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The Impact of Connectivity on Market Interlinkages;

Evidence from Rural Punjab

Mahvish Shami*

Abstract: *Up to the late 1980s it was generally accepted that many of the key issues in agrarian development could not be studied without an understanding that rural markets were interlinked, causing equilibria to be jointly determined. In recent years, however, theory on market interlinkages has disappeared from mainstream agrarian development literature. Based on a household-level survey conducted in rural Pakistan, this paper seeks to re-introduce the importance of interlinkages and to illustrate the exploitative potential this market structure can have for poor peasants, particularly in unequal isolated villages where the landlord is essentially a monopolist/monopsonist. A proposed solution is then to connect villages to the external economy so as to increase peasants' alternative options. Making use of a natural experiment found in the construction of a motorway, the study finds that while connectivity does not break interlinkages completely - as they do have the functional effect of lowering transaction costs - it does significantly alter the nature of the relationship between landlords and the rural poor in favour of the latter, and in particular to the advantage of the socially lower classes.*

***Key words**: Interlinked markets, Rural road networks, Pakistan*
***JEL classification**: R2, Q13*

In an article reviewing the literature on interlinked markets, Bardhan (1980) starts by stating "It is being increasingly appreciated in the literature on agrarian development that many of the key issues cannot be analyzed without an

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understanding of the nature of interlinkage of factor markets (particularly those of land, labour and credit) in the specific institutional context of a poor agrarian economy" (pg. 82). This statement was made in reference to a number of studies conducted in the late 1960s and 1970s that emphasised the shortcomings of standard economic theory, based on the assumption of markets being independent, for analysing equilibria in agrarian societies (see for example Bardhan and Rudra 1978, Griffin 1974, Srinivasan 1979, Bhaduri 1977, Long 1968). They illustrated, both empirically and theoretically, that transactions in rural economies were not made at arm's length, but rather markets were interlinked, with the outcome in a single market being jointly determined with those of other markets. This helped explain outcomes which were previously considered paradoxical, such as wages, rent and interest rates varying within rural communities without arbitrage arising. Given the confined space of a village economy, standard economic theory would expect these markets to clear so that there existed one rate for everyone within the village. However, when outcomes are viewed jointly, markets are seen to clear in rural economies, as equilibrium in a single market is not determined independently. The use of this theory for studying agrarian societies continued to grow over the 1980s and the early 1990s with a plethora of studies analysing their effect on rural development (see for example Basu 1983, Basu 1986, Bardhan 1984, Aleem 1990, Siamwalla et al. 1990, Udry 1990, Swaminathan 1991, Bell and Srinivasan 1989, Bell 1988). There was an increasing appreciation of the fact that, besides distorting equilibria, this type of market structure had the potential for being highly exploitative of the rural poor, particularly, as shown by Basu (1983, 1986), when peasants found themselves confined to the village economy with no one but the landlord to rely on for fulfilling their survival needs.

However, in recent years, interest in interlinked markets seems to have lessened to the extent that it is no longer part of mainstream agrarian development literature. In the last decade there are few, if any, references made to the interlinkage of

markets when explaining outcomes in rural economies.[1] Based on a household-level survey conducted in rural Punjab, Pakistan, this paper shows that rural markets[2] continue to be interlinked, highlighting the importance of this literature in expaining economic, social and political outcomes in agrarian economies. The paper also illustrates the potential this market structure has for being exploitative towards poor peasants, particularly when villages are isolated from the external economy, leaving peasants no option but to approach the landlord. A possible solution suggested in this paper for reducing the exploitative nature of this relationship is to provide peasants with alternative options so as to break the hold of the landlord. This could be achieved by improving the link between rural villages and the external markets, making the wider national economy more accessible. Making use of the data from rural Punjab, this paper tests the feasibility of this solution by analysing the effect a motorway constructed in 1998, has had on the level and nature of interlinkages in villages dominated by large landlords. As will be shown, while connectivity does not break market interlinkages completely, as they do have the functional effect of lowering transaction costs, it does, to a large extent, take away the exploitative nature of this relationship, allowing outcomes to converge towards those found in relatively egalitarian villages.

The remainder of the paper is organised as follows. Section 1 explores the various explanations extended in the literature for the emergence of market interlinkages. Section 2 makes use of game theory to illustrate the exploitative powers that an all-controlling landlord can have over peasants' welfare, and the change that occurs in the power dynamics when peasants are exposed to outside options. Section 3 makes use of empirical data, collected in Hafizabad district, Punjab, Pakistan, to highlight the continued existence of interlinked markets in rural

[1] The few exceptions I could find were Swain (1999) and Gill (2006).
[2] A market, in this paper, is defined as the exchange of goods and services. However, following Bardhan's (1980) example they are not required to be "... formal or organised or monetized" (pg 83) thus allowing us to include the exchange of services such as dispute resolution, political bargaining and voting, which would normally not be included in a market analysis.

economies which are potentially welfare reducing for resource poor peasants. It also evaluates the impact of connectivity on the level and nature of interlinkages in villages in its proximity. Lastly, it aims to study the impact that households' social status has on their chances of being in an interlinked relationship, both in villages connected by the motorway and those isolated from the external economy. The data reveals that, while the road has welfare enhancing effects on rural society at large, the group benefitting the most from market exposure is the historically neglected class – the Muslim Sheikhs. Section 4 concludes the paper.

1. Why Do Interlinkages Arise?

There are two main arguments extended in the literature to explain the emergence of market interlinkages; inequality and the resultant limitation of alternative options, and the desire to increase efficiency in the presence of missing and/or incomplete markets.

Inequality, in many developing countries, has meant that most income generating assets tend to be concentrated in a few hands, thus making the majority of the population dependent on the resource rich (World Bank 2000). As well as being the main source of employment, the landowner may also be providing the poor with credit and homestead land, further tying them to the landlord (Bardhan 1980). Moreover, the absence of formal insurance markets in rural economies may lead peasants to use credit as a substitute for insurance, again increasing their dependence on the resource rich (Udry 1990). Also, in developing countries, land ownership enables the rich to command social authority which results in their playing a dominant role in the socio-political sphere (Scott 1972, Powell 1970, Husain 1989). In the absence of well functioning state institutions, the landed elite are then able to perform functions such as dispute resolution, provision of social security and access to local politicians and public resources (Chabal and Daloz 1999, Alavi 1972, Ahmad 1977). This combined social and economic authority,

derived from land ownership, enables them to interlink markets and exert considerable control over the actions of the peasants (Bell 1988).

The peasant, on the other hand, has very little leverage in this relationship as the services he has to offer are available in abundance and are easily dispensable (Scott and Kerkvliet 1977). This low bargaining position is further exacerbated by the isolated nature of many village economies (Bhaduri 1977, Basu 1983) as poverty and poor infrastructure make the outside economy largely inaccessible to rural peasants. While poverty makes the cost of the journey to the market prohibitive for most peasants (Rouse 1988, Fan et al. 2005, Fan et al. 1999, Minten and Kyle 1999), poor quality road networks have meant that few traders pass through unconnected villages, leaving peasants confined to the village and dependent on the landlord for most of their needs (Fan et al. 2005, Fan et al. 1999, Songco 2002, Rouse 1988). This makes the landlord essentially a monopolist/monopsonist with the ability to extract considerable surplus from the peasant (Bhaduri 1977). In fact, seclusion has been argued to enhance the powers of the landlord to the extent that allows him to interrupt peasants' independent relationships if they do not comply with his wishes (Basu 1983).[3]

Markets have also been argued to be interlinked in an effort to increase efficiency in the presence of incomplete and/or missing markets. Market imperfections can raise the cost of doing business making it difficult for agents to detect 'lemons' (Akerlof 1970) (due to asymmetric information) and to enforce costs on them once they are identified as potential defectors (due to bad legal institutions) (Hoff and Stiglitz 1990). Bundling transactions may be one way for service providers to protect themselves from these potential losses (Bardhan 1984, Bell 1988, Mitra 1983, Stiglitz 1982). This is achieved through two mechanisms. Firstly, by restricting transactions to known agents, the service provider reduces both his cost of gathering information and the chances of attracting a 'lemon' (Wharton 1962,

[3] This refers to the ability of landlords to establish triadic relationships, which is discussed in detail in the next section.

Basu 1986). Secondly, the bundling of transactions increases the cost of defection on the part of the player as he no longer just loses access to the market he is defecting in, but also severs ties in other markets. Long (1968), while studying the Indian and Thai credit markets, found that lenders' risk fell considerably when markets were interlinked.

Markets may also be interlinked by agents trying to minimise moral hazard problems (Bell 1988). A classic example used in the literature is for the landlord to offer tenancy only to those workers who borrow exclusively from him (Bhaduri 1973, Braverman and Stiglitz 1982, Mitra 1982, Bell 1988). Interlinking the two markets gives peasants a greater incentive to work hard on the fields as they have to repay the loan, which may only be possible if crop outcome is maximised. Moreover, it substantially increases the cost of shirking as not only would the peasant lose his job, making it difficult to repay the existing credit, but he would also lose credit facilities. However, it must be pointed out, interlinkage of markets often provides no protection to the peasant borrower. If the crop fails due to weather conditions or other factors outside the peasant's control, the tenant may lose his collateral or be forced to borrow more, thus getting further embroiled in the debt-trap.

While the arguments explaining the emergence of market interlinkages are rational, particularly on efficiency grounds, we cannot ignore the exploitative potential of this form of market structure, particularly when this arises due to inequality and isolation. However, as the empirical section of this paper will demonstrate, the two types of interlinkages are not mutually exclusive. Within the same village it is possible to find households that are tied into an interlinked relationship due to resource poverty, resulting in them living close to subsistence level, and households whose markets are interlinked in an effort to reduce transaction costs. Upon further investigation it was revealed that which relationship the household engages in was found to depend largely on their social status within rural society. While the upper class find their markets interlinked in

an effort to increase efficiency, the lower classes are most likely to be engaged in the exploitative form interlinkages.

2. The Game

Interlinked markets have been modelled either as a dyadic relationship (Bell 1988, Basu 1983, Bliss and Stern 1982) or as a triadic one (Akerlof 1976, Basu 1986, Hatlebakk 2002, Naqvi and Wemhoner's 1995). A dyad consists of two individuals interacting in one or more transactions, while a triad involves interaction between three individuals in multiple transactions. The difference between the two types of relationships lies largely in the extent of power the resource holder has, his ability to extract surplus from the relationship and the effect it has on a third uninvolved party.

In a dyadic model, surplus extraction is limited to a player's threshold value[4] (Basu 1983), as anything below this yields a negative payoff thus disincentivizing the agent from playing the game. Given that the interaction is limited to the two individuals, and does not extend to agents' independent relationships, the disadvantaged player has the option of walking away without incurring additional costs.[5] The only way to get an unwilling player to participate in an exploitative exchange is to change the nature of the game – for instance by threatening to use brute force, in which case the benefit of participation becomes his physical well-being[6] (Naqvi and Wemhoner 1995).

