

Political Economy of Road Networks: What happens to a local economy when a new road is built?



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About the project

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Impact

The government (Ministry of Human Resource Development) is interested in exploring how road development is linked to change in land use, e.g. agricultural farm use to housing societies/real estate development. Our proposed policy recommendation is that places and communities which lack road connectivity should be provided road infrastructure on the priority basis. This will lead to positive externalities in local communities, it can improve labor productivity and economic growth at the local, regional and national levels. Work was presented to Office of the Minister of Human Resource Development. The discussion Was about the potential ways in which labor productivity can be increased and how infrastructure development can play a positive role in it.

This report was prepared by Danish Khan (University of Massachusetts-Amherst), Dr. Shahram Azhar (Bucknell University), and Dr. Vamsi Vakulabharanam (University of Massachusetts-Amherst).

In brief

- Studies show that road networks in other countries have multiple positive externalities or 'wider economic benefits'. However, the differential and uneven provision of public goods, not only further perpetuates poverty and inequality in society, it also reduces overall productivity of the economy.
- This project aims to analyse how the construction of new road networks effects and mediates existing gaps and differences in the provision of public goods in Pakistan.
- The project shows that policymakers need to look at road development in rural areas not just in terms of mobility of people and goods/services, but also in the broader context where it facilitates in the processes of provision of public goods and changes the relative spatiality of the households/villages.

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Political Economy of Road Networks in Pakistan: What happens to a local economy when a new road is built?

Working Paper

International Growth Center &

Consortium for Development Policy Research

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1. Introduction

Recent years have witnessed a gnawing recognition, amongst global scholars and policymakers alike, that development interventions exhibit spatially heterogeneous outcomes (Sachs, 2015; Peet and Hartwick, 2015; Harvey, 2012). A key concern for theorists and practitioners has been the realization, based on empirically observed trends across the globe, of there being mutually *contradictory* effects associated with the same set of policy instruments and interventions at different spatial levels. The consensus seems to be converging at the idea that any developmental intervention---the construction of a new road, a new dam, a new energy project---may yield differential, or even mutually exclusive gains at the *global* (country, regionality, district) versus the *local* (community, village, *mohalla*) level, making it difficult to ascertain the net impact on social welfare. As a result, our evaluation of the successes or failures of development interventions may not be neutral, as we had previously believed, to the spatial frame of reference we deploy to evaluate those interventions.

In the context of Pakistan, a number of influential studies provide robust evidence for this heterogeneity, pointing to a clear pattern of provincial and district-level variation in development outcomes (UNDP, 2016; Naveed, Wood and Ghaus, 2016; Cheema, Khalid and Patnam, 2008). Yet, while provincial and rural-urban differences are well-documented (see; Burki, Memon and Mir, 2015; Said, Musaddiq and Mahmud, 2011; Burki and Khan, 2010;) differences at the local community levels are not sufficiently well-explored in the existing literature. As we seek to demonstrate in this paper, both theoretically as well as via the results of a field experiment we conducted in rural Punjab, analyzing the socio-spatial dynamics of inequality at higher scales of abstraction--- such as ‘province’, ‘district’, or ‘urban/rural’--- conceals more than it reveals about

inequality. In contrast to existing modes of explaining inequality, the empirical evidence we present points to the need for a theoretical framework that captures the local heterogeneity *within* each scale. A simple aggregation of local effects will not adequately reflect the net impact on welfare, given the large variations in the experiential dynamics of localities that we report in this paper.

We propose that a synthesis of two disparate streams of literature, critical human geography on the one hand, and recent developments in the political economy literature on the other, provide us with the appropriate theoretical arsenal that we need to explain this heterogeneity. Our synthesized framework emphasizes the significance of scale both at the level of analysis and also at the level of governance (see Brenner, 2001, 2000; Marston, 2000). The need for such an inter-disciplinary framework is especially acute in the context of post-colonial countries such as Pakistan where extractive institutional structures were designed at the local level to facilitate the siphoning of surpluses from the local economy to the metropole. (Acemoglu, Johnson, & Robinson 2002; Frank, 1978). In this case, ‘scale’ becomes especially relevant as it is intricately tied to the institutional milieu within which development interventions will take place.

In this study, we explore the underlying factors which lead to differences in development outcomes, specifically the provision of public goods, at the scale of a village economy in Punjab, Pakistan. While the existing literature has paid attention to ‘class’ (Martin, 2016; Akhtar, 2006), caste (Gazdar and Mallah, 2012; Mohmand and Gazdar, 2007), and political networks (Javid, 2011; Nelson, 2002) as the major causes, the key question for us is the following: How does a ‘spatial change’ effect provision of public goods *within* a pre-existing village economy? By a spatial change, we mean the impact of a development intervention (such as a new road network)

on existing connections and relations within the local economy, what has been referred to in the literature as the ‘relative spatiality of the place’ (see Brenner, 2004; Harvey, 2004; Soja, 1980). Seen from this light, every infrastructural change can be seen as transforming the relative spatiality of a place and may thus exhibit an impact on economic and political outcomes in accordance with this transformation.

Consider the following thought experiment. A local economy, consisting mostly of subsistence but also some market-based agriculture, experiences a major infrastructural intervention, say the construction of a new mega highway. On the one hand, one can reasonably presume that the new road will allow owner-cultivators--- farmers who own their own land--- improved access to distant markets, thus expanding the possibility set of their scale of production, and possibly liberating them from the dual bondage of the middle-man (the *Arthi*), who often acts as the creditor as well as the buyer of the output (see Jan, 2019). On the other hand, the infrastructural intervention will also increase the *price* of the asset--- the land itself--- possibly incentivizing the owner to sell or move to an alternative use for the land, thereby unemploying agrarian workers (i.e. non-owners). How does one evaluate the successes and failures of our intervention in this case? To answer this, we must appreciate how any infrastructural intervention alters the existing socio-spatial dialectic⁴ of the pre-existing locality.

