l_{jt}$ is the same with low technology (traditional inputs and rain fed). Since HYV seeds requires mechanized inputs and irrigation, the difference between the two suitabilitys captures the extent to which area j will gain from the HYV technology. HYV_{cpt} is the total improved seeds distributed in a province in any year for any crop. The interaction of the difference in suitability and the HYV gives a time and area varying measure of shock to agricultural productivity.

Figures 4-5 below show the FAO measures for potential yields of wheat in tones/ha under the two

input environments, high/irrigated and low/rain-fed. Figures 6 shows the HYV penetration for different crops across years and provinces. For any region I use the *Prod* measure for the crop that is most widely grown in that region in an initial period (1980). The constructed measure of productivity exploits 3 sources of variation - differences across regions within a province and differences across years and differences across provinces.

Figure 4: FAO Suitability for Wheat with High Input Level and Irrigation

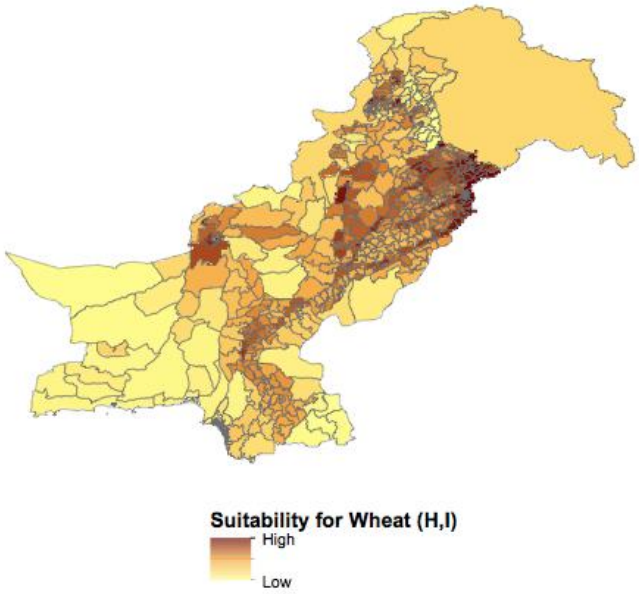


Figure 5: FAO Suitability for Wheat with Low Input Level and No Irrigation

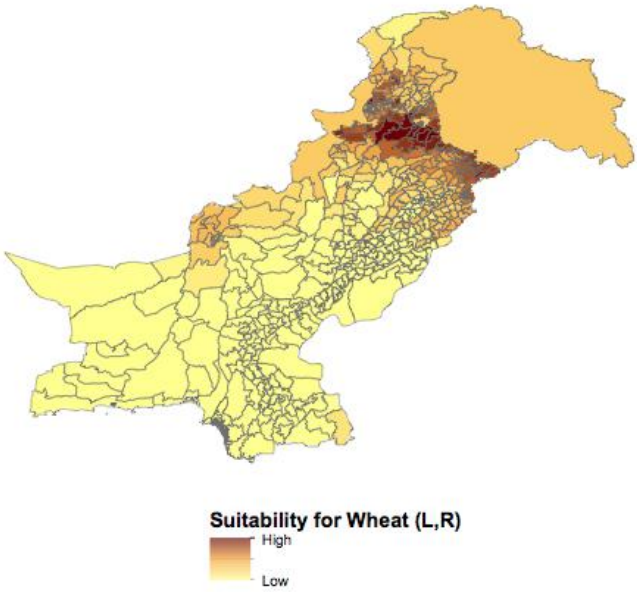


Figure 6: HYV Penetration across Years and Crops

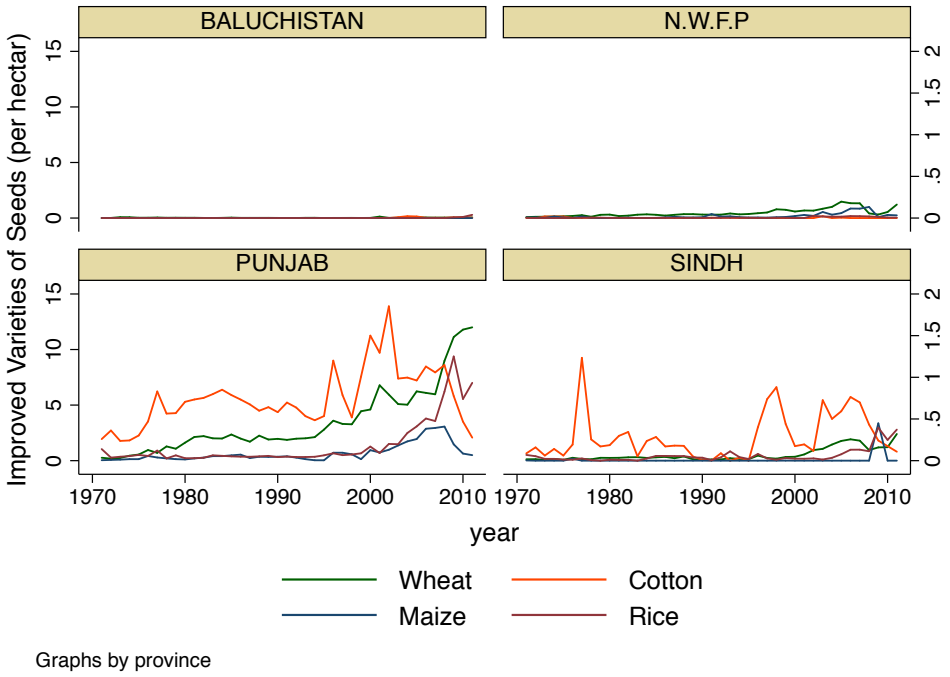


Table 8 shows that constructed measure is significantly correlated with the actual yields by crop, and can be used as a proxy for productivity. Using data from Agricultural Statistics published by the government, I get the areas shares of different crops for each district. I use the suitability for the crop that is most widely grown in any district in the regressions. By using the most commonly grown crop in an initial period (1980), I avoid any confounding factors due to endogenous crop choice.

