

Political competition and rural welfare: evidence from Pakistan

Katrina Kosec^a, Hamza Haider^b, David J. Spielman^c, and Fatima Zaidi^c

April 30, 2018

Abstract

Can stronger political competition improve rural livelihoods in developing countries? We explore this question in rural Pakistan, showing that greater political competition in a Provincial Assembly constituency predicts significantly better access to publicly-provided infrastructure and amenities, but no changes in other public goods including perceived access to justice and security. Nonetheless, overall welfare effects appear to be positive: higher political competition predicts higher expenditures per capita, especially among land-poor households. It also predicts higher land values, greater land wealth, and lower land wealth inequality. Further, political competition increases land rental, possibly indicating improved functionality of land markets. Sensitivity analyses suggest that our estimates are unlikely to be substantially affected by omitted variable bias, and they are further similar to instrumental variables estimates. The findings are also robust to use of alternate measures of political competition. Greater provision of both public and private goods appears to explain welfare improvements.

JEL Classification: H11, H40, Q11, Q15

^a The International Food Policy Research Institute, 1201 I Street, NW, Washington, DC 20005, USA; e-mail: k.kosec@cgiar.org

^b Department of Agricultural, Food, and Resource Economics, Michigan State University

^c The International Food Policy Research Institute

1 Introduction

Can stronger political competition improve rural livelihoods in developing countries? While evidence from developed countries and urban settings suggests that competitive pressures on elected policymakers can increase growth and public spending (Stansel, 2005; Besley et al., 2010; Hatfield and Kosec, 2013), evidence from developing country settings and especially from rural areas is more limited. While political competition can reduce the prevalence of ethnic favoritism (Burgess et al., 2015), it may exert relatively weak electoral incentives in places where governance is non-transparent or the press is not free (Strömberg, 2004). Individuals in developing countries are also often tied to their land or face insurmountable barriers to migration (De Brauw et al., 2014), making it less likely that citizens and other factors of production “vote with their feet” in response to bad policies as they might in other contexts (Tiebout, 1956). Further, in weak party systems, political competition may reduce public goods provision by increasing the complexity of legislative bargaining and thus policy implementation (Gottlieb and Kosec, 2018). At the macro level it is thus not surprising that cross-country studies have found mixed impacts of democracy on public goods provision (Boix, 2001; Stasavage, 2005a; Ross, 2006; Besley and Kudamatsu, 2006).

In this paper, we make two main contributions. First, we provide evidence on the impacts of political competition on public goods and rural welfare in one lower-middle income country: Pakistan. Pakistan is a young democracy with the world’s sixth-largest population and a rural poverty rate that has declined slowly in recent years (Malik et al., 2016). The majority of public goods and services are provided at the provincial or lower levels of government, and key policy decisions are made by a provincial assembly comprised of one elected member from each constituency. We consider how the level of political competition in provincial assembly constituency races influences subsequent public goods and welfare outcomes. Second, we provide suggestive evidence on the mechanisms underlying welfare improvements.

Our primary data are drawn from a household survey carried out in rural Pakistan in 2012 covering 942 land-cultivating households in three provinces, 19 districts, and 57 Provin-

cial Assembly constituencies. We pair these with Provincial Assembly elections data from 2008, constructing measures of political competition for each constituency. The survey asked household heads questions about access to three public goods which capture the range of responsibilities of the provincial government: justice, infrastructure and amenities, and security. Our welfare measures include expenditures per capita, land wealth, non-land wealth, and inequality. As land is typically a rural household's most valuable asset ([Bardhan, 1984](#); [Jatileksono, 1989](#); [Renkow, 1993](#)), and given its importance to rural production, we also consider several land-related outcomes: land value per acre, prevalence of land ownership, prevalence of land rental, and the share of owned land rented out.

We find that a standard deviation increase in political competition, as measured by one minus a Herfindahl-Hirschman Index ($1 - \text{HHI}$), is associated with a 16% increase in an index of household access to infrastructure and amenities, relative to the mean. However, it is not associated with greater perceived access to justice or security, suggesting that improvements in public goods are limited to more visible infrastructure. Greater political competition also predicts improvements in household welfare overall: a standard deviation increase in political competition is associated with an 8% increase in household expenditures per capita and a 22% increase in land wealth. While households are no more likely to own land, land values per acre are 15% higher, and inequality of land wealth as measured by a Gini coefficient is predicted to be 16% lower, relative to the mean. Households also engage in more land rental, possibly indicating improved functionality of land markets. We show that these findings are robust to use of alternate measures of political competition. Superior infrastructure and amenities in places with greater competition appears to explain only a portion of overall welfare improvements. This suggests a role for other mechanisms, such as greater provision of private goods.

Our estimates come from ordinary least squares regressions which include geographic location controls, demographic and socioeconomic controls, land use controls (dummies for major crops grown), and land controls (characteristics of plots and land available). We carry

out sensitivity analysis following [Imbens \(2003\)](#) and show that any omitted variable would need to be a lot more influential than any of these four vectors of controls in explaining both political competition and our infrastructure index to invalidate our findings. This suggests that our controls allow us to treat political competition as exogenous. To further test this interpretation, we show that the results hold when employing a more plausibly exogenous measure of political competition that exploits political parties' national popularity, and when using instrumental variables estimates that exploit this exogenous variation.

The next section outlines our conceptual framework and provides background information on political competition and land in Pakistan. [Section 3](#) presents our dataset and empirical strategy. [Section 4](#) presents empirical findings on the relationship between political competition and land. Finally, [Section 5](#) concludes.

2 Background and Literature

2.1 Conceptual framework

The existence of government is often justified by its ability to promote citizens' well-being. Governments do so by passing laws and regulations and investing in public goods. The latter is especially important in developing countries and rural areas, where many cannot afford private versions of publicly-provided goods. Indeed, about 68% of the poor live in rural areas worldwide ([World Bank, 2016](#)). Governments may also support citizens through the provision of private goods, ranging from cash transfers or vouchers targeted at the poor to more clientelistic transfers and subsidies to political supporters.

Standard models of electoral accountability show the amount and quality of public goods provision to be increasing in political competition (e.g., [Fearon \(1999\)](#); [Besley \(2006\)](#)). Incumbent politicians are disciplined by the existence of a credible threat from the opposition. Numerous models expand on these insights, showing that political competition enhances incentives for long-term productive investments ([Weingast, 1995](#); [Brueckner, 2006](#);

Hatfield and Padró i Miquel, 2012). More generally, theory and empirical work show that political competition makes politicians more responsive to citizens' preferences (Stasavage, 2005b; Gordon and Huber, 2007; Callander, 2008; McCourt, 2012; Hatfield and Kosec, 2013).

In young democracies with less established political parties, politicians often prefer to provide private goods to targeted groups and individuals instead of public goods because they cannot make credible pre-election promises about public goods (Keefer, 2007). Elected officials also have incentives to bias resource allocation towards loyal voting groups and provide goods which supply opportunities for kickbacks and graft—which may be easier with private goods than public (Arif et al., 2010; Mani and Mukand, 2007). Several empirical studies accordingly suggest a positive correlation between political competition and provision of private goods (Levitsky, 2007; Wilkinson, 2007; Kopecký, 2011; Weitz-Shapiro, 2012).

In settings with strong traditional authorities and ascriptive groups, emphasis on provision of private goods to mobilize voters is common (Chandra, 2004; Kitschelt and Wilkinson, 2007; Rojo et al., 2015; Gottlieb, 2016). Pakistan is one such context, where the notions of *biradiri* (clan) and *zaat* (caste) are critical to social status and state–society relations. High demand for private goods and conditions allowing for their provision are likely to prevail.

2.2 Political competition and public goods provision

We contribute to the literature examining how political competition affects access to justice. For example, theory and empirical evidence suggest that political competition can increase the transparency of governance (De Janvry et al., 2012), insulate policymakers from lobbyists (Solé-Ollé and Viladecans-Marsal, 2012), and lead to the development of more independent judicial institutions (Hanssen, 2004).

Our paper also relates to the literature showing that political competition induces greater allocation of public funds to growth- and welfare-maximizing investments, including essential infrastructure and amenities. For example, political competition may allow local governments to capture a greater share of resource transfers from the center, thus increasing local

spending on such goods (Arulampalam et al., 2009). Or it may incentivize local governments to provide more and higher-quality public goods (Crost and Kambhampati, 2010; Arvate, 2013; Hatfield and Kosec, 2013; Díaz-Cayeros et al., 2014; Martinez-Bravo et al., 2014; Acemoglu et al., 2014; Hatfield, 2015). Acemoglu and Robinson (2006) show that political competition can prevent leaders from blocking technological and institutional innovations. And political competition may also lead to pro-growth policies such as more efficient taxation policies, greater capital spending, and adoption of labor and other market reforms (Besley et al., 2010; Murillo and Martínez-Gallardo, 2007; Rodrik, 1999). Conversely, political competition may reduce public sector spending by reducing opportunities for rent-seeking and corruption (Keefer and Knack, 2007).

Finally, our paper relates to the literature on how political competition impacts security. It can increase interactions among citizens, and between citizens and government, reducing conflict and yielding peaceful, institutionalized mechanisms for grievance resolution (Robertson and Teitelbaum, 2011). Conversely, political competition may lower security—for example, by undermining the power of autocratic leaders or local strongmen integral to stability in an institutionally-fragile setting (Baliga et al., 2011).

Our interest in land is motivated by a literature showing its importance for welfare. Difficulty accessing land can perpetuate poverty and lead to political instability (de Janvry et al., 2001). Efficient land markets, on the other hand, can increase agricultural productivity by allowing for more efficient use of land (Jin and Deininger, 2009; Atwood, 1990; Deininger et al., 2008). Where property rights are secure and land markets function smoothly, individuals may invest more in their land (Feder, 1988; Besley, 1995; Banerjee et al., 2002; Lanjouw and Levy, 2002; Carter and Olinto, 2003; Deininger and Ali, 2008), generating large welfare gains.

2.3 Political competition in Pakistan

Pakistan is governed under a parliamentary system where the president is the head of state and a popularly-elected prime minister is head of government. Since independence in 1947,

Pakistan has switched frequently between democratically elected civilian governments and military-led governments. The latest transition from military to civilian rule occurred in 2008 and brought to power a coalition led by the Pakistan People’s Party (PPP).

Pakistan’s bicameral federal legislature consists of the Senate (the upper house) and the National Assembly (the lower house). Members of the National Assembly are elected through a first-past-the-post system, i.e., the candidate with the most votes wins, under universal adult suffrage. One National Assembly (NA) seat is allocated per NA constituency. In the 2008 elections, there were 272 NA constituencies.

There is also a unicameral legislature in each of Pakistan’s four main provinces (Punjab, Sindh, Khyber-Pakhtunkhwa (KPK), and Balochistan). One provincial assembly (PA) seat is allocated per PA constituency, under a similar first-past-the-post system. There are 577 PA constituencies in Pakistan’s four main provinces; they are proper subsets of NA constituencies. Each political party can field up to one candidate per constituency.

NA and PA members influence the design, location, and budgetary allocation of government projects, policies, and programs (Mirza, 2012). Both NA and PA members receive development funds for authorized public works projects. The allocation process is both competitive and controversial, with huge variation in funding amounts across constituencies.¹

Two recent governance reforms massively increased the importance of PAs. First, in 2009, the National Finance Commission (NFC) of Pakistan directed a greater share of federal resources to the provinces (Shah, 2012). Second, in 2010, the 18th Amendment to the Constitution devolved 17 major federal ministries and many essential development responsibilities to the provinces. These included education, health, transfer of property, tourism, unemployment insurance, industry, agriculture and rural development, planning, welfare, and local development (Shah, 2012; Pakistan Institute of Legislative Development and Transparency, 2010). PA members thus have large responsibilities for the prioritization, financing, and delivery of publicly-provided goods and services. Districts also play an important role, helping to identify development priorities and implement policies and investments.