To examine these locally heterogenous effects, and in particular to develop an empirical estimation of how they play out in the context of peripheral localities in post-colonial economies, we conducted a field experiment in rural Sheikhpura, Pakistan. This is a part of the Punjab region, the largest and most populous province of Pakistan, that has experienced a number of

⁴ Social relations of production are both space-forming and space-contingent.

infrastructural interventions in canals, railways, and roads over the course of its colonial and post-colonial history (Ali 1988; Azhar 2016). Following Shami (2012a), we posit the construction of the M2 motorway (Islamabad to Lahore), which runs through Sheikhupura, as a quasi-natural experiment. While Shami is interested in the impact of the motorway on inter-linkages in factor markets, we are interested in heterogenous provision of public goods⁵. Given our concerns, the Sheikhupura district is an ideal case study because it has heterogeneity in terms of distribution of landownership. The villages in Sheikhupura can be divided into two categories based on land ownership: landlord villages (where there is only one large landowner) and peasant villages (where there is not just one large landowner but rather multiple medium size landowners)⁶ (Chaudhry, 2015). The motorway cuts through many small localities in Sheikhupura, allowing us to use the variation in terms of distance from the motorway across two kinds of villages---'connected' versus 'isolated'---as our proxy for relative spatiality within the locality. This gives us a matrix of four possibilities: landlord versus peasant villages that are, in each case, isolated or connected. To achieve this empirical design, we used a two-staged random stratification sampling method. In the first stage we selected eight villages through random stratification sampling technique. We stratified villages across village type (landlord or peasant village) and spatiality⁷ (connected to motorway and isolated). Four of these villages (two landlord and two peasant villages) are near the road and other four are away from the road (two

⁵ In addition to provision of public goods, we are interested in analyzing changes in landownership patterns which are historically determined by the persistence of colonial institutions, we do not discuss this here because it is beyond the scope of this study.

⁶ This does not mean that peasant villages are egalitarian, instead, the only difference between peasant and isolated villages is presence of more than one large landowner.

⁷ Connected villages are those which are nearby the motorway and connected to motorway through metaled link roads. While, isolated villages are those which are at least 30 minutes from the motorway due to lack of metaled link roads which would connect them to motorway and nearby villages/markets.

landlord and two peasant villages). In the second stage, we conducted a subsequent random stratification sampling to select households⁸ and asked questions related to demographic background, public goods provision, socio-economic profile and political networks.

There are three main reasons why we focus on the provision of public goods. First, there is a wide body of literature that convincingly demonstrates the crucial link between the unequal provision of public goods and poverty outcomes at local levels (see Ferdman and Kohn, 2018; Blakeslee, 2018; Besley and Ghatak, 2004). If we can improve our understanding of the factors that lead to sustained improvements in the provision of public goods, we can then devise policies aimed to eradicate poverty. Second, the heterogeneity of public goods provision has become an especially important concern during the neoliberal period (1990- present), a period that saw a secular increase in inequality in urban and rural areas across social and regional lines (see Vakulabharanam and Motiram, 2012; Vakulabharanam, 2005). The increase in precarious and informal forms of work during this period make the provision of public goods ever more significant for lower orders of society, who can no longer rely on either public or private sector to generate decent jobs (Standing, 2016; Harris-White 2018). Finally, the question of public goods is also important in the context of post-colonial economies such as Pakistan, where political discourse of development is frequently centered around the provision of public goods (Chaudhry and Vyborny, 2013; Cheema et al, 2012; Gazdar and Mallah, 2013).

The rest of the paper is structured in the following way. Section 2 provides an overview of the political economy of public goods provision in the context of post-colonial Pakistan. Section 3 explains the political economy of roads infrastructure in the context of Pakistan and it also

⁸ Households are stratified based on their biraderi because biraderi is intertwined with class in the context of rural Punjab (see Martin, 2016).

delineates how road development is tied to the notion of spatiality. Section 4 explains the data and methodology for the empirical case study of villages in Sheikhpura district, Punjab. Section 5 provides policy implications of the empirical results of the study and concludes the paper.

1. Political economy of Public Goods

The provision of public goods⁹ in South Asia is highly politicized and contested¹⁰ (see Verghese, 2018; Habyarimana et al, 2007; Banerjee and Somanthan, 2007; Banerjee, Iyer and Somanthan, 2007, 2005, Miguel and Gugerty, 2005; Banerjee and Duflo, 2006). In postcolonial countries like Pakistan, in order to delineate the underlying dynamics of unequal provision of public goods, historical approach is necessary given the long-lasting effects of British colonial rule (Azhar, 2016; Cheema et al, 2012, 2009). It has been observed that distribution of power is highly skewed in the favor of elites who misappropriate them for their own interest rather than the welfare of the poor (Pilivasky, 2014; Chaudhary and Vyborny, 2013. Moreover, there is negligible taxation on agricultural income and agricultural land ownership in Pakistan¹¹. This is tied to the fact the landed elites are well represented in legislative bodies and state institutions which accentuates their bargaining power vis-à-vis other social classes (see Khan, 2017; Javid, 2011; Cheema et al, 2009). This also explains the fact why Pakistan was unable to implement substantive redistributive land reforms¹² (Hussain, 2004). Moreover, poor road infrastructure and

⁹ For example, paved roads, streets, electricity, piped water connections and drainage system.

¹⁰ The question of public goods is important from the perspective of development economics and Marxian political economy. One of the key features that differentiate developing countries from the developed countries is highly politicized and unequal provision of basic public goods in the former vis-à-vis the latter. While, inadequate and unequal distribution of public goods in developing countries lower the bargaining power of the working classes.

¹¹ <https://tradingeconomics.com/pakistan/corporate-tax-rate>

¹² Pakistan undertook three land reforms, the first one in 1959 during the military regime of Ayub Khan and the last two in 1970s in the democratic era of Zulfikar Ali Bhutto. All these land reforms aimed at restricting land ownership of big feudal lords and redistributing land among the landless peasants. However, all of them resulted in a failure due to strong influence and networks

transportation further limits poor households' capacity to seek better employment opportunities outside their village (Griffin et al, 2002). In other words, rural markets are segmented and fractured which leads to low-welfare equilibrium for rural poor. This inherent inequality provides breeding ground for patronage-based politics¹³ (Shami, 2012b).

As a result, a large part of the discourse in Pakistani politics is centered around the provision of public goods, or what has been referred to in the literature as the 'politics of development' (see Akhtar, 2018; Mallick, 2017; Gazdar and Mallah, 2013). The 'politics of development' shapes how, using what mechanisms, and via the mediation of which influential groups ordinary citizens gain (or are excluded from) access to public goods. Consequently, the ruling elites use the provision of public goods as a tool to consolidate their hegemonic rule (Akhtar, 2018; Piliavsky, 2014; Chatterjee, 2008). These factors collectively exacerbate economic inequality in the countryside and perpetuate dependence of rural poor on local landed elites.

Empirical studies in the context of South Asia show that that districts which were assigned relatively equal land distribution under colonial regime tend to have better provision of public goods vis-à-vis villages which were assigned unequal land distribution (Cheema, Naqvi,

of landed elites in every state institution. Moreover, land reforms authenticity and legitimacy was questioned on religious (Islamic law) grounds.

