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Social Capital, Poverty and its Alleviation in a Chinese Border Region: A Case Study in the Kirghiz Prefecture, Xinjiang

Abstract:

Border poverty is a special type of poverty that urgently needs to be reduced in order to construct a well-off society in China by 2020. China's current policies for targeting poverty alleviation in its border areas pay greatest attention to the availability of physical and human capital and ignore the role which social capital might play in poverty alleviation. Making use of survey results obtained in July, 2016 from a sample of households dominated by Kirghizs in the Kirghiz Prefecture of Xinjiang, the attributes associated with being poor are identified. Logistic regression is employed to determine the probable effects of increased social capital on border poverty. The results indicate that increasing social capital at the household level could have a significant positive effect on poverty alleviation, while increased collective social capital probably does not. In addition, it is found that the amounts of livestock and village pasture land possessed by households and their use of formal financial capital are positively associated with the absence of poverty of households, whereas greater human capital (education) and amounts of informal financial capital do not display this association. Policy implications of the analyis are outlined and assesed.

1. Introduction

The United Nations' *Millennium Development Goals Report 2015* points out that 70 per cent of the reduction in global extreme poverty between 1990 and 2015 occurred in China. China became the first country in the world to achieve the goal of halving its proportion of the poor, a goal set by the United Nations (United Nations, 2015). Although China has been very

successful in poverty reduction, there are still many challenges it has yet to overcome in order to build a well-off society by 2020[1]. Border poverty needs to be reduced by this time to achieve China's goal.

There are 136 border counties adjacent to China's 22,000 km land border with Russia, Mongolia and another 15 countries. Of these, 107 counties are national autonomous counties. There was a total of 24.3 million people (at the end of 2013) living in border counties. Ethnic minorities accounted for nearly 50% of this number. The low ability of ethnic minorities to increase their income, the intergenerational transmission of poverty and significant spatial agglomeration of populations are especially prominent features of border areas. Forty-two of the 136 border counties and cities are the key areas for poverty alleviation and development at a national level. The incidence of poverty in these 42 counties is 5.1 times that of the national average and 1.8 times that of key counties which are the prime focus of China's national poverty alleviation program (Huang, 2013). Three prefectures in southern Xinjiang, several on Yunnan's western border, and the border areas of Tibet have the highest incidence of poverty in China's border areas.

Reducing poverty in China's border areas is not only important for the development of these areas, but also for China's national image and for its national security. Unlike the poverty alleviation goals adopted for inland areas, poverty alleviation in China's border areas has two main purposes: first, encouraging farmers and herders to remain on the frontier line by improving the quality of their lives in order to enhance their ability to become better off. Second, it aims to entice emigrants from border areas to return to border towns by improving their available support and services there. Thus, current policy aims to retain current populations in border areas and boost their level by immigration.

In its 13th Five-Year Plan, China has intensified its efforts to improve living and production conditions in its border areas to ensure it does not lose border residents by migration. In doing so, it wants to prevent the edge of the country from being strategically weakened. The Xinjiang Autonomous Provincial Government made 6.365 billion yuan available for targeting poverty alleviation in its border areas in 2016. These funds were mostly used to provide tangible assets

to these areas. However, it is very difficult to reduce poverty in these areas by depending mainly on large amounts of investment in tangible assets. The availability of intangible assets, such as social capital and human capital, should also be taken into account.

At present, the importance of education in reducing poverty is widely accepted, but the possibility of increased social capital doing likewise has not gained the corresponding amount of attention. Social capital represents individual social relationships of many kinds. Social capital can potentially correct market failures and government failures, and contribute to economic development and social welfare (Grootaert et al., 2002, Dowla, 2006). Increased social capital could potentially compensate for flaws in China's border markets, provide a formal or informal system for information supply, facilitate credit guarantees and enable considerable risk-sharing by poor households. These effects can help reduce their level of poverty. Because the presence of social capital influences other forms of livelihood capital, raising the quality of social capital of the poor can promote their investment in other types of capital (Coleman, 1988), and also enhance the capacity of the people to access resources from the outside world (Bebbington, 1999). Therefore, it is necessary to examine the status and influence of social capital on poor households in the border areas of China. This may help to identify policies that will improve the ability of border households to engage in self-help in order to reduce their poverty. It should also result in improved targeting of poverty alleviation policies in the border areas.

The remainder of this article is developed as follows: There is a short relevant literature review of social capital and its relationship with poverty. A list of hypotheses (to be explicitly tested) of the relationships between social capital and poverty reduction follows. Information is then given about the sample used to test these hypotheses, and various attributes of the sample are identified. Subsequently, logit analysis is adopted to test these hypotheses and to consider the influences on poverty reduction of other variables. Before concluding, the policy implications of the results are explored.

2. A Short Literature Review of Social Capital and its Relationship with Poverty

Although paying attention to social capital has become an important consideration in addressing many practical problems, there is no commonly agreed-upon definition. In fact, the concept remains to some extent "fuzzy". Putnam et al. (1993) and Lin et al. (2001) have argued that social capital consists of primarily social networks, norms and trust for the coordination and cooperation of common interests. Citizens' participation in social networks, reciprocity norms and the formation of trust are the main constituents of social capital. Based on the theory of network embeddedness, Granovetter (1985) has argued that the economic behaviors of individuals are influenced by their ongoing social relationships. Individuals can use social network relationships (friends, colleagues, and general contacts) to create wealth. Based on the theory of social norms, Fukuyama (1999) and the World Bank (Woolcock and Narayan, 2000) point out that social capital is influenced by institutions, personal relationships, and social norms. These shape the quantity and quality of social interactions. In fact, social capital is a multidimensional concept which takes account of several dimensions of social structures. Therefore, it cannot be fully captured by a single dimension (Hean et al., 2003).