2.4 Land and land tenure in Pakistan

As Pakistan’s voting base is predominantly rural, land is central to politics (Javid, 2012). Land ownership is among the most important measures of socioeconomic status in Pakistan (Qureshi et al., 2004; Renkow, 1993). Rural land values are closely tied to the anticipated productivity of land. This is in turn tied to the availability and reliability of surface and ground water, the efficiency of institutions governing water use, and access to other public goods and services (Aberman et al., 2013).

There is a weak legal regime governing land transactions in rural Pakistan; this has led to the emergence of a well-developed and highly diverse body of customary laws governing land rights and informal dispute-resolution systems (Jacoby and Mansuri, 2006). Land transactions typically occur through informal sales following customary laws, or through inheritance; formal sales of land ownership rights are less common (Renkow, 1993; Qureshi et al., 2004). Despite land market frictions, there is an active land rental market in Pakistan, characterized by two main rental arrangements: fixed rent and crop-sharing (Jacoby and Mansuri, 2006).

3 Empirical Strategy

We hypothesize that political competition decreases public goods provision and rural welfare. To test this, we estimate the following fixed effects model using ordinary least squares (OLS):

$$Y_{ijk} = \beta_0 + \beta_1 P_j + \beta_2 \mathbf{X}_{ijk} + \alpha_k + \epsilon_{ijk} \quad (1)$$

where an observation is a household (or a plot of land when we consider land value per acre as our outcome) indexed by i , with j indexing its PA constituency, and k indexing its district. α_k denote district fixed effects and Y_{ijk} is one of several outcomes, described in Section 3.2.

P_j is a measure of political competition in PA constituency j during the 2008 PA elections. In our main specification, it is one minus a Herfindahl-Hirschman Index of political

concentration (1 - HHI). The HHI is constructed by summing the squared vote shares (s_c) of all candidates $c \in \{1, \dots, n\}$. Hence:

$$P_j = 1 - \sum_{c=1}^n s_c^2 \quad (2)$$

Since $s_c \in [0, 1] \forall c$, $P_j \in [0, 1]$. A higher value of P_j indicates greater political competition. $P_j = 0$ when one candidate wins all votes. In two PA constituencies with the same number of candidates, the constituency with the closest to an “even” split of votes (e.g. 50% each for 2 candidates) would have the highest P_j .²

We check robustness to two other measures of P_j . First, we consider one minus the vote share of the winning candidate. Second, we consider one minus the vote margin of the winning candidate (i.e. the share received by the winner minus the share received by the first runner up.) All three measures are used, for example, by Afzal (2014). Gottlieb and Kosec (2018) use the HHI and the vote margin of the winning candidate as their primary measures.

\mathbf{X}_{ijk} is a vector of control variables, detailed in Section 3.3. District fixed effects, α_k , control for the institutional, geographic, and social features of districts—a critical administrative level for making public investments (see Section 2.3). We cluster standard errors at the Provincial Assembly constituency level as political competition varies at this level.

3.1 Data

Our primary data source is Round 1.5 of the Pakistan Rural Household Panel Survey (RHPS), carried out during October–November 2012 (IFPRI/IDS, 2012). It includes 942 land-cultivating households in 76 rural villages in Punjab, Sindh, and KPK provinces, selected using a multi-stage stratified random sampling approach. Households come from 19 sample districts which collectively contain 79 NA constituencies and 165 PA constituencies. Of these constituencies, 45 of the NA constituencies and 57 of the PA constituencies appear in our sample (see Appendix Table A1 in the Supplementary material). Appendix Table A2

summarizes key variables at the level of the PA constituency. The average PA constituency contains 1.3 sample villages.

NA and PA election results come from the [Election Commission of Pakistan \(ECP\) \(2008\)](#).³ Figure 1 shows a map of our sample PA constituencies; intensity of blue shade indicates intensity of political competition (PA constituencies not in the sample are not shaded). As Appendix Table A2 shows, the average PA constituency has 7 candidates competing. Figure 2 shows a map of PA constituency boundaries overlaid on NA constituency boundaries; the average NA constituency contains 2.1 PA constituencies (see Appendix Table A1).

We use two datasets in our subsequent analysis. The first is a household-level cross-section comprised of 942 land-cultivating households. The second is a plot-level dataset, used to analyze drivers of land value per acre. We have complete data on 1,391 plots of 1,659 total plots.

3.2 Outcomes

Our first set of outcomes captures three broad classes of public goods. First, we measure perceived access to justice using seven questions answered by the household head during Round 1 of the RHPS (March–April 2012). We combined these into a “justice index” by normalizing each variable and averaging across all seven; doing so allows us to avoid problems associated with multiple hypothesis testing ([Anderson, 2008](#)). These questions asked respondents if they strongly disagree (1), disagree (2), agree (3), or strongly agree (4) with a statement. The statements were: 1) The laws and law enforcement in my community generally prevent crime; 2) If someone commits a crime against me, the police will be able to help me; 3) If someone commits a crime against me, I can get justice through the courts system; 4) In the end, victims of crime usually see justice done; 5) I can get justice through the courts if someone tries to take my land; 6) A land title means that I can get justice through the courts if someone tries to take away my land; and 7) Police harassment is a problem for young men in my community. Some questions were reverse-coded so that high

scores always indicate greater access.

Second, we capture government infrastructure and amenities with nine outcomes. These include dummies for the household having access to electricity, a flush toilet, a piped drainage system, piped water, and piped gas, and dummies for living in a village that has electricity (whether or not the household itself has electricity), a fixed line telephone, a primary road surface other than mud (asphalt, concrete, or gravel), and public transportation to a commercial center. The first two come from Round 1 of the RHPS (March–April 2012) while the latter five come from Round 1.5 (October–November 2012). Once again, to avoid multiple testing, we construct an index which is an average of these nine dummy variables. We loosely refer to such infrastructure and amenities as public goods since they are publicly-provided in this context. However, they are not necessarily non-excludable and non-rival.

Third, we measure perceived access to security using 12 questions answered by the household head during Round 1 of the RHPS (March–April 2012), which we combine into a “security index” by normalizing each variable and averaging across all 12. Heads were asked if they strongly disagree (1), disagree (2), agree (3), or strongly agree (4) with a given statement. These statements are: 1) Locks are necessary to keep one’s house and belongings safe from theft while they are away from home; 2) Harassment is a problem in my community; 3) Drugs are a problem ...; 4) Theft is a problem ...; 5) Assault is a problem ...; 6) Abduction is a problem ...; 7) Murder is a problem ...; 8) I feel safe going outside my house alone; 9) I feel safe going outside my house during the day; 10) I feel safe going outside my house at night; 11) I worry about my spouse’s safety when they are outside the home; and 12) A woman traveling during the day without a male relative is likely to be harmed or threatened. Some questions were reverse-coded so that high scores always indicate greater access to security.

Our second set of outcomes is related to welfare and inequality. We first consider logged expenditures per capita—overall and among those with below-median and above-median land holdings. Our focus on expenditures rather than income is motivated by the difficulty of

measuring income in rural parts of developing countries. Next, we consider logged household land wealth and non-land wealth separately; land wealth constitutes around 77% of total wealth on average in our sample (see Table 1). In addition to expenditures and wealth, we also consider six measures of inequality: whether the household has above-mean expenditures per capita, land wealth, and non-land wealth, and the value of the Gini coefficient of the household’s village when considering the distribution of each of the three.

Our final outcomes relate to land and land markets. First, we examine whether or not the household owns land. Second, we examine the logged land value per acre. For each plot, the head of the household cultivating it was asked, “How much would this plot sell for per acre if it were sold today?” Existing literature suggests that household perceptions of land values are close to market valuation (e.g., [Roka and Palmquist \(1997\)](#)). Further, perceptions drive investments and decision-making. Third, for the 742 households that own at least one plot, we code a dummy variable for them renting out some portion of their land as well as a continuous variable for the share rented out.

3.3 Controls

We consider four types of controls: geographic location controls (district fixed effects, a quadratic polynomial in longitude and latitude,⁴ household elevation in meters, and logged distance to a city of 100,000+ population), demographic and socioeconomic controls (dummies for household size, ethnicity of the head, and education level of the head,⁵ in addition to controls for logged total wealth and logged expenditures per capita in specifications for which these are not the outcome variables), land use controls (dummies for major crops grown: wheat/rice, wheat/maize, wheat/sorghum, wheat/cotton, wheat/sugarcane, or other), and land controls. In household-level regressions, land controls include a quadratic in land owned (acres) and a dummy for operating land on the watercourse. In plot-level regressions, they include a quadratic in plot area (acres), average rainfall during each growing season (*rabi* and *kharif*) during 1981-2012,⁶ and dummies for soil type, soil fertil-

ity level, soil erosion level, plot slope, plot location on the watercourse/ canal (not on the watercourse, head, middle, or tail), having a tubewell/ pump, experiencing waterlogging, experiencing salinity, and location inside the village. All data come from our 2012, Round 1.5 household survey except for rainfall data, which are satellite data from the [U.S. National Aeronautics and Space Administration \(NASA\) \(2013\)](#).⁷ All specifications include geographic location controls and we show specifications without and with the full control set. Variables in the household- (plot-) level dataset are summarized in Table 1 (2).

3.4 Predicted Competition

To test whether our use of control variables allows us to interpret our OLS estimates as causal, we examine if results also hold when using a more plausibly exogenous measure of political competition: a variable we construct and call “predicted” political competition. The idea behind the measure is as follows. Each party competing in a PA constituency will be helped or harmed by how popular the party is on a national scale (or by how popular independent candidates are, for independents). As Appendix Table A3 shows, there are a number of large parties in Pakistan, and their popularity varies substantially across provinces.

Our predicted competition measure, N_j , is also one minus an HHI constructed from the sum of squared vote shares of parties competing in the PA constituency. However, we compute these vote shares differently. Instead of looking at the number of votes actually won by each competing party in the PA constituency, we look at the number of votes won by that party across *all* NA constituencies in the country *other than* the NA constituency in which PA constituency j is located. This captures the party’s national popularity, but it is importantly not influenced by its local popularity. Given these vote totals, we compute the share of votes that it implies each party winning. The measure is then one minus the sum of these squared vote shares, s_r , of all parties $r \in \{1, \dots, n\}$ competing in the PA constituency:

$$N_j = 1 - \sum_{r=1}^n s_r^2 \quad (3)$$

The measure is similar to the instrument used by [Svaleryd and Vlachos \(2009\)](#), though we cannot exploit temporal variation in the popularity of political parties. We use N_j in two ways. First, we use it in place of P_j in eq. 1. Second, we use it to instrument for P_j in eq. 1.

The validity of this instrument rests on the main identifying assumption: that the national popularity of parties in Pakistan and the identities of the particular parties running in a given PA constituency only affect public goods and other welfare outcomes through their effects on political competition. We argue that this will hold; not only is a single PA constituency small and unlikely to affect nation-wide popularity of a party, but also we only consider constituencies other than the one in question when computing national popularity. Further, while there may be many reasons that parties do or do not run in a given PA constituency, we argue that these factors should largely be absorbed by district fixed effects and our full control set.

Table 3 presents first-stage estimates with household-level (Panel A) and plot-level (Panel B) data, both without (column 1) and with (column 2) our full control set. Political competition is always positively correlated with predicted political competition. In column 2 of Panel A, the F-statistic on predicted political competition is between the Stock-Yogo critical value for 15% size (8.96) and 20% size (6.66). In column 2 of Panel B, the F-statistics is between the Stock-Yogo critical value for 10% size (16.38) and 15% size (8.96). These F-statistics leave some concerns with weak instruments and lead us to prefer our OLS estimates. However, to the extent that IV results support the narrative of our OLS results, we take this as evidence that our control set has helped us identify causal effects of political competition.