Case 2 of the model holds when land concentration is high, so I must interact the productivity measure with a measure of land concentration. Using the colonial land estate data mentioned in the previous section, I construct a dummy variable for each constituency which equals 1 if a large estate was granted in that constituency in the colonial time. Figures 8A-B shows the maps for the areas with estates and the degree of land concentration across the districts from a post-independence census. The *estate* dummy essentially captures an environment where landlords are likely to exert political influence - land concentration and tenancy is high. This is in fact the case, the summary statistics table (Table 3) shows that politicians with agricultural land holdings are more likely to be present in the areas where *estate* equals 1. The sharecropping rate is also high in these areas. However, the FAO suitability index in not significantly different in these areas, which lends support to the exogeneity of the HYV suitability. The regression I estimate is:

$$y_{jt} = \beta_1 + \beta_2 Prod_{jt} + \beta_3 Prod_{jt} \times estate_j + \nu_j + \mu_{pt} + \epsilon_{jt}$$

y_{jt} is the outcome of interest in area j (constituency or district) and year t; the outcomes I look at are rate of sharecropping and owner cultivation (district level), the politicians land holding status and size of land holdings, measures of electoral competition (constituency level), and the types of public goods provided (district and sub-district level). By controlling for fixed effects for area j, I have differenced out any time-unvarying differences across areas. I assume that the constructed independent variable is exogenous to any characteristics of the area that may affect the electoral outcomes other than the agricultural productivity of the areas contained in it, as long as they are not changing differentially over time. The above regression is a reduced form OLS regression. I also run a 2SLS using *estate* as an instrument for land concentration. Table 2 show the summary statistics and Tables 6-10 show the results.

Table 2: Summary Statistics: Data for Testing Prediction 2-3

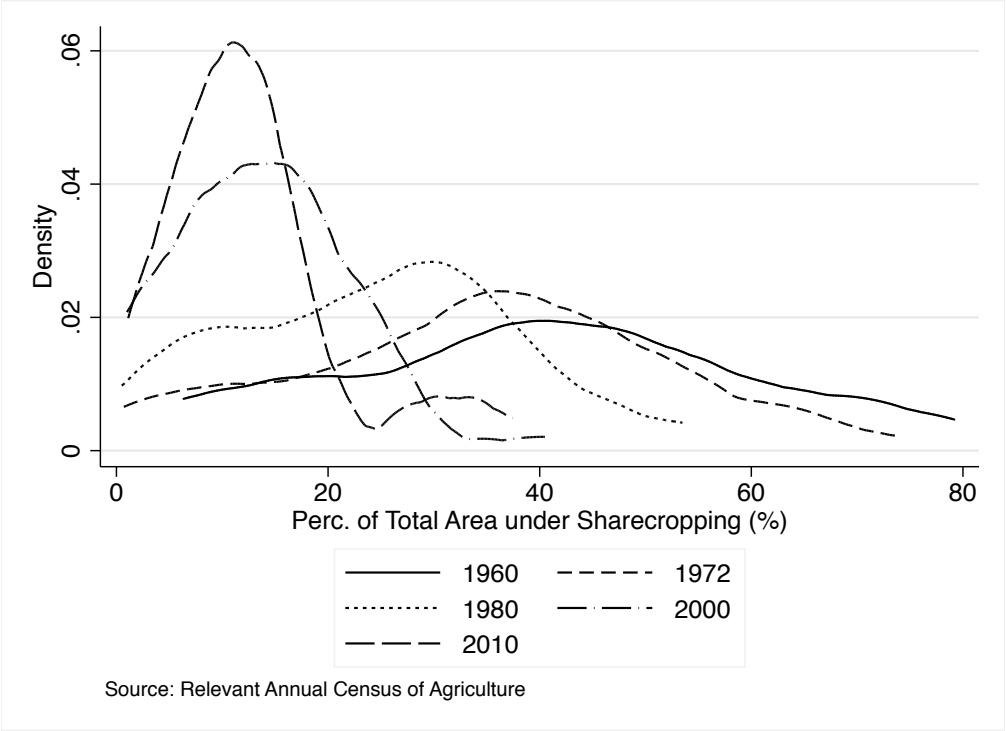
	Estate=0	Estate=1	Difference	Unit	Source	Observations
Agriculture						
Perc. under sharecropping	23.2	31	7.8***	District	Ag. Census	225
	(17.0)	(18.5)				
Suitability Diff	2.00	2.22	0.22	9.25 × 9.25 km	FAO	
	(0.06)	(0.14)				
Electoral						
Ag.Land=1	0.65	0.79	0.14***	Constituency	Elec. Comm	1402
	(0.477)	(0.410)				
Agr. Land Declared (Kanals)	776.4	2630.1	1853.7**	Constituency	Elec. Comm	1402
	(2659.8)	(8202.0)				
Win Margin	17.9	20.3	2.4**	Constituency	Elec. Comm	1635
	(18.03)	(19.10)				
Public Goods						
Irrigation	8.6	6.7	-1.9***	Sub-district	Village Census	723
	(12.7)	(11.0)				
Fertilizer Depot	8.9	6.1	-2.8***	Sub-district	Village Census	723
	(10.8)	(6.7)				
BHU	51	40	-11***	District	PSLM	543
	(28)	(25)				
School	91	82	-9***	District	PSLM	543
	(8)	(9)				

Note that it is common for politicians to hold agricultural land; 65% declare some agricultural land holding. The average land holding is over 900 kanals or over 100 acres[12], but go up to 80,000 kanals or 10,000 acres. As noted earlier the areas with the large estates have higher sharecropping, more landlord politicians, worse electoral competition and worse public goods. These observations are consistent with the model.