According to Woolcock (2001), social capital can be divided into three types – bonding, bridging, and linking social capital – depending on the nature, level and degree of interaction involved. Bonding social capital is based on strong feelings of identity between family members, good friends and neighbors. It is a strong force for promoting reciprocity and commitment between network members. Bridging social capital is based on weak connections between the common interests of colleagues or group members. Its networks are of a social horizontal type and are used to gain access to resources and information. Linking social capital is based on vertical network linkages between individuals or groups at different social levels. It can help members to access resources and information from formal systems which would otherwise not be available to them.

There is considerable evidence that increased social capital contributes to economic development (Beugelsdijk and van Schaik, 2005), poverty reduction (Morris, 1998) and health (Song, 2013) and welfare improvements. A cross-country study by the World Bank indicates

that raising levels of social capital contributes to poverty reduction (Grootaert, 2001). High levels of social capital are characterized by heterogeneous links which can enable poor households to improve their welfare through knowledge-exchange and risk-sharing. Increased social capital is economically more beneficial to the poor than to the rich, according to Grootaert (1998). Social capital acts to reduce poverty through the following mechanisms: first, it can promote the transmission of technological and market information, reduce market failures caused by information asymmetry, and lower transaction costs in terms of access to new technologies. Narayan and Pritchett (1999) found that households in villages with higher levels of social capital in Tanzania were more likely to use fertilizers and improved seeds to increase their agricultural output.

Second, social capital can promote cooperative behaviors which contribute to the provision of local public services and which may assist in monitoring and coordinating the quality, efficiency and effectiveness of public services. This can help reduce poverty. Narayan and Pritchett (1999) found in Tanzania that villages with more social capital engaged in more community activities for road construction. Mutual trust can also reduce the opportunistic behavior of members of groups and improve the efficiency of collective decision-making. It can enhance the quality of information about the trustworthiness of individuals involved in market exchange and other forms of exchange and can enable the economic return on information obtained by individuals to be increased. The former aspect can raise the general level of trustworthiness in a society because those who are found not to be trustworthy (as a result of social contacts) are likely to be excluded from social and market exchange. This provides an incentive for all individuals to develop a reputation for being trustworthy.

Third, increased social capital facilitates access to other resources (for example, through increased access to the market and to the availability of credit), thereby reducing the vulnerability of families to poverty (Grootaert, 1998, Knight and Yueh, 2008, van Bastelaer, 2002).

On the other hand, social capital can be a double-edged sword, depending on its nature. It can produce negative effects on the economy and on the incidence and persistence of poverty. First,

some social networks enable greater market access to established participants, who have proven to be trustworthy. This is reinforced by repeated transactions. To a certain extent, this will exclude new entrants from these types of social networks (Collier, 2002). A barrier to entry of new participants in these networks is created. Second, social norms may be of a nature which stifles individual economic initiative and creativity, and may result in community members who do not comply with these norms being expelled (Mayoux, 2001). Third, inequality in the distribution of social capital may exclude the poor from benefiting from it and lead to or entrench chronic poverty. This is because the poor often do not have the ability to invest in social relations (Tisdell et al., 2017) or lack the ability to negotiate in unequal exchange systems (Cleaver, 2005).

Chinese studies of social capital and poverty have mainly concentrated on inland rural areas, and have paid little attention to border areas where the natural capital is scarce. Zhang et al. (2017) undertook a household survey to identify factors associated with the occurrence of poverty in Western China. However, their study is very aggregative. It does not target minority groups that are known to be prone to poverty nor consider their specific situations. Their model does not take into account other forms of capital such as material and natural capital. It is, therefore, possible that the model yields biased results. Moreover, their selection of social capital indicators did not take full account of the multi-dimensional characteristics of social capital. Our paper takes into account a wider range of forms of capital and considers possible effects of different types of social capital on poverty. Specific strategies to expand and enhance the quantity and quality of social capital in border areas will be presented. Strategies are suggested that might help reduce poverty in Chinese border areas.

3. Hypotheses to be Tested Relying on a Sample of Households from Kirghiz Prefecture

Several hypotheses follow, together with some relevant observations taking into account the existing literature. These hypotheses will be tested using our sample.

Hypothesis 1: Different dimensions of household social capital of border residents have different effects on poverty alleviation.

Relying on Putnam's definition, we focus on three dimensions of household social capital, namely social networks, trust, and help norms. As different parts of household social capital can have different consequences for border residents, we will examine the effects of each dimension of social capital seperately (Adam and Roncevié, 2003).

Hypothesis 2: Household social networks have a significant effect on the probability of escaping from poverty. The increased scale of a social network (its size, breadth and depth) can have a positive effect on this probability, while the higher cost of maintaining a social network has a negative effect on this probability.

Social networks based on blood-relationships and geography frequently act as a means of informal sharing in order to mitigate risks and alleviate poverty. This they do by the sharing of information, providing access to economic opportunities and so on (Fafchamps and Gubert, 2007). Because they are at the periphery of China and its centers of economic and social activity, border residents may be less well-informed than inner and coastal residents. We found that local social networks are the main channel through which residents gain information. Our survey indicated that relatives and friends are the third most important source of information, behind TV and the village committee. There is evidence that social networks have positive effects on self-employment (Allen, 2000).

Industry and service sectors are underdeveloped in China's northwest border areas. Animal husbandry is the main industry but it cannot absorb the available surplus labor in border areas because livestock numbers are already at (or beyond) the carrying capacity of the land. The size and scope of the networks of friends and relatives not only broadens the horizons of the border people but can also provide useful information about jobs and other economic opportunities thereby enhancing employment prospects and incomes.

It might be noted that there is a high incidence of serious local diseases (such as Kahin-Beck disease, the nature of which is well described on Wikipedia) in border areas. Because of the

presence of poor medical service facilities, the potential risks of poverty and returning to poverty in border areas are very high. Local social networks help border residents to cope with these risks. The same is true for other risks encountered by border people such as the occurrence of natural disasters and work-related risks.