4 Results

4.1 Public goods

We first consider how increasing political competition affects measures of three broad areas of public goods provision: our indices of perceived access to justice, infrastructure and amenities, and perceived access to security. Table 4 presents, in Panels A, B, and C, respectively, OLS results which use our primary measure of political competition (1 - HHI), OLS results which instead use predicted political competition (1 - predicted HHI), and IV second stage results which instrument for actual with predicted political competition (again using our HHI-based measures). For our three public goods outcomes, columns 1, 3, and 5 present results with only geographic location controls while columns 2, 4, and 6 present results with our full set of controls. Comparing across odd- and even-number specifications, the coefficient on political competition varies little with the inclusion of controls. In all six specifications, greater political competition is associated with greater access to infrastructure and amenities (statistically significant at the 1% or 5% level). And in none of the six specifications is political competition a statistically significant predictor of perceived security. We find more mixed results for our justice index; in the specification of Panel B, which directly uses predicted political competition in the regression, greater political competition predicts greater access to justice regardless of the control set used. However, these results are not robust to using either the Panel A or Panel C specifications once controls are included.

In our preferred OLS specification (Panel A) with the full set of controls, a standard deviation (0.11 unit) increase in political competition is associated with a 0.05 unit, or 0.25 standard deviation increase in the infrastructure and amenities index (significant at the 5% level).⁸ When we consider as outcomes each of the individual components of our three indices in Appendix Table A4, we see that improvements in infrastructure and amenities are especially driven by increased access to electricity, fixed line telephones, and improved (non-mud) roads. Overall, if our estimates were due to omitted variables or reverse causality,

we would not expect them to stand up to use of our more plausibly exogenous, “predicted” measure of political competition in Panels B and C. The fact that those results yield similar outcomes supports the OLS findings.

Our preferred estimates come from OLS regressions which include geographic location controls, demographic and socioeconomic controls, land use controls, and land controls. If our estimates were severely affected by omitted variable bias, we would not be able to interpret them as causal. To examine this possibility, and thus see whether our full control set allows us to treat political competition as exogenous, we carry out sensitivity analysis following [Imbens \(2003\)](#) and [Harada \(2012\)](#). Specifically, we relax the exogeneity assumption to allow for correlation between political competition and unobserved covariates correlated with both political competition and our outcome variables—in this case, the infrastructure index. We allow a vertical axis to show the marginal increase in the R-squared from adding an unobserved covariate to a regression of the infrastructure index on our full set of controls. We let a horizontal axis show the the marginal increase in the R-squared from adding the covariate to a regression of political competition on our full set of controls. Generating pseudo-unobservables via 200 iterations, in [Figure 3](#) we plot a series of points that trace out a curve representing the combination of R-squared values that would result in a halving of our effect size, hence significantly altering our findings. [Blattman and Annan \(2010\)](#) perform a similar test. The figure makes clear that modest correlation between political competition and an omitted variable would only be problematic in the case of very high correlation between our infrastructure index and an omitted variable, and vice versa.

To better understand how much correlation between some hypothetical omitted covariate and our key dependent and explanatory variables to expect, we also plot, for each of our four vectors of controls, its correlation with political competition and with our infrastructure index. We see that none of these vectors comes close to the threshold for reducing our estimated coefficient on political competition by half. Hence, any omitted variable would need to be a lot more influential than our existing vectors of controls in explaining political

competition and the infrastructure index to invalidate our findings. This suggests that our control sets allow us to treat political competition as exogenous.

Our null findings on perceived access to justice and security might reflect greater noise in these perception-based variables—a problem that does not confront our more objective infrastructure and amenities index. Nonetheless, these findings suggest that increases in political competition predict more investment in at least some public goods—possibly those which politicians perceive to be most highly visible and thus likely to bring electoral gains.

4.2 Expenditure and wealth

If political competition spurs investments in public goods, we would expect to see accompanying improvements in rural welfare. We examine this in Table 5, which presents OLS estimates where outcomes are logged expenditures per capita (overall, for those with below-median land holdings, and for those with above-median land holdings) (Panel A), wealth (both land and non-land) (Panel B), and inequality (Panels C and D). All specifications include our full set of controls.

We find that a standard deviation (0.11 unit) increase in political competition predicts an approximate 8% increase in expenditures per capita—a finding that is statistically significant at the 1% level. We estimate an even larger 10% increase for those with below-median land holdings, and a smaller 7% increase for those with above-median holdings. This suggests that expenditures of the land-poor benefit most from political competition, though we cannot reject that the two estimates are equal (p-value = 0.488).

While political competition does not appear to influence non-land wealth, we find some evidence that it is associated with greater land wealth: a one standard deviation (0.11 unit) increase in political competition predicts an approximate 22% increase in total land wealth (p-value = 0.102). Thus, increases in political competition appear to help households accumulate more land wealth—either by increasing their land holdings, or by increasing the value of the land they already hold. We consider which of these two mechanisms explains

these findings in Section 4.3.

The poor often do not share in the gains from rising average affluence (Ravallion, 2001). We can gain further insight into the welfare implications of political competition by explicitly considering village-level measures of inequality as outcome variables. Overall, there are few significant findings: households are no more likely to have above-mean expenditures per capita, land wealth, or non-land wealth following an increase in political competition. When we instead consider the village-level Gini coefficient based on expenditures per capita, land wealth, and non-land wealth, we similarly obtain null results except in one case: a one standard deviation (0.11 unit) increase in political competition predicts a 0.096 unit, or a 0.52 standard deviation reduction in land wealth inequality as measured by the Gini coefficient.

Appendix Figure A1 shows that, just as for our public goods outcomes, analysis following Imbens (2003) suggests that omitted variables are unlikely to eliminate (or materially reduce) the estimated effects of political competition on per capita expenditure, wealth, or inequality. By comparing the impact of a hypothetical omitted covariate with the actual impact of our four vectors of control variables (geographic, demographic and socioeconomic, land use, and land), we again find that these vectors rarely come close to the threshold for reducing our estimate coefficient on political competition by half. This again suggests that our controls allow us to treat political competition as exogenous.

In Appendix Table A5, columns 1 - 5, we present regression results with our expenditure, wealth, and inequality outcomes that use predicted political competition in place of political competition (Panel A) and that use IV estimation (Panel B). Across both panels, we see that the magnitudes and signs of the coefficients on political competition in the regressions for expenditures per capita and wealth are similar to those from Table 5, but standard errors are larger and they are accordingly no longer statistically significant at conventional levels. However, the finding that an increase in political competition predicts lower inequality is even stronger, and now holds for both land- and non-land wealth in both panels. We take

this as evidence that is broadly supportive of our interpretations based on the OLS results.

Our findings on land wealth inequality are especially important for Pakistan. For decades, entrenched socio-political power structures have effectively partitioned the landed elite from the dispossessed (Cheema and Mohmand, 2006). This inequality has persisted in many parts of the country, both in terms of the prevalence of landlessness and the concentration of landholdings (Kalshian, 2011; Anwar et al., 2004). That increasing political competition predicts less inequality of land wealth suggests a potentially important mechanism to help the poor share in the gains from development.

4.3 Land and land rental markets

Findings that an increase in political competition predicts higher land wealth and lower land wealth inequality prompt us to consider what happens to land and land rental markets in Table 6, which presents OLS results. We first consider a plot-level outcome: land value per acre. Whether we include only basic geographic location controls (column 1) or our full control set (column 2), we find that an increase in political competition predicts significantly higher land values. From column 2, a one standard deviation (0.11 unit) increase in political competition predicts an approximate 15% increase in land values (significant at the 1% level). Appendix Figure A1 further shows that, for the land value outcome, omitted variables are unlikely to materially reduce the estimated effects of political competition. However, political competition is not a statistically significant predictor of land ownership (columns 3 and 4).

In Appendix Table A5, we obtain similarly positive and significant impacts on land values when we use predicted rather than actual political competition (Panel A) and when we use IV estimates (Panel B). The IV results, unlike the OLS, further show that political competition predicts less land ownership (column 7). These findings are consistent with greater political competition making existing land more valuable rather than providing a household with additional land. The added value could be due to realized improvements in infrastructure and amenities, but could alternately be due to greater provision of private goods such as

fertilizer and other inputs; we explore mechanisms in Section 4.4.

We next consider whether greater political competition predicts greater use of land rental arrangements. We analyze the subset of households that owns land and consider two measures: i) a dummy for the household renting out land (columns 5–6 of Table 6) and ii) the share of owned land that is rented out (columns 7–8). For both measures, we find that an increase in political competition is associated with significantly greater land rental. A standard deviation increase in political competition (0.11 units) predicts a 7 percentage point increase in the probability of renting out land—a more than doubling of the mean rate of rental (about 6% of landowners do so, on average). Further, greater political competition is also associated with a greater share of total owned land being rented. A standard deviation increase in political competition is associated with an additional 3 percentage points of the average landowner’s land being rented out (column (4)). Once again, this is an approximate doubling in the share of land rented out, relative to a mean of 3% of land. Appendix Figure A1 once again shows, for these two land rental outcomes, that omitted variables are unlikely to afflict the results. And, as Appendix Table A5 shows, similarly significant impacts on land rental hold when using predicted political competition in place of political competition, and when using our IV strategy (columns 8–9); this corroborates our OLS results. These findings are important; they suggest that increases in political competition may improve rural livelihoods in part by improving the functionality of land markets.

4.4 Mechanisms

A natural question is: how much of the impact of an increase in political competition is mediated by its impacts on infrastructure and amenities? Any additional impacts would then be due to impacts on private goods (e.g., provision of fertilizer, inputs, or other forms of transfers to households) or another mechanism. We explore this in Table 7, where we control for the infrastructure and amenities index in each of seven regressions of key welfare outcomes on political competition. For those outcomes for which we found statistically

significant results in Tables 4, 5, and 6, we observe reductions in the magnitude of the coefficient on political competition upon controlling for our infrastructure and amenities index. For expenditures per capita, the reduction is by about 21%, for land wealth it is 42%, and for non-land wealth it is 91%. Similar results hold for land value and rental outcomes; upon controlling for infrastructure and amenities, the coefficient on political competition in the land value per acre regression drops by 11%, the coefficient on land rental drops by 8%, and the coefficient on the share of land rented drops by 7%. This provides suggestive evidence that improvements in rural welfare due to increases in political competition are partly mediated by provision of infrastructure and amenities, especially for the case of wealth. However, it also suggests that increases in political competition improve welfare through other channels.

4.5 Robustness: Alternate Measures of Political Competition

While the HHI is a standard measure of concentration used in economics and political science, it obviously cannot perfectly capture everything meant by “political competition.” For example, if small parties have little impact on an election, one may prefer a measure that only takes the winning party and runner up into account. We thus examine whether our results are robust to two other popular measures of political competition: the vote share of the winner and the vote margin of the winner (we take one minus each measure).

These results appear in Appendix Table A6, and generally support our main results. For both alternate measures, greater political competition is associated with a higher infrastructure and amenities index but no changes in the justice or security indices. Both measures are also positively correlated with logged per capita expenditure—though this finding is only statistically significant at conventional levels for the vote share of the winner measure of competition. Notably, while political competition was a borderline significant predictor of land wealth when using our HHI measure (p-value=0.102), it is significant at the 5% level for both of these alternate measures of competition. For both measures, we also find that

greater political competition is associated with lower land wealth inequality, higher land values, and more land rental. Overall, this suggests that our results are not sensitive to the measure of political competition employed.

5 Conclusions

In this paper, we combine data from Pakistan’s 2008 elections with data from a 2012 household survey to show that higher political competition in Provincial Assembly (PA) constituencies is associated with greater access to infrastructure and amenities, but no significant change in perceived access to justice or security. Nonetheless, overall welfare effects appear to be positive—most notably for expenditures per capita and land wealth. Further, public goods do not appear to be the only mechanism mediating improvements in welfare; there may be an important role for private goods as well.