As per the model, we expect share cropping to go down as the productivity rises, and more so in areas with high land concentration, where land owners are likely to have tenants for political reasons. Figure 7 below shows the trend in the distribution of sharecropping over the past few 5 decades. There has been drastic fall in the rate of tenancy; this contrasts with the relatively much slower shift in distribution of land concentration over the same time. Tenancy may be falling for a number of reasons, like a reduction in the size of farms, better property rights and access to land. The relatively stable distribution of land concentration indicate that changes in the distribution of land ownership can only be partly responsible for shifts in the tenancy rates. Table 9 provides evidence for the political economy mechanism illustrated in the model which may be responsible for part of this dramatic fall. Panel A shows the sharecropping, in fact, falls even more in the areas with large estates. A 1 S.D. change in the measure of productivity reduces the rate of sharecropping by about 3 percentage point, which is a 10% decreases. Conversely, the same shock to productivity also shifts up the rate of owner cultivation by about 2.6 percentage points (Table 10). Thus I can discern that the rate of sharecropping goes down, partly because land owners prefer to self-cultivate and also because they shift from sharecropping to fix rent tenancy.

[12]The land ceiling fixed by the Land Reforms of 1971 is 150 acres. Despite this a fifth of the politicians declare more than that. After the land reforms, large land holders allegedly shifted their land into the names of members of extended family to ensure their personal holding was within the land ceiling, while the land still stayed within the family. More details about the land reforms are in the Institutional Background section

Figure 7: Distribution of Sharecropping Rate (percent of area under sharecropping) across Districts



The next set of regressions (Table 11) looks at the land holdings of the elected members of the Provincial Assemblies, or lower house of the government, and the degree of electoral competition in these elections. As expected high average productivity of the area within a constituency leads to fewer winning politician with agricultural land holdings, when the HYV penetration is also high. The results hold in a linear probability model where the dependent variable is whether or not the winner has any land or has a large land holding (over 150 acres). A 1 S.D. increase in the measure of productivity lower the agricultural land holding of winning politician by over 200 acres in the areas with a big estate, and lowers the probability of the politician owning agricultural land by 0.25 points. The results hold up in the 2SLS specification where *estate* is used to instrument for initial land concentration. As productivity shifts up, two effects illustrated in the model lead to the drop in landlord politicians; firstly, the incentives for land owners to run are less, because farm profits are much more attractive, secondly, even if running, landlords have fewer tenants, thus fewer voters who can be targeted cheaply. Both effects lead to a lower likelihood of having a landowner in office, and also improved electoral competition. Indeed columns 3 and 4 of Table 11 indicate this by using a categorical variable for low competition, *lowcomp*, which is 1 when the win margin is below the 25th percentile. Using win margin as the dependent variable or other cut-off to classify *lowcomp* yields similar results. A shock amounting to 1S.D of the productivity measure *Prod.* lowers the likelihood of an uncompetitive election by

0.18.

The outcome directly relevant to development is public goods; I look at the composition of public goods provided. As outlined in Section 5 the rural public goods come from a quinquennial village census and measure the percentage of rural villages in any sub-district level that have a facility in the year of the survey. Table 12 presents the effect of the productivity shift in area with high land concentration on rural facilities which presumed to directly affect farm profits; these include a veterinary facility, a water course improvement scheme (irrigation), a diesel pump, and electricity (also assumed to be helping irrigation), and are represented by G_1 in the model. As predicted by proposition 2, since landlord politicians are likely to over provide these services, a shift in the balance of political power away from land owners caused by a shift in productivity, will call these services go down in areas with high land concentration. In areas where land distribution is equal, and more representative of Case 1 in the model, productivity shift will only have an income effect and shift the availability of all public goods up. That is indeed the case, and the co-efficient on $Prod.$ is positive. The coefficient on $Prod \times estate$ is negative, which is consistent with the model's prediction that landowners electoral advantage is lower when productivity is high. The co-efficient for all rural services expected to help farm profits is negative. The percentage of villages that party electrified represents villages where electricity is provided only to some areas or households. To the extent that the service of electricity was targeted by the public official towards land owners in these villages, we would expect that number of partly electrifies villages go down and wholly electrified villages go up. That is true, as shown by the regressions.

As a next step, I look at public goods which are not directly related to farm profits. I get data for these public goods from the Pakistan Living Standards Measurment Surveys conducted between 2004 and 2008. The outcomes I consider are percentage of respondents from any district that report having a useable facility available to them in their vicinity. The facilities I have from this data set include a basic health unit, public school, bus station, population welfare or family planning center and also rural facilities which match the village census data, veterinary clinic and agricultural extension center. The other feature of the PSLM data is that it surveys both urban and rural areas. While not explicitly modeled, we can have some prior about the distribution of public goods across rural and urban areas depending on whether politicians target "core voters" or "swing voters". Constituencies consist of both urban and rural areas. In the case of landlord politicians, they draw a considerable amount of their support from rural voters. If they target their voter base when providing public goods, we would expect them to overprovide public goods to rural areas relative to urban areas. To check this I add an additional interaction with a dummy for urban areas. Results

are shown in Table 13. Firstly, I notice that as expected pubic goods which are not directly affecting profits of land owners go up with the productivity shock in the areas with high land concentration. The results from the previous table are re-enforced using this data set - as we see in columns (5) and (6), the services directly affect farm profits go down. Looking at the effect across rural-urban status, we note that the effect are more positive in the urban areas. The public goods like school, bus and family planning centers go up more in urban areas relative to rural areas. This is suggestive evidence that traditional politicians not only steered resources towards services which benefited farmers directly, but favored rural areas in provision of all other services. A shift in power towards the modern elite and away from the traditional rural elite results in a shift of resources towards urban areas. The results thus speak subtly to the rural-urban inequality and the rural-urban migration, which is a strong feature of developing economies.