Triads, on the other hand, enable a player to make others participate for values below their threshold level without having to resort to violence. Basu's (1986) triadic interaction model, studying the relationship between a landlord, a merchant

[4] The threshold value is that level below which the player incurs losses.
[5] This is a voluntary exchange as the players have the option and the ability to return to the state of no-interaction (Basu 1986).
[6] As argued by Basu (1986) this is no longer a voluntary exchange, as once the player has interacted in the game he does not have the option of returning to the old equilibrium of no-interaction.

and a peasant, illustrates the ability of the landlord to coerce the peasant into accepting an offer below his threshold value by threatening to interrupt the peasant's trading with the merchant if he does not comply. The merchant abides by the wishes of the landlord, as not doing so carries the consequences of the landlord ceasing all trading relations with him.[7] Hence the peasant incurs an additional cost, imposed by the merchant, if he rejects the landlord's offer. Furthermore, the peasant's decision to reject the landlord's offer, adversely affects the merchant, (as he has to ostracize the peasant which reduces his trading revenue), even though he plays no role in the labour market.

The cost that the landlord levies indirectly, through the merchant, effectively changes the peasant's exercisable options, as returning to the no-interaction state is no longer a possibility. He now has to choose between accepting a contract that offers returns below his threshold level or a situation where he is completely isolated in the rural economy. Interestingly, the ability of the landlord to impose these costs is largely dependent on the merchant abiding by his wishes and punishing the defector. As argued by Havel (1978), as long as a third party is willing to impose sanctions on the defector, the aggressor can achieve the desired outcome without having to impose any sanctions himself. Alternatively, if the two agents were to collude against the landlord and refuse to punish a non-complying player this exploitative state would break down and a new equilibrium would have to be negotiated.[8] However, the problem with collusion is that it requires someone to make the first move in an environment that extends strong first mover disadvantages (Havel 1978). Hence, even though the collective benefit from defection is higher than the collective cost, the prohibitive cost to the individual prevents collusion from occurring, enabling the landlord to continue enjoying control over all agents in the economy (Basu 1986, Sen 1985, Havel 1978).

[7] The value of trading with the landlord is assumed to exceed that of trading with the peasant.
[8] In the absence of indirect sanctions, the landlord may not be able to impose sanctions high enough to get agents to participate in an exploitative exchange.

The following subsection makes use of game theory to illustrate the level of control enjoyed by the landlord under triadic interaction games. It highlights how, in line with Bhaduri's (1977) argument, isolation and inequality makes the landlord a defacto monopolist/monopsonist, enabling him to appropriate large surpluses from the peasant. The section also explores the change in the power dynamics, and the resultant pay-offs, when an external element, outside the control and influence of the landlord, is brought into the game. The game is set up in three parts; the first looks at an isolated economy with few options outside of the landlord. The second part analyses the change in the interaction between the landlord and the merchant when the merchant gains access to the external market. Lastly, the third part examines the change in the nature of the game when all three actors are exposed to the external economy.

2.1. The Model[9]

Consider a village society with three players: a landlord, a peasant and a merchant. The landlord hires the peasant to work on his farm for a certain wage and buys commodities from the merchant. The peasant is assumed to be landless with his only asset being his labour, which he sells to the landlord. The peasant also buys commodities[10] from the merchant. The merchant trades with both the peasant and the landlord. They are his only two customers. The value of trade with the landlord far exceeds the value of trade with the peasant. The utility functions of the peasant (U_P), merchant (U_M) and landlord (U_L) in this economy are as follows:

$$U_P = Y_P + [wl - \psi(l)] + [\tau(x_P) - Px_P]$$

$$U_M = Y_M + Px_P + Px_L \quad \text{where } x_L > x_P$$

$$U_L = Y_L + [\pi - wl] + [\lambda(x_L) - Px_L] - \phi(d_M)$$

Utilities are calculated in the appendix.

[9] The model draws extensively on the models by Hatlebakk (2002) and Naqvi and Wemhoner's (1995).

[10] These commodities are assumed to be handmade from supplies found within the village. They don't require the merchant to import anything.

Starting with the peasant's utility function; w is the wage paid to the peasant per hour of labour worked (l). ψ captures the disutility to the worker of every hour of effort put in. τ is the utility from consuming x_P goods bought from the merchant at a price of P. If the labourer (peasant) neither works for the landlord nor trades he gets a disutility of -20 (Y_P) as, in the absence of outside options, he has to be self-sufficient. Given that the peasant has no assets, the only way he can do this is by relying on others to ensure survival which may require him to beg from his fellow villagers. This should entail high disutility.[11]

The merchant's payoff includes utilities from selling x_P to the peasant and x_L to the landlord. It is assumed that he charges both parties the same price. As x_L is greater than x_P, the merchant values trade with the landlord more than with the peasant. If he does not trade with either his payoffs are -10 (Y_M). Similar to the peasant, in the absence of trade the merchant needs to be self-sufficient which depletes his resources. However, it is assumed that the merchant is better endowed than the peasant and so his disutility is lower.

The landlord makes a profit of $[\pi - wl]$ if the peasant works on his fields and gets utility equal to λ for every good bought from the merchant (x_L), paying a price of P for it. The disutility faced by the landlord from the merchant trading with a non-complying peasant is $\phi(d_M)$. If the peasant rejects the landlord's offer and the landlord does not trade with the merchant he gets a payoff of 0 (Y_L). It is assumed that the landlord has outside options but exercising them incurs certain costs due to which his payoff is 0.[12]

[11] During field work it was found that peasants who could not find work would go around the village begging for food and clothing. Besides the uncertainty involved in securing the needed goods this was also humiliating for the peasant and made him or her an outcast in society.

[12] These outside options include hiring external, seasonal, labour to work in the fields. However, the problem with these workers is that their availability is not confirmed. Moreover, given that they are outsiders and have few, if any, other ties with the landlord, they present a serious moral

When setting up this model it is important to question the ability of the landlord to coerce the merchant and the peasant. Hatlebakk (2002) criticizes Naqvi and Wemhoner's (1995) formalisation of Basu's (1986) model on the grounds that the landlord does not share any of the surplus appropriated from the peasant with the merchant, thus questioning whether the merchant has any incentive to cut off the peasant as per the landlord's wishes. However, in an isolated economy where the landlord wields complete control, not just of economic activities but also of social and political activities, there is no need for him to share the surplus with the merchant, as the lack of outside options weakens the merchant's bargaining position to the extent that he has no option but to comply with the wishes of the landlord.

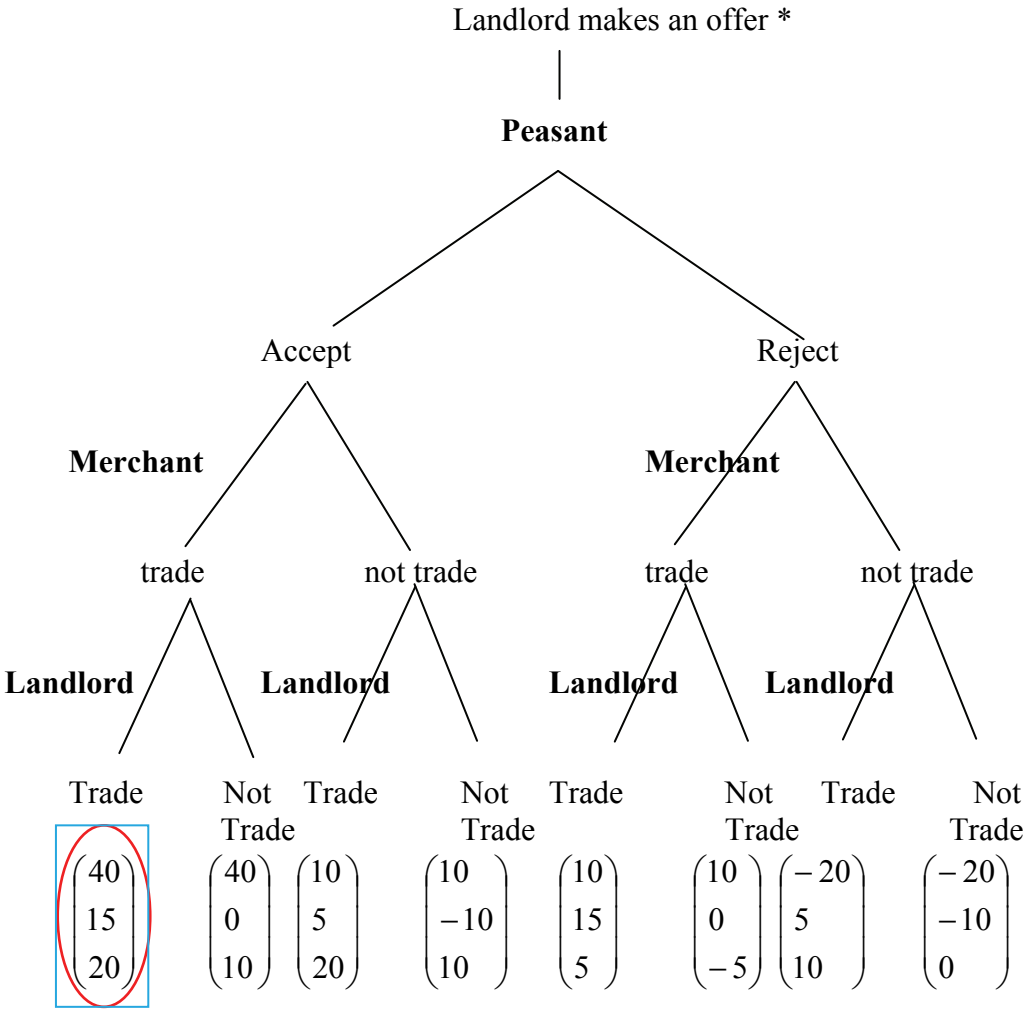
The sequence of the game is as follows. The landlord makes an offer to the peasant which he either accepts (A) or rejects (R). The merchant then decides whether to trade (t) with the peasant or not (n). Based on the outcome of the above two transactions, the landlord decides whether to trade (T) with the merchant or not (N). The payoffs and equilibrium depend considerably on the offer made by the landlord.

In the first variant it is assumed that the landlord offers the peasant at least his reservation value. The payoffs in this case are as follows. The peasant gets 30 (wl-ψl) if he works for the landlord (A) and 30 (τx_P-Px_P) if he trades with the merchant (t). If he neither trades nor accepts the landlord's offer he gets -20 (Y_P). The merchant gets 10 (Px_P) from trading with the peasant and 15 (Px_L) from trading with the landlord. If he does not trade with either he gets -10(Y_M). The landlord gets 10 $[\pi - wl]$ if the peasant agrees to work for him and 10 $[\lambda(x_L) - Px_L]$ if he trades with the merchant. However, if the merchant trades with

hazard problem. As for trading, the landlord has the ability to travel to the nearby town to pick up the supplies he needs. However, this entails costs in the form of time, effort and money.

the peasant after he rejects the landlord's offer, he gets a disutility of -5(ϕd_M). The game is drawn in Figure 1.[13] In a single interaction game the Nash equilibrium is (A, t, T), i.e. the peasant accepts the offer made by the landlord, the merchant trades with the peasant and the landlord trades with the merchant. No one can do any better by deviating, making it a stable equilibrium. The equilibrium remains unchanged in a repeated interaction game.

Figure 1: No exploitation



* Details of the payoff calculations are given in Appendix 1.
The payoffs are (peasant, merchant, landlord).
Single interaction Nash equilibrium.
Repeated interaction Nash equilibrium.

[13] The peasant has the highest utility because of his low starting point. In the case of the merchant and the landlord, on the other hand, their higher starting point means that diminishing marginal returns set in fairly early.