These findings are important given the relatively sparse empirical knowledge base on how political competition affects outcomes in rural, developing country settings. Using the case of Pakistan—a large, lower-middle income country with substantial variation in the level of political competitiveness in its Provincial Assembly constituencies—we are able to contribute to such a knowledge base. Our findings of a large, positive impact of greater political competition on visible public goods like infrastructure—but less impact on less visible public goods like justice and security—provides insights into the incentives political competition creates in such a setting. Our finding of overall positive impacts on measures of welfare including expenditures and wealth suggests that competitive pressures can be net beneficial, even in a young democracy and in settings of limited mobility.

A large area for future research concerns how precisely political competition influences policymakers’ decision-making. For example, do its impacts operate predominately through the electoral incentives of office-motivated politicians, or do they additionally influence the policymaking process between elections by, for example, influencing the ease of legislative

bargaining? Additional work should also explore which private goods are influenced by the level of political competition, and how policymakers make tradeoffs across public versus private goods in different contexts.

Future work should also consider the impacts of using alternate and potentially better measures of public goods and welfare. For example, despite our generally null findings when using perceptions-based measures of justice and security, might political competition influence more objective measures such as the presence of laws that make property rights more secure, concrete metrics on the ease of doing business, or data on the actual incidence of crimes or threats of violence? Comparison of such results to our own would additionally contribute to literature on how best to measure government performance.

Supplementary material

Supplementary material is available on the OUP website. This comprises the data, the replication files, and an online appendix.

Funding

This work was supported by the the CGIAR Research Program on Policies, Institutions, and Markets led by the International Food Policy Research Institute (IFPRI) and the U.S. Agency for International Development [Cooperative Agreement # AID-391-IO-11-00002].

Acknowledgments

We are grateful to Nuzhat Ahmad, Paul Dorosh, Guy Grossman, Jordan Kyle, Sohail J. Malik, Margaret McMillan, Tewodaj Mogues, Valerie Mueller, Danielle Resnick, and numerous seminar participants for comments and helpful discussions. We are also grateful to Madeeha Hameed, Brian Holtemeyer, and Huma Khan for excellent research assistance. All remaining

errors are the sole responsibility of the authors.

References

- Aberman, N., B. Wielgosz, F. Zaidi, C. Ringler, A. Akram, A. Bell, and M. Issermann (2013). The policy landscape of agricultural water management. IFPRI discussion paper 1265. International Food Policy Research Institute: Washington, DC.
- Acemoglu, D., T. Reed, and J. A. Robinson (2014). Chiefs: Economic development and elite control of civil society in Sierra Leone. *Journal of Political Economy* 122, 319–368.
- Acemoglu, D. and J. A. Robinson (2006). Economic backwardness in political perspective. *American Political Science Review* 100, 115–131.
- Afzal, M. (2014). Do barriers to candidacy reduce political competition? evidence from a bachelor’s degree requirement for legislators in Pakistan. *Public Choice* 161, 51–72.
- Anderson, M. L. (2008). Multiple inference and gender differences in the effects of early intervention: A reevaluation of the abecedarian, perry preschool, and early training projects. *Journal of the American Statistical Association* 103, 1481–1495.
- Anwar, T., S. K. Qureshi, H. Ali, and M. Ahmad (2004). Landlessness and rural poverty in Pakistan. *The Pakistan Development Review*, 855–874.
- Arif, S., W. Cartier, A. Golda, and R. Nayyar-Stone (2010). The local government system in Pakistan: Citizens perceptions and preferences. The Urban Institute IDG Working Paper: Washington, DC.
- Arulampalam, W., S. Dasgupta, A. Dhillon, and B. Dutta (2009). Electoral goals and center-state transfers: A theoretical model and empirical evidence from India. *Journal of Development Economics* 88, 103–119.
- Arvate, P. R. (2013). Electoral competition and local government responsiveness in Brazil. *World Development* 43, 67–83.
- Atwood, D. A. (1990). Land registration in Africa: the impact on agricultural production. *World Development* 18, 659–671.
- Baliga, S., D. O. Lucca, and T. Sjöström (2011). Domestic political survival and international conflict: is democracy good for peace? *The Review of Economic Studies*, rdq027.
- Banerjee, A. V., P. J. Gertler, and M. Ghatak (2002). Empowerment and efficiency: tenancy reform in West Bengal. *Journal of Political Economy* 110, 239–280.
- Bardhan, P. K. (1984). *Land, labor, and rural poverty: Essays in development economics*. Columbia University Press: New York, New York.
- Besley, T. (1995). Property rights and investment incentives: Theory and evidence from Ghana. *Journal of Political Economy*, 903–937.
- Besley, T. (2006). *Principled agents?: The political economy of good government*. Oxford University Press: Oxford.

- Besley, T. and M. Kudamatsu (2006). Health and democracy. *Political Economy* 96, 313–318.
- Besley, T., T. Persson, and D. M. Sturm (2010). Political competition, policy and growth: theory and evidence from the U.S. *The Review of Economic Studies* 77, 1329–1352.
- Blattman, C. and J. Annan (2010). The consequences of child soldiering. *The Review of Economics and Statistics* 92, 882–898.
- Boix, C. (2001). Democracy, development, and the public sector. *American Journal of Political Science* 45, 1–17.
- Brueckner, J. K. (2006). Fiscal federalism and economic growth. *Journal of Public Economics* 90, 2107–2120.
- Burgess, R., R. Jedwab, E. Miguel, A. Morjaria, et al. (2015). The value of democracy: evidence from road building in Kenya. *The American Economic Review* 105, 1817–1851.
- Callander, S. (2008). Political motivations. *The Review of Economic Studies* 75, 671–697.
- Carter, M. R. and P. Olinto (2003). Getting institutions right for whom? credit constraints and the impact of property rights on the quantity and composition of investment. *American Journal of Agricultural Economics* 85, 173–186.
- Chandra, K. (2004). *Why ethnic parties succeed: Patronage and ethnic head counts in India*. Cambridge University Press: Cambridge.
- Cheema, A. and S. Mohmand (2006). Bringing electoral politics to the doorstep: Who gains who loses? *Paper presented at the Decentralization Task Force Meeting of the Initiative for Policy Dialogue (IPD) on February 25*.
- Crost, B. and U. S. Kambhampati (2010). Political market characteristics and the provision of educational infrastructure in north India. *World Development* 38, 195–204.
- De Brauw, A., V. Mueller, and H. L. Lee (2014). The role of rural–urban migration in the structural transformation of Sub-Saharan Africa. *World Development* 63, 33–42.
- De Janvry, A., F. Finan, and E. Sadoulet (2012). Local electoral incentives and decentralized program performance. *Review of Economics and Statistics* 94, 672–685.
- de Janvry, A., G. Gordillo, J.-P. Platteau, E. Sadoulet, et al. (2001). *Access to land, rural poverty, and public action*. Oxford University Press: Oxford.
- Deininger, K. and D. A. Ali (2008). Do overlapping land rights reduce agricultural investment? evidence from Uganda. *American Journal of Agricultural Economics* 90, 869–882.
- Deininger, K., S. Jin, and H. K. Nagarajan (2008). Efficiency and equity impacts of rural land rental restrictions: Evidence from India. *European Economic Review* 52, 892–918.
- Díaz-Cayeros, A., B. Magaloni, and A. Ruiz-Euler (2014). Traditional governance, citizen engagement, and local public goods: evidence from Mexico. *World Development* 53, 80–93.

- Election Commission of Pakistan (ECP) (2008). Final polling scheme (general elections 2008). <http://ecp.gov.pk/PollingScheme.aspx>.
- Fearon, J. (1999). Electoral accountability and the control of politicians: Selecting good types versus sanctioning poor performance. In A. Przeworski, S. C. Stokes, and B. Manin (Eds.), *Democracy, accountability, and representation*, pp. 55–97. Cambridge: Cambridge University Press: Cambridge.
- Feder, G. (1988). *Land policies and farm productivity in Thailand*. Johns Hopkins University Press: Baltimore, Maryland.
- Gordon, S. C. and G. Huber (2007). The effect of electoral competitiveness on incumbent behavior. *Quarterly Journal of Political Science* 2, 107–138.
- Gottlieb, J. (2016). Explaining variation in broker strategies: A lab-in-the-field experiment in senegal. *Berkeley Center on the Politics of Development Working Paper 2015-06*.
- Gottlieb, J. and K. Kosec (2018). The countervailing effects of competition on public goods provision: When bargaining failures lead to bad outcomes. IFPRI Discussion Paper: Washington, DC.
- Hanssen, F. A. (2004). Is there a politically optimal level of judicial independence? *The American Economic Review* 94, 712–729.
- Harada, M. (2012). Generalized sensitivity analysis. *Unpublished manuscript*.
- Hatfield, J. W. (2015). Federalism, taxation, and economic growth. *Journal of Urban Economics* 87, 114–125.
- Hatfield, J. W. and K. Kosec (2013). Federal competition and economic growth. *Journal of Public Economics* 97, 144–159.
- Hatfield, J. W. and G. Padró i Miquel (2012). A political economy theory of partial decentralization. *Journal of the European Economic Association* 10, 605–633.
- IFPRI/IDS (2012). Pakistan Rural Household Panel Survey 2012 Round 1.5 [Dataset]. Washington, D.C.: IFPRI; Islamabad: IDS.
- Imbens, G. W. (2003). Sensitivity to exogeneity assumptions in program evaluation. *American Economic Review* 93, 126–132.
- Jacoby, H. and G. Mansuri (2006). Incomplete contracts and investment: a study of land tenancy in pakistan. World Bank Policy Research Working Paper 3826, World Bank: Washington, DC.
- Jatileksono, T. (1989). Impact of modern rice technology on land prices across production environments in lampung, indonesia. *Paper presented at the Third Workshop on Differential Impacts of Modern Rice Technology on Favorable and Unfavorable Production Environments, Dhaka*.

- Javid, H. (2012). *Class, power, and patronage: the landed elite and politics in Pakistani Punjab*. Ph. D. thesis, The London School of Economics and Political Science (LSE): London.
- Jin, S. and K. Deininger (2009). Land rental markets in the process of rural structural transformation: Productivity and equity impacts from China. *Journal of Comparative Economics* 37, 629–646.
- Kalshian, R. (Ed.) (2011). *Leveling the Playing Field: A Survey of Pakistan’s Land Reforms*. Panos South Asia.
- Keefer, P. (2007). Clientelism, credibility, and the policy choices of young democracies. *American Journal of Political Science* 51, 804–821.
- Keefer, P. and S. Knack (2007). Boondoggles, rent-seeking, and political checks and balances: public investment under unaccountable governments. *The Review of Economics and Statistics* 89, 566–572.
- Kitschelt, H. and S. I. Wilkinson (2007). *Patrons, clients and policies: Patterns of democratic accountability and political competition*. Cambridge University Press: Cambridge.
- Kopecký, P. (2011). Political competition and party patronage: Public appointments in ghana and south africa. *Political Studies* 59, 713–732.
- Lanjouw, J. O. and P. I. Levy (2002). Untitled: A study of formal and informal property rights in urban Ecuador*. *The Economic Journal* 112, 986–1019.
- Levitsky, S. R. (2007). From populism to clientelism? the transformation of labor-based party linkages in Latin America. In H. Kitschelt and S. I. Wilkinson (Eds.), *Patrons, clients and policies: Patterns of democratic accountability and political competition*, pp. 110–140. Cambridge University Press: Cambridge.
- Malik, S., H. Nazli, E. Whitney, A. Shahzad, and A. Mehmood (2016). Food, agriculture and rural development in pakistan. In D. Spielman, S. Malik, P. Dorosh, and N. Ahmed (Eds.), *Agriculture and the rural economy in Pakistan: Issues, outlooks, and policy priorities*. University of Pennsylvania Press: Philadelphia, Pennsylvania.
- Mani, A. and S. Mukand (2007). Democracy, visibility and public good provision. *Journal of Development Economics* 83, 506–529.
- Martinez-Bravo, M., G. Padró i Miquel, N. Qian, and Y. Yao (2014). Political reform in china: Elections, public goods and income distribution. *Nancy and Yao, Yang, Political Reform in China: Elections, Public Goods and Income Distribution (July 14, 2014)*.
- Mccourt, W. (2012). Can top-down and bottom-up be reconciled? electoral competition and service delivery in Malaysia. *World Development* 40, 2329–2341.