7 Concluding Remarks

The results show one way in which traditional elites, landlords, are able to perpetuate their political influence. The process of development attenuates the influence of the traditional elites. The results support the Deninger and Squire view (1998) that initial asset distribution is what matters, and affects growth as well as income and political inequality. The paper also corroborates the evidence in favor of historical institutional persistence, specifically Dell (2010) which suggests the channels are through land tenures and public goods. Contrary to conventional wisdom, traditional elites are not always detrimental for development, at least in the regions of their influence. I find that landed elites, when in power, provide facilities that benefit farmers and their voter base. The shift in political power away from the traditional landed elites and toward the modern elite also results in a shift of resources; from the evidence presented here resources are transferred away from the goods which benefit rural voters, and in favor of urban voters. These results speak to rural-urban inequality and rural-urban migration, which is a common feature of developing economies.

References

[1] Acemoglu, D., Reed, T., and Robinson, J. A. (2014). Chiefs: Elite Control of Civil Society and Economic Development in Sierra Leone forthcoming in the Journal of Political Economy, 122.

[2] Acemoglu, D., Bautista, M. A., Querubin, P., & Robinson, J. A. (2007). Economic and political inequality in development: the case of Cundinamarca, Colombia (No. w13208). National Bureau of Economic Research.

[3] Alavi, H. (1976). The rural elite and agricultural development in Pakistan. Pakistan Economic and Social Review, 173-210.

[4] Ali, I. (1989), The Punjab under Imperialism, 1885-1947. New Delhi: Oxford University Press.

[5] Ali, I. (2004). Historical Impacts on Political Economy in Pakistan. Asian Journal of Management Cases, 1(2), 129-146.

[6] Baland, J. M., and Robinson, J. A. (2008). Land and Power: Theory and Evidence from Chile. American Economic Review 98: 173765.

[7] Baland, J. M., and Robinson, J. A. (2012). The political value of land: political reform and land prices in Chile. American Journal of Political Science, 56(3), 601-619.

[8] Barro, R. J. (2000). Inequality and Growth in a Panel of Countries. Journal of economic growth, 5(1), 5-32.

[9] Banerjee, A. V., and Iyer, L. (2002). History, institutions and economic performance: the legacy of colonial land tenure systems in India.

[10] Banerjee, A. V., and Iyer, L. (2008). Colonial land tenure, electoral competition and public goods in India. Harvard Business School.

[11] Banerjee, A., and Somanathan, R. (2007). The political economy of public goods: Some evidence from India. Journal of development Economics, 82(2), 287-314.

[12] Banerjee, A., Iyer, L., and Somanathan, R. (2005). History, social divisions, and public goods in rural india. Journal of the European Economic Association, 3(23), 639-647. Chicago

[13] Banerjee, A., and Somanathan, R. (2001). Caste, community and collective action: The political economy of public good provision in india. mimeo, Massachusetts Institute of Technology.

[14] BBC 2008. Feudal shadow over Pakistan elections, by Hasan S. , December 2.

[15] Bell, C. and Zusman, P. (1989) New approaches to the theory of rental Contracts in Agriculture. I.A.A.E. occaisonal paper - International Association of Agricultural Economists.

[16] Bloomberg 2013. Feudal Bonds Grip Pakistan Rural Vote in Bar for Landowner Tax. by Anwar, H., and Anis, K.. May 7.

[17] Braverman, A., and Stiglitz, J. E. (1982). Sharecropping and the interlinking of agrarian markets. The American Economic Review, 695-715.

[18] Braverman, A., and Stiglitz, J. E. (1986). Cost-sharing arrangements under sharecropping: moral hazard, incentive flexibility, and risk. American Journal of Agricultural Economics, 68(3), 642-652.

[19] Braverman, A., and Srinivasan, T. N. (1981). Credit and sharecropping in agrarian societies. Journal of Development Economics, 9(3), 289-312.

[20] Brockett, C. D. (1992). Measuring political violence and land inequality in Central America. American Political Science Review, 86(01), 169-176.

[21] Brown, D. (2000) Democracy, colonization, and human capital in sub-Saharan Africa Studies in Comparative International Development, 35 (1) , pp. 2040

[22] Boone, C. (1994) States and ruling classes in postcolonial Africa: the enduring contradictions of power. J. Migdal, A. Kohli, V. Shue (Eds.), State power and social forces: domination and transformation in the Third World, Cambridge University Press, New York , pp. 108139

[23] Chanock, M. (1985) Law, custom, and social order: The colonial experience in Malawi and Zambia. Cambridge University Press, New York

[24] Cheung, S. (1969) The Theory of Share Tenancy, Chicago: University of Chicago Press.

[25] Deininger, K., and Squire, L. (1998). New ways of looking at old issues: inequality and growth. Journal of development economics, 57(2), 259-287.

[26] Dell, M. (2010). The persistent effects of Peru's mining mita. Econometrica, 78(6), 1863-1903.

[27] Dixit, A., & Londregan, J. (1996). The determinants of success of special interests in redistributive politics. Journal of politics, 58, 1132-1155.

[28] Economist 2013 Gone with the wind. May 18.

[29] Engerman, S. L., and Sokoloff, K. L. (2005). Colonialism, inequality, and long-run paths of development (No. w11057). National Bureau of Economic Research.

[30] Eswaran, M., and Kotwal, A. (1985). A theory of contractual structure in agriculture. The American Economic Review, 352-367.

[31] Field, E. (2005). Property rights and investment in urban slums. Journal of the European Economic Association, 3(23), 279-290.

[32] Field, E. (2007). Entitled to work: Urban property rights and labor supply in Peru. The Quarterly Journal of Economics, 1561-1602.

[33] Forbes, K. J. (2000). A Reassessment of the Relationship between Inequality and Growth. American economic review, 869-887.

[34] Galor, O. (2000). Income distribution and the process of development. European Economic Review, 44(4), 706-712.

[35] Galor, O., Moav, O., and Vollrath, D. (2003). Land inequality and the origin of divergence and overtaking in the growth process: theory and evidence (No. 2003-04). Working Paper, Brown University, Department of Economics.