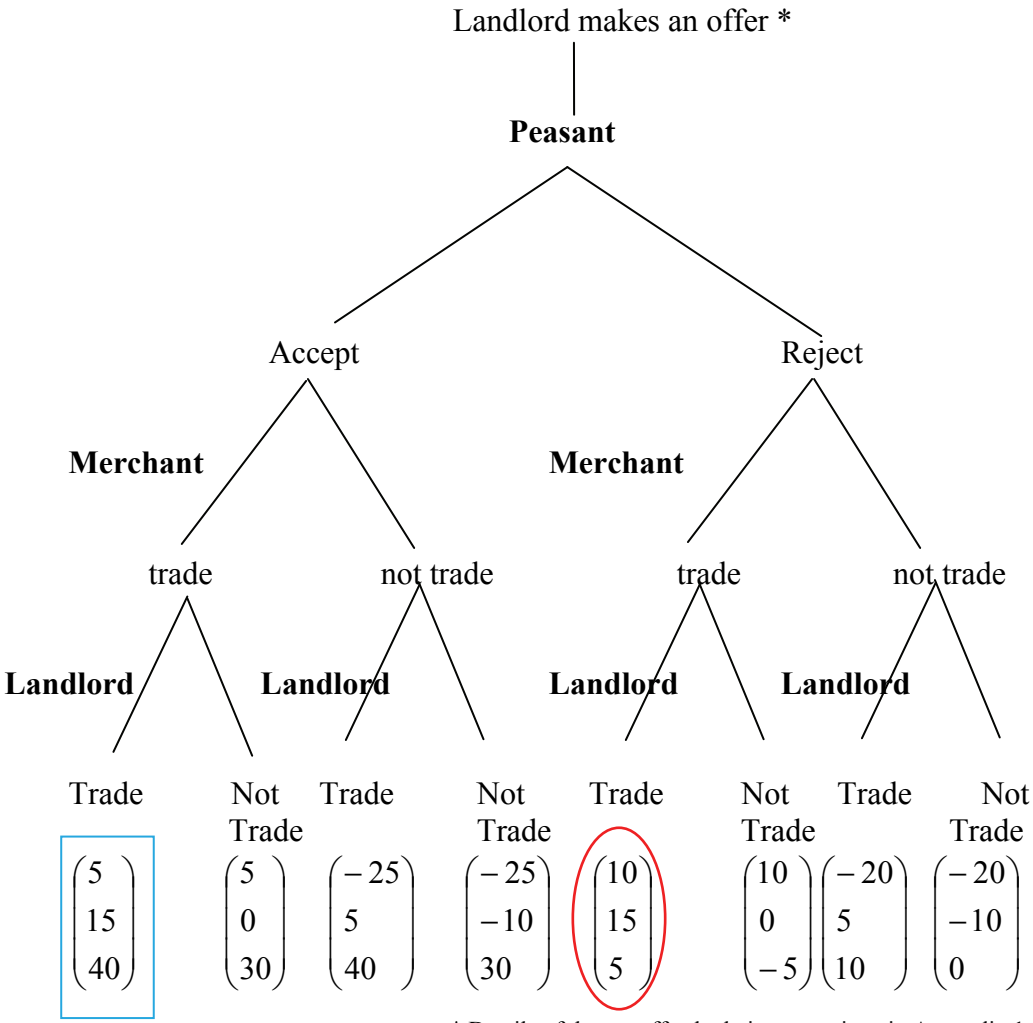
Now assume the exploitation case where the landlord offers the peasant a return of -5, which is clearly below his threshold value. This gives the landlord a payoff of 30 (as opposed to 10). The rest of the payoffs are unchanged. The game is shown in Figure 2.

The sequence of the game is the same as before. The equilibrium in a single interaction game is now (R, t, T). This follows from Naqvi's and Wemhoner's (1995) argument that, in a single interaction game, the landlord has little incentive to punish a disobedient merchant as it gives him no benefit. Therefore he will always trade with the merchant. Knowing this the merchant will always trade with the peasant as that maximises his payoffs. Given full information and assuming that all agents are rational, the peasant will always reject the landlord's offer.[14]

The equilibrium under a repeated interaction game, however, is considerably different as the landlord now has an incentive to punish the merchant for trading with a defecting peasant. This is achieved through an in-built trigger strategy which is to play N for K periods if the merchant trades with a non-complying peasant and T otherwise. The value of K will depend on the payoffs, on how patient the landlord is, and the extent of losses the merchant faces when the landlord does not trade with him. K is assumed to be long enough to ensure that the discounted cash flows from non-compliant behaviour are less than those from cooperation, thus creating a strong incentive for the merchant to cease trading with a non-complying peasant. Given this scenario, the peasant's choice essentially becomes to either accept the landlord's offer and get an overall utility of 5, or to reject it, not trade with the merchant and get an overall (dis)utility of -20. In this situation the peasant will always accept the landlord's offer.

[14] This game assumes common knowledge.

Figure 2: *Exploitation*



* Details of the payoff calculations are given in Appendix 1.
The payoffs are (peasant, merchant, landlord).
Single interaction Nash equilibrium.
Repeated interaction Nash equilibrium.

This equilibrium is sustainable mainly because the peasant and the merchant have no outside options and are unlikely to collude against the landlord.[15] This allows the landowner to exploit isolation and inequality to his advantage. The question then is: what happens to these payoffs and the equilibrium when one player has outside options available? Arguably, with partial access to the market, Naqvi and Wemhoner's (1995) model breaks down as the landlord loses the ability to impose

[15]Collusion would result in the single interaction equilibrium of (R,t,T).

sanctions. The presence of alternative options means that, in order to play the exploitation game, the landlord now has to collude with one party against the other, by offering to share the extracted surplus.[16]

Assume that there are still three people in the village economy, but the merchant now has access to alternative trading opportunities. This allows the merchant to trade in the external market if he is unable to engage with the landlord. However, trading outside the village is assumed to entail some costs, making it less profitable than dealing with the landlord. A simplifying assumption is that at any one time the merchant must choose whether to trade with the landlord or his outside option.[17] The presence of alternative trading options means that the landlord is no longer able to impose economic sanctions on a merchant who trades with a defecting peasant. Hence, the only way to stop the merchant from trading with a non-complying peasant is to collude with him by offering part of the surplus extracted. The peasant is still assumed to be confined to the rural economy.[18] The utility functions are as follows:

$$U_P = Y_P + [wl - \psi(l)] + [\tau(x_P) - Px_P]$$

$$U_M = Y_M + [Px_P + Px_L + Px_O] + (1-\alpha)[\pi - wl] \quad \text{where } x_L > x_P,\ x_O < x_L \text{ and}$$

$$0 \le \alpha \le 1$$

$$U_L = Y_L + [\pi - wl] + [\lambda(x_L) - Px_L] - \phi(d_M) - \phi(d_o)$$

Utilities are calculated in the appendix.

The utility function of the peasant is unchanged. The merchant now has an additional trading option x_O in the equation. Moreover, the equation also includes a proportion of the landlord's profit $(1-\alpha)$, meant to incentivise the merchant to punish a defecting peasant. The landlord now gets only α of the profit extracted

[16] The model that follows is a variation of the Hatlebakk (2002) model.
[17] Limited resources of the merchant make this a realistic assumption.
[18] High levels of poverty in rural areas restrict peasant mobility, making this a realistic assumption.

from the peasant as the remainder is offered to the merchant.[19] Lastly, if the merchant trades outside the village the landlord receives an additional disutility of $\phi(d_o)$, as it signals a loss of control on his part.

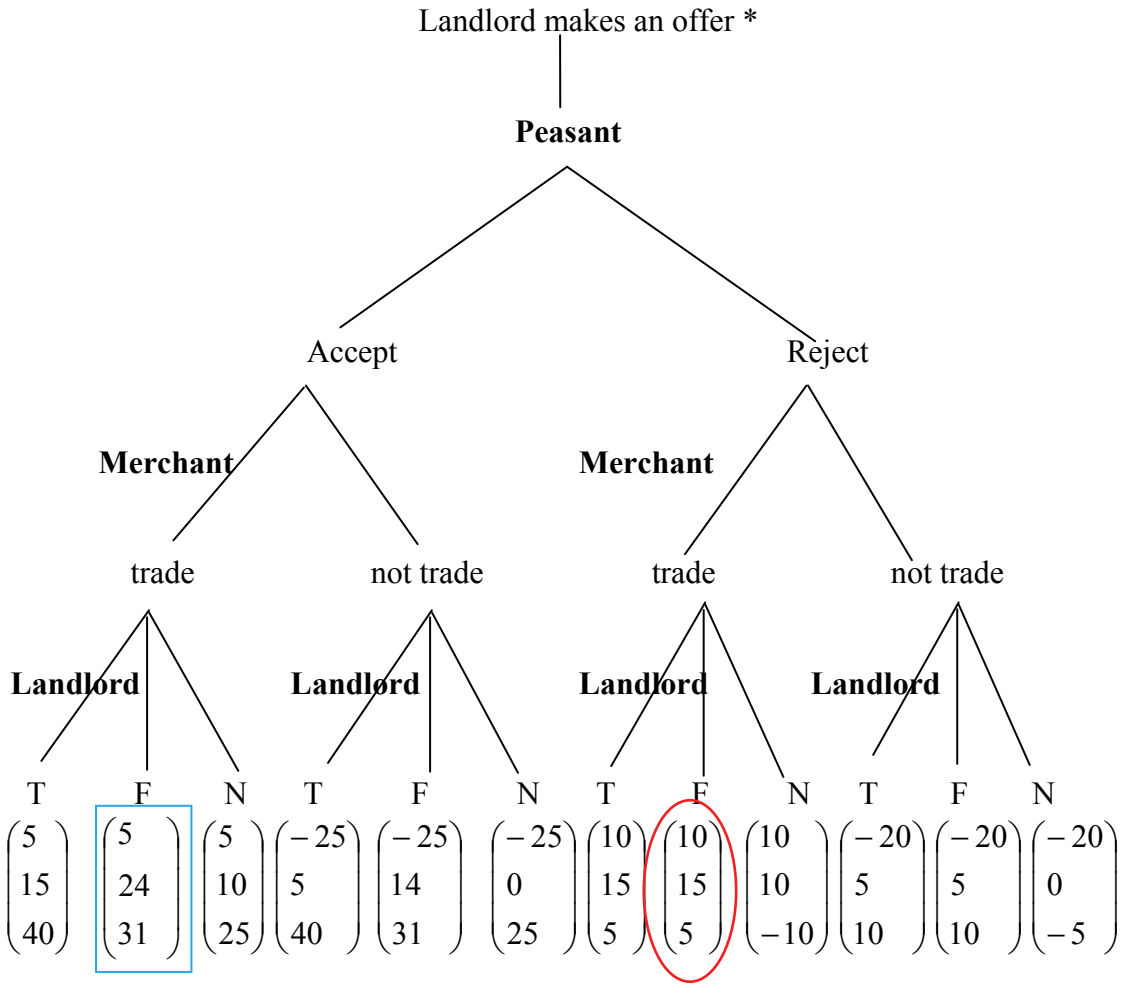
The payoffs of the game are as follows. The merchant can get 10 from trading outside the village (N) and 15 from trading with the landlord on normal terms (T). If the landlord shares his surplus with the merchant (F) then the merchant gets 24 (this assumes that α takes the value of 0.7).[20] The landlord, on the other hand, gets 40 if the peasant agrees to work for him and the merchant trades with him on normal terms. If he trades on favourable terms with the merchant he gets only 31. If the merchant refuses to cooperate with the landlord and trades outside the village, then he experiences additional disutility giving him an overall payoff of -5. The rest of the payoffs are unchanged. This game is depicted in Figure 3.