¹³ The patrons are usually property owners (land, capital) who offer employment, protection to landless workers and small peasants in return of their services and clientelism. The uncertainty in the rural economy which is mostly contingent upon the weather, quality and price of the crop results in unpredictable income streams for the poor, who then have no other option than to turn to the patrons/feudal for their sustenance. This plummets the bargaining power of the peasants who then even have to vote according to the whims and wishes of their patrons. This further consolidates the bargaining power of the patron who can then solicit funds from the local politicians in exchange of peasants' votes (Martin, 2016; Piliavsky, 2014). This is convenient even for the politicians as they merely have to attract patrons possessing huge blocks of votes rather than each individual citizen (Shami, 2012b). The focus of politicians in such countries naturally diverts from providing citizenry with public goods to merely appeasing patrons through provision of funds, public goods, political favors etc.

et al, 2012; Banerjee and Iyer, 2005). These studies, which are part of the ‘New Institutional economics’ literature, trace out the root causes of development outcomes (including provision of public goods) by paying attention to historical institutions and their persistence (see Cheema, Naqvi, et al, 2012; Banerjee et al, 2005; Banerjee and Iyer, 2005). The institutional persistence is conceptualized through path dependency and elite capture (see Cheema and Naseer, 2013; Javid, 2011; Cheema, Mohmand and Patnam, 2009; Acemoglu and Robinson, 2007; Easterly, 2001). The general idea in this line of inquiry is to posit the impact of colonization as a watershed moment that shaped the future direction of political and economic institutions.

One criticism of new-institutional economics literature is its lack of acknowledgement for the agency of the post-colonial state in the processes of development/underdevelopment, especially in the context of post-colonial state’s capacity to mitigate the impact of colonial institutions (Azhar, 2016; Schneider and Nega, 2013). For example, in the context of the postcolonial Punjab, Azhar (2016) explained the divergence between eastern and western Punjab through differential state policies of India and Pakistan, respectively. In sharp contrast to new institutional economics literature, Azhar (2016) showed that infrastructure (including road networks) provision is better in landlord districts vis-à-vis non-landlord districts in the context of canal colonies in Punjab. While Azhar (2016) conceptualized the post-colonial state policies at the national scale, allowing him to draw comparisons between policies of post-colonial states of India and Pakistan, there are significant heterogeneities at the sub-district level in Punjab as colonial state instituted different regimes of land, labor and revenue collections even within a district (Memon, 2012; Cheema, Naqvi, et al, 2012). Therefore, it is important to conceptualize the impact of the post-colonial state policies at a micro level (e.g. village/community) to develop a more nuanced understanding of the processes of development (provision of public goods) and

lack thereof in rural areas. In this study, we fill this void by analyzing the impact of postcolonial state policies (such as building motorways and road networks) on development outcomes at the micro level.

2. Political Economy of Road Infrastructure and Spatiality

As a budgetary item, the construction of new road networks occupies central importance in Pakistan's Public Sector Development Programs (PSDP). Pakistan is also in the process of receiving huge sums of investment via the China-Pakistan Economic Corridor (CPEC), hoping to positively transform country's socio-economic landscape through economic corridor development (Melecky et al, 2019; Ministry of Planning, Development & Reform, 2017). While critics argue that traffic volume is not high enough in Pakistan to justify expenditure on motorways/highways (Economist, 2017). Another critique is that spending on expansive road networks lead to sprawl which leads to multiple socio-economic and environmental problems (Haque, 2015). On the other hand, there is a growing strand of literature that makes an argument in favor of road development based on wider economic benefits (WEB) of road infrastructure (Melecky et al, 2019; Roberts et al, 2018). WEB of road development includes improved access to markets (Shami, 2012a), higher volumes of trade (Melecky et al, 2019) and expansion in the size of the labor market (Altaf, 2015). The improved road connectivity can help local communities resolve their collective action problem (see Shami, 2012b). In other words, the volume of traffic cannot be used as a sole measure or yardstick to gauge the socio-economic benefits of road networks. In this paper, we build on WEB of road literature by incorporating spatial dimension. We argue that road development reconfigures the spatiality/geography of a place and as a result major socioeconomic changes are followed by the development of road network. To elucidate this point, we need to first explain what we mean by 'spatiality'.

We argue that space as a concept is a complex phenomenon and it requires a careful analysis. The dichotomy between rural and urban, inner cities and suburbs, global north and global south, represents spatial differentiations at various scales. At times these spatial differentiations seem so obvious that space becomes trivial and it leads to fallacy of externalizing space from socio-economic analyses without ever being cognizant of it (Khan, 2019; Motiram and Vakulabharanam, 2018). This paper brings to the fore the significance of space not just in the context of theoretical discussion but also for the purpose of policy making. It is argued in this paper that space is an integral aspect of social reality and our understanding of the socio-economic processes would become more robust and dynamic by incorporating space into our social analyses¹⁴. We find the works of one of the leading political economist/human-geographer of the contemporary epoch, David Harvey (1973, 2004) as a pertinent point of departure to conceptualize space. Harvey's (1973, 2004) tripartite division of space is comprised of absolute, relative and relational, notions of space. *Absolute space* is static and fixed; it is a frame in which events take place. Absolute space is immovable, and it can be geometrically measured (Harvey, 2004:2). In the context of socio-economic analysis, absolute space would be represented in terms of bounded territories such as administrative units, private property and urban grid (ibid). The notion of *relative space* is more dynamic vis-à-vis absolute space. Relative space exists as a relationship between different objects. The conceptualization of relative space depends on the objects which are being relativized (Harvey, 2004:3). Contrary to the notion of absolute space which can be conceptualized independent of time, relative space has to be understood in temporal context: 'spatiotemporality' (ibid). "The movement of people, goods, services and

¹⁴ In order to make space relevant in socio-economic analyses, the first step would be to theorize and contextualize space in the backdrop of socio-economic processes. This should be followed by empirical studies focused on the intersectionality of space and socio-economic processes.

information takes place in a relative space because it takes money, time, energy, and the like to overcome the friction of distance” (Harvey, 2004:5, quoted from Harvey, 1973). *Relational space* refers to the notion that space contains object in itself. In other words, relational space cannot be conceptualized without the processes that take place in space. Thus, relational space is not exogenous to the socio-economic processes instead it is internal to these processes (Harvey, 2004:4). Harvey (2004) eloquently captures aforementioned three conceptualizations of space by using an example of a house:

I recognize it [house] as a physical and legal entity that situates it in absolute space. I also recognize its position in relative space given its location with respect to places of employment, recreation, services and the flows of people, electricity, water, and money that sustain it as a living habitat. But then I also understand its relationality to global property markets, changing interest rates, climatic change, the sense of what is or is not a historic building, and its significance as a place of personal and collective memories, sentimental attachments, and the like (p. 6).

Edward Soja (1980) introduced the concept of socio-spatial dialectic by drawing from the works of Henri Lefebvre. He argued that “social and spatial relationships are dialectically inter-reactive, inter-dependent; that social relations of production are both space-forming and space-contingent” (Soja, 1980: 211). But how does one can empirically capture the change in ‘spatiality’? That is where we introduce the impact of new road networks. Road networks change space both in absolute and relative terms. In other words, we use the construction of a new road infrastructure as a proxy for the change in spatiality and this allows us to explore the impact of spatial change on development outcomes.