Hypothesis 3: An increase in the level of trust of neighbors or the village committee, as well as the greater availability of mutual help, reduces the probability of the occurrence of poverty.

Trust can promote cooperation and reduce transaction costs, benefits which otherwise would not exist (Fukuyama, 2001). General trust in neighbors can foster social reciprocity. This can help poor households overcome their production or living difficulties. There are many mountainous areas in the Kirghiz Prefecture. Summer grazing requires herders to be stationed on the mountains for several months. Households with insufficient labor entrust others to graze livestock there on their behalf. They usually entrust friends and relatives to do this.

Trust is also important in informal borrowing of finance (without any mortgage) by households. Social networks help to build trust and this is of financial importance to poor households. High trust in the village committee is conducive to the implementation of various public policies and projects, which can help improve the efficiency of the supply of village collective public goods. So we expect that a high level of trust will have positive effects on poverty reduction.

Hypothesis 4: Strengthening the social norm that villagers should participate in activities to increase the supply of public goods reduces the incidence of poverty.

It is widely agreed that social norms can influence the incidence of poverty. In addition to the above, we consider whether this norm is accepted to a great extent by the poor and the non-poor and its possible relationship with the occurrence of poverty. Collective norms are the cognitive basis of shared beliefs (including religious beliefs), group identification and social ties. Collective norms can promote the formation of good neighborhood relations, protect community resources and optimize community development (Krishna and Uphoff, 2002).

Hypothesis 5：Increased collective social capital has a positive effect on the probability of reducing poverty. The larger the number of persons involved in cooperative economic organizations, the more beneficial this is for poverty alleviation.

In our survey, we used the membership of economic groups (such as cooperatives and formal associations) to measure the level of collective social capital of border residents. Although economic organizations are more important to Tanzanian villagers than non-economic ones (Narayan and Pritchett, 1999), this is different in China's border areas because Kirghizs (the main ethnic group in the Kirghiz Prefecture) follow the same religion and are fond of singing, dancing and sports. Almost everyone is willing to participate in such social non-economic activities. It is unclear how important participating in economic organizations is for them, such as cooperatives, rotating-credit groups and so on.

If community economic organizations are run effectively with efficient rules and benefit mechanisms, they can produce a positive spillover or demonstration effect on village communities. This may encourage poor households to look for new livelihood strategies (Woolcock and Narayan, 2000). At the same time, increased collective social capital can expand or strengthen household social networks, trust and norms, and this can have positive effects on household incomes.

4. Attributes of the Sampled Group of the Poor and Non-Poor in the Kirghiz Prefecture

Xinjiang is the largest border province in China. It has the greatest number of neighboring countries as well as the longest border area, and the highest incidence of border poverty of all border provinces. Half of the counties in this region are classified nationally as poverty-stricken. Kirghiz Autonomous Prefecture consists of three counties and one city. Its total population of about 600,000 is comprised of Kirghizs, Uighur, Han and another 11 ethnic groups. Ethnic minorities account for 93% of its population. Kirghiz Prefecture has an area of 725,000 square kilometers, of which more than 90% is mountainous. It has borders with Kyrgyzstan, Tajikistan, Afghanistan and Pakistan, and a total border length of 1133.7 kilometers. This prefecture is a key area for poverty alleviation in China. Within this prefecture, Atushi City, Aktao County,

Wuqia County and Aheqi County have all been identified nationally as key areas for poverty alleviation. Our sample is drawn from Wuqia and Aheqi counties.

During the 12th Five-Year Plan period, Kirghiz Prefecture invested a total of 1.372 billion yuan in poverty reduction and a total of 3.25 million households and 14.27 million people have transited from poverty in this prefecture. Its average annual poverty reduction rate is 12.21%. However, due to historical, natural and other reasons, the status quo of poverty in this prefecture has not altered greatly. At the end of 2015, it still contained three classified poor counties and 99 poor villages, 41,636 poor households and more than 150,000 poor people (Zheng, 2016).

In July 2016, when we chose Aheqi County and Wuqia County in Kirghiz Prefecture as typical areas to evaluate the effect of China's border poverty reduction policy and undertook our survey, we adopted a multi-stage sampling method and randomly selected six administrative villages for a household survey. At the beginning, we sorted the townships according to the per capita income level of these two counties, then randomly selected three townships from each county. We used the same method to obtain six villages from these six townships. The selected villages were Aguiyi Village, Aetta Village and Hala Braque Village in Aheqi county. Chati Village, Batang Kuruti Village and Takaklak Village were selected in Wuqia county. Random sampling of households in the villages was not possible. Twenty households were selected from each village on the basis of advice provided by heads of the villages.

We obtained 120 valid completed questionnaires. These consisted of 51 from poor households and 69 from non-poor households. Poor households were identified as those registered on the official poor list. There are two criteria by which households are identified for the official poor list. First, the per capita disposable income of the household must have been less than 2855 yuan at the end of 2015; the second criterion takes account of the household's housing, livestock assets, labour force, and its expenditure on the education of children. Descriptions of the sampled households' income and consumption levels and their social capital variables follow.

4.1. Income and consumption comparisons between the poor and non-poor households

As would be expected, Table 1 shows that the average and median values of per capita gross income and per capita real income of officially designated poor households were much lower in 2015 than those of non-poor households. The coefficients of variation of the poor households are 0.84 and 1.19 respectively. These are higher than for the non-poor households, namely 0.78 and 0.89 respectively. Inequality in income levels is, therefore, *relatively* larger for poor households than for non-poor ones. The coefficient of variation of income of both poor and non-poor households is decreased by government subsidies. This decline is greater for poor households than for non-poor ones. Thus, government subsidies decrease relative income inequality overall but more so for the poor than the non-poor. This table also indicates that relative inequality in consumption levels is higher for the poor than the non-poor.