This game, played over a single period, results in the same equilibrium as in the case of no collusion, i.e. (R, t, T). What has changed is the nature of the repeated interaction game. The landlord is no longer able to punish the merchant by playing N as the merchant is better off trading with the peasant and his outside options (10) than trading only with the landlord (5). Hence, in order to sustain his desired long run equilibrium, the landlord has to offer the merchant part of the surplus, making the repeated interaction equilibrium (A, t, F). This new equilibrium signals a significant shift in the power dynamics between the landlord and the merchant. The presence of the external market has eroded the landlord's ability to impose economic sanctions on the merchant and forces him to collude with the merchant to get the desired outcome. Hence the landlord must treat the merchant as an equal and not as someone he can coerce into submission. As for the merchant, access to the market not only gives him a higher payoff, but also has the benefit of removing the uncertainty stemming from the landlord's ability

[19] α also factors in the disutility the landlord faces due to the loss of control.
[20] α is assumed to be 0.7 for simplicity's sake. The actual value will depend on their relative bargaining powers and the value of the merchant's trade with the outside market.

to impose sanctions. Unfortunately, for the peasant nothing has changed. The only difference is that now, instead of only the landlord benefitting from his misfortune, the merchant is also doing so.

Figure 3: *Merchant has outside options*



* Details of the payoff calculations are given in Appendix 1.
The payoffs are (peasant, merchant, landlord).
Single interaction Nash equilibrium.
Repeated interaction Nash equilibrium.

However, if the peasant also gained access to alternative options, the exploitation game would break down completely, as it would no longer be possible for the landlord and the merchant to impose sanctions on the peasant. Moreover, the presence of alternative options, it is argued, converts the triad into a dyadic

relationship as the landlord loses the ability to influence the peasant's trading relationships. This then changes the utility functions as follows:

$$U_P = Y_P + [wl - \psi(l)] + [\tau(x_P) - Px_P] + [w'l - \psi'(l)]$$

$$U_M = Y_M + [Px_P + Px_L + Px_O] \quad \text{where } x_L > x_P,\ x_O \leq x_L \text{ and } 0 \leq \alpha \leq 1$$

$$U_L = Y_L + \alpha[\pi - wl] + [\lambda(x_L) - Px_L] - \phi(d_M) - \phi(d_o)$$

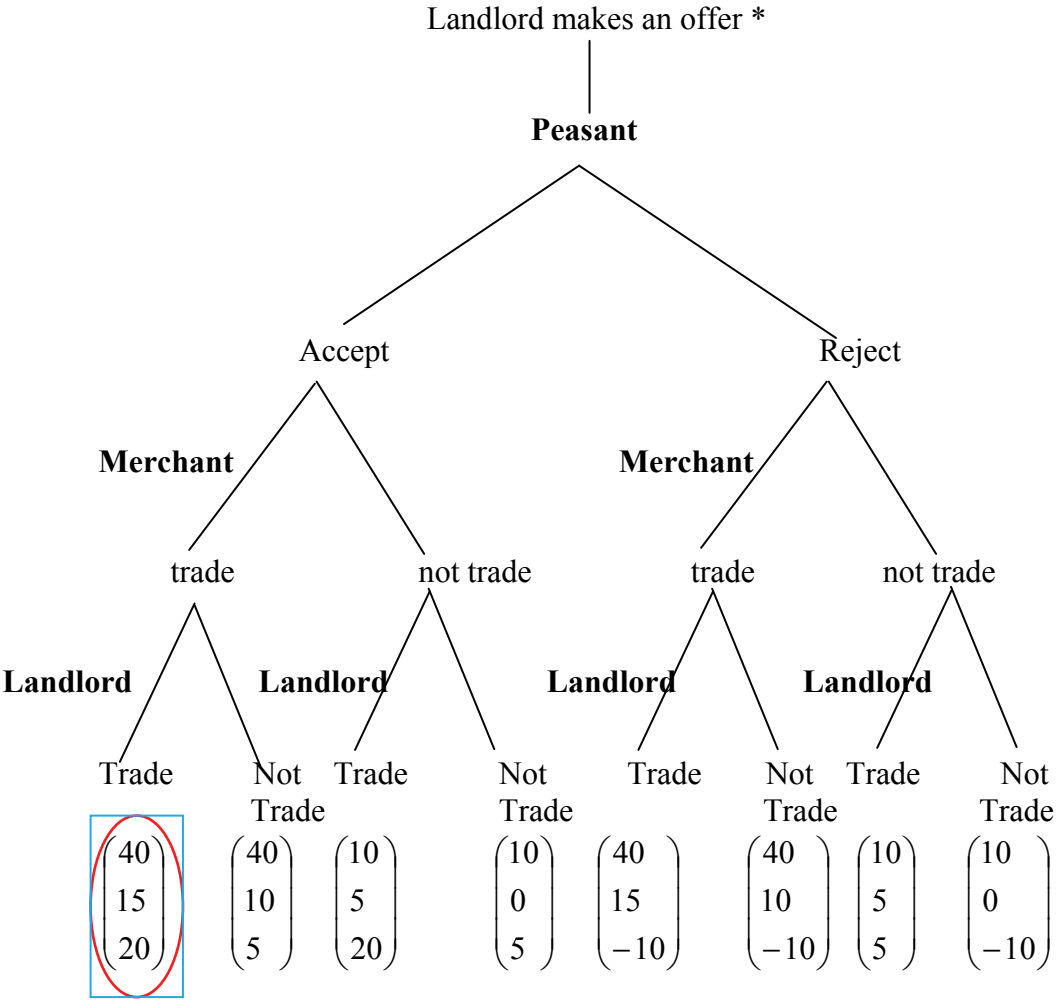
Utilities are calculated in the appendix.

The availability of outside options enables the peasant to get $[w'l - \psi'(l)]$ from his alternative options if he rejects the landlord's offer. Therefore in order to enlist the peasant's services the landlord has to offer him his reservation value, otherwise the peasant will always reject the offer. The merchant's utility function remains unchanged. As for the landlord's utility function, $\phi(d_o)$ now represents the disutility if either the merchant or the peasant or both engage with their outside options. The payoffs of the game are as follows. The peasant gets 30 whether he accepts the landlord's offer (A) or if he rejects it (R), as he will get the same amount from his outside options. The peasant also gets 30 from trading with the merchant. The merchant's payoffs are as before; 10 from trading with the peasant (t), 10 from trading with his outside options (N) and 15 from trading with the landlord (T). Lastly, the landlord gets 20 if the peasant agrees to work for him and the merchant trades with him. If the merchant and peasant refuse to cooperate with the landlord and trade outside the village he experiences additional disutility giving him an overall payoff of -5. Also if the merchant trades with a non-complying peasant he experiences a disutility of -5. This game is depicted in Figure 4.

The merchant now has a dominant strategy to always trade with the peasant, irrespective of whether the peasant accepts or rejects the landlord's offer. Knowing this the landlord will always trade with the merchant as he lacks the ability to influence the merchant's actions in any way. Also since the peasant is

offered his reservation value he will accept the landlord's offer. Thus the single interaction Nash equilibrium is (A,t,T), i.e. the peasant accepts the landlord's offer, the merchant trades with the peasant and the landlord chooses to trade with the merchant. No one in this game can do any better by changing strategies and so the equilibrium remains unchanged under repeated interaction.

Figure 4: *Merchant and Peasant Have Outside Options*



* Details of the payoff calculations are given in Appendix 1.
The payoffs are (peasant, merchant, landlord).
Single interaction Nash equilibrium.
Repeated interaction Nash equilibrium.

The outcomes of these games allow us to formulate two hypotheses, one at the village level and the other at the individual level:

1. *Market intervention should expose villagers to alternative avenues of provision, thus reducing and/or breaking market interlinkages and the exploitative hold of the resource rich.*
    a. *The beneficial effects of the market should be felt more strongly by peasants residing in villages with asymmetric distribution of resources.*

2. *Within the village the benefits of market exposure should be felt most by peasants who are landless and/or have low social status, making them highly vulnerable to exploitation. These peasants would have the greatest incentive to break out of this relationship.*

Infiltration of the market, and the alternative options that come with it, are thus hypothesised to be one viable way of reducing the exploitative powers of the landlord as he is unable to control or collude with them. The next section, making use of data collected in Hafizabad district, Pakistan finds that while interlinkages continue to exist even in close proximity to a major highway, their nature is considerably less exploitative when compared to those found in isolated villages.

3. Empirical Analysis

The rationale for situating the study in Pakistan was driven by two considerations. Firstly, large scale inequality has meant that most income generating assets in rural communities tend to get concentrated in a few hands (see for example

Gazdar 2000, Hussain 1989, Rouse 1988). This enables resource holders to provide villagers with multiple services, causing markets to get interlinked. Secondly, poor infrastructure has meant that many villages are fairly isolated, making it very difficult and costly, for peasants to travel outside the village. Moreover, due to bad road networks few outsiders ever pass through the village economy, which further isolates peasants from the outside world. This combination of the high cost of travelling and the lack of outside visitors greatly reduces peasants' options for fulfilling their needs, thus making them highly dependent on the local landlord (Rouse 1988).

What further made Pakistan a good choice for this study is the motorway constructed by the federal government in 1998, connecting Lahore (a major cosmopolitan city and the provincial capital of Punjab) to Islamabad (the capital of the country). Along the 365 km of this road there are multiple exits, each of which has a link road that goes to the nearest city/town, and runs past previously unconnected villages. In this study, proximity of a village to the motorway is measured by its distance to a link road and not the motorway itself as the motorway is a fenced off road. Since the construction of the road there has been a marked increase in traffic passing through the villages, bringing with it economic opportunities in the form of road side cafes, vehicle repair shops, general stores etc. Moreover, the road has led to an increase in transport facilities available to the peasants, thus pushing down the cost of travelling to the nearby towns and cities, both in terms of waiting time and money.[21]

The motorway was constructed with the aim to eventually connect all the major cities in the country. The location of the motorway was determined by the federal

[21] The journey to the city took between 10 to 20 minutes. This same journey previously took them two to three hours due to the long wait for a ride to come along and the slow pace at which it travelled due to the bad road. Moreover, households reported travelling both for work and pleasure, something they said was very difficult before the construction of the road. The deserted nature of the bad roads had meant that travelling at night was considered dangerous as it put travellers at risk of being robbed. Hence they avoided journeys that required them to return in the dark.

government based on three main considerations – geography, connectivity and defence (Republic Engineering Corporation Limited 1988).[22] Firstly, efforts were made to ensure that the road ran through as few geographical hazards as possible so as to minimise the risk of road accidents.[23] Secondly, the federal government wanted to connect these two major cities with a motorway that was not very close to the old highway, and one which passed through as many towns and villages as possible without hampering the economic benefits to traders.[24] Lastly, the Air Force has a bombing range situated between Lahore and Islamabad which made some of the suggested routes unusable. None of these factors are systematically related to specific village characteristics.

There were rumours however, that the placement of the road was changed from the original plan so as to allow it to run past the lands of large landlords. While I was unable to find evidence to confirm this, I identified areas where the motorway was not altered from the original plan in any way. Among these was Hafizabad, Punjab. In the area selected for this study the landlords, while commanding considerable authority in their own villages, would be considered part of the lower middle class in urban settings. This was quite evident from the houses they lived in, the cars they drove, the schools they sent their children to and their own levels of education. Therefore, they lacked the influence needed to alter the federal government's decision regarding the placement of a national highway. Hence the decision to make the motorway run through this area was independent of individual village level characteristics, making it an exogenous shock to the village economies and social relations.