Thus, it is imperative for policy makers to pay close attention to how road networks alter the spatial configuration. There is a dearth of empirical studies on this issue in the context of Pakistan. In other words, the key research question that we explore in this paper is the following:

how does road infrastructure impact provision of public goods at a level of a village economy?

This paper does not only fill an important void for policy makers in Pakistan, but it opens up new avenues for the academic discussion on the political economy of spatiality and development in Pakistan.

3. Data and Methodology

For the empirical case study, we selected the district of Sheikhupura, Punjab. By focusing at a sub-district level (village), we address the methodological issues of the heterogeneity which are faced by recent studies that focus on national, provincial and district levels. Moreover, the notion of spatiality is incorporated by using proximity to motorway and a linked road as a measure of relative spatiality¹⁵. Sheikhupura district is a good case study in the context of Punjab because it has heterogeneity in terms of distribution of landownership. The villages in Sheikhupura can be divided into two categories based on the distribution of land ownership: landlord villages (where there is only one large landowner) and peasant villages (where there is not just one large landowner but rather multiple medium size landowners)¹⁶ (Chaudhry, 2015). Moreover, the M2 motorway (Islamabad to Lahore) runs through the district. In fact, the construction of the motorway from Islamabad to Lahore provides us a quasi-natural experiment setting to study the provision of public goods at the sub-district level¹⁷ (see Shami, 2012a). In

¹⁵ For a brief review of literature on spatiality and state-spatiality, see Khan, 2019 and Khan and Karak, 2019

¹⁶ This does not mean that peasant villages are egalitarian, instead, the only difference between peasant and isolated villages is presence of more than one large landowner.

¹⁷ At the methodological level, our approach is significantly different than Shami (2012a) where she argued that construction of the motorway can be assumed as an exogenous socio-spatial shock at the local level because it was a federal project and there were three key factors that determined its pathway: geography, connectivity and defense (Shami, 2012a: 1004; Republic Engineering Corporation Limited, 1988). We argue that these three factors cannot be assumed as exogenous at the local level. In fact, the ‘geography’ (spatiality) of a district is not just given but

1998 the construction of Motorway was completed which stretched across 367 kilo meters from Lahore (capital of Punjab) to Islamabad (capital of Pakistan). It cuts through many small cities, towns and villages in Punjab, including Sheikhpura. This allows us to use variation in terms of distance from the motorway across villages in Sheikhpura. So, we get two sets of villages, connected and isolated. We used two-staged random stratification sampling method to collect data. In the first stage we selected eight villages through random stratification sampling technique. We stratified villages across village type (landlord or peasant village) and spatiality¹⁸ (connected to motorway and isolated). Four of these villages (two landlord and two peasant villages) are near the road and other four are away from the road (two landlord and two peasant villages). In the second stage, we used random stratification sampling technique to select households¹⁹. We asked questions related to demographic background, public goods provision, socio-economic profile and political networks. Our total sample size is 384 households.

The provision of public goods in villages of Sheikhpura district needs lot of attention from policy makers as a large segment of population does not have access to basic public goods. As it can be seen in figures 1-5 below. Only 38 percent of households have access to paved streets (see figure 1). The situation is even worse when it comes to street lights, less than 20 percent of households have access to street lights (see figure 2). Around 65 percent of households have access to some drainage system (see figure 3), while 52 percent households have access to gas

it is created by human activity (Soja, 1980). Thus, we do not intend to make any causal claims, rather we use a dialectical approach in which we see feedback effect of geography and economy on each other.

¹⁸ Connected villages are those which are nearby the motorway and connected to motorway through metaled link roads. While, isolated villages are those which are at least 30 minutes from the motorway due to lack of metaled link roads which would connect them to motorway and nearby villages/markets.

¹⁹ Households are stratified based on their caste because castes are intertwined with class in the context of rural Punjab (see Martin, 2016).

connections (figure 4). As illustrated in figure 5, 57 percent households have reported access to piped water connections.