- Mirza, N. (2012). Role of women parliamentarians and need for internal party quotas. *Aurat Foundation Report on the Performance of Women Parliamentarians 2007-2012*. http://www.sdpi.org/sdc/12thsdcr/role_of_women_parliamentarians.html#1 , accessed September 15, 2013.
- Murillo, M. V. and C. Martínez-Gallardo (2007). Political competition and policy adoption: market reforms in latin american public utilities. *American Journal of Political Science* 51, 120–139.
- Pakistan Institute of Legislative Development and Transparency (2010). Impact of 18th constitutional amendment on federation-provinces relations. Brief No. 39, PILDAT: Islamabad.
- Qureshi, M. G., S. K. Qureshi, and A. Salam (2004). Impact of changing profile of rural land market in pakistan on resource allocation and equity. *The Pakistan Development Review*, 471–492.
- Ravallion, M. (2001). Growth, inequality and poverty: looking beyond averages. *World Development* 29, 1803–1815.
- Renkow, M. (1993). Land prices, land rents, and technological change: evidence from Pakistan. *World Development* 21, 791–803.
- Robertson, G. B. and E. Teitelbaum (2011). Foreign direct investment, regime type, and labor protest in developing countries. *American Journal of Political Science* 55, 665–677.
- Rodrik, D. (1999). Democracies pay higher wages. *Quarterly Journal of Economics* 114, 707–738.
- Rojo, G., S. Jha, and E. Wibbels (2015). Political networks, clientelism and public goods: Evidence from slums in Udaipur, India. *Unpublished paper*.
- Roka, F. M. and R. B. Palmquist (1997). Examining the use of national databases in a hedonic analysis of regional farmland values. *American Journal of Agricultural Economics* 79, 1651–1656.
- Ross, M. (2006). Is democracy good for the poor? *American Journal of Political Science* 50, 860–874.
- Shah, A. (2012). The 18th constitutional amendment: Glue or solvent for nation building and citizenship in Pakistan? *Lahore Journal of Economics* 17, 387–424.
- Solé-Ollé, A. and E. Viladecans-Marsal (2012). Lobbying, political competition, and local land supply: recent evidence from Spain. *Journal of Public Economics* 96, 10–19.
- Stansel, D. (2005). Local decentralization and local economic growth: A cross-sectional examination of us metropolitan areas. *Journal of Urban Economics* 57, 55–72.
- Stasavage, D. (2005a). Democracy and education spending in africa. *American Journal of Political Science* 49, 343–358.

- Stasavage, D. (2005b). Democracy and education spending in africa. *American Journal of Political Science* 49, 343–358.
- Strömberg, D. (2004). Mass media competition, political competition, and public policy. *The Review of Economic Studies* 71, 265–284.
- Svaleryd, H. and J. Vlachos (2009). Political rents in a non-corrupt democracy. *Journal of Public Economics* 93, 355–372.
- Tiebout, C. M. (1956). A pure theory of local expenditures. *Journal of Political Economy* 64, 416–424.
- U.S. National Aeronautics and Space Administration (NASA) (2013). Power (prediction of world-wide energy resource) database. <http://power.larc.nasa.gov/cgi-bin/cgiwrap/solar/agro.cgi?email=agroclim@larc.nasa.gov>. (Accessed December 2, 2013).
- Weingast, B. R. (1995). The economic role of political institutions: market-preserving federalism and economic development. *Journal of Law, Economics, and Organization* 11, 1–31.
- Weitz-Shapiro, R. (2012). What wins votes: Why some politicians opt out of clientelism. *American Journal of Political Science* 56, 568–583.
- Wilkinson, S. I. (2007). Explaining changing patterns of party-voter linkages in india. In H. Kitschelt and S. I. Wilkinson (Eds.), *Patrons, clients and policies: Patterns of democratic accountability and political competition*, pp. 110–140. Cambridge University Press: Cambridge.
- World Bank (2016). World Development Indicators. Washington, D.C.: World Bank.

Table 1: Summary Statistics: Household-level Dataset

Variable	N	Mean	S.D.
<i>Outcomes</i>			
Justice index	734	0.02	0.59
Infrastructure and amenities index	934	0.45	0.21
Security index	766	0.00	0.51
Household owns land	937	0.72	0.45
Household rents out land	742	0.06	0.23
Share of owned land rented	742	0.03	0.12
Monthly expenditures per capita (Rs.)	937	3,196	2,450
Expenditures per capita above mean	937	0.42	0.49
Land wealth (Rs.)	937	2,004,207	3,999,874
Non-land wealth (Rs.)	937	613,031	1,040,905
Land wealth above mean	937	0.66	0.47
Gini coefficient based on land wealth	937	0.60	0.19
Non-land wealth above mean	937	0.52	0.50
Gini coefficient based on non-land wealth	937	0.38	0.11
<i>Measures of political competition</i>			
Political competition index (1 - HHI)	937	0.58	0.11
1 - (Vote share of winner)	937	0.48	0.12
1 - (Vote margin of winner)	937	0.81	0.14
Predicted political competition index (1 - predicted HHI)	937	0.66	0.10
<i>Geographic location controls</i>			
Latitude	937	29.66	2.84
Longitude	937	70.94	2.01
Latitude x longitude	937	2,108.77	249.24
Latitude squared	937	887.94	166.66
Longitude squared	937	5,036.10	283.13
Household elevation (meters)	937	0.13	0.09
Log distance to city of 100,000 + pop	937	9.99	0.66
<i>Demographic and socioeconomic controls</i>			
Household head uneducated	937	0.49	0.50
Household head has up to primary education	937	0.20	0.40
Household head has education above primary	937	0.31	0.46
Household size	937	6.95	3.43
Logged total wealth (10,000 Rs.)	937	4.47	1.68
Logged expenditures per capita	937	-1.28	0.44
<i>Land controls</i>			
Land owned (acres)	937	3.43	6.24
Land owned (acres) squared	937	50.61	298.90
Household operates land on the watercourse	937	0.65	0.48
<i>Land use controls</i>			
Crops = wheat/ rice	937	0.15	0.35
Crops = wheat/ maize	937	0.08	0.27
Crops = wheat/ sorghum	937	0.05	0.22
Crops = wheat/ cotton	937	0.27	0.44
Crops = wheat/ sugarcane	937	0.05	0.21
Crops = other	937	0.41	0.49

Sources: ECP (2008), IFPRI/IDS (2012) and NASA-POWER (2012).

Table 2: Summary Statistics: Plot-level Dataset

Variable	N	Mean	S.D.
<i>Outcome</i>			
Log land value per acre	1391	13.13	0.90
<i>Measures of political competition</i>			
Political competition index (1 - HHI)	1391	0.59	0.11
1 - (Vote share of winner)	1391	0.49	0.12
1 - (Vote margin of winner)	1391	0.82	0.13
Predicted political competition index (1 - predicted HHI)	1391	0.66	0.10
<i>Geographic location controls</i>			
Latitude	1391	30.13	2.78
Longitude	1391	71.17	1.89
Latitude x longitude	1391	2,148.63	241.16
Latitude squared	1391	915.65	164.74
Longitude squared	1391	5,069.21	267.61
Household elevation (meters)	1391	0.14	0.09
Log distance to city of 100,000 + pop	1391	9.99	0.66
<i>Demographic and socioeconomic controls</i>			
Household head uneducated	1391	0.46	0.50
Household head has up to primary education	1391	0.20	0.40
Household head has education above primary	1391	0.34	0.47
Household size	1391	7.20	3.53
Logged total wealth (10,000 Rs.)	1391	4.74	1.63
Logged expenditures per capita	1391	-1.25	0.43
<i>Land controls</i>			
Plot area (acres)	1391	3.84	4.78
Plot area (acres) squared	1391	37.59	181.49
Soil type = sandy	1391	0.10	0.30
Soil type = sandy loam	1391	0.30	0.46
Soil type = loam	1391	0.27	0.44
Soil type = clay loam	1391	0.32	0.47
Soil type = clay	1391	0.01	0.12
Soil fertility level = very fertile	1391	0.15	0.36
Soil fertility level = moderate	1391	0.77	0.42
Soil fertility level = poor	1391	0.05	0.23
Soil fertility level = very poor/ not productive	1391	0.02	0.13
Soil erosion level = no erosion	1391	0.83	0.38
Soil erosion level = mild erosion	1391	0.15	0.36
Soil erosion level = severe erosion	1391	0.02	0.15
Slope = flat	1391	0.70	0.46
Slope = slight slope	1391	0.19	0.39
Slope = moderate slope	1391	0.08	0.28
Slope = steep slope	1391	0.03	0.17

Table continued on next page...

Variable	N	Mean	S.D.
Tubewell / pump on plot	1391	0.25	0.43
Plot experiences waterlogging	1391	0.16	0.37
Plot experiences salinity	1391	0.13	0.34
Dummy - plot located in village	1391	0.73	0.45
Not on watercourse	1391	0.43	0.50
Watercourse location = head	1391	0.10	0.29
Watercourse location = middle	1391	0.27	0.44
Watercourse location = tail	1391	0.20	0.40
Average annual <i>kharif</i> season rainfall (cm), 1981-2012	1391	58.61	40.47
Average annual <i>rabi</i> season rainfall (cm), 1981-2012	1391	56.27	91.98
<i>Land use controls</i>			
Crops = wheat/ rice	1391	0.16	0.37
Crops = wheat/ maize	1391	0.10	0.30
Crops = wheat/ sorghum	1391	0.05	0.23
Crops = wheat/ cotton	1391	0.27	0.45
Crops = wheat/ sugarcane	1391	0.05	0.21
Crops = other	1391	0.37	0.48

Sources: ECP (2008), IFPRI/IDS (2012) and NASA-POWER (2012).

Table 3: IV First Stage Results, Showing the Effect of Predicted Political Competition on Observed Political Competition

	(1)	(2)
Panel A: 1st stage for household-level dataset		
Predicted political competition index (0-1)	0.290*** (0.103)	0.292*** (0.103)
Observations	937	937
R-squared	0.825	0.841
First stage F statistic	7.88	7.97
Panel B: 1st stage for plot-level dataset		
Predicted political competition index (0-1)	0.294** (0.111)	0.344*** (0.100)
Observations	1,391	1,391
R-squared	0.819	0.859
First stage F statistic	7.05	11.92
Full control set	No	Yes

Notes: Standard errors clustered at the Provincial Assembly constituency level appear in parentheses. Coefficient estimates are significant at the * 10%, ** 5%, and *** 1% levels, respectively. All estimates are at the household level and include district-level fixed effects and geographic controls (a quadratic polynomial in longitude and latitude, household elevation in meters, and logged distance to a city of 100,000+ population). The full set of controls additionally includes demographic and socioeconomic controls (dummies for household size, ethnicity of the head, head education level, logged total wealth, and logged expenditures per capita), land controls (a quadratic in acres of land owned and a dummy for operating land on the watercourse), and land use controls (dummies for major crops grown).

Sources: IFPRI/IDS (2012) and NASA-POWER (2012).