Table 1: Comparison of per capita gross income and consumption indicators of sample households in 2015   (Unit: yuan)

Variable	Classification	Mean	Median	St. Dev	Coef. of Var.
Per capita gross income [a]	Poor households	7179	5988	6060	0.84
	Non-poor households	11970	8971	9304	0.78
Per capita real income [b]	Poor households	4983	3000	5940	1.19
	Non-poor households	9638	7429	8562	0.89
Per capita main consumption items [c]	Poor households	3773	2500	4110	1.09
	Non-poor households	4739	3667	3600	0.76

Notes: (a) Household per capita gross income = (income from agriculture and animal husbandry + non-agricultural income + subsidy income) / household population

(b) Household per capita real income = (agriculture and animal husbandry income + non-farm income) / household size

(c) The consumption here is the sum of the three major consumptions of sample border households in 2015.

However, absolute income inequality (as measured by the standard deviation) rose both for the poor and the non-poor in the sample after the payment of government subsidies. This increase is quite small (120 yuan which is almost negligible) for the poor but it is 742 yuan for the non-poor. This amounts to a rise in the standard deviation for the poor of two per cent and an increase of 8.7 per cent for the non-poor.

After payment of government subsidies, the difference between the mean and the median levels of the poor declined from 1,983 yuan to 1,191 yuan. This indicates (Karmel, 1957) that after the payment of subsidies the skew of the distribution of income in favor of the poor having the highest income levels is reduced. However, government subsidies appear to add, to some extent, to the income inequality between those who are designated as being non-poor. The difference between the mean and the median value of income of this group increases from 2,263 yuan to 2,999 yuan after the payment of government subsidies. This indicates an increase in the skew of income in favor of those with higher incomes.

From the data in Table 1, it can be deduced that government subsidies on average increased the incomes of members of poor households by 44 per cent, and those living in non-poor households by 24.1 per cent. Nevertheless, on average, members of non-poor households had a larger absolute boost in their income from government subsidies than those of poor households. The former had 2,332 yuan added to their income, on average, and the latter, 2,196 yuan. It is clear that government subsidies elevated both the incomes of the poor and the non-poor in our sample. They reduced income inequality among the poor but increased it somewhat among the non-poor.

When the per capita levels of expenditure of the sample households on food, health care and education combined are considered, it is found that this is lower for persons in poor households than in non-poor ones, and it is more dispersed. Purchases of food, health care and education constitute for most families, their major consumption items. Both the mean and median values shown in Table 1 indicate that the expenditure by the poor on these items is substantially less than that of the non-poor. Therefore, it appears that they are more likely to suffer from ill health

than are the non-poor and are less likely to invest in the educational capital component of their families.

4.2 The extent and nature of social capital possessed by poor and non-poor households

In our survey, we wanted to determine the extent and nature of social capital possessed by border residents in Kirghiz Prefecture at household and community levels. According to Putnam's definition of social capital, we focus on four dimensions of household social capital, namely social networks, trust, mutual help, and social norms. Community social capital is measured by organizational membership.

As for social networks, we use the number of trusted friends (s1) to represent the size of the social network of border residents, the number of friends and relatives living in the town or city (s3) to represent the breadth of social networks, and the number of friends and relatives who are cadres (including village cadres) (s4) to examine the depth of social networks. We rely on gift expenditure (s2) in 2015 to measure the cost of maintaining social networks.

As shown in Table 2, the variables s1, s3 and s4 of poor households are, on average, smaller than those of non-poor households in our sample. On average, poor households have fewer persons in their social networks than the non-poor. They also have fewer friends and relatives living in cities, as well as fewer relatives and friends who are cadres. The size, breadth and depth of the social networks of poor households are less than those for non-poor ones. In short, the poor are less well socially connected on average. It is also evident that these attributes display greater relative variation compared to those of the non-poor. The coefficient of variation of these three variables is also far greater for poor households than those of the non-poor households.

The average household gift expenditure in 2015 of poor households was much less than that of non-poor households, but their coefficients of variation were almost the same. Poor households spent 31.2 per cent of their gross income on maintaining social networks in 2015 and non-poor ones spent 49.3 per cent. These figures are very high. Even though respondents may have exaggerated the extent of their gift-giving (or understated the levels of their gross income), gift-

giving is an important feature of these border communities.

The two-sample mean t-test showed that there were statistically significant differences at the 5 per cent probability level in the breadth and depth of social networks of poor and non-poor households. This reinforces the view that poor households are socially less well-connected than non-poor ones. Although poor households on average had fewer members in their networks, this difference was not statistically very significant.

Table 2: Values of social network indicators for the sample of poor and non-poor households

Indicator	Classification	Mean	Standard Deviation	Coefficient Variation
Size of social networks s1 (persons)	Poor households	6.47	12.97	2
	Non-poor households	8.01	9.56	1.19
Breadth social networks s3 (persons)	Poor households	1.63	3.31	2.03
	Non-poor households	3.32	4.38	1.32
Depth of social networks s4 (persons)	Poor households	0.92	1.56	1.7
	Non-poor households	1.93	2.92	1.51
Maintenance costs of social networks s2 (yuan)	Poor households	2295	2751	1.2
	Non-poor households	5876	7179	1.22

Trust and mutual help are important attributes of social capital at the household level. Likert scales were used to measure how much trust respondents had in their village neighbors (s5) and how much trust they had in village committees (s6). The options ranged from 1-5 with one corresponding to very untrustworthy to five indicating completely trustworthy. Respondents were also asked whether mutual trust between villages is getting better, is unchanged or is getting worse and the answers were coded one to three respectively. A Likert scale was also

adopted to measure the mutual help variable (s7). The Likert options ranged from "As much time as possible to help others" (1) to "Never spend time to help others" (5). The relevant statistics are reported in Table 3.