[22] Mr. Chaudry Muhammad Altaf, Chairman National Highway Authority, interview, 15 April 2008.
[23] Particular attention was paid to a salt range situated between Lahore and Islamabad, as passing through the salt range required the construction of winding roads which, it was believed, would increase the chances of motor accidents. Therefore the government wanted to minimise the stretch that ran through this area.
[24] The benefits of connecting additional towns and villages had to be weighed against the costs of the route between the two main cities being stretched to facilitate increased access.

3.1. Methodology

The empirical strategy adopted is to use household level surveys, collected from villages both close to and far from the motorway, and with variation in their land tenure system. These surveys allow us to analyse the role households' economic and social status plays in determining their chances of having their markets interlinked and the nature of their relationship with the landlord. Furthermore, variation in land tenure systems enables us to evaluate whether, as per Hypothesis 1, landlords in villages with high inequality (landlord based villages) are able to use isolation to their advantage by playing the exploitative triadic interaction game. On the other hand, in villages with dispersed land ownership (peasant based villages), we would expect there to exist a multiplicity of service providers, thus limiting the extractive powers of the resource owners, as peasants should have the ability to switch providers if they deem the exchange to be exploitative.

The area chosen was Hafizabad district in Punjab, Pakistan. The motorway passes through the district with two exits connecting it to the Hafizabad City and Pindi Bhattian.[25] Within the district, 8 villages located at varying distances from the motorway were chosen. Hafizabad district has considerable variation in its land distribution, making it possible to find both landlord based villages as well as peasant based ones.[26] It is worth mentioning that within both types of villages the incidence of landlessness is quite high. The difference is that while no single landowner is powerful enough to wield control in peasant based villages, the main landowner in landlord dominated villages is large enough to be, for most peasants, the main source of employment, both in the fields and for domestic work, the

[25] This study focuses on the exit to Hafizabad City.

[26] Land distribution was historically determined by the British revenue collecting machinery making it exogenous to this model. For a discussion on land distribution under British rule over India see Nelson (2010).

owner of their homestead land, and, most of the time, the main source of credit.[27] Thus, to evaluate the differential impact of connectivity on these two types of villages, four of the eight selected villages are dominated by a large landlord[28] while four are peasant based villages. Moreover, for each group, two villages are found to have the motorway run through them, while two are situated far away. Distant villages were situated between 8 and 11 km from the road.

	Landlord Dominated	Egalitarian
Close to the Motorway	2	2
Far from the Motorway	2	2

Apart from connectivity, the descriptive statistics in Table 1 reveal that the 8 villages are relatively very similar. We can see that 68% of households close to the road and 69% of those that are far away derive their primary source of income from agriculture, working as self-cultivators, sharecroppers, tenant farmers or agricultural labourers. However, even though almost 70% draw their livelihood from land, 51% of households close to the road and 54% of those that are far, do not own land themselves. Moreover, the road has done little to reduce poverty in the villages as the average monthly spending of households was $109 and $101 for those situated close and far from the motorway, respectively.[29] These spending levels were meant to sustain, on average, 8 people living in a 3 room house, and enabled only 80% of households in connected villages and 74% in far away villages to consume three meals daily. Moreover, illiteracy is relatively high in these villages with 50% households in connected villages and 48% in isolated

[27] The time honoured tradition between large patrons in South Asia of not accepting other patrons' defecting peasants (Platteau 1995) has meant that, even if there existed 2 or 3 large patrons in landlord based villages each patron would still be able to behave as a monopolist/monopsonist.
[28] A landowner is considered to be a dominant landlord if his land holding is greater than 100 acres. In this sample, land holding of the patron varied from 100 acres to 300 acres.
[29] Most households claimed to spend everything they earned.

ones being headed by an illiterate person.[30] Despite this 75% in villages far from the road sent their children to school, illustrating the importance placed on education. The corresponding figure for villages in proximity to the motorway was 78%.[31]

Table 1: Descriptive statistics:

	Villages connected to the road	Villages far from the road
Percentage households engaged in agriculture	68%	69%
Percentage households who are landless	51%	54%
Average household spending	$109	$101
Percentage of households having three meals a day	80%	74%
Average number of rooms in the house	2.95	3.2
Average number of people in the house	8.3	8.3
Percentage of households headed by an illiterate person	50%	48%
Percentage of households sending their children to school	78%	75%

Given the relative similarities between the villages it is therefore safe to make the counterfactual that, prior to the construction of the motorway the outcomes in villages close to the road would have been largely similar to those found in isolated ones. Therefore, this allows us to use the spatial variable (close and far) as a proxy for time (before and after) with respect to the road, thus overcoming the disadvantage faced by the absence of any data collected in the region prior to my fieldwork.

[30]The head of the household's education level is important because he or she is the main decision maker.

[31] The households that failed to send their children to school cited reasons such as the school being too expensive, education being un-Islamic, or the need for the child to work to supplement the family income.

The household level surveys were conducted by a team of 14 surveyors, supervised by myself, over a period of three months. The surveying process involved mapping the villages,[32] identifying the biradery (kinship group) of each household and surveying the selected households. The surveys were collected from a stratified random sample of 20% households. Stratification was done along biradery lines as literature on South Asia documents this as being a good proxy for social status and relative bargaining power (see for example Alavi 1972, Ahmad 1977, Cheema and Mohmand 2007). The aim was to ensure that the sample was representative of all biraderies so that the results were not biased due to over or under sampling of particular social groups. The survey used was broadly divided into four sections; public goods provision, politics, socio-political needs and household profile. It asked questions regarding five markets; employment, credit, housing, dispute resolution and voting patterns. For each market the household was asked who the supplier was and if they had any other relationship with him. Moreover, questions were also asked regarding the terms of the exchange.

A household is defined to be in an interlinked relationship if it has two or more markets supplied by the same person. For example, if members of the household are employed as agricultural labourers and they live in a house provided by the landlord then the household is considered to have its markets interlinked. The same is true if the household takes a loan from the same person who owns their house and solves their disputes. Furthermore, for the purpose of this analysis interlinkages are split into two types; labour-tying and non-labour based interlinkages. Labour-tying interlinkages arise when the household's labour market is tied to other markets, e.g. if members from the household are employed as agricultural workers, take loans from their employer and live in a household owned by their employer. Non-labour based interlinkages, on the other hand, are those where markets other than employment are interlinked e.g. if the household

[32] There are no official or unofficial maps of these villages. My maps are the first record of the layout of these villages, at least since 1947.

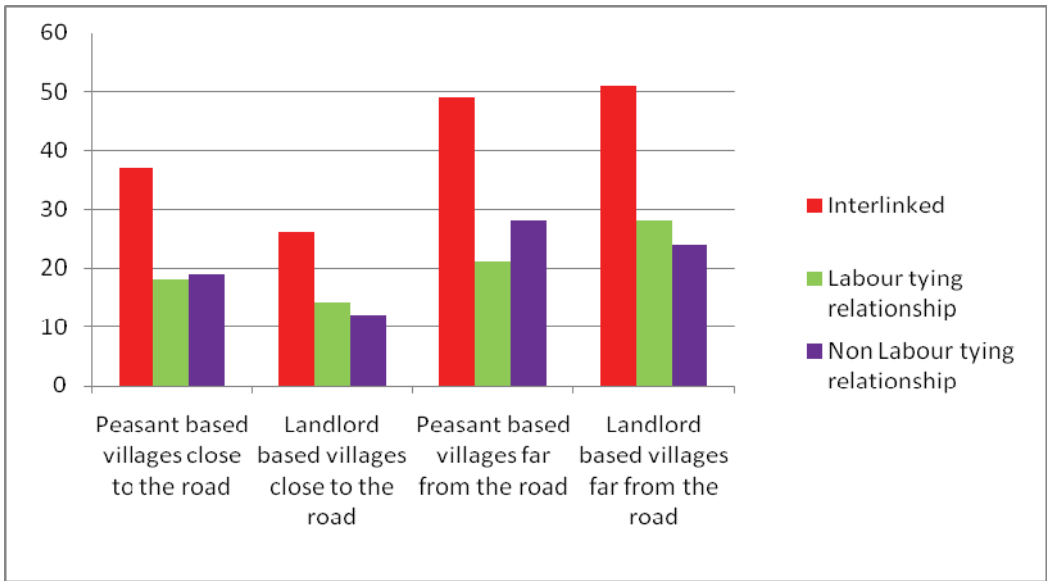
takes a loan from the same person who solves their disputes and owns their house. The rationale for splitting interlinkages into these categories is the perceived variation in the power relations. In labour-tying interlinkages peasants have relatively low bargaining power as their livelihood, and thus their survival, is dependent on them agreeing to the resource holder's terms in other markets. This low bargaining power enables the resource rich to play the exploitation game as peasants are not in a strong enough position to reject his offer. However, in the case of non-labour based interlinkages, peasants are believed to have some level of leverage as it can be claimed that, even without access to several markets, their survival is still ensured due to the independence of the labour market,[33] arguably limiting the sanctioning powers of the resource holder. Moreover, given its low potential for exploitation, I conjecture that these interlinkages are driven more by a desire for efficiency than for surplus extraction.

3.2. Basic Model

Figure 5 illustrates the extent of interlinkages found across the different types of villages, highlighting the greater percentage of households found to be in an interlinked relationship when situated in an isolated village. We can see from the graph that in all four types of villages labour-tying and non-labour tying interlinkages co-exist, pointing towards the inability of the resource rich to control the entire village. Moreover, a larger percentage of households have their markets interlinked in isolated villages than those connected by a highway, significant at the 1% level. Also, in secluded villages land tenure system has no significant effect on the overall level of interlinkages, but it does appear to impact the distribution between the two types of interlinkages. In landlord based villages a larger percentage of households are in a labour-tying relationship while in peasant based villages there is a greater tendency towards non-labour tying relationships. The evidence suggests that the motorway has helped reduce both types of interlinkages, significant at the 10% and 5% level respectively.

[33] This is on the assumption that an independent labour market would enable the peasant to buy the goods needed for basic survival.

Figure 5: Level of interlinkages across the different types of villages:



Lastly, the impact of connectivity appears to be stronger in landlord dominated villages than in peasant based ones. This could be explained by the difference in the nature of the interlinked relationship and the peasants' attitude towards the service provider in the two types of villages. In peasant based villages, dispersed land ownership has created a large number of suppliers in the market, limiting the ability of the resource holder to exploit the peasant.[34] Markets in these villages were interlinked largely in an effort to increase efficiency, as high transaction costs make it costly to engage with peasants in only one market.[35] Thus it is mostly a functional relationship and reduces the incentive of the peasants to break out of it, even when connected by the motorway. However, in the case of landlord based villages high inequality restricts the options available to villagers, thus giving the landlord the ability to establish triadic relationships with the peasants. The high potential for exploitation in these types of interlinkages, as illustrated in the previous section, should incentivize peasants to break out of this relationship when presented with external options. Hence the only way for landlords to

[34] While landowners may be able to exploit, to some extent, the extremely poor members of society, the level is still much lower than that in landlord dominated villages.
[35] Large information costs expose service providers to potential risks (Basu 1983).

interlink markets in connected villages is to play the non-exploitative dyadic interaction game.