Table 4: Effects of Political Competition on Justice, Infrastructure and Amenities, and Security Indices

	(1)	(2)	(3)	(4)	(5)	(6)
		Justice Index	Infrastructure/ Amenities Index	Security Index		
Panel A: OLS, political competition						
Political competition index (1 - HHI)		-0.199 (0.330)	0.646*** (0.214)	0.469** (0.196)	-0.652 (0.716)	-0.454 (0.716)
Observations	734	734	934	934	766	766
R-squared	0.215	0.271	0.671	0.727	0.183	0.233
Panel B: OLS, predicted political competition						
Predicted political competition index (1 - predicted HHI)		0.435* (0.236)	0.399*** (0.124)	0.246** (0.119)	-0.202 (0.284)	-0.078 (0.331)
Observations	734	734	934	934	766	766
R-squared	0.220	0.272	0.663	0.721	0.180	0.231
Panel C: IV 2nd stage, political competition						
Political competition index (1 - HHI)		1.372 (1.071)	1.377*** (0.522)	0.844** (0.400)	-0.728 (0.949)	-0.270 (1.088)
Observations	734	734	934	934	766	766
R-squared	0.176	0.256	0.639	0.720	0.183	0.233
Full control set	No	Yes	No	Yes	No	Yes

Notes: Standard errors clustered at the Provincial Assembly constituency level appear in parentheses. Coefficient estimates are significant at the * 10%, ** 5%, and *** 1% levels, respectively. All estimates are at the household level and include district-level fixed effects and geographic controls (a quadratic polynomial in longitude and latitude, household elevation in meters, and logged distance to a city of 100,000+ population). The full set of controls additionally includes demographic and socioeconomic controls (dummies for household size, ethnicity of the head, head education level, logged total wealth, and logged expenditures per capita), land controls (a quadratic in acres of land owned and a dummy for operating land on the watercourse), and land use controls (dummies for major crops grown). The excluded instrumental variable is predicted political competition, described in Section 3.4.

Sources: ECP (2008), IFPRI/IDS (2012) and NASA-POWER (2012).

Table 5: Effect of Political Competition on Expenditures Per Capita, Wealth, and Inequality

	(1)	(2)	(3)
Panel A: Log expenditures per capita			
	All	Below-median land holdings	Above-median land holdings
Political competition index (1 - HHI)	0.668*** (0.179)	0.876*** (0.312)	0.625*** (0.183)
Observations	937	458	479
R-squared	0.461	0.519	0.477
Panel B: Log household wealth			
	Land wealth	Non-land wealth	
Political competition index (1 - HHI)	1.800 (1.083)	0.666 (0.540)	
Observations	658	936	
R-squared	0.308	0.468	
Panel C: Household has above village mean ...			
	Per capita expenditure	Land wealth	Non-land wealth
Political competition index (1 - HHI)	0.072 (0.217)	-0.271 (0.243)	-0.063 (0.148)
Observations	937	937	937
R-squared	0.270	0.186	0.047
Panel D: Village Gini coefficient based on ...			
	Per capita Expenditure	Land Wealth	Non-land Wealth
Political competition index (1 - HHI)	-0.085 (0.094)	-0.868*** (0.254)	-0.139 (0.250)
Observations	937	937	937
R-squared	0.601	0.491	0.487

Notes: Standard errors clustered at the Provincial Assembly constituency level appear in parentheses. Coefficient estimates are significant at the * 10%, ** 5%, and *** 1% levels, respectively. All estimates are at the household level. The full set of controls includes district-level fixed effects, a quadratic polynomial in longitude and latitude, household elevation in meters, logged distance to a city of 100,000+ population, basic demographic and socioeconomic controls (dummies for household size, ethnicity of the head, and head education level), and land use controls (dummies for major crops grown). Controls for logged total wealth and logged expenditures per capita as well as land controls are omitted given that they form the main dependent variables.

Sources: ECP (2008), IFPRI/IDS (2012) and NASA-POWER (2012).

Table 6: Effects of Political Competition on Logged Land Values, Land Ownership, and Land Rental

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable:		Log land value per acre	Household owns land	Household rents out land	Share of owned land rented			
Political competition index (0-1)	1.711** (0.701)	1.287*** (0.444)	0.124 (0.224)	-0.120 (0.177)	0.582** (0.289)	0.616** (0.242)	0.283** (0.130)	0.303** (0.115)
Full control set?	No	Yes	No	Yes	No	Yes	No	Yes
Observations	1,391	1,391	937	937	742	742	742	742
R-squared	0.383	0.534	0.342	0.581	0.052	0.145	0.049	0.127

Notes: Standard errors clustered at the Provincial Assembly constituency level appear in parentheses. Coefficient estimates are significant at the * 10%, ** 5%, and *** 1% levels, respectively. All estimates are at the household level and include district-level fixed effects, a quadratic polynomial in longitude and latitude, household elevation in meters, and logged distance to a city of 100,000+ population. The full set of controls additionally includes demographic and socioeconomic controls (dummies for household size, ethnicity of the head, head education level, logged total wealth, and logged expenditures per capita) and land use controls (dummies for major crops grown). The full control set in column (2) (plot-level regression) also includes plot-level land controls (a quadratic in plot area, dummies for soil type/ slope/ fertility/ tubewell access/ waterlogging/ salinity/ location, and controls for rainfall during each growing season). Land controls are omitted from columns (4), (6), and (8) given that they form the main dependent variables.

Sources: ECP (2008), IFPRI/IDS (2012) and NASA-POWER (2012).

Table 7: Mediators Analysis: Impacts of Political Competition When Controlling for Infrastructure Index

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Log per capita expend.	Log land wealth	Log non-land wealth	Log land value per acre	Owns land	Rents out land	Share land rented
Political competition index (1 - HHI)	0.526*** (0.194)	1.036 (1.161)	0.057 (0.585)	1.142** (0.444)	-0.072 (0.190)	0.564** (0.245)	0.282** (0.115)
Infrastructure and ammenities index	0.252** (0.102)	1.294** (0.548)	1.114*** (0.216)	0.383* (0.200)	-0.097 (0.074)	0.108* (0.060)	0.043 (0.031)
Observations	934	656	934	1,385	934	740	740
R-squared	0.464	0.318	0.479	0.535	0.581	0.147	0.128

Notes: Standard errors clustered at the Provincial Assembly constituency level appear in parentheses. Coefficient estimates are significant at the * 10%, ** 5%, and *** 1% levels, respectively. Column (4) estimates are at the plot level and all other estimates are at the household level. All specifications include the full set of controls corresponding to the outcome.

Sources: ECP (2008), IFPRI/IDS (2012), and NASA-POWER (2012).

Figure 1: Terciles of 2012 Level of Political Competition (darker = lower HHI value)