Table 3: Comparison of trust and help indicators of the border households in sample

Variable	Classification	Mean	Standard deviation	Coefficient of variation
The degree of trust in the village neighbors (s5) [a]	Poor households	4.1	0.98	0.24
	Non-poor households	4.33	0.74	0.17
The degree of trust in the village committee (s6)	Poor households	4.25	1.06	0.25
	Non-poor households	4.44	0.74	0.17
Change in degree of mutual trust between villagers (s7) [b]	Poor households	1.31	0.55	0.42
	Non-poor households	1.32	0.7	0.53
Amount of time the villagers spend	Poor households	1.61	1.08	0.67
trying to help others (s10) [c]	Non-poor households	1.43	0.83	0.58

Notes: (a) The response options 1-5 for s5 and s6 represent the different degrees of trust, from very untrustworthy to completely trustworthy.

(b) The response options of s7 are 1 getting better, 2 no change, 3 getting worse.

(c) The response options 1-5 for s10 range from "as much as possible to help others" to "never spend time to help others".

The mean values of the trust variables are higher (but not by large amounts) for non-poor households than poor ones. The poor, on average, seem to have less trust in other villages and village committees than the non-poor. Nevertheless, on average, the poor reported that they spend more time helping other villages than the non-poor. Except for the reported change in mutual trust, there was greater variation in the trust variables for the poor compared to the non-

poor. At the 10 per cent level of statistical significance, the two-tailed sample mean t-test indicated that the degree of trust which the poor have in their village neighbors is lower than that of the non-poor. Table 3 indicates that in general, the level of reported trust which both the poor and the non-poor have in their fellow villagers and their village committees is high, and on the whole it is believed that mutual trust between villagers has increased somewhat. Also the stated willingness to spend time to help other villagers is located at the higher end of the relevant Likert scale (for both the poor and the non-poor) but not at the very highest possible level.

In order to obtain some information about social norms, we asked those sampled two questions. These were: Did you participate in village public activities in 2015 (s8)? If you do not participate in such activities, will you be condemned or criticized (s9)? As can be seen from Table 4, a larger percentage of non-poor households said that they participated in village public activities compared to poor households. The difference is statistically significant at the 5 per cent level according to the two-sample mean t-test.

As to whether or not non-participation in village activities leads to criticism or condemnation, respondents were able to answer on a scale of 1-5, where one corresponds to definitely will be, to five corresponding to certainly will not be criticized or condemned. The responses (see Table 4) indicate that the majority of responding poor and non-poor households believed it to be highly likely that not participating in public activities will result in public criticism. The two-sample mean t-test indicated that there was no statistically significant difference between the responses of the two groups to this question.

Table 4: Comparisons of a norm indicator of border residents in our sample and their participation in collective activities

Variable	Classification	Responses	Freq.	Per cent
Participated in collective village activities (s8)	Poor households	No	9	17.65
		Yes	42	82.35
	Non-poor households	No	5	7.25
		Yes	64	92.75
Criticized if do not participate in village collective activities (s9)	Poor households	s9<=2	35	68.63
		s9<=2	15	31.37
	Non-poor households	s9<=2	42	60.87
		s9<=2	27	39.13

We also asked respondents whether they participated in any economic cooperatives or similar forms of economic organization. Only 18 households (15 per cent) said they had done so. Despite these forms of economic organization being promoted by some government bodies, they do not appear to be popular in this border region.

5. Logit analysis of the 'effect' of social capital and other variables on border poverty

5.1 The variables

DiMaggio and Zukin (1990) consider social capital to be a synthesis of actual or potential resources generated from all kinds of exchanges between individuals and group members and they are of the view that all forms of exchanges are inherently embedded in social and economic relationships. We derive proxy variables for social networks, trust and help, and social norms.

Before conducting empirical analysis, we carried out reliability analysis of social capital data. First, the normalized social network variable s1 - s4 has an alpha = 0.63. This confidence level is acceptable. The item-test correlations of the variables are more than 0.6, except s2. After re-coding the trust and mutual help variables s5, s6, s7, and s10, their reliability levels are acceptable with alpha = 0.69, which satisfies the prerequisite for exploratory factor analysis.

We can extract two indices from the above variables which pass the validity test. According to the factor loading score, the two indices are defined as "network" and "trusthelp". Their eigenvalues are 1.45 and 1.34, and their KMO values are 0.62 and 0.72 respectively. The reliability level of variables s8 and s9 do not pass the validity test, so s8 and s9 cannot be extracted as a composite public index. We use s8 and s9 to represent attributes of public social capital. Social capital at community level also should be considered. We use the variable "cooperation" to represent the collective level of Kirghiz's social capital. Consequently, five variables are used (network, trusthelp, s8, s9 and cooperation) to measure Kirghizs' household and community social capital in this model.

A binary logistic regression model is adopted to determine whether social capital has a significant effect on (or has a significant association with) the poverty status of border Kirghizs. The dependent variable is a binary one: if the household is poor, it is zero and if it is not poor, it is one. The indices for network and trusthelp (extracted by factor analysis) are identified as household social capital variables. Levels of public capital are represented by s8 and s9. The variable cooperative is selected as collective social capital. The model contains a series of discrete and continuous variables. These are listed and described briefly in Table 5 and descriptive statistics of the attributes of these variables for the sample are given in Table 6.