[36] Gazdar, H. (2009). The Fourth Round, And Why They Fight On: An Essay on the History of Land and Reform in Pakistan. PANOS South Asia, Collective for Social Science Research, Karachi.

[37] Griffin L. H. and Craik H. (1865). The Panjab Chiefs. Sang-e-Meel Publication (repiublished 1993). Punjab (India)

[38] Hamid, N. (1982). Dispossession and differentiation of the peasantry in the Punjab during colonial rule. The Journal of Peasant Studies, 10(1), 52-72.

[39] Hasnain, Z. (2008). The Politics of Service Delivery in Pakistan: Political Parties and the Incentives for Patronage, 1988-1999. The Pakistan Development Review, 129-151.

[40] Hughes, A. W. (1986). A Gazeteer of of the Province of Sindh. Second Edition. London

[41] Hussain, A. (1979). Elite politics in an ideological state: the case of Pakistan. Folkestone: Dawson.

[42] Iyer, L. (2010). Direct versus indirect colonial rule in India: Long-term consequences. The Review of Economics and Statistics, 92(4), 693-713.

[43] Joshi, P. C. (1970). Land Reform in India and Pakistan. Economic and Political Weekly, A145-A152.

[44] Keefer, P., and Khemani, S. (2005). Democracy, public expenditures, and the poor: understanding political incentives for providing public services. The World Bank Research Observer, 20(1), 1-27.

[45] Keefer, P., and Vlaicu, R. (2002). Clientelism, credibility and democracy. World Bank: Washington, DC Processed.

[46] Keefer, P. (2007). Clientelism, credibility, and the policy choices of young democracies. American journal of political science, 51(4), 804-821.

[47] Kuznets, S. (1955). Economic growth and income inequality. The American economic review, 1-28.

[48] Kuznets, S. (1963). Quantitative aspects of the economic growth of nations: VIII. Distribution of income by size. Economic development and cultural change, 11(2), 1-80.

[49] Lange, M. K. (2004). British colonial legacies and political development. World Development, 32(6), 905-922.

[50] Logan, C. (2011). The Roots of Resilience: Exploring Popular Support for African Traditional Authorities. Working Paper no. 128, AFRObarometer, Michigan State Univ.

[51] Mamdani, M. (1996) Citizen and subject. Princeton University Press, Princeton, NJ

[52] Martinez-Bravo, M., Qian, N., and Yao, Y. (2011). Do local elections in non-democracies increase accountability? Evidence from rural China (No. w16948). National Bureau of Economic Research.

[53] Mason, T. D. (1986). Land reform and the breakdown of clientelist politics in El Salvador. Comparative Political Studies, 18(4), 487-516.

[54] Medina, L. F., and Stokes, S. (2002, August). Clientelism as political monopoly. In the 2002 Annual Meetings of the American Political Science Association Conference. Boston. August (Vol. 29).

[55] Merry, S.E. (1991) Law and colonialism. Law and Society Review, 25 (4), pp. 889922

[56] Migdal, J. (1988) Strong societies and weak states: statesociety relations and state capabilities in the Third World. Princeton University Press, Princeton, NJ (1988)

[57] Nunn, N. (2009). The importance of history for economic development (No. w14899). National Bureau of Economic Research.

[58] PILDAT (2011). Tax on Agricultural Income, Briefing Paper No. 43.

[59] Persson, T., & Tabellini, G. E. (2002). Political economics: explaining economic policy. MIT press.

[60] Powell, J. D. (1970). Peasant society and clientelist politics. The American Political Science Review, 411-425.

[61] Rashid, S. M. (1985). Land Reforms in Pakistan. Social Scientist, 44-52.

[62] Robinson, J. A., and Verdierz, T. (2003). The Political Economy of Clientelism.

[63] Roberts, R. and Mann, K. (1991) Law in colonial Africa. K. Mann, R. Roberts (Eds.), Law in Colonial Africa, Heinemann, Portsmouth, NH, pp. 358

[64] Scott, J. C. and B. J. Kerkvliet (1976) How traditional rural patrons lose legitimacya theory with special reference in Southeast Asia, pp. 439-458 in S. W. Schmidt, L. Guasti, C. H. Lande, and J. C. Scott (eds.) Friends, Followers and Factions: A Reader in Political Clientelism. Berkeley: Univ. of California Press.

[65] Stiglitz, J. E. (1974). Incentives and risk sharing in sharecropping. The Review of Economic Studies, 219-255.

[66] Time 2008. Landowner Power in Pakistan Election by Baker, A., & Bhutto, M. February 13.

[67] Times of Karachi 2011 Feudalism in Pakistan. January 1.

[68] Quan, N. T., and Koo, A. Y. (1985). Concentration of land holdings: An empirical exploration of Kuznets' conjecture. Journal of Development Economics, 18(1), 101-117.

[69] Wang, S., and Yao, Y. (2007). Grassroots democracy and local governance: Evidence from rural China. World Development, 35(10), 1635-1649.

[70] World Bank 2010: World Development Indicators

[71] Wright Jr, T. P. (1994). Can there be a melting pot in Pakistan? Interprovincial marriage and national integration. Contemporary South Asia, 3(2), 131-144.