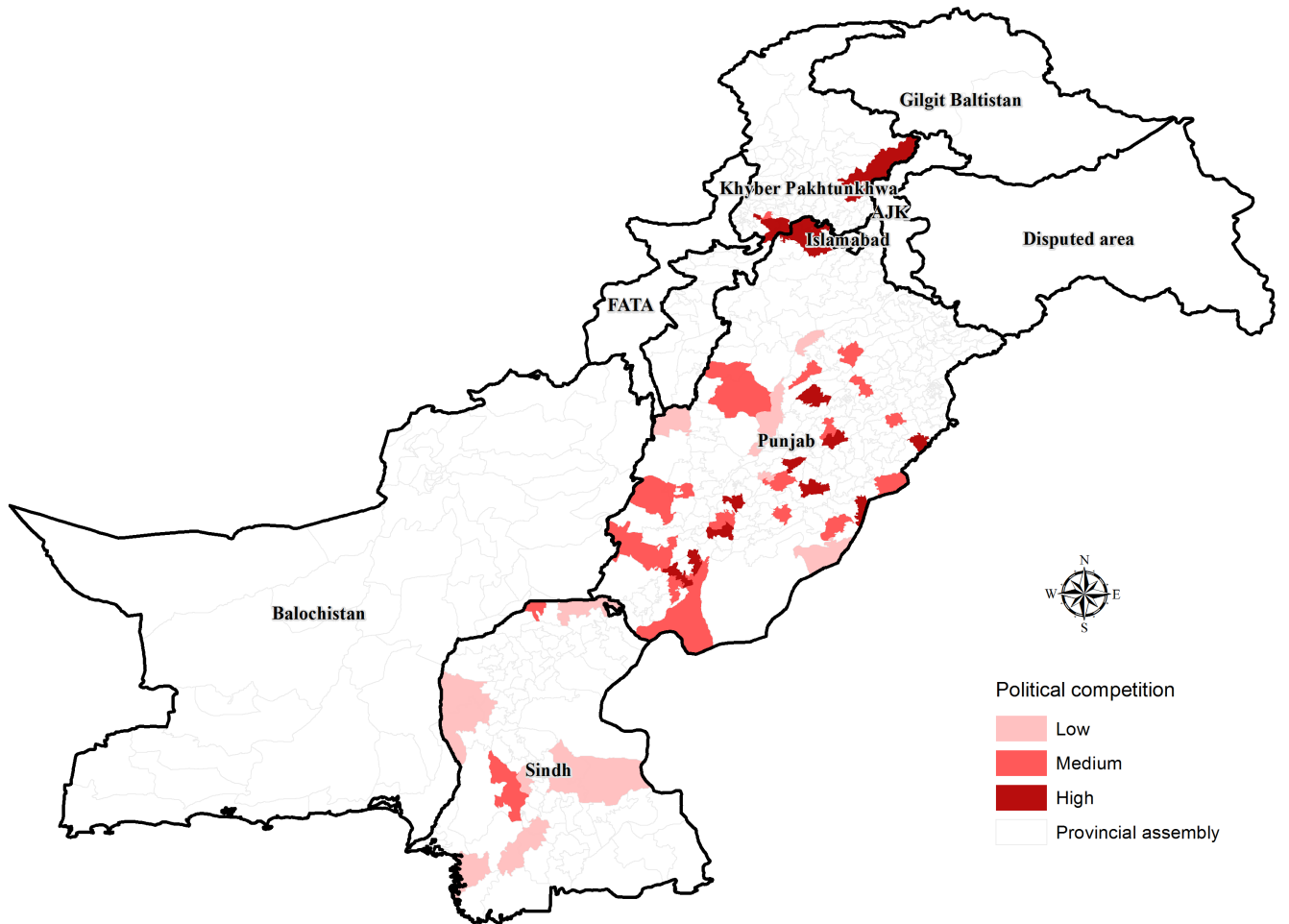


Figure 2: National Assembly and Provincial Assembly Constituency Boundaries

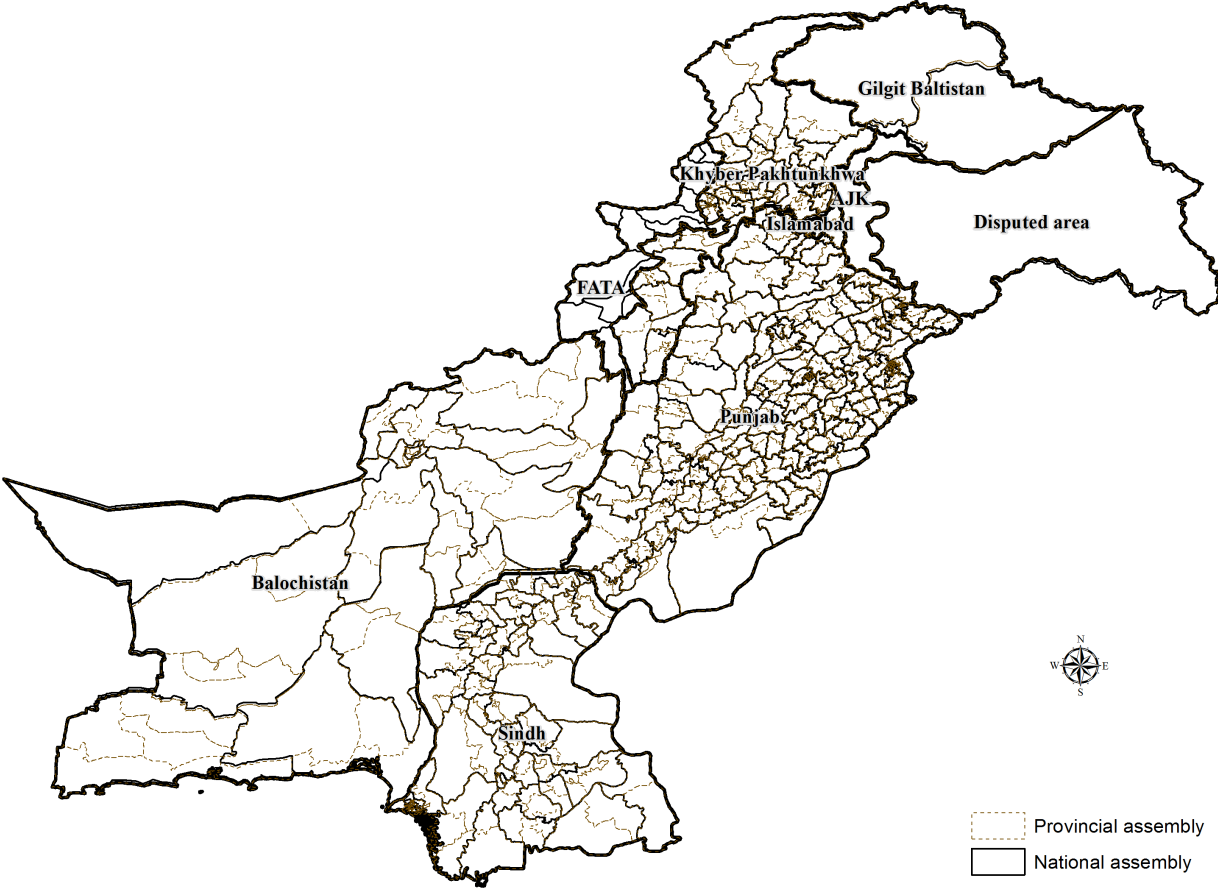
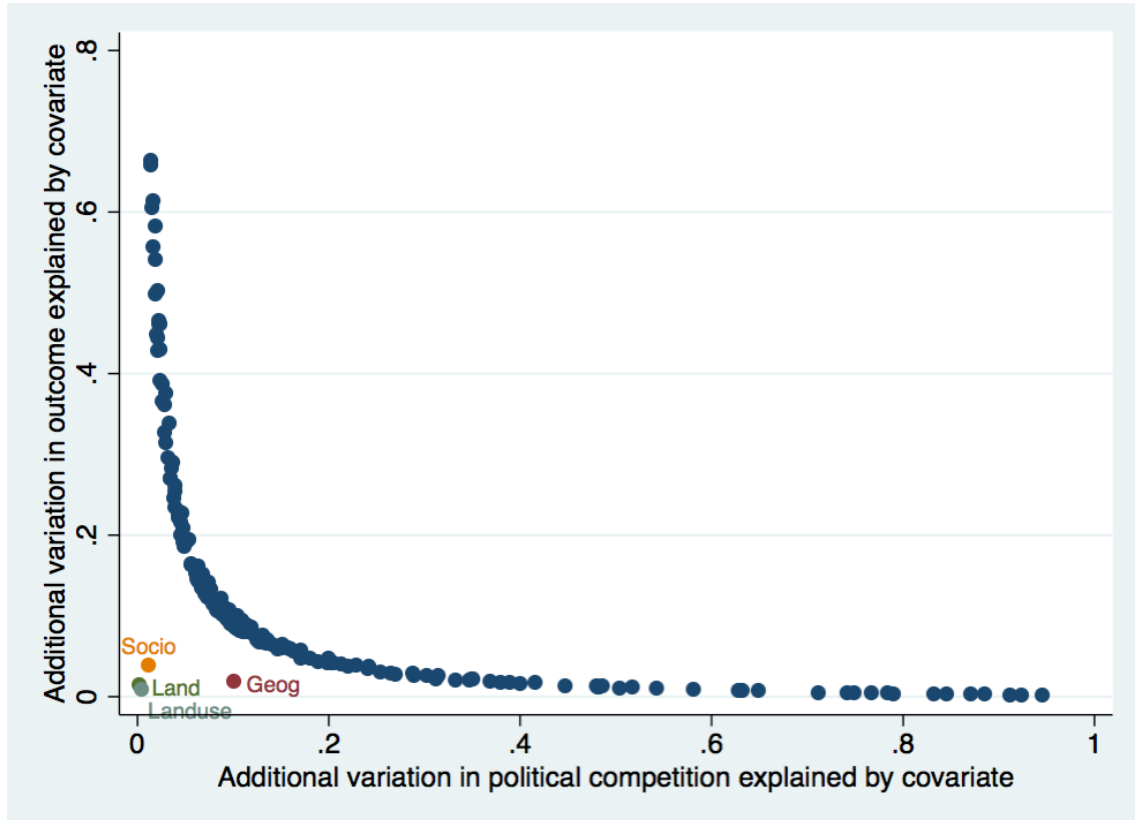


Figure 3: Robustness to relaxing the exogeneity assumption



Notes: The figure shows the degree to which an omitted variable would need to be correlated with political competition and the infrastructure index to reduce the estimated effect of political competition by half (same test as Blattman and Annan, 2010). The vertical axis represents the marginal increase in the R-squared from adding that covariate to a regression of the infrastructure index on our full set of controls. The horizontal axis represents the marginal increase in the R-squared from adding that covariate to a regression of political competition on our full set of controls. The points trace out a curve representing the combination of R-squared values that would result in a halving of our effect size. 200 iterations are used to generate continuous pseudo-unobservables. Geog indicates geographic location controls, socio indicates demographic and socioeconomic controls, landuse indicates land use controls, and land indicates land controls.

Notes

¹Unfortunately, publicly-available data on federal allocations to PA members are scarce.

²In eq.(1), we do not control for the number of candidates competing as this would constitute a second measure of political competition and make it difficult to interpret P_j .

³The election data was conveniently tabulated on <http://elections.com.pk> by PakTribune, a Pakistani news service (last accessed April 2014).

⁴That is, we control for longitude, latitude, longitude \times latitude, longitude squared, and latitude squared.

⁵We code up a series of dummy variables for which “uneducated” forms the base group and we include dummies for “grade 1 to primary” and “higher than primary.”

⁶The *rabi* season is October–March, while the *khariif* season is April–June.

⁷We use rainfall data for the village centroid, using household GPS coordinates. 1981-2012 is the full period for which data were available.

⁸This is computed by taking $(0.469 \times 0.11)/0.21 = 0.05/0.21 = 0.25$.

Online Appendix for Political Competition and Rural Welfare: Evidence from Pakistan

Katrina Kosec, Hamza Haider, David J. Spielman, & Fatima Zaidi

March 2018

Table A1: Number of NA and PA constituencies in each of 19 sample districts, 2008

Province	District	Total Number		Number in Sample	
		NA constituencies	PA constituencies	NA constituencies	PA constituencies
Punjab	Kasur	5	9	2	2
	Jhang	6	11	2	3
	Rahim Yar Khan	6	13	2	4
	Khanewal	4	8	3	3
	Sargodha	5	11	3	3
	Multan	6	13	2	3
	Bhakkar	2	4	2	2
	Faisalabad	11	22	3	3
	Vehari	3	8	3	3
	Bahawalnagar	4	8	4	4
	Attock	3	5	2	3
	Dera Ghazi Khan	3	7	2	3
	KPK	Nowshera	2	5	2
Mansehra		2	6	2	3
Sindh	Sanghar	3	6	2	3
	Jacobabad	3	5	2	3
	Dadu	3	7	3	4
	Hyderabad	6	12	2	3
	Thatta	2	5	2	2
TOTAL		79	165	45	57

Notes: We have used district boundaries from 1998 since our sample frame is based on district information from the 1998 population census.

Source: Election Commission of Pakistan (2008).

Table A2: Summary statistics for sample PA constituencies

Variable	N	Mean	S.D.
Number of villages	57	1.30	0.57
Household size	57	6.91	1.47
Share of households renting out owned land	54	0.06	0.10
Share of owned land rented out	54	0.03	0.05
Political concentration index (0-1)	57	0.41	0.11
Predicted political concentration index (0-1)	57	0.51	0.21
Vote share of winner	57	0.51	0.13
Vote margin of winner	57	0.18	0.15
No. of candidates competing	57	7.09	3.39
Share of household heads uneducated	57	0.46	0.22
Share of household heads with up to primary education	57	0.20	0.13
Share of household heads with above primary education	57	0.34	0.24
Logged total wealth (10,000 Rs.)	57	4.53	1.27
Logged expenditures per capita	57	-1.25	0.21

Notes: Number of observations is 57, reflecting that 57 PA constituencies appear in our dataset. The sample size is only 54 for outcomes related to renting out land as there are no landowners (and thus nobody renting out owned land) in 3 of our sample PA constituencies.

Source: ECP (2008) and IFPRI/IDS (2012).

Table A3: Voting results from the 2008 Pakistan National Assembly Election, by Party and Province

Party Name	Votes	Share (%)	Share (%) by Province:			
			Punjab	Sindh	KPK	Balochistan
	(1)	(2)	(3)	(4)	(5)	(6)
Pakistan Peoples Party	10,666,548	30.8	26.8	41.9	16.6	12.3
Pakistan Muslim League	8,007,218	23.1	28.3	13.7	12.8	33.4
Pakistan Muslim League (N)	6,805,324	19.7	27.0	1.6	8.2	1.1
Independent	3,865,954	11.2	15.8	2.3	24.2	25.8
Muttahida Qaumi Movement Pakistan	2,573,795	7.4	0.1	30.1	0.1	0.4
Mutthida Majlis-e-Amal Pakistan (MMA)	766,240	2.2	0.8	1.0	14.6	15.1
Awami National Party	704,811	2.0	0.0	0.8	17.0	4.8
Pakistan Muslim League (F)	685,684	2.0	0.9	6.2	0.0	0.2
National Peoples Party	148,892	0.4	0.0	2.0	0.0	0.4
Pakistan Peoples Party (Sherpao)	141,975	0.4	0.0	0.0	6.3	0.0
Balochistan National Party (Awami)	72,956	0.2	0.0	0.0	0.0	5.1
Pakistan Democratic Party	64,505	0.2	0.1	0.0	0.0	0.0
Sindh United Party	33,641	0.1	0.1	0.3	0.0	0.0
National Party	27,076	0.1	0.0	0.0	0.0	0.8
Pakistan Awami Party	19,248	0.1	0.0	0.0	0.2	0.0
Other	53,655	0.2	0.1	0.1	0.0	0.6

Notes: For each election, the “other” category other includes all parties beyond the 15 which were nationally most popular. KPK is Khyber Pakhtunkhwa province. Totals may add up to more than 100% due to rounding.

Sources: Authors’ calculations, based on data from ECP (2008).