When talking to villagers in landlord dominated villages it was interesting to hear the difference in their attitude towards the landlord depending on their level of seclusion. In isolated landlord dominated villages peasants found the question of defying the landlord absurd and unthinkable. Their response to such a query would often be *"Where would we go if we defied him?,"* [36] or *"How would we feed our children if he cuts us off?"*[37] This fear of the landlord was not shared by villagers close to the road. When asked why the household aligned with the landlord the responses were usually: *"He provides for our needs."* [38], or "*Because he helps get us drains and paved streets.*" [39], or *"He listens to us and does good work around the village."* [40] Moreover, these households were very clear that, if the exchange with the landlord became unfair or exploitative, they would not hesitate to look for other service providers in the market.[41]

3.3. Extended Model

The tables that follow run more rigorous tests to see if the results found through the descriptive statistics hold after controlling for household specific characteristics. Moreover, the tables also analyse whether household characteristics impact its chances of being in an interlinked relationship. The following logit regression model is run to test for this:

$$Y = \alpha + \beta_1 MW + \beta_2 LL + \beta_3 Edu + \beta_4 Exp + \beta_5 Bh + \beta_6 Kh + \beta_7 An + \beta_8 MS + \xi \quad (1)$$

[36] Household ID 45, interview, Isolated landlord dominated village 1, 16 May, 2008.
[37] Household ID 286, interview, Isolated landlord dominated village 2, 24 May, 2008.
[38] Household ID 249, interview, Connected landlord dominated village 1, 3 May, 2008.
[39] Household ID 284 and 247, Connected landlord dominated village 1, 3 May, 2008.
[40] Household ID 396, 393 and 407, interview, Connected landlord dominated village 2, 23 May, 2008.
[41] This was particularly true when talking to the younger generation in the household. Household ID 258 and 266, interview, Connected landlord dominated village 1, 3 May, 2008. Household ID 381, interview, Connected landlord dominated village 2, 23 May, 2008.

$$Y = \alpha + \beta_1 MW + \beta_2 LL + \beta_3 MW*LL + \beta_4 Edu + \beta_5 Exp + \beta_6 Bh + \beta_7 Kh + \beta_8 An + \beta_9 MS + \xi \quad (2)$$

Where Y= The household has its markets interlinked.

MW= Household is situated in an isolated village.

LL= Household resides in a village dominated by a large landlord.

Edu = Education level of the household head.

Exp = Average household expenditure per month.

Bh= Household belongs to the Bhatti biradery.

Kh = Household belongs to the Kharral biradery

An= Household belongs to the Ansari biradery

Ms= Household belongs to the Muslim Sheikh biradery.

Y is a binary variable capturing whether the household is in an interlinked relationship or not. It takes the value of 1 if the household has two or more markets supplied by the same person, 0 otherwise. Moreover, when analysing the effect of the road on labour-tying relationship Y takes the value of 1 only if the household's labour market is tied to another market. If the household is in a non-labour tying interlinked relationship than Y is 0. The opposite holds when looking at non-labour tying relationships. Distance from the road, MW, takes the value of 1 if the household resides in an isolated village and 0 otherwise. Distance is analysed as a binary variable and not as a continuous one due to the research design which chose to look at villages which were polar opposite, i.e. while half are situated on the motorway the other half are far enough to be classified as being isolated. Within this setup modest changes in distance are irrelevant.[42] LL is a dummy variable for whether the household resides in a village dominated by a large landlord. Edu captures the number of years of schooling of the household head, included on the assumption that he or she is the main decision maker in the

[42] This research design was, amongst other things, driven by practical considerations, as trying to find the distance from the road after which villagers are isolated would have been extremely expensive and would have required looking at a large number of villages.

house.[43] This variable is included on the assumption that education, due to the awareness that comes with it, reduces the households' chances of engaging in an exploitative relationship. Exp measures the total monthly expenditure for running the household, incorporated as an indicator for the household's economic standing.[44] This helps evaluate whether economically better off households are less likely to be in an interlinked relationship. The variable MW*LL in equation 2 is an interaction term meant to capture the effect of belonging to a landlord dominated village far from the motorway. In equation 2, due to the presence of the interaction term, MW now captures the effect of the road on peasant based villages only; i.e. it assumes LL is taking the value of 0. Similarly LL captures the effect of land tenure systems on villages close to the road only; i.e. when MW is 0.[45]

The last four variables are dummies for the major biraderies found in the villages, meant to control for the social status of the household.[46] Bh and Kh represent the upper class biraderies of Bhattis and Kharrals. These were historically the land owning classes,[47] who enjoy a high status in village society, especially as they often share their biradery with the landlord. Their elevated social status places them in a slightly better position vis-à-vis the landlord when compared to the lower classes, making them synonymous to the merchant in our previous model. However, as we saw from the model, when isolated they too are vulnerable to exploitation. An takes the value of 1 if the household belongs to the Ansari biradery. These households were historically not allowed to own land which lowered their social status considerably. Lastly, MS is 1 if the household is a Muslim Sheikh. They too, like the Ansaris, were previously not allowed to own land and belong to the lowest strata of society. However, their status is even lower

[43] Household interviews revealed this to be the case.
[44] This figure is verified by asking the household questions about their consumption patterns and then checking if the consumption matched the stated level of spending. Moreover, most households claimed to have no savings.
[45] The effect of that variable cannot be read off the table directly. It requires further computation.
[46] For a detailed discussion on social stratification and biradery status in a Punjabi village see Ahmad (1977).
[47] Bhatti and Kharral households are considered to be upper class even if they do not own land.

than the Ansaris due to this biradery being responsible for doing menial tasks within the village which most other households find demeaning (e.g. cleaning the sewers). The low economic and social status of these biraderies makes them similar to the landless peasants from our model, who were found to be extremely vulnerable to exploitation.[48] The reference category is the small middle class biraderies.

Table 2 presents the results for Equations 1 and 2 enquiring whether the household is in any kind of interlinked relationship. Starting with column 1 we find that, in line with Figure 5, households situated in isolated villages are 23% more likely to be in an interlinked relationship when compared to those residing in connected villages. This result is significant at the 1% level. Moreover, column 1 finds that being situated in a landlord dominated village reduces the households' chances of being in an interlinked relationship by 13% (significant at the 1% level). However, as can be seen from column 2, this result is largely driven by the low levels of interlinkages found in landlord dominated villages close to the motorway. The education level of the household head lowers the probability of a household having its markets interlinked by 2% for every year of schooling attended.[49] This result is also significant at the 1% level. Household expenditure, on the other hand, has a significant but not very substantial effect on the household's chances of being in an interlinked relationship.

Including the interaction term in column 2 does not take away the significant effect of connectivity, highlighting the positive effect connectivity has had on peasant based villages. Furthermore, in landlord dominated villages situated on the motorway, a household's chances of having the same provider for multiple markets is significantly reduced. However the interaction term itself is not found

[48] While there are now no legal restrictions against these two biraderies owning land, most of them were found to be landless.
[49] It must be pointed out that the effect of education on interlinkages is most likely not linear. The effect is probably stronger in the first few years and then tapers off with additional years of schooling.

to be significant, supporting the findings in Figure 5 that in isolated villages, land tenure systems have no impact on the households' chances of having their markets interlinked. This is not a surprising result as isolation leads to a reduction in the options available to peasants and an increase in transaction costs, both of which were cited as contributing factors for market interlinkages in Section 1.

Table 2: Is the household in an interlinked relationship?

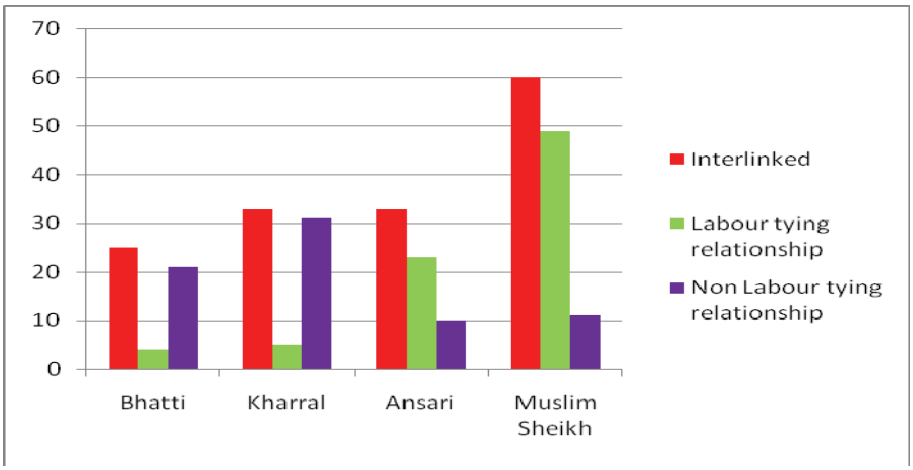
	Basic Model	
	(1)	(2)
Household is situated in an isolated village	0.23***	0.2***
	(0.00)	(0.00)
Household belongs to a landlord dominated village	-0.13***	-0.17**
	(0.01)	(0.02)
Household resides in an isolated landlord dominated village		0.08
		(0.55)
Education level of the household head	-0.02***	-0.019***
	(0.01)	(0.01)
Expenses (per Rs. 1000)	-0.005**	-0.005*
	(0.04)	(0.06)
Bhatti	-0.21***	-0.19***
	(0.00)	(0.00)
Kharral	-0.045	-0.06
	(0.11)	(0.24)
Ansari	-0.13**	-0.13***
	(0.02)	(0.01)
Muslim Sheikh	0.22***	0.22***
	(0.00)	(0.00)
N	356	356
R^2	0.1192	0.1200

Robust standard errors calculated; p-values in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The table also highlights the significant impact that the households' biradery has in determining its chances of being in an interlinked relationship. Muslim Sheikhs, the most disadvantaged in village society, are 22% more likely to have their markets interlinked while the Bhattis, who make up the upper class of rural society, are 19% less likely, than any other biradery, to be in an interlinked relationship. These results are in line with our expectations. However, a curious result is the lower chances of Ansari households of having their markets interlinked. In order to analyse this further Figure 6 splits the data by biradery to

see the level and type of interlinkages that households from different social groups find themselves in.

Figure 6: Interlinkages across different biraderies:



The Muslim Sheikhs are by far the worst off with 60% of households having their markets interlinked in one form or another and 49% being in a labour-tying relationship. The Ansaris, on the other hand, due to their slightly more elevated status are better off with only 33% having their markets interlinked. This is similar to the level of interlinkages amongst the upper class Kharral households. However, where they differ from the Kharrals is in the type of interlinkages they find themselves in. Whereas most Ansaris have their labour market tied to other markets, Kharrals are more likely to enjoy a relatively independent labour market. The same holds true for Bhatti households; by far the majority have an independent labour market. The high status enjoyed by the Bhattis and Kharrals makes it highly unlikely that they will find themselves in an exploitative labour-tying relationship.

Table 3 goes on to analyse the impact of connectivity, land tenure system and household status on the chances of a household engaging in a labour-tying relationship. Starting with the basic model we find that households situated far from the motorway are 8% more likely to have their labour market tied to other

markets. This result is significant at the 5% level. Land tenure system, on the other hand, has no significant impact on the households' chances of having an interlinked labour market. Moreover, including the interaction term in column 2 takes away the significant effect of the road and the interaction term itself is not significant either.

Table 3: Is the household in a labour-tying relationship?