[72] Young, C. (1994) The African Colonial State in Comparative Perspective, Yale University Press, New Haven, CT

8 Appendix

Figure 8A: The Historic 'Jagir' Districts

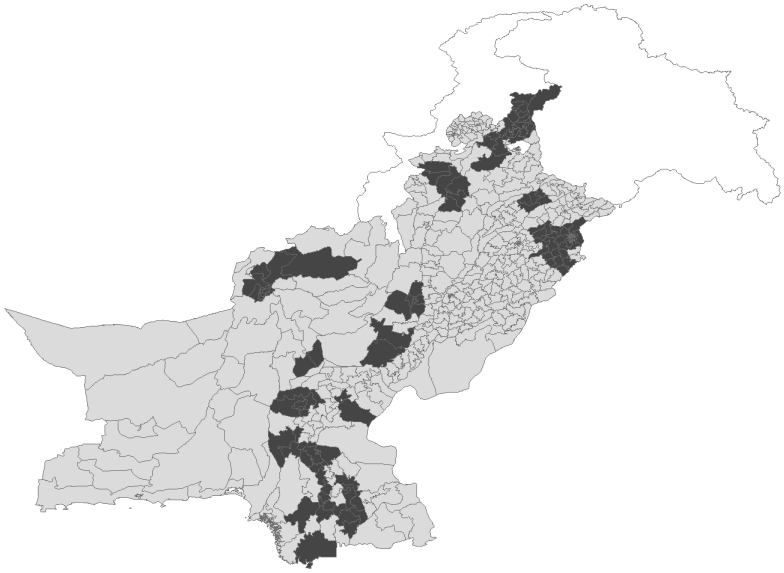
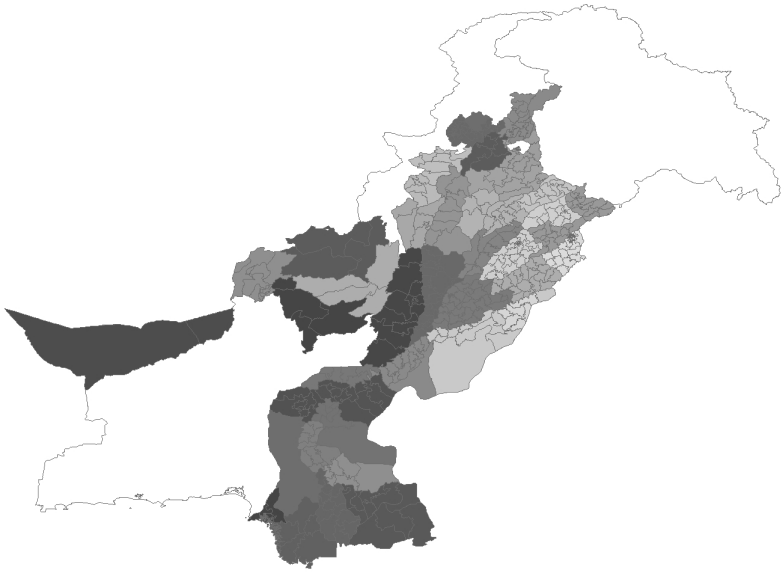


Figure 8B: Land Concentration



Notes: The top panel shows the districts coded as estate==1. The bottom panel shows the land concentration index (Brockett 1992, described in the Data Section) using holdings data from 1972 agricultural census. Darker areas represent high values of land concentration.

Table 4: Landlord Politicians and Sharecropping

Dependant variable is dummy for a sharecropped plot	(1)	(2)	(3)	(4)
LL_Pol	-0.123	-0.103	-0.0601	-0.0663
	[-0.58]	[-0.41]	[-0.22]	[-0.23]
LL_PolxPost	0.854**	0.810**	1.057**	1.120**
	[2.41]	[2.05]	[2.28]	[2.35]
Post	0.438***	0.444***	0.638***	0.575***
	[4.81]	[4.65]	[4.23]	[3.72]
LL Holding		0.0000128*	0.0000154	0.0000157
		[1.66]	[1.26]	[1.31]
Tenant Holding		-0.00264***	-0.00301***	-0.00291***
		[-3.35]	[-3.39]	[-3.31]
Observations	1563	1563	1148	1148
Plot Type	Leasedin/out	Leasedin/out	Leasedin	Leasedin
Other Landlords	No	No	No	Yes
Crop Composition	No	No	Yes	Yes

Notes

Robust standard errors (clustered at household level)

All regressions include tenant fixed effects, plot controls (size, irrigation, soil/slope)

Other landlord controls include a dummy for an influential landlord (village head, panchayat leader, Large landlord, religious leader)

t statistics in brackets

Table 5: Landlord Politicians and Input/Output Shares

LL Share of:	(1) Seeds	(2) Fertilizer	(3) G-Water	(4) Thresher	(5) Output
LL_Pol	-5.262	-1.591	9.605	-8.387	0.938
	[-1.00]	[-0.51]	[1.47]	[-1.39]	[0.42]
LL_PolxPost	2.879	7.935**	17.06*	17.08*	-3.152
	[0.44]	[2.09]	[1.80]	[1.73]	[-1.00]
Post	-6.298	-8.554***	-24.99***	-12.50***	0.215
	[-1.47]	[-4.06]	[-4.12]	[-3.19]	[0.17]
LL Holding	0.0000145	-0.0000305	-0.000717**	0.000242*	0.000126
	[0.18]	[-0.72]	[-2.56]	[1.84]	[1.23]
Tenant Holding	-0.0751***	-0.0524***	0.572***	0.0456	-0.0194
	[-2.93]	[-3.95]	[3.42]	[1.62]	[-1.48]
Observations	808	837	496	824	844

Notes:

Robust standard errors (clustered at household level)

All regressions include tenant fixed effects, plot controls (size, irrigation, soil/slope), crop controls

t statistics in brackets

Table 6: Landlord Politicians and Input/Output Shares-Robustness Check

LL Share of:	(1) Seeds	(2) Fertilizer	(3) G-Water	(4) Thresher	(5) Output
LL_Pol	-6.328	-2.194	13.54	-8.585	1.590
	[-1.06]	[-0.72]	[1.52]	[-1.29]	[0.63]
LL_PolxPost	3.151	7.158*	9.966	17.86*	-3.600
	[0.50]	[1.92]	[0.81]	[1.72]	[-1.19]
Post	-8.562**	-10.21***	-24.39***	-14.40***	-0.0470
	[-2.57]	[-5.40]	[-3.95]	[-4.49]	[-0.03]
LL_Influential	-0.0888	-0.364	2.509	-5.063	-1.633
	[-0.02]	[-0.08]	[0.37]	[-0.67]	[-0.66]
LL_InfluentialxPost	1.629	1.585	-18.19**	8.444	-12.00
	[0.26]	[0.33]	[-2.21]	[0.96]	[-1.11]
LL_large	-6.337	-5.027*	22.50	0.0877	-0.829
	[-1.37]	[-1.77]	[1.39]	[0.02]	[-0.36]
LLl_largexPost	9.240	7.622*	-11.12	-2.660	3.748
	[1.34]	[1.87]	[-1.26]	[-0.42]	[0.99]
Observations	808	837	496	824	844