Table A4: Effects of Political Competition on Individual Components of Justice, Infrastructure and Amenities, and Security Indices

Dependent variable	Mean	SD	N	(1)		(2)		(3)		(4)	
				OLS	Coef. on political comp. index	OLS	S.E. on political comp. index	IV	Coef. on political comp. index	IV	S.E. on political comp. index
Panel A: Justice											
The laws and law enforcement in my community generally prevent crime	0	1	800	0.463	(0.809)	4.204*	(2.494)				
If someone commits a crime against me, the police will be able to help me	0	1	801	0.788	(0.654)	1.750	(1.360)				
If someone commits a crime against me, I can get justice through the courts	0	1	801	-1.063**	(0.490)	3.486	(2.619)				
In the end, victims of crime usually see justice done	0	0.99	799	-0.232	(0.516)	0.846	(1.204)				
I can get justice in the courts if someone tries to take my land	0	1	739	-0.048	(0.621)	2.598	(1.725)				
A land title means I can get justice in the courts if someone tries to take my land	0	1	738	0.039	(0.616)	2.437	(1.989)				
Police harassment is a problem for young men in my community (reverse coded)	0	1	809	-0.565	(0.580)	-0.329	(1.411)				
Panel B: Infrastructure and Amenities											
Household has electricity	0.83	0.38	936	0.376	(0.360)	0.398	(0.634)				
Household has a flush toilet	0.46	0.50	935	0.083	(0.320)	-1.027	(0.810)				
Village has electricity	0.90	0.30	937	0.597**	(0.253)	0.886*	(0.527)				
Most common surface type of village roads is not mud (asphalt/ concrete/ gravel)	0.29	0.45	937	0.982*	(0.587)	3.487*	(1.876)				
Household has a piped drainage system	0.45	0.50	935	-0.065	(0.240)	-0.151	(0.696)				
Household has piped water as main source	0.06	0.23	935	0.185	(0.181)	0.413	(0.694)				
Public transportation available to a commercial center	0.77	0.42	937	0.766	(0.507)	-0.413	(1.701)				
Household has access to piped gas	0.06	0.24	937	-0.206	(0.208)	0.670	(0.843)				
Village has fixed line telephone	0.20	0.40	937	1.511***	(0.488)	3.331***	(1.200)				
Panel C: Security											
Locks are necessary to keep one's house and belongings safe (reverse coded)	0	1	801	-0.443	(0.543)	-3.722**	(1.833)				
Harassment is a problem in my community (reverse coded)	0	1	800	0.544	(1.035)	-3.743	(2.501)				
Drugs are a problem in my community (reverse coded)	0	1	801	0.698	(1.117)	-1.396	(2.012)				
Theft is a problem in my community (reverse coded)	0	1	801	0.148	(1.212)	-1.062	(2.333)				
Assault is a problem in my community (reverse coded)	0	1	801	-1.778*	(0.985)	-0.030	(2.447)				
Abduction is a problem in my community (reverse coded)	0	1	809	-1.042	(0.836)	-1.504	(1.570)				
Murder is a problem in my community (reverse coded)	0	1	808	-1.056**	(0.519)	0.189	(1.377)				
I feel safe going outside my house alone	0	1	809	0.706	(0.973)	2.880	(2.187)				
I feel safe going outside my house during the day	0	1	808	-0.810	(0.779)	0.556	(1.988)				
I feel safe going outside my house at night	0	1	808	-2.051*	(1.164)	1.102	(1.875)				
I worry about my spouse's safety when they are away from home (reverse coded)	0	1	777	-0.830	(0.767)	-2.610	(1.747)				
A woman traveling without a male relative is likely to be harmed (reverse coded)	0	1	809	-0.964	(0.687)	1.950	(2.746)				

Notes: Standard errors clustered at the Provincial Assembly constituency level appear in parentheses. Coefficient estimates are significant at the * 10%, ** 5%, and *** 1% levels, respectively. All estimates are at the household level and include district-level fixed effects and geographic controls (a quadratic polynomial in longitude and latitude, household elevation in meters, and logged distance to a city of 100,000+ population). The full set of controls additionally includes demographic and socioeconomic controls (dummies for household size, ethnicity of the head, head education level, logged total wealth, and logged expenditures per capita), land controls (a quadratic in acres of land owned and a dummy for operating land on the watercourse), and land use controls (dummies for major crops grown). The excluded instrumental variable is predicted political competition, described in Section 3.4. Where it is indicated that a dummy variables has been reverse coded, this means that the responses to this question—strongly disagree (1), disagree (2), agree (3), or strongly agree (4)—have been reverse such that 1=4, 2=3, 3=2, and 4=1 before normalizing (subtracting the sample mean and dividing by the sample standard deviation) to create a dummy. Doing so ensures that a higher value of each of these variables indicates more of the outcome it aims to measure (justice, infrastructure/ amenities, or security).
Sources: ECP (2008), IFPRI/IDS (2012) and NASA-POWER (2012).

Table A5: Predicted Political Competition and Instrumental Variables Analysis with Additional Outcome Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Log per capita expend.	Log land wealth	Log non-land wealth	Gini land wealth	Gini non-land wealth	Log land value per acre	Owns land	Rents out land	Share land rented
Panel A: Use of predicted political competition index (1 - predicted HHI) in place of political competition index (1 - HHI)									
Predicted political competition index (1 - predicted HHI)	0.263 (0.228)	0.207 (0.864)	0.856* (0.486)	-0.559** (0.228)	-0.322** (0.127)	0.946* (0.542)	-0.339** (0.148)	0.606** (0.241)	0.262** (0.119)
Observations	937	658	936	937	937	1,391	937	742	742
R-squared	0.457	0.304	0.469	0.475	0.514	0.534	0.583	0.143	0.121
Panel B: Instrumenting for political competition Index (1 - HHI) with predicted political competition index (1 - predicted HHI)									
Political competition index (1 - HHI)	0.890 (0.764)	0.540 (2.079)	2.901 (1.888)	-1.892** (0.819)	-1.091** (0.538)	2.750* (1.524)	-1.160* (0.692)	1.406*** (0.482)	0.608*** (0.211)
Observations	937	658	936	937	937	1,391	937	742	742
R-squared	0.460	0.306	0.460	0.422	0.324	0.529	0.568	0.117	0.110
First stage F statistic	8.220	6.298	8.206	8.220	8.220	11.92	8.072	6.420	6.420

Notes: Standard errors clustered at the Provincial Assembly constituency level appear in parentheses. Coefficient estimates are significant at the * 10%, ** 5%, and *** 1% levels, respectively. Column (6) estimates are at the plot level and all other estimates are at the household level. All specifications include the full set of controls corresponding to the outcome.

Sources: ECP (2008), IFPRI/IDS (2012), and NASA-POWER (2012).

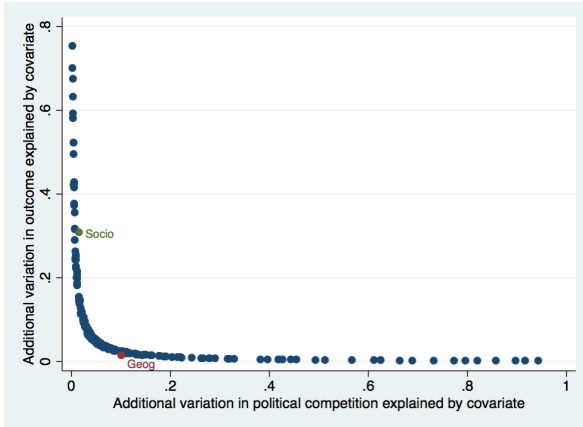
Table A6: Robustness: Alternate Measures of Political Competition

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Justice index	Infra. index	Security index	Log per capita expend.	Log land wealth	Log non-land wealth	Gini land wealth	Gini non-land wealth	Log land value per acre	Owns land	Rents out land	Share land rented
Panel A: 1 - vote share of the winner												
1 - (vote share of winner)	-0.004 (0.256) 734	0.422*** (0.144) 934	-0.06 (0.581) 766	0.532*** (0.170) 937	1.857** (0.917) 658	0.984** (0.416) 936	-0.704*** (0.226) 937	-0.097 (0.208) 937	1.709*** (0.399) 1,391	-0.213 (0.146) 937	0.468** (0.215) 742	0.249** (0.100) 742
Observations	0.270	0.728	0.231	0.460	0.310	0.469	0.486	0.486	0.540	0.581	0.141	0.125
R-squared												
Panel B: 1 - vote margin of the winner												
1 - (vote margin of winner)	0.088 (0.206) 734	0.253** (0.110) 934	-0.075 (0.419) 766	0.197 (0.157) 937	1.858** (0.788) 658	0.555 (0.380) 936	-0.629*** (0.195) 937	-0.121 (0.138) 937	1.836*** (0.346) 1,391	-0.284** (0.110) 937	0.301* (0.177) 742	0.163** (0.077) 742
Observations	0.270	0.723	0.231	0.456	0.312	0.468	0.501	0.490	0.547	0.583	0.136	0.120
R-squared												

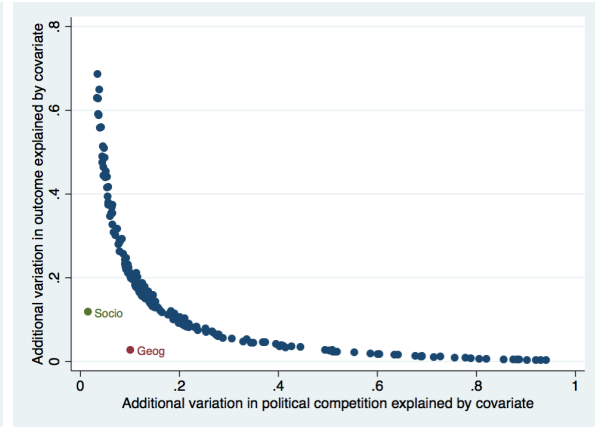
Notes: Standard errors clustered at the Provincial Assembly constituency level appear in parentheses. Coefficient estimates are significant at the * 10%, ** 5%, and *** 1% levels, respectively. Column (9) estimates are at the plot level and all other estimates are at the household level. All specifications include the full set of controls corresponding to the outcome.

Sources: ECP (2008), IFPRI/IDS (2012), and NASA-POWER (2012).

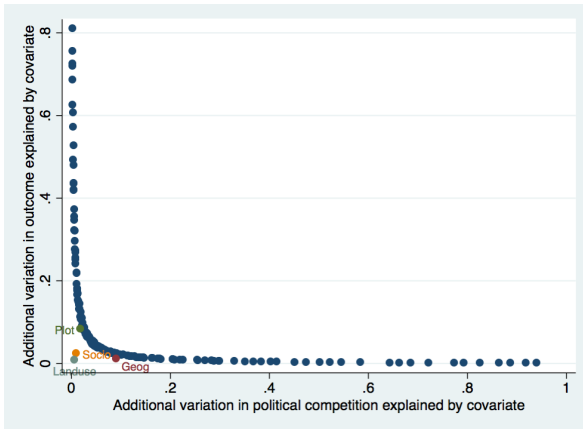
Figure A1: Robustness to relaxing the exogeneity assumption



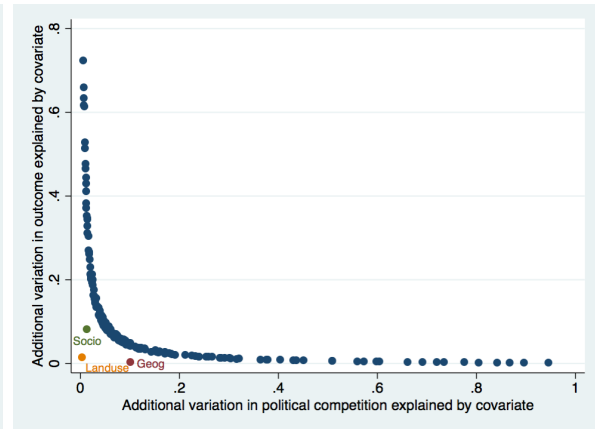
(a) Per Capita Expenditure



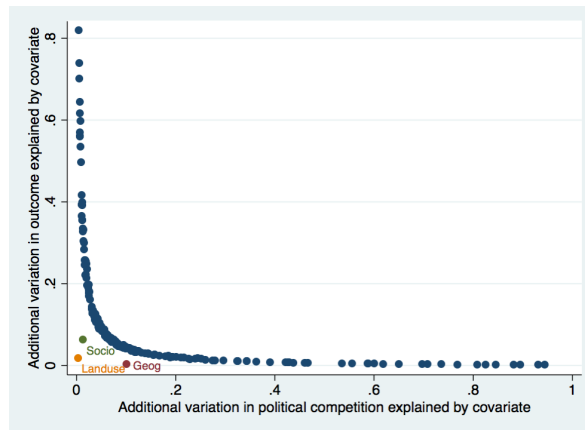
(b) Gini Coefficient for Land Wealth



(c) Land Value



(d) Rent Out (dummy)



(e) Share of Owned Land Rented/ Shared Out

Notes: The figure shows the degree to which an omitted variable would need to be correlated with political competition and the infrastructure index to reduce the estimated effect of political competition by half (same test as Blattman and Annan, 2010). The vertical axis represents the marginal increase in the R-squared from adding that covariate to a regression of the infrastructure index on our full set of controls. The horizontal axis represents the marginal increase in the R-squared from adding that covariate to a regression of political competition on our full set of controls. The points trace out a curve representing the combination of R-squared values that would result in a halving of our effect size. 200 iterations are used to generate continuous pseudo-unobservables. Geog indicates geographic location controls, socio indicates demographic and socioeconomic controls, landuse indicates land use controls, and land indicates land controls.