Figure 1: Provision of Paved Streets

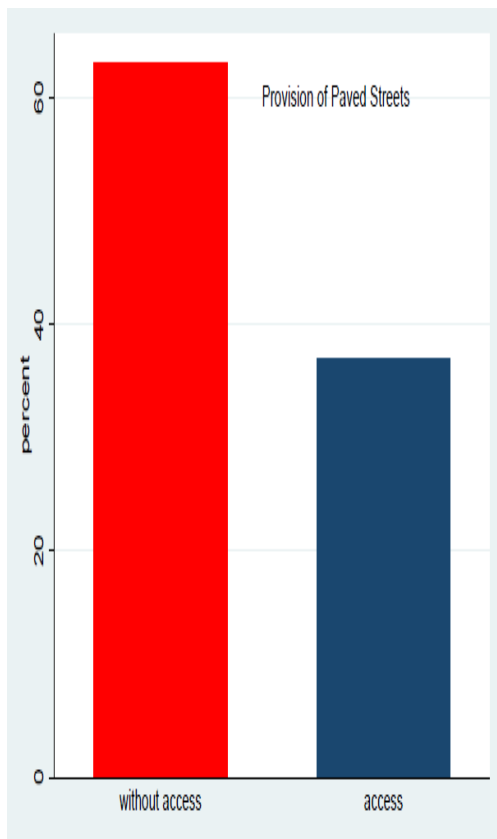


Figure 2: Provision of Street Light

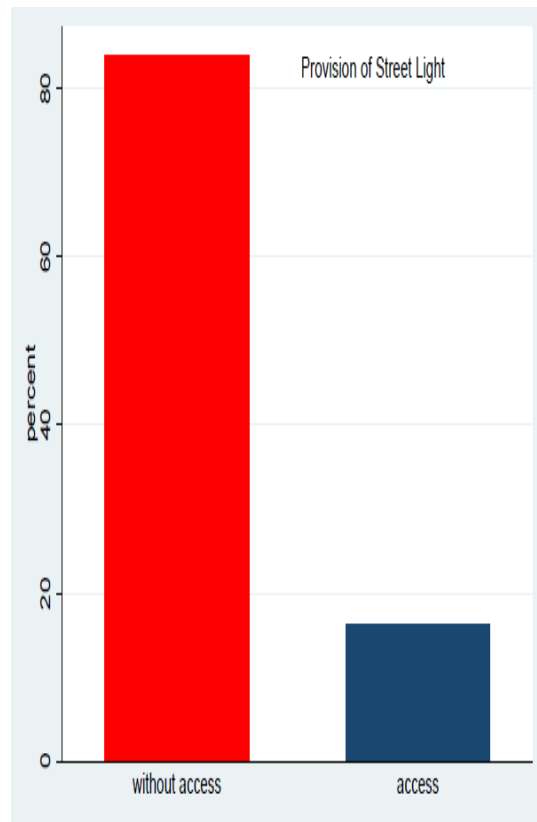


Figure 3: Provision of Drainage

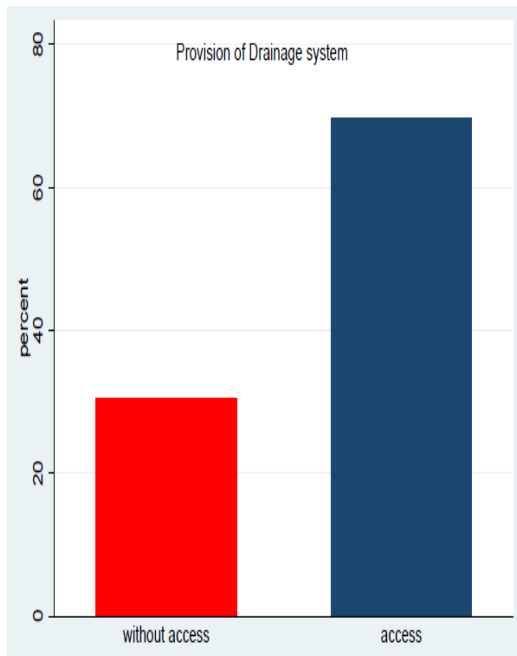


Figure 4: Provision of Gas connections

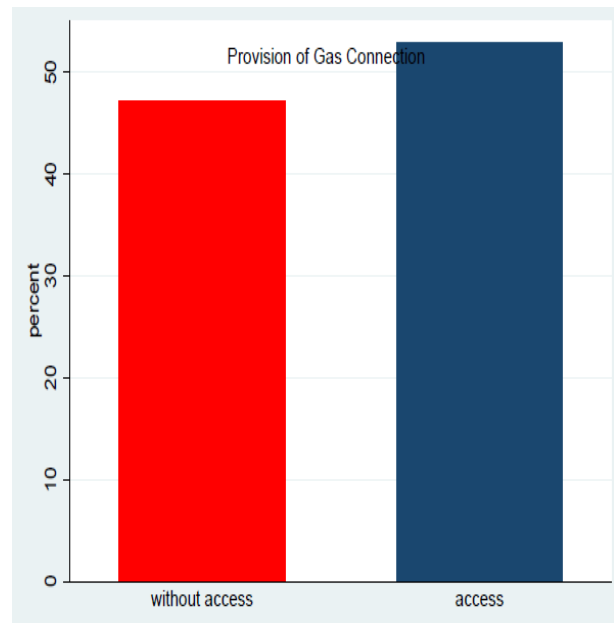
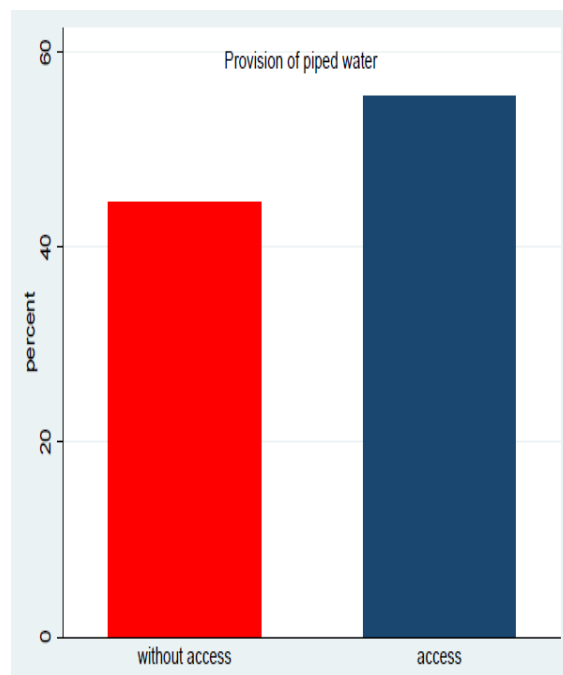


Figure 5: Provision of Piped Water



To empirically analyze the driving factors which allow some households to get access to public goods while others fail to do so, we will undertake logistic regression analysis. We use the following econometric model:

$$Y_{iv} = \alpha + \beta_1 \text{Connected}_{iv} + \beta_2 \text{Landlord}_{iv} + \beta_3 \text{Landsize}_v + \beta_4 \text{Biraderi}_{iv} + \delta X_{iv} + \varepsilon \dots \dots [1]$$

In equation (1) ‘i’ represents the household and ‘v’ represents the type of the village. Y_{iv} is a binary outcome variable that would take value of 1, if a public good is provided to a household and 0 otherwise. We analyze five public goods: paved street, street lights, drainage system, gas connection and piped water connection. Connected_{iv} is a binary variable that will take a value of 1 if household is located in a village near the motorway and 0 if it is located in far from the motorway (isolated village). Landlord_{iv} is a binary variable that will take value 1 if household is located in a landlord village and 0 if it is located in the peasant village. Land-size_{iv} is a continuous variable which captures land in acres. This would control for the fact that households which own more land would have higher incentive to secure provision of public goods vis-à-vis those who own less or no land. The term Biraderi_{iv} is a binary variable, it takes a value of 1 if a household belongs to a dominant biraderi/caste at the local level and 0 otherwise. Although caste hierarchy is usually associated with rural India, but in Pakistan biraderi/kinship ties and castes also play an important role in mediating socio-economic outcomes (Gazdar and Mullah, 2012; Mohmand and Gazdar, 2007; Ahmed, 1977). The vector X_{iv} controls for the education level and the size of the household. The logistic regression results of equation 1 for each public good are reported below.