Table 5: List of variables used in logistic regression

Variable	Specific description	Unit	Classifications
Poverty level	Whether household is poor Poor households = 0 Non-poor households = 1	-	Dependent variable
network	Social network index of border residents		Household social capital
trusthelp	Trust and mutual help index among border residents	-	Household social capital
s8	Whether household has participated in village public activities. Dummy variable. Participation = 1. Did not = 0		Public social capital
s9	Norm whether residents will receive condemnation if they do not participate in collective activities. Dummy variable. If yes = 1, If no = 0		Social norm
cooperation	Membership of economic organization(such as cooperatives), did not participate = 0, Participated = 1	-	Collective social capital
finance	Finance obtained from a bank or credit union as a formal	10,000 yuan	Financial capital
infinance	Borrow money informally from relatives, friends or village help groups	10,000 yuan	Financial capital
edu	The average years of education of family's labor force	year	Human capital
labor	Border household's labor force, including 14-65 years old	person	Quantity of labor
land	Pasture area possessed by border households	mu	Natural and material capital
house	Per household housing area	Square meters	Material capital
livestock	Per household livestock assets, in sheep units	head	Material capital
family	Family size	persons	Control variable, family characteristics
age	Age of the head of household	years	Control variable, family characteristics
feed	Dependency ratio of household members	-	Control variable, Family characteristics
county	Aheqi = 1; Wuqia = 0	-	Control variables, county characteristics

Some further clarification of the (assumed) independent variables appearing in Table 5 is in order. The nature of these variables are classified in the last column of this table. Public social capital refers to capital which adds to the supply of public goods. Collective social capital refers to investment in cooperative organisations that provide economic benefits to their members. The whole community is able to benefit from the supply of the first mentioned type of capital, but only members of the relevant cooperative organisations are the prime beneficiaries of their investment in these.

Pasture area is the amount of grazing land possessed by individual households in the vicinity of their village. It is used for holding livestock during the colder parts of the year when these animals are not in the mountains. These villages practise transhumance. This area of pasture partly consists of natural capital, and where investment has occurred in it, material capital. Mountain grazing land is primarily natural capital and is common property.

The villagers' composition of livestock is diverse. It includes sheep, yaks, camels and horses. Sheep predominate. Livestock holdings have been converted to sheep units on the basis of relative prices for livestock prevailing at the Kashigar (Kashi) market. The amount of livestock is that estimated to be present at the end of 2015.

The household dependency ratio was estimated to be equal to the number of persons in the family less its labour force divided by the availability of family labour, which is estimated to be persons in the household aged 14-65 years. The figures shown in Table 6 should be regarded as rough approximations. For example, some of those aged 14-65 may be unable to work because of disabilities.

Table 6 provides a description of variables used in the logit analysis after eliminating three outliers, namely one poor household and two non-poor ones. From Table 6, it can be seen that the following mean values of the independent variables are considerably higher for non-poor households than poor ones: the composite social network variable, use of formal finance, the amount of grassland possessed and the number of livestock as well as the size of their dwellings. The average age of non-poor household heads is rather high (over 50) and is comparable for

poor and non-poor households. Family size is larger for non-poor households than poor ones, and the average years of education are somewhat higher for non-poor than poor households. On average, ownership of livestock is much higher for non-poor than for poor households. Ownership of livestock is not only a source of income, it is a store of value and provides social prestige in Kirghiz communities.

Table 6: Descriptive statistics of the values of dependent variables obtained from the sample

Variable	Mean		Std. Dev.	
	Poor(50)	Non-poor(67)	Poor(50)	Non-poor(67)
network	-0.24	0.19	0.61	0.97
trusthelp	-0.09	0.1	0.82	0.75
s8	0.82	0.93	0.39	0.26
s9	0.68	0.6	0.47	0.49
cooperation	0.16	0.15	0.37	0.36
finance	2.63	3.81	7.12	6.79
infinance	0.31	0.34	0.64	0.96
edu	6.38	6.93	2.18	2.23
labor	2.32	2.96	0.94	1.35
land	6.8	10.5	4.97	8.09
house	75.52	117.55	25.24	52.34
livestock	24.87	71.69	24.52	63.23
family	3.8	4.63	1.14	1.58
age	50.42	53.4	14.49	12.56
feed	0.82	0.74	0.71	0.7
county	0.52	0.51	0.5	0.5

5.2 The results obtained from the logit models

The form of logistic regression model is $\ln\frac{p_j}{1-p_j} = \alpha + \sum \beta_i x_{ij}$, where p_j is the probability of success of the j-th event, and $p = 1$; x_{ij} is the series of independent variables of the family j. When all the other independent variables are fixed, the partial regression coefficient β_i indicates the change in the value of $\ln\frac{p_j}{1-p_j}$ and is the probability of the occurrence/non-occurrence of the j-th event when a factor changes by a unit. Making the ratio of odds $= \frac{p_j}{1-p_j}$, then the odds $= e^{\beta_i}$, and the Odds Ratio $= \frac{odds_1}{odds_0}$.

Taking into account the residual conditions of the logistic model, we removed three outliers in the survey data. The remaining 117 observations yielded a satisfactory logit model (with allowances for robust error) after several filters. The logistic results show that Wald chi2 = 38.6, with a probability of 0.001. The results indicate that the null hypotheses of the model are rejected at a significant level of 1%. The model's roc curve area is 0.90, Pearson chi = 83.18 with a probability of 0.89, which shows that the test of the null hypothesis of the goodness fit can not be rejected at the 5% level. The estimated ratio of the model's predicting classifications correctly is 83.76%. This indicates that the overall fit of the model is good and the model can be analyzed further. At the same time, the model was checked by backward steps and the significant variables were found to be consistent with the abovementioned results. In order to directly compare the effects of the different variables in the model on poverty alleviation, the variables were standardized, thereby permitting improved comparability of changes in the variables. The robust results are shown in Table 7 and the marginal effects are listed in the last column.

Some preliminary comments on the results of the modeling given in Table 7 may be helpful. Comments all refer to the standardized model. Results indicate that a one unit increase in the (composite) social capital variable, network, raises the probability of a household not being poor by 0.184. This relationship is statistically significant at the 5 per cent level. On the other hand, the (composite) social capital variable, trusthelp, is not statistically significant, and changes in it seem to have little impact on the probability of the occurrence of poverty. This

supports the hypothesis 1 that different dimensions of social capital have different consequences for poverty alleviation and require seperate consideration (see section 3). It also supports hypothesis two, namely that social networks have a significant effect on the probability of escaping from poverty.