	Basic Model		Close to The Motorway	Far From The Motorway
	(1)	(2)	(3)	(4)
Household is situated in an isolated village	0.08**	0.04		
	(0.05)	(0.19)		
Household belongs to a landlord dominated village	0.01	-0.04	-0.12	0.11
	(0.77)	(0.33)	(0.31)	(0.30)
Household resides in an isolated landlord dominated village		0.12		
		(0.31)		
Education level of the household head	-0.015***	-0.01***	-0.06***	-0.01***
	(0.00)	(0.00)	(0.00)	(0.01)
Expenses (per Rs. 1000)	-0.006**	-0.06**	-0.02**	-0.0058
	(0.05)	(0.05)	(0.05)	(0.18)
Bhatti	-0.12***	-0.11***		-0.15***
	(0.00)	(0.00)		(0.00)
Kharral	-0.15***	-0.16***		-0.18***
	(0.00)	(0.00)		(0.00)
Ansari	-0.0001	-0.003	-0.13**	0.08
	(1.00)	(0.93)	(0.05)	(0.35)
Muslim Sheikh	0.15***	0.16***	0 13	0.31***
	(0.01)	(0.01)	(0.12)	(0.01)
N	356	356	90	182
R^2	0.2673	0.2735	0.2566	0.1941

Robust standard errors calculated; p-values in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The more interesting story emerges when we analyse the impact of household specific characteristics. Starting with education we find that, once again, the education level of the household head has a significant impact on reducing the chances of the household having their labour market interlinked with others (significant at the 1% level). Also, as before, the impact of household expenditure is significant but not substantial. Turning next to the role of household biradery it can be seen that, in line with Figure 6, Bhatti and Kharral households are 11% and 16% respectively less likely to have their labour market interlinked with another

market. Muslim Sheikh households, on the other hand, are 15% more likely to be in a labour-tying relationship. These results are significant at the 1% level.

Columns 3 and 4 split the data by distance to the motorway to see if connectivity impacts the role of households' status on their chances of being in a labour-tying relationship. It can be seen that Muslim Sheikhs, situated in isolated villages, are 31% more likely than any other biradery to be in a labour-tying relationship, significant at the 1% level. These households are some of the poorest in rural society and have always been considered part of the lowest strata in the village[50] (Ahmad 1977). Moreover, almost all of them are landless which, combined with their low social status, limits their options, thus making them highly prone to exploitation. Hence, when presented with alternative options, they appear to be breaking away from this exploitative relationship, as column 3 finds that, in villages close to the motorway, belonging to the Muslim Sheikh biradery no longer presents a disadvantage in terms of being in a labour-tying relationship. Results for the Ansaris show those situated in connected villages to be 13% less likely to engage in a labour-tying relationship, significant at the 5% level. Hence it seems that, as per hypothesis 2, the road is taking away the age old disadvantage of belonging to the lower classes (Ahmad 1977, Rouse 1988). However, this is not to say that connectivity is not impacting the upper class of society. In villages connected to the external economy there are no Bhatti or Kharral households engaged in labour-tying relationship.

Table 4, inquiring into households engaged in non-labour based interlinkages, finds that those in isolated villages are 13% more likely to be engaged in such types of interlinkages than those situated close to the motorway, significant at the 1% level. However, from column 2 we can see that it is peasant based villages, rather than landlord dominated ones, that favour these relationships. Households in isolated landlord based villages are 8% less likely to be in a non-labour based

[50] Most villagers do not like even associating with the Muslim Sheikhs. While collecting data I was often told by other households not to bother interviewing the Muslim Sheikhs as *"They are unimportant and their opinion is not worth anything."* (Key respondent 9).

relationship, significant at the 5% level. In fact, when we split the data by distance from the road, we find that households in isolated landlord based villages are 23% less likely to engage in a non-labour based relationship when compared to similarly isolated peasant based villages (significant at the 1% level). This is not entirely unexpected when we consider that this is a relationship born more out of the desire for efficiency and has low exploitative powers. Therefore, a landlord wanting to maximise surplus extraction, and able to do so because of isolation, would be more inclined to tie-in the labour market.

Table 4: Is the household in a non-labour tying relationship?

	Basic Model		Close to The Motorway	Far From The Motorway
	(1)	(2)	(3)	(4)
Household is situated in an isolated village	0.13***	0.17***		
	(0.00)	(0.00)		
Household belongs to a landlord dominated village	-0.12***	-0.07*	-0.06	-0.23***
	(0.00)	(0.06)	(0.18)	(0.00)
Household resides in an isolated landlord dominated village far from the motorway		-0.08**		
		(0.03)		
Education level of the household head	0.0007	-0.00008	0.00012	-0.00043
	(0.83)	(0.98)	(0.95)	(0.95)
Expenses (per Rs. 1000)	-0.0005	-0.0007	0.0013	-0.003*
	(0.8)	(0.66)	(0.65)	(0.07)
Bhatti	-0.02	-0.03*	-0.047	-0.05
	(0.56)	(0.07)	(0.3)	(0.27)
Kharral	0.15***	0.17***	0.15***	0.24***
	(0.00)	(0.00)	(0.00)	(0.00)
Ansari	-0.13*	-0.13*	-0.03	-0.20**
	(0.07)	(0.07)	(0.83)	(0.03)
Muslim Sheikh	-0.07	-0.07	0.02	-0.14
	(0.39)	(0.37)	(0.87)	(0.11)
N	356	356	174	182
R^2	0.0752	0.0773	0.0727	0.0720

Robust standard errors calculated; p-values in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Turning to the effect of household level characteristics on non-labour based relationships, we find that the education level of the household head and the households' average spending levels have no impact on the probability of the household being in a non-labour tying relationship. Furthermore, we can see that

belonging to the Muslim Sheikh biradery also has no significant impact on households' chances of being in a non-labour tying relationship. This can largely be attributed to high levels of poverty amongst Muslim Sheikh households, making it difficult for them to keep their labour market independent. This is true in both isolated and connected villages. Kharral households, on the other hand, have a 15% higher probability of engaging in a non-labour tying relationship. This result is significant at the 1% level. This effect is even stronger when looking at the Kharrals in isolated villages.

Given the disadvantage Muslim Sheikh households face, it is worth investigating what is driving this, i.e. is it due to their landlessness, and the resultant poverty forcing them to approach the landlord, or their low social status, making it difficult for them to break out of exploitative relationships? We can try and tease this out by observing if all landless households suffer from higher chances of having their markets interlinked or if it is specific to Muslim Sheikhs. Table 5 makes use of a restricted sample to analyse the effect of connectivity and land tenure systems on the chances of a landless household being in a labour-tying relationship. From the table we can see that distance from the road increases households' chances of being in any type of interlinked relationship by 16%, significant at the 10% level. However, including the interaction term takes away the significance of the motorway variable and the interaction term too is not significant. As before, the household head's education level lowers their chances of interlinking their labour market, significant at the 5% level. Interestingly, from columns 3 and 4 we can see that the positive effects of education are confined to connected villages, as these are where peasants actually have the option to break out of exploitative relationships.

Moreover, looking at the impact of biradery we find that even amongst the landless, Muslim Sheikhs are significantly more likely to have their labour market interlinked when compared to other biraderies. Furthermore, landless Bhatti and Kharral households are 22% and 28% less likely to be in a labour-tying

relationship. These results too are significant at the 1% level. This gives weight to the argument that Muslim Sheikh households are disadvantaged, not so much because of poverty, as these are all landless households, but more so because of their low social status. However, connectivity is helping to reduce this disadvantage, as from columns 3 and 4 we find that, while Muslim Sheikh households in isolated villages are 25% more likely than any other biradery to have their labour market interlinked, significant at the 1% level, in villages connected to the motorway belonging to this biradery has no significant effect.

Table 5: Is the household in a labour-tying relationship? (Landless households only)

	Basic Model		Close to The Motorway	Far From The Motorway
	(1)	(2)	(3)	(4)
Household is situated in an isolated village	0.16*	0.1		
	(0.07)	(0.19)		
Household belongs to a landlord dominated village	-0.04	-0.10	-0.13	0.08
	(0.65)	(0.28)	(0.33)	(0.57)
Household resides in an isolated landlord dominated village		0.14		
		(0.43)		
Education level of the household head	-0.03**	-0.03**	-0.06***	-0.01
	(0.03)	(0.03)	(0.01)	(0.54)
Expenses (per Rs. 1000)	-0.01	-0.01	-0.025*	0.01
	(0.25)	(0.24)	(0.08)	(0.89)
Bhatti	-0.22***	-0.20***		-0.18***
	(0.00)	(0.00)		(0.00)
Kharral	-0.28***	-0.28***		-0.29***
	(0.00)	(0.00)		(0.00)
Ansari	-0.06	-0.06	-0.16**	-0.006
	(0.34)	(0.41)	(0.02)	(0.95)
Muslim Sheikh	0.19***	0.19***	0.14	0.25***
	(0.00)	(0.00)	(0.12)	(0.00)
N	198	198	81	105
R^2	0.1429	0.1462	0.2242	0.0995

Robust standard errors calculated; p-values in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Overall the results paint an interesting picture of how social and spatial characteristics interact to determine market interlinkages. First and foremost, we find that markets continue to be interlinked in rural Punjab, both in villages dominated by a large landlord as well as peasant based ones. However, the nature

of the relationship varies considerably in the different types of villages and amongst households of different social standing. In peasant based villages the multiplicity of service providers restricts the ability of the resource holder to exploit the peasant, even when engaged in a labour-tying relationship. It has been argued that interlinkages in these villages are created more for the service provider to protect himself from potential losses than for him to extract surplus. In isolated landlord dominated villages, on the other hand, the evidence is consistent with the findings of the game theoretic model which argued that the landlord is able to use inequality and seclusion to his advantage so as to establish triadic relationships with the possibility of forcing peasants to engage in transactions that lower their utility.

Secondly, the tables highlight that the most disadvantaged group in these villages are the Muslim Sheikh households, not just because of their extreme poverty, but also due to their low social status. These households are seen to play a role similar to the landless peasants from the game theoretic model in Section 2, who have relatively little, if any, access to the external market thus making them highly vulnerable to exploitation. The Kharrals and the Bhattis, on the other hand, play the role of the merchant trading social interaction. In isolated villages they too have restricted options, though they are better off than the Muslim Sheikhs due to their higher social status and the fact that some of these households own land. The question then is; if a Muslim Sheikh peasant was to reject the landlord's offer would the Bhattis and Kharrals comply with the landlord's wishes and ostracise him, or would they defy the landlord and continue to interact with the defector? In the presence of seclusion, the landlord provides Bhatti and Kharral households with social (dispute resolution and social insurance) and political (public goods provision and access to the local politician) goods which they otherwise do not have access to. The Muslim Sheikhs, on the other hand, can only offer their labour[51] and their support in case the upper class households decided to engage in collective action. Thus, in an isolated economy, the upper class have more to gain

[51] These are mostly unskilled households that can only perform odd jobs around the village.

from interacting with the landlord than with the Muslim Sheikhs, and so they are more likely to comply with the wishes of the landlord. Being aware of this the Muslim Sheikhs are unlikely to reject the landlord's offer, even if it lowers their utility.[52] This can be seen by the high percentage of Muslim Sheikh households found in a labour-tying relationship. However, as the tables show, this disadvantage is limited to isolated villages. For Muslim Sheikh households residing in villages close to the motorway, their social status has no significant impact on their chances of being in an interlinked relationship. Connectivity, similar to peasant based villages, leads to peasants having access to multiple service providers, thus limiting the landlord's ability to exploit them.