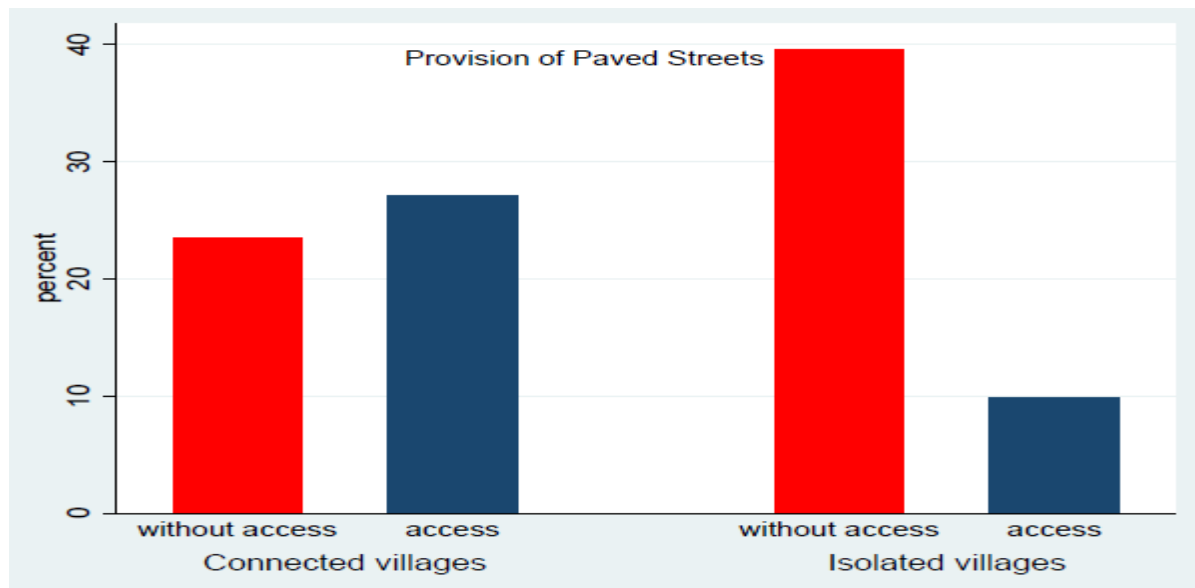
Table 1: Results

	<i>Paved Street (I)</i>	<i>Street Light (II)</i>	<i>Drainage System (III)</i>	<i>Gas Connection (IV)</i>	<i>Water Connection (V)</i>
<i>Connected Village</i>	1.645*** (0.272)	2.732*** (0.430)	0.814*** (0.301)	3.361*** (0.349)	4.789*** (0.547)
<i>Landlord Village</i>	0.124 (0.269)	-0.068 (0.302)	0.216 (0.292)	0.537 (0.353)	1.702*** (0.525)
<i>Biraderi</i>	-0.078 (0.247)	-0.577 (0.310)	1.075*** (0.311)	1.169*** (0.019)	0.291 (0.325)
<i>Land Size (acres)</i>	0.013*** (0.003)	0.001 (0.004)	0.031*** (0.004)	-0.0002 (0.004)	0.010** (0.188)
<i>Observations</i>	384	384	384	384	384
Robust standard errors in parentheses *** p<0.01 ** p<0.05					

The logistic regression results for the ‘paved street’ public good are reported in the first column of Table 1 above. The results in table 1 are given in log odds, so connected village coefficient is 1.645 log odds and it is statistically significant at 1% confidence level. If we exponentiate 1.645, we get 5.18 odds ratio. It means that odds of having a paved street for a household located in connected village as compared to isolated village are 5.18, while holding other variables constant. In other words, households located in connected villages have 418% times higher odds to have a paved street vis-a-vis for households located in isolated villages. This result can also be seen in figure 6 below. The large proportion of household who have access to paved streets are located in connected villages. The results for the type of village (landlord or peasant dominated) and biraderi are statistically insignificant. However, the size of landholdings is statistically significant at 5% confidence level and it has a small positive impact on the provision of paved streets. This means that a household possessing a large piece of land is more likely to get a paved street vis-à-vis landless household or household which owns a small plot of land. This result is

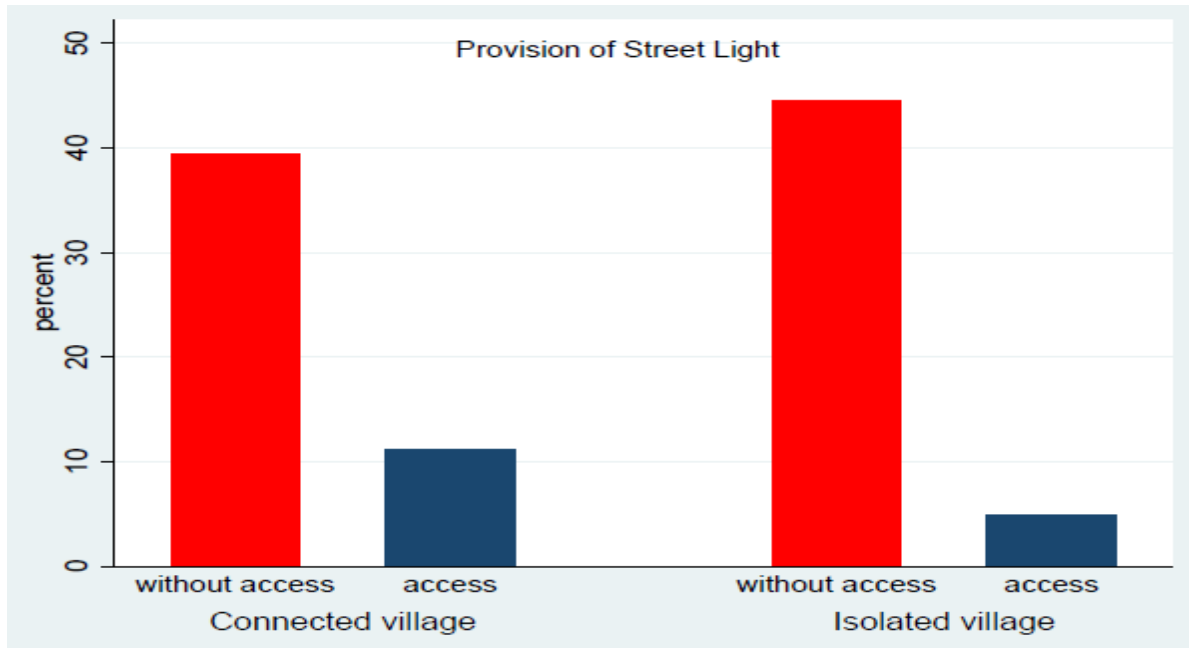
consistent with other studies on Punjab, Pakistan which delineate the strong linkage between landownership and development outcomes (Martin, 2016; Cheema et al, 2012; Javid, 2011).

Figure 6: Paved Streets and ‘Spatiality’



The logistic regression results of the public good ‘street lights’ are shown in the second column of Table 1 above. The coefficient for connected village is 2.732 log odds and if we exponentiate it, we get 15.36 odds ratio. In other terms, this means that a household located in connected village has odds of 15 to 1 to have a street light vis-à-vis household located in village far from the motorway (isolated village). This can be seen in figure 7 below, the gap between households located in connected village and isolated village is substantially high in terms of access to street lights. As it can be seen in column II of table 1, the coefficient of landlord village is not significant. While the effect belonging to dominant biraderi of the village is surprisingly negative, but it is statistically not significant. Similarly, the effect of land ownership is positive as expected, but it is not statistically significant for street lights.