Table 7: Robust regression results of the logistic models

Independent variables	Model 1 (Original)			Model 2 (Standardized)	Mf(x)
	Odds Ratio	Robust Std. Err.	*p*-value	Odds Ratio	dy/dx
network	2.98**	1.29	0.01	2.56**	0.184 **
trusthelp	1.62	0.58	0.16	1.47	0.082
S8	7.61**	7.14	0.03	7.61**	0.442**
S9	0.38	0.28	0.18	0. 38	-0.149
cooperation	0.49	0.37	0.35	0.49	-0.136
finance	1.10**	0.04	0.02	1.94**	0.016**
infinance	1.32	0.43	0.38	1.26	0.047
land	1.11**	0.06	0.04	2.15**	0.018**
edu	1	0.13	0.99	1	0.001
labor	2.64	1.89	0.18	3.31	0.164
house	1.04***	0.01	0	6.68***	0.007***
livestock	1.03***	0.01	0	5.41***	0.005***
family	0.66	0.35	0.44	0.54	-0.071
age	1.03	0.02	0.21	1.44	0.005
feed	4.56*	3.73	0.06	2.92*	0.256*
county	3.10*	2.03	0.08	3.09*	0.191*
Pseudo R^2	0.4538	-	-	0.4538	-

Note: Significant degree *** p <0.01, ** p <0.05, * p <0.10 (two-tailed test).

The results of the model do not support the proposition that an increase in the level of trust in

neighbors and in village committees, as well as greater availability of mutual help, reduce the probability of the occurrence of poverty. Hypothesis four, "strengthening the social norm that villagers should participate in activities to increase the supply of public goods reduces the instances of poverty" (s9), is not supported by the results. Nevertheless, it is more likely that those who engage in these types of activities are not poor rather than poor. This relationship is statistically significant at the 5 per cent level. Furthermore, there is no support for hypothesis five, namely that the increase in collective social capital (that is, involvement in cooperative organizations) contributes to poverty reduction. Consequently, the evidence from this model about the ability of increases in the quantity of social capital to reduce the instance of household poverty is mixed.

Now consider other variables in the modeling. The supply of formal finance is significantly associated (at the 5 per cent level) with a household not being poor, but not the use of informal finance obtained by a household. The amount of pasture land possessed by households, their livestock numbers and the size of their houses all show noteworthy statistical significance in relation to whether households are classified as poor or non-poor. However, the marginal probability values associated with these variables are low. At the rather low level of statistical significance of 10 per cent, the probability of households not being poor rather than being poor increases with their dependency ratio. This is a rather unusual result. Furthermore, the marginal probability of poverty reduction in Aheqi county is higher than in Wuqia county, but the relationship is only significant at the 10 per cent statistical level. The model also indicates that the years of education in households have little impact on whether they are in poverty or not.

6. Further Discussion of the Results, and Policy Issues

Table 7 indicates that the social network index of border residents has a significant effect on the odds of escaping poverty. Specifically, for a unit increase in this index, the odds of escaping poverty are expected to increase by a factor of 2.98, holding all other variables constant. We can also consider the marginal effects of each variable in model two to determine the instantaneous rate of change in $\ln \frac{p_j}{1-p_j}$. Here, each is computed with all other variables held at

their means. The marginal probability value is 0.184 for the social network index. This implies that a unit increase in this index will enhance the probability of escaping poverty by approximately 0.184, holding other variables at their means.

Further analysis of the impacts of the different components of the social network index show that the size (s1) and depth (s4) of border residents' social networks are not statistically significant at the level of 5%. On the other hand, the maintenance cost (s2) and breadth (s3) of social networks have significant positive associations with the odds of a household not being poor[2]. However, it is not the cost of maintaining social networks which is important for whether or not households are involved in social networks but the net benefits of doing so (see Tisdell et al., 2017).

Different components of the social network index display different types of association with the odds of households not being poor. It was noted that greater expenditure on the maintenance of social networks is positively associated with the odds of a household not being in poverty. While this variable possibly contributes to not being poor, its value is also likely to be partly a consequence of not being poor. As discussed further below, some of the other variables in this modeling may depend, to some extent, on whether a household is or is not in poverty. This greatly complicates this type of analysis as far as determining causality is concerned, and the policy conclusions which can be derived from it.

Although it might appear from the analysis that the government could reduce the probability of households being in poverty by improving their social networking, this may note be easily achieved, for example, the non-poor may resist the addition of the poor to their social networks. In other words, barriers to entry may exist. The personal nature of most social networks makes it difficult for government intervention to have any effect on them. However, it is possible (but not certain) that greater use of the Internet could usefully add to the information networks of the poor and have some positive effect on their economic opportunities.

While the results in Table 7 indicate that the trusthelp variable is not a statistically significant variable in influencing whether a household is poor or not, this is probably a result of little

difference in this variable for these types of households. The value of this variable is high for both groups. Even if the variation in this variable is not significant for enabling households to escape poverty, it may still be important for alleviating some adverse consequences of their poverty, for example, by increasing the availability of help to the poor on occasions of their greatest need and enabling their access to informal finance on such occasions.

Even though there is a statistically significant association between whether or not a household is poor and the involvement of its members in activities to supply public goods, this is most likely due to differences in their pre-existing poverty situations. This is because the benefits of supplying of public goods are available to all. Also, if payment is made for helping to supply such goods, the non-poor could (to some extent) monopolize available opportunities to increase their incomes. If this is so, then greater attention should be given to ways in which the poor can be paid to participate in the supply of public goods.

The results of the logit models indicate that there is a significant statistical difference between the amount of formal finance obtained by the non-poor compared to the poor, but this is not so for informal finance. The non-poor, because of the assets they possess, are likely to be able to achieve higher returns from formal loans and meet the conditions of their repayments more easily. They also face lower relative risk in taking such loans. Furthermore, because of their social position, they are likely to find it easier to access such loans than the poor, and if collateral is required for formal loans, they are in a superior position to provide it.