Notes:

Robust standard errors clustered at household level

All regressions include tenant fixed effects, plot controls (size, irrigation, soil/slope), crop controls

t-statistics in brackets

Table 7: Landlord Politicians and Lending to Tenants

Dependent Variable is dummy for borrowing from LL	(1)	(2)	(3)	(4)
Sharecrop	0.0186	0.0249	0.0379	0.0418
	[0.13]	[0.16]	[0.27]	[0.27]
LL_Pol	-0.402	-0.417	-0.269	-0.334
	[-1.51]	[-1.54]	[-0.97]	[-1.16]
LL_PolxPost	0.979***	0.774**	0.880**	0.621*
	[2.77]	[2.17]	[2.47]	[1.69]
Post	-0.916***	-0.625***	-0.893***	-0.572***
	[-7.87]	[-3.90]	[-7.34]	[-3.49]
LL_Influential			-0.230	-0.254
			[-0.85]	[-0.87]
LL_InfluentialxPost			-0.139	-0.0341
			[-0.28]	[-0.06]
LL_large			0.353	0.276
			[1.58]	[1.15]
LLl_largexPost			-0.186	-0.532
			[-0.62]	[-1.63]
Observations	1386	987	1386	987
Crop Controls	No	Yes	No	Yes
Plot Type	Leasedin/out	Leasedin	Leasedin/out	Leasedin

Notes:

Robust standard errors clustered at household level

All regressions include HH fixed effects, plot controls, (size, irrigation, soil/slope), landlord and tenant holdings and landlord-tenant level controls(relationship, length of contract)

Marginal effects reported

t-statistics in brackets

Table 8: Actual Yields and Productivity Shift

	(1) Wheat	(2) Cotton	(3) Rice	(4) Maize	(5) Maxcrop	(6) Maxcrop
Suitability x HYV (by crop)	0.0000105	0.0000593	-0.0001000	0.000151	0.0109	0.0106
	[2.80]***	[2.74]***	[-1.50]	[2.92]***	[2.84]***	[2.91]***
Suitability x HYV x Estate						0.00172
						[0.59]
Observations	1580	955	1110	1162	1529	1529

Notes

t statistics in brackets

District-level yield

Standard errors clustered at province-year level

All regression include district FE and province-year FE

Table 9: Sharecropping in response to Productivity Shift

Perc. of Total Area under Sharecropping by farm size category:	(1) Under 5 acres	(2) 5-25 acres	(3) Over 25 acres
Panel A: OLS Second Stage			
Prod.	-0.0468	0.133	0.178
	[-0.35]	[1.24]	[1.13]
Prod. x Conc.	-0.00348	-0.00806	-0.00527
	[-1.18]	[-3.25]***	[-1.45]
Panel B: Reduced Form			
Prod.	-0.156	-0.149	-0.0199
	[-3.64]***	[-3.80]***	[-0.44]
Prod. x Estate	-0.189	-0.220	-0.0515
	[-2.80]***	[-1.85]*	[-0.29]
Overall Effect of 1 S.D change in Prod	**-3.11**	**-3.32**	**-0.64**
Panel C: 2SLS Second Stage			
Prod.	0.149	0.206	0.0634
	[0.94]	[1.38]	[0.24]
Prod. x Conc.	-0.00852	-0.00993	-0.00233
	[-2.30]**	[-3.03]***	[-0.34]
Overall Effect of 1 S.D change in Prod at mean Conc.	**-3.03**	**-3.24**	**-0.62**
Panel D: First Stage			
Dependent Variable:			Prod. x Conc.
Prod.			35.7
			[16.7]***
Prod. x Estate			22.1
			[2.79]***
R-square			0.55
Observations	225	225	225

Notes: t statistics in brackets. Standard errors clustered at district level. All regression include district and province-year FE. District-level data from Agricultal Censuses of 1960 to 2010. The land concentration measure is un-available for 3 districts, so the 2SLS regressions exclude them. Other results are not sensitive to excluding these districts.

Table 10: Owner-Cultivation in response to Productivity Shift

Perc. of Total Area under Sharecropping by farm size category:	(1) Under 5 acres	(2) 5-25 acres	(3) Over 25 acres
Panel A: OLS Second Stage			
Prod.	0.0368	-0.104	-0.159
	(0.27)	(-0.93)	(-1.02)
Prod. x Conc.	0.00306	0.00654	0.00394
	(0.94)	(2.44)**	(1.09)
Panel B: Reduced Form			
Prod.	0.134	0.121	-0.0217
	(2.80)***	(2.93)***	(-0.50)
Prod. x Estate	0.156	0.205	0.108
	(1.76)*	(1.84)*	(0.88)
Overall Effect of 1 S.D change in Prod	**2.61**	**2.93**	**0.78**
Panel C: 2SLS Second Stage			
Prod.	-0.117	-0.210	-0.197
	(-0.81)	(-1.39)	(-1.06)
Prod. x Conc.	0.00703	0.00925	0.00490
	(2.20)**	(2.87)***	(1.12)
Overall Effect of 1 S.D change in Prod at mean Conc.	**2.55**	**2.86**	**0.74**
Observations	225	225	225

Notes: t statistics in brackets. Standard errors clustered at district level. All regression include district and province-year FE. District-level data from Agricultal Censuses of 1960 to 2010. The land concentration measure is un-available for 3 districts, so the 2SLS regressions exclude them. Other results are not sensitive to excluding these districts.