Figure 7: Street lights & Spatiality

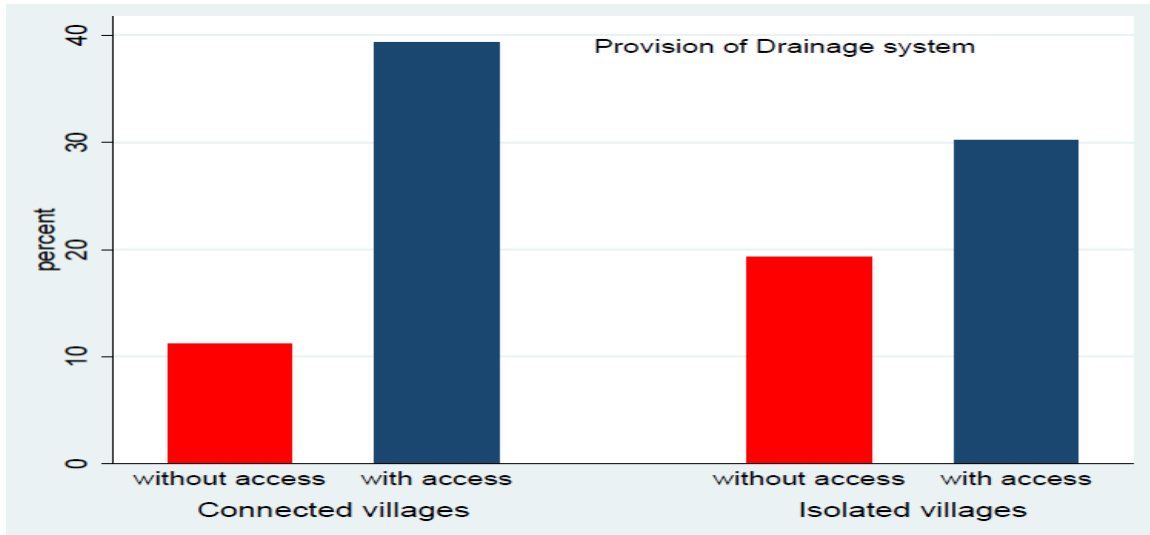


Next, we turn our attention to the logistic regression results of the ‘drainage system’. The third column of Table 1 shows that with the exception of type (landlord or peasant) of village, all other variables are statistically significant at 1% confidence level. The coefficient for connected village, biraderi and size of the land owned are 0.814 log odds, 1.075 log odds and 0.031 log odds, respectively. After exponentiation, we get the following odds ratio, 2.25, 2.92 and 1.03, respectively. As expected, households situated in connected village have better odds to secure access to drainage system vis-à-vis households located in isolated villages (see figure 8).

Interestingly, the effect of belonging to dominant biraderi/caste has the largest positive effect as compared to other variables in the case of the drainage system. This is in line with existing anthropological studies on Punjab, Pakistan --- these studies have highlighted the role of caste and biraderi system hierarchies in regulating development and underdevelopment outcomes (for details see Martin, 2016; Gazdar and Mallah, 2012). Similarly, the odds ratio for the size of the land is 1.03 which means ownership of the land has a positive impact on the provision of

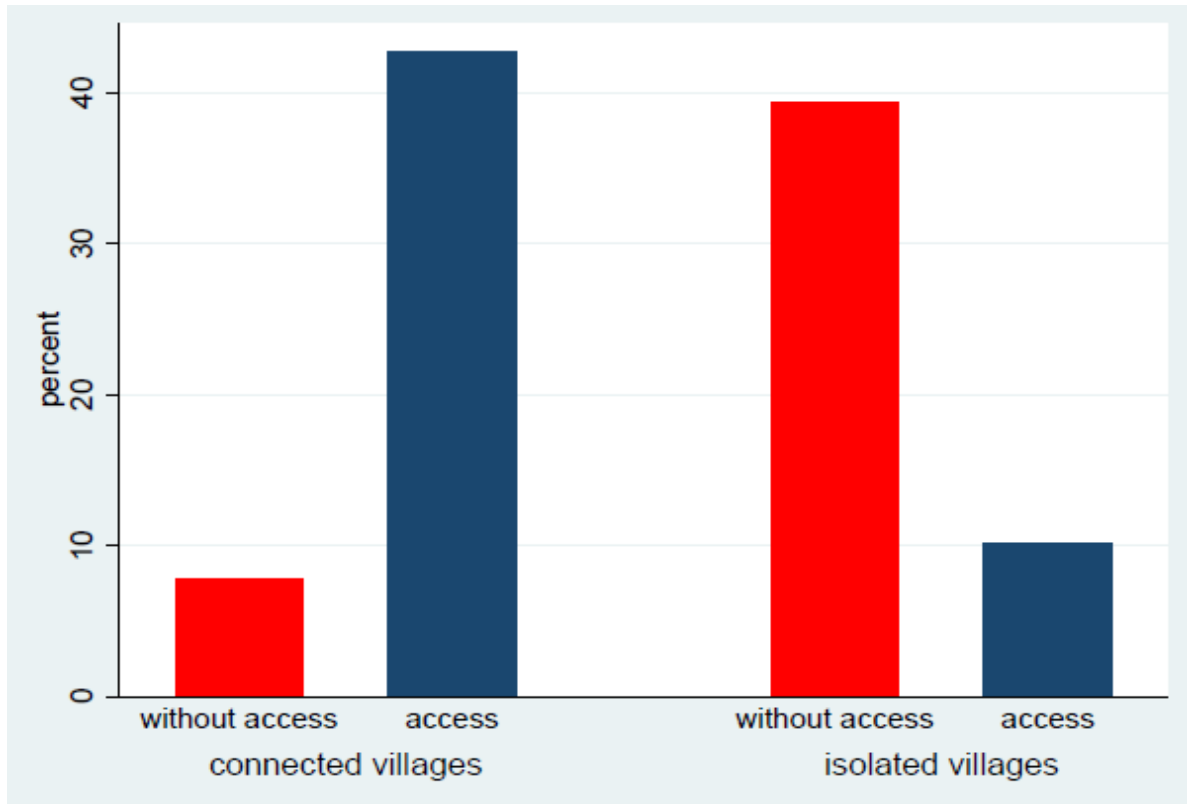
drainage system. This is consistent with the existing literature on Punjab, Pakistan (see Piliavsky, 2014; Shami, 2012a).