4. Conclusion

Market interlinkages provide development researchers with two problems. Firstly, they have the potential for being exploitative, particularly when found in isolated villages with high inequality (Basu 1983, Bell 1988). Secondly, they make standard economic theory incapable of conducting equilibria analysis as transactions are no longer at arm's length (Bardhan 1980). However, in the last decade, literature on agrarian economies has not focused on the theory of interlinked markets and their implications for today's rural poor. This paper has argued the need to bring the theoretical framework of market interlinkages back into mainstream agrarian development literature by establishing, through empirical data, that rural markets continue to be interlinked. The paper has also illustrated the dire welfare implications that this market structure has had in isolated villages with high inequality, particularly for the social underclass.

The empirical section found that while markets in rural Punjab were interlinked, irrespective of the level of inequality, there was a difference in the nature of and incentive for the interlinking of markets. In egalitarian villages the evidence is

[52] This was evident from their response to the question of defying the landlord. They thought such a question was ridiculous, as defying the landlord could mean starvation.

consistent with the argument that the multiplicity of service providers forces the resource holders to engage in a dyadic relationship with the peasants, enabling them to walk away from the interaction if they deem it to be exploitative. This is seen through the higher incidence of non-labour tying relationships in peasant based villages and the relatively equal percentage of households engaged in a labour-tying relationship in peasant based villages connected to the external market and those situated far away. Markets in these types of villages, it was argued, were interlinked more in a desire to minimise transaction costs than to extract surplus. In landlord dominated villages, on the other hand, interlinkages were, at times, used as a mechanism for exploitation. This could be seen through the peasants' obvious fear of the landlord, their inability to envisage defying him in any way and the large percentage of households found to be in a non-labour-tying relationship in connected landlord based villages.

Moreover, the data highlighted the role households' social status plays in determining their chances of being in an interlinked relationship. We saw that by far the most disadvantaged group in the village was the lower class Muslim Sheikhs, who had the highest probability of being in a labour-tying relationship, even when compared to other landless households. Low social status, combined with poverty, has placed them in the lowest strata of society resulting in the upper class biraderies placing little value on interacting with them, making them likely to sever ties with a non-complying Muslim Sheikh household. Knowing this, Muslim Sheikh households are unlikely to reject the landlord's offer even when it is exploitative.

However, this disadvantage was not evident in villages connected to the highway. Households in such villages had a significantly lower probability of finding themselves in an interlinked relationship. Moreover, the tables find households' biradery extends no significant disadvantage on the households' chances of having their markets interlinked when situated close to the road. This can be explained by the increase in external options that connectivity provides to lower

class peasants, thus taking away the landlord's ability to impose sanctions on them. Hence, as long as the household is connected to the wider national economy, the land tenure system of a village seems to be unimportant, as outcomes in villages with large landlords are found to be relatively similar to those in villages with dispersed land ownership.

The results from this paper therefore highlight that inequality and isolation by themselves are not detrimental to peasant welfare as far as market interlinkages are concerned. Rather, it is the interaction of the two that creates a monopolistic/monopsonistic landlord who is able to extract the maximum surplus possible from the peasant. Therefore, the policy implication drawn from this paper is to connect rural villages to the wider national economy so as to give villagers the option of breaking out of an exploitative relationship. However, this policy prescription must be extended with the caveat that this is by no means the sole or main initiative needed for rural development. Connectivity is merely meant to be a short to medium term catalyst for change, as it mitigates the harmful effects of poverty to some extent and should be seen as a complement to, and not a substitute for, other more direct pro-poor developmental policies.

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***Appendix 1*: Payoffs**

No exploitation:	*Exploitation:*
$U_P = Y_P + [wl - \psi(l)] + [\tau(x_P) - Px_P]$ $U_M = Y_M + Px_P + Px_L$ $U_L = Y_L + [\pi - wl] + [\lambda(x_L) - Px_L] - \phi(d_M)$	$U_P = Y_P + [wl - \psi(l)] + [\tau(x_P) - Px_P]$ $U_M = Y_M + Px_P + Px_L$ $U_L = Y_L + [\pi - wl] + [\lambda(x_L) - Px_L] - \phi(d_M)$
(A,t,T)	(A,t,T)
U_P = -20 + 30 + 30 = 40	U_P = -20 + -5 + 30 = 5
U_m = -10 + 10 + 15 = 15	U_m = -10 + 10 + 15 = 15
U_L = 0 + 10 + 10 + 0 = 20	U_L = 0 + 30 + 10 + 0 = 40
(A,t,N)	(A,t,N)
U_P = -20 + 30 + 30 = 40	U_P = -20 + -5 + 30 = 5
U_m = -10 + 10 + 0 = 0	U_m = -10 + 10 + 0 = 0
U_L = 0 + 10 + 0 + 0 = 10	U_L = 0 + 30 + 0 + 0 = 30
(A,n,T)	(A,n,T)
U_P = -20 + 30 + 0 = 10	U_P = -20 + -5 + 0 = -25
U_m = -10 + 0 + 15 = 5	U_m = -10 + 0 + 15 = 5
U_L = 0 + 10 + 10 + 0 = 20	U_L = 0 + 30 + 10 + 0 = 40

(A,n,N)	(A,n,N)
U_P = -20 + 30 + 0 = 10	U_P = -20 + -5 + 0 = -25
U_m = -10 + 0 + 0 = -10	U_m = -10 + 0 + 0 = -10
U_L = 0 + 10 + 0 + 0 = 10	U_L = 0 + 30 + 0 + 0 = 30
(R,t,T)	(R,t,T)
U_P = -20 + 0 + 30 = 10	U_P = -20 + 0 + 30 = 10
U_m = -10 + 10 + 15 = 15	U_m = -10 + 10 + 15 = 15
U_L = 0 + 0 + 10 – 5= 5	U_L = 0 + 0 + 10 – 5= 5
(R,t,N)	(R,t,N)
U_P = -20 + 0 + 30 = 10	U_P = -20 + 0 + 30 = 10
U_m = -10 + 10 + 0 = 0	U_m = -10 + 10 + 0 = 0
U_L = 0 + 0 + 0 – 5 = -5	U_L = 0 + 0 + 0 – 5 = -5
(R,n,T)	(R,n,T)
U_P = -20 + 0 + 0 = -20	U_P = -20 + 0 + 0 = -20
U_m = -10 + 0 + 15 = 5	U_m = -10 + 0 + 15 = 5
U_L = 0 + 0 + 10 + 0 = 10	U_L = 0 + 0 + 10 + 0 = 10

(R,n,N)	(R,n,N)
U_P = -20 + 0 + 0 = -20	U_P = -20 + 0 + 0 = -20
U_m = -10 + 0 + 0 = -10	U_m = -10 + 0 + 0 = -10
U_L = 0 + 0 + 0 + 0 = 0	U_L = 0 + 0 + 0 + 0 = 0

Merchant has outside options: $U_P = Y_P + [wl - \psi(l)] + [\tau(x_P) - Px_P]$ $U_M = Y_M + Px_P + Px_L + Px_O + (1-\alpha)[\pi - wl]$ $U_L = Y_L + \alpha[\pi - wl] + [\lambda(x_L) - Px_L] - \phi(d_M) - \phi(d_o)$	*Merchant and peasant have outside options :* $U_P = Y_P + [wl - \psi(l)] + [\tau(x_P) - Px_P] + [w'l - \psi'(l)]$ $U_M = Y_M + Px_P + Px_L + Px_O$ $U_L = Y_L + [\pi - wl] + [\lambda(x_L) - Px_L] - \phi(d_M) - \phi(d_o)$
(A,t,T)	(A,t,T)
U_P = -20 + -5 + 30 = 5	U_P = -20 + 30 + 30 + 0= 40
U_m = -10 + 10 + 15 + 0 + 0 = 15	U_m = -10 + 10 + 15 + 0 = 15
U_L = 0 + 30 + 10 + 0 + 0 = 40	U_L = 0 + 10 + 10 + 0 + 0= 20
(A,t,F)	(A,t,N)
U_P = -20 + -5 + 30 = 5	U_P = -20 + 30 + 30 + 0= 40
U_m = -10 + 10 + 15 + 0 + 9 = 24	U_m = -10 + 10 + 0 + 10 = 10

U_L = 0 + 21 + 10 + 0 + 0 = 31	U_L = 0 + 10 + 0 + 0 - 5 = 5
(A,t,N)	(A,n,T)
U_P = -20 + -5 + 30 = 5	U_P = -20 + 30 + 0 + 0= 10
U_m = -10 + 10 + 0 + 10 + 0 = 10	U_m = -10 + 0 + 15 + 0 = 5
U_L = 0 + 30 + 0 + 0 + -5 = 25	U_L = 0 + 10 + 10 + 0 + 0 = 20
(A,n,T)	(A,n,N)
U_P = -20 + -5 + 0 = -25	U_P = -20 + 30 + 0 + 0= 10
U_m = -10 + 0 + 15 + 0 + 0 = 5	U_m = -10 + 0 + 0 + 10 = 0
U_L = 0 + 30 + 10 + 0 + 0 = 40	U_L = 0 + 10 + 0 + 0 - 5 = 5
(A,n,F)	(R,t,T)
U_P = -20 + -5 + 0 = -25	U_P = -20 + 0 + 30 + 30= 40
U_m = -10 + 0 + 15 + 0 + 9 = 14	U_m = -10 + 10 + 15 + 0 = 15
U_L = 0 + 21 + 10 + 0 + 0 = 31	U_L = 0 + 0 + 10 -5 - 5 = 0
(A,n,N)	(R,t,N)
U_P = -20 + -5 + 0 = -25	U_P = -20 + 0 + 30 + 30= 40
U_m = -10 + 0 + 0 + 10 + 0 = 0	U_m = -10 + 10 + 0 + 10 = 10
U_L = 0 + 30 + 0 + 0 -5 = 25	U_L = 0 + 0 + 0 -5 - 5 = -10
(R,t,T)	(R,n,T)

U_P = -20 + 0 + 30 = 10	U_P = -20 + 0 + 0 + 30= 10
U_m = -10 + 10 + 15 + 0 + 0 = 15	U_m = -10 + 0 + 15 + 0 = 5
U_L = 0 + 0 + 10 – 5 + 0 = 5	U_L = 0 + 0 + 10 +0 - 5 = 5
(R,t,F)	(R,n,N)
U_P = -20 + 0 + 30 = 10	U_P = -20 + 0 + 0 + 30= 10
U_m = -10 + 10 + 15 + 0 + 0 = 15	U_m = -10 + 0 + 0 + 10 = 0
U_L = 0 + 0 + 10 + 0 – 5 = 5	U_L = 0 + 0 + 0 - 5 - 5 = -10
(R,t,N)	
U_P = -20 + 0 + 30 = 10	
U_m = -10 + 10 + 0 + 10 + 0 = 10	
U_L = 0 + 0 + 0 + -5 + -5 = -10	
(R,n,T)	
U_P = -20 + 0 + 0 = -20	
U_m = -10 + 0 + 15 + 0 + 0 = 5	
U_L = 0 + 0 + 10 + 0 + 0 = 10	
(R,n,F)	
U_P = -20 + 0 + 0 = -20	
U_m = -10 + 0 + 15 + 0 + 0 = 5	

$U_L = \quad 0 + \quad 0 + 10 + 0 + 0 \quad = 10$	
(R,n,N)	
U_P = -20 + 0 + 0 = -20	
U_m = -10 + 0 + 0 + 10 + 0 = 0	
$U_L = \quad 0 + \quad 0 + \quad 0 + 0 + -5 \quad = -5$	