Both the amount of pasture land possessed by non-poor households (near their village) and the number of livestock are significantly greater for these households than poor ones. Mechanical application of the results suggests that increasing the amount of pasture land available to poor households and the number of their livestock would lower the likelihood of them remaining poor. While this seems to be so, it can only be achieved by redistributing the possession of village pasture and livestock, that is, by their reallocation in favor of the poor. This is because the available area of pasture in the vicinity of the villages is fixed and the livestock carrying capacity of mountain pastures has been reached or has been exceeded, given current pastoral

practices. Policies to bring about a redistribution of these resources are likely to cause social conflict and disruption in Kirghiz communities.

Whether it would be possible to increase the economic returns from livestock by adopting improved pastoral practices requires investigation. Also the scope for increasing these returns by genetic improvements in livestock needs to be assessed. It is likely to be the case that some livestock are held for a longer period than that which maximizes the economic return obtained from them. This is partly a consequence of the social prestige associated with having a large holding of livestock and the use of livestock as a store of value. For example, yaks and horses are only sold in times of special need.

The size of the dwelling of a household is positively associated (at the 1 per cent level of statistical significance) with its members not being poor. This relationship, however, is most likely a result of not being poor, rather than a factor which causes a household not to be poor. To some extent, however, improved housing could result in better health and thereby help reduce poverty. Such a relationship is possible but is a matter requiring specific examination.

Given the emphasis in much of the literature on the ability of increased education to reduce poverty, it may come as a surprise to find that our logit models do not, on the basis of the available data, find evidence to support this relationship. This is probably because there is little difference between the average years of education of members of poor households and non-poor ones. Nevertheless, it is likely that economic returns on formal education in these border regions are likely to be low. This is because there are few employment opportunities which require significant levels of formal education, and informal education may be more appropriate to the employment opportunities which exist, for example in herding. Whether or not the educational system needs adjustments to be more appropriate to local needs requires investigation.

It should also be kept in mind that models and relationships of the above type are based on existing circumstances. They may not include all variables that are relevant to poverty

alleviation and they are unable to spot new possibilities for this. For example, Wuqia county is located near the border crossing with Kirghizstan. Is there scope for it obtaining greater benefit from cross-border trade and to what extent might the poor benefit from this? A stream (or small river) flows through Aheqi county. Can some of the water from it be used to make pasture land in the county more productive?

There is also the question of how accurate our data are because they were self-reported by household heads. Furthermore, some selective bias could be present. However, application of the two-step Heckman test and calculation of the inverse Mills ratios suggest that this is not a problem in our modelling.

It is also worthwhile recalling some other features of the findings in this article. First, on average, government subsidies benefit both the poor and non-poor. The relative increase in average income of the poor was much greater than for the non-poor with the absolute increase being much the same for both groups. After the payment of subsidies, income inequality rose slightly among the poor but to a greater extent among the non-poor. These results indicate that government policies are relatively effective in eliminating the poverty of the poor, despite a lack of coordination in government bodies providing economic support for border residents.

Second, it was found that the social networks of the poor are less developed than those of the non-poor. They are (on average) smaller in size, show less breadth, and less depth. It was also found that the non-poor spent considerably more, on average, than the poor in maintaining their social networks. Presumably this is because they obtain more economic benefit from doing this than do poorer households. The economics of establishing and maintaining social networks is to a large extent a cost-benefit problem.

Third, the average values of the trust variables reported by respondents are high for both poor and non-poor households. As for mutual help, on average, the poor indicated that they are willing to spend more time in giving mutual help than are the non-poor. While mutual help (and sharing) can iron out fluctuations in meeting economic needs, it is unlikely to raise

incomes and reduce poverty to any great extent. It primarily acts as a social security blanket.

Fourth, most responders argued that they will be criticized if they do not engage in activities to produce public goods. It seems the non-poor households were more active in that participation than poor ones. That might be because they obtained a greater payment from such involvement than poor households, or received larger non-pecuniary rewards. In future work, we need to distinguish between voluntary (unpaid) contributions to the supply of public goods and those which are paid for.

7. Concluding Comments

This article demonstrates that some of the component values of social capital possessed by poor and non-poor households in our sample differ significantly. The extent to which these differences result in households being non-poor rather than being a consequence of them being non-poor are unclear. In any case, it is unlikely to be easy for governments to alter the nature of these networks, and doing so may not have a significant impact on poverty alleviation. The scope for providing alleviation in Kirghiz Prefecture is restricted because of the limited availability of economic opportunities in this prefecture, for example, for investment in productive activities. However, new possibilities can be explored, some of which have been mentioned in this article.

The problem of mitigating poverty in the Kirghiz Prefecture is complicated by the inability (or limited ability or willingness) of its residents to migrate. This is being compensated for (partly) by the provision of government subsidies to residents living in this prefecture. This raises the general question of the extent to which residents should obtain handouts from the government or alternatively economic support for their investment in activities that help to increase economic productivity in the area. A case can be made out for both types of economic support. This aspect has been explored previously by Tisdell (1990, ch. 10) in a different context. The policy problems of how best to respond to the inability (or unwillingness) of residents to migrate from areas with few economic opportunities (where considerable poverty exists) is not

limited to China. It is, for example, a problem encountered by Australian Aborigines living in remote communities.[3] These policy problems need more attention.

Notes

1. According to "China Poverty Alleviation and Development Report 2016" published by the Chinese Academy of Social Sciences and the State Council Poverty Alleviation Office on December 27, 2016, a major goal is to eliminate rural poverty by 2020.
2. In the logistic model with sub-indicators instead of network index,the coefficients of s1, s2, s3 and s4 are repectively 0.98, 1.00, 1.29 and 0.79, with p-value 0.454, 0.015, 0.002 and 0.206.
3. For some information about this see Tisdell (2014, ch. 16).

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