Table 11: Landlord Politicians and Electoral Competition in response to Productivity Shift

	(1) Agland Size	(2) AgLand==1	(3) Lowcomp	(4) Candidates
Panel A: OLS Second Stage				
Prod.	-10.54	0.000102	0.00673***	0.0977**
	[-0.50]	[0.04]	[2.91]	[2.58]
Prod. x Conc.	0.447	-0.0000216	-0.000186***	-0.00191*
	[0.68]	[-0.41]	[-3.13]	[-1.96]
Overall Effect of 1 S.D change in Prod at mean Conc.	172.325	-0.01851	-0.0131	0.58025
Panel B: Reduced Form				
Prod.	6.621	-0.000561	0.000130	0.0275***
	[0.65]	[-0.55]	[0.21]	[2.78]
Prod. x Estate	-85.31**	-0.00962**	-0.00734**	0.126
	[-2.05]	[-2.29]	[-2.11]	[1.58]
Overall Effect of 1 S.D change in Prod	**-1967**	**-0.25**	**-0.18**	**3.84**
Panel C: 2SLS Second Stage				
Prod.	319.3***	0.0343	0.0331*	-0.527
	[2.72]	[1.01]	[1.66]	[-0.78]
Prod. x Conc.	-8.680***	-0.000969	-0.000919	0.0155
	[-3.13]	[-1.01]	[-1.63]	[0.82]
Overall Effect of 1 S.D change in Prod at mean Conc.	**-480**	**-0.09**	**-0.07**	**1.94**
Observations	1402	1402	1635	1635

Notes:

t statistics in brackets

Standard errors clustered at district level. All regression include district and province-year FE

The size categories are as follows: Small (under 5 acre); Med (5-25 acre); Large (over 25 acre)

District-level data from Agricultal Censuses of 1960 to 2010

The land concentration measure is un-available for 3 districts, so the 2SLS regressions excludes 79 observations. Other results are not sensitive to excluding these observations

Table 12: Land Owner preferred Facilities in response to Productivity Shift

	(1) Vet	(2) Fert. Depot	(3) Diesel Pump	(4) Wat Course Impr.	(5) Partly Electrified
Panel A: OLS Second Stage					
Prod.	2.714	1.328	1.308	4.504	1.790
	(4.09)***	(1.40)	(1.20)	(5.79)***	(1.14)
Prod. x Conc.	-0.0367	-0.0158	-0.0128	-0.0526	-0.0290
	(-3.36)***	(-1.04)	(-0.73)	(-5.17)***	(-1.25)
Overall Effect of 1 S.D change in Prod at mean Conc.	**6**	**4**	**5**	**13**	**2**
Panel B: Reduced Form					
Prod.	0.452	0.388	0.567	1.247	0.0622
	(3.91)***	(2.78)**	(3.95)***	(6.77)***	(0.24)
Prod. x Estate	-1.063	-1.316	-1.378	-0.640	-1.907
	(-2.29)**	(-2.01)**	(-2.55)**	(-0.71)	(-4.13***)
Overall Effect of 1 S.D change in Prod	**-5**	**-7**	**-6**	**5**	**-15**
Panel C: 2SLS Second Stage					
Prod.	4.887	5.820	6.192	3.705	7.600
	(4.38)***	(2.91)**	(3.36)***	(2.20)**	(2.24)**
Prod. x Conc.	-0.0714	-0.0875	-0.0907	-0.0398	-0.122
	(-4.24)***	(-2.78)**	(-3.20***)	(-1.65)*	(-2.22)**
Overall Effect of 1 S.D change in Prod at mean Conc.	**8**	**8**	**10**	**12**	**7**
Observations	723	723	723	723	723

Notes:

t statistics in parentheses

All regression include subdistrict fixed effects and errors are clustered at sub-district level

The dependent variable is the change in the percentage of villages which have each facility

Table 13: Facilities preferred by Voters in response to Productivity Shift

	(1) Health	(2) School	(3) Fam Planning	(4) Bus	(5) Vet	(6) Ag. Ext
Panel A: OLS Second Stage						
Prod. x Conc.	0.0193	0.0485	0.0664	0.160	-0.0151	-0.0254
	(0.77)	(2.92)***	(1.77)*	(1.63)	(-1.03)	(-1.98)*
Prod. x Conc. x Urban	-0.00706	0.00985	0.0142	-0.00371	0.0333	0.0309
	(-0.97)	(3.94)***	(2.34)**	(-0.32)	(7.27)***	(5.62)***
Panel B: Reduced Form						
Prod. x Estate	0.116	0.758	2.654	3.908	-0.893	-0.859
	(0.08)	(0.95)	(2.79)***	(1.43)	(-1.44)	(-1.70)*
Prod. x Estate x Urban	0.0599	0.273	0.384	0.542	0.669	0.636
	(0.34)	(2.11)**	(1.47)	(2.30)**	(1.78)*	(1.74)*
Panel C: 2SLS Second Stage						
Prod. x Conc.	0.0127	0.0767	0.260	0.379	-0.0693	-0.0667
	(0.10)	(1.82)*	(1.61)	(2.76)***	(-0.80)	(-1.08)
Prod. x Conc. x Urban	0.00348	0.0149	0.0174	0.0305	0.0345	0.0324
	(0.39)	(3.20)***	(2.00)**	(1.69)*	(3.25)***	(3.55)***
Overall Effect of 1 S.D change in Prod at mean Conc.	**6**	**18**	**58**	**68**	**-3**	**-8**
Observations	543	543	543	543	543	543

Notes:

t statistics in parentheses

Standard errors clustered at district level

All regressions include controls for urban and urban interacted with province and year

Dependant variables refer to percentage of responders who reported using a service without problem