Figure 8: Drainage System & Spatiality



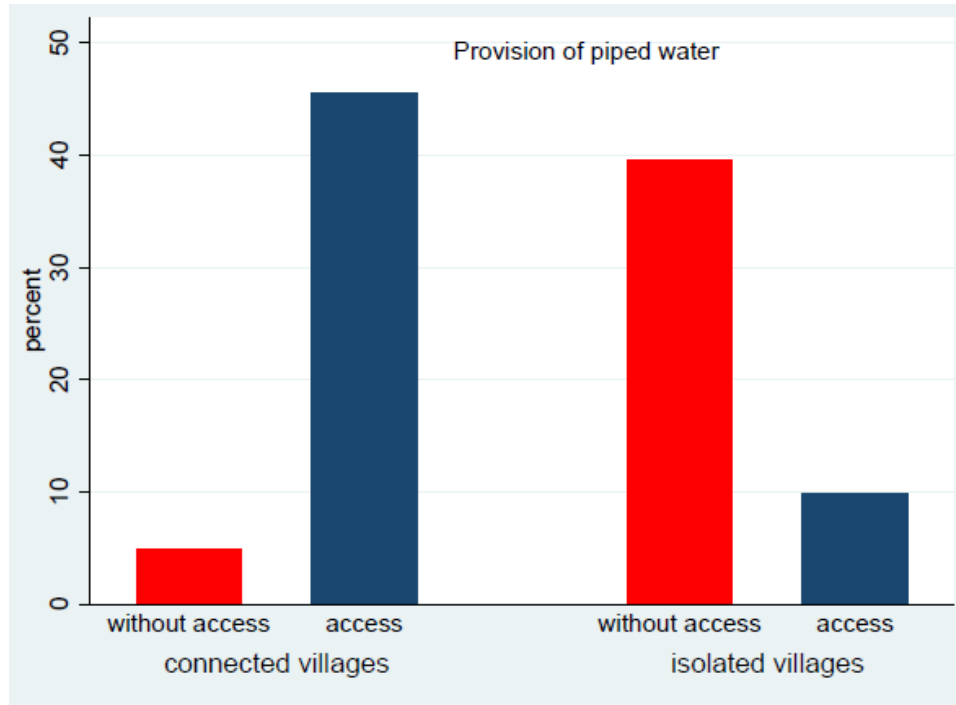
The fourth column of Table 1 displays the logistic regression results of the public good ‘gas connection’. As it can be noted connected village has a coefficient of 3.36 log odds and it is significant at 1% confidence level. If we convert it into odds ratio, we get 28.85. In other words, households located in connected village have substantially better odds to get provision of gas connection as compared to households located in isolated villages (see figure 9). In column IV, the only other significant result is the effect of belonging to a dominant biraderi, i.e. 1.17 log odds or 3.22 odds ratio. These results point to the fact that spatiality (located near the road) and dominant biraderi mutually mediate and regulate development outcomes.

Figure 9: Gas connection & Spatiality



Fifth column of Table 1 provides the logistic regression results for ‘water connection’. The coefficient for connected village and landlord village are 4.79 log odds and 1.70 log odds, respectively. Both results are statistically significant at 1% confidence level. By converting them in to odds ratio, we get 120.0 and 5.5 for connected village and landlord village, respectively. The substantially large effect of being located in connected village can be seen in figure 10 below. The coefficient for biraderi is not statistically significant, while, land size has a positive effect and it is statistically significant at 5% confidence level.

Figure 10: Water connection & Spatiality



4. Conclusion and Policy Implications:

Our findings show that road connectivity has a positive impact on the provision of public goods such as paved streets, street lights, water, gas and electricity connections. This implies that providing access to road connectivity can have multiple positive spillover effects on local community. Therefore, policymakers need to look at road development in rural areas not just in terms of mobility of people and goods/services. Instead, road infrastructure must be seen in the broader context where it facilitates in the processes of provision of public goods and changes the relatively spatiality²⁰ of the households/villages. Therefore, the question of uneven development becomes central. Our findings illustrated that belonging to a historically disadvantaged

²⁰ Other aspect of spatiality would include change in labor, land and produce markets at the local level.

biraderi/caste has a negative impact on the provision of public goods. Moreover, at the local level, the networks of patronage play a key role in deciding who will get access to public goods and this also negatively effects places/communities which are historically disadvantaged and discriminated. There is ample evidence which shows that elites in Punjab have been able to use state resources to consolidate their hold over the local communities at the village level (see Chaudhary and Vyborny, 2013; Cheema et al, 2012; Javid, 2011). This means that road development itself is regulated by the patronage networks (see Akhtar, 2018; Khan, 2018; Azhar, 2016; Martin, 2016). Those who are tied to political and local elites have a better chance to get access to road networks and by extension access to other public goods. The most recent example of this is the China Pakistan Economic Corridor (CPEC) where overtly political elites of the country contested with each other in terms of getting access to CPEC road route.²¹ Thus, the question of power distribution becomes central for provision of public goods in Punjab, Pakistan (see Martin, 2016; Cheema and Naseer, 2013; Cheema et al, 2009). Therefore, it is imperative for policymakers to prioritize provision of road infrastructure to places and communities which are historically disadvantaged and marginalized. In recent years, more funds have been allocated towards infrastructure and road development in urban areas vis-à-vis rural areas in the context of Punjab (Khawer, 2019; Haque, 2015). Based on our findings we argue that policymakers can make best use of funds which are earmarked for infrastructure development by channeling them towards road development in villages which are far from the M2 motorway rather than spending more on villages/urban centers which are near the motorway. In other words, if isolated villages are

²¹ see Dawn, 2016: <http://www.dawn.com/news/1261376>; The News, 2016: <https://www.thenews.com.pk/print/88825-Demand-to-construct-CPEC-route-through-Chitral>; Daily Times, 2016: <http://dailytimes.com.pk/khyber-pakhtunkhwa/05-Oct-16/assembly-demands-inclusion-of-western-route-in-cpec>

provided road infrastructure, there will be multiple positive externalities such as improved access to public goods like paved streets, street lights, piped water connection, drainage system and gas connections for local households. Thus, the key policy recommendation from this study is that policymakers should prioritize road development in isolated villages in Punjab because they are the low-hanging fruit and road connectivity can yield substantial benefits to local economies²². This will also help in addressing social and regional inequities across Pakistan (see UNDP, 2016).

In terms of contribution to existing literature, on one hand, the findings of our study corroborate the earlier studies by Martin (2016), Pillavsky (2014), Akhtar (2018, 2006), Shami (2012a, 2012b) and Nelson (2002). That is, development outcomes in Punjab, Pakistan are mediated by multiple factors viz., landownership, biraderi/caste and patronage networks. But the point where our study marks a major departure from the existing studies on Pakistan is that it brings in the notion of spatiality and illustrates that *relative space* is one of the key dimensions that mediates development and underdevelopment in the context of the postcolonial, Punjab²³. In future, we plan to expand on this line of inquiry by studying the impact of connectivity on land markets in rural spaces in Punjab.

²² Our findings may be relevant for other provinces, especially for districts through which motorway/highways passes in Khyber Pakhtunkhwa (KP) and Sindh province. Ideally, this study should be expanded in the context of KP and Sindh to capture the local nuances and idiosyncrasies.

²³ Shami (2012a) is the first study in the context of Punjab, Pakistan that highlights the significance of the motorway, but it reduces the role of the road connectivity only in terms of access to market. While, as we discussed above, we conceptualize road connectivity not in the narrow sense of market access but in terms of changes in relative spatiality (for details see Khan, 2019; Khan and Karak, 2018; Soja, 1980)

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