Does villager social capital hinder poverty targeting? Evidence from poverty-stricken county of Western China

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ABSTRACT

Poor targeting performance is a common concern in the increasingly implemented decentralized targeted antipoverty programs in developing countries. Different from previous literature that focuses on targeting errors caused by elite capture, we explore the role of villager social capital as a whole in poverty targeting in the context of China's Targeted Poverty Alleviation (TPA) policy. The empirical analysis uses a unique census-type data from three administrative and seventeen natural villages in the poverty-stricken county in Western China in 2017. Villager social capital is measured by a proxy index by combing reciprocity, support time, gift expenses, and political connection of villagers. We verify that the villager with rich villager social capital is more likely to be a beneficiary of TPA by using instrumental variable estimation. The nonpoor can mobilize their higher level of social capital than the poor to capture the beneficiary quotas that should be allocated to the poor, resulting in mistargeting. Such effect persists after controlling political elite capture effects. The findings point out villager social capital is the root cause of poor targeting in decentralized targeting programs in rural China and also lend new support from China to the classic debate on social capital is not the capital of the poor.

1. Introduction

Targeted antipoverty programs are increasingly implemented in the developing world (Banerjee, Hanna, Kreindler, & Olken, 2017). The effectiveness of these programs hinges on how successful the targeting is, but poor targeting remains concerned (Coady, Grosh, & Hoddinott, 2004). Political elite capture is often considered as the major challenge in these programs (Hu & Wang, 2017; Pan & Christiaensen, 2012; Panda, 2015), as most decentralized targeted transfer programs rely on the local political elite in implementation, such as selection of the recipients and dissemination of program information. Being directly connected with local political elite provides opportunities for households to obtain program benefits (Caeyers & Dercon, 2012; Panda, 2015). However, only focusing on political elite capture of programs implies that only the political elite and their close friends or relatives will mobilize support from the programs, and nonelite villagers only mobilize their political connections to obtain resources. These results are inconsistent with the frequent observations that there are still targeting errors after eliminating the elite capture, which means that some important factors have been ignored. Since connecting with the political elite is only one type of embedded resource of villager

social capital, has villager social capital led to poverty targeting error in decentralized targeting programs? Surprisingly, this question has not been explored in a systematic way.

In this paper, we explore the role of villager social capital in poverty targeting in the context of China's Targeted Poverty Alleviation (TPA) program. Since the economic reform started in 1978, China has made remarkable achievements in poverty reduction, contributing up to 70% of the global poverty reduction (World Bank, 2018). Targeted poverty alleviation has been an important component of China's antipoverty initiatives. China's poverty targeting has been evolving through district-county-township-village levels to households and individuals (Liu, Liu, & Zhou, 2017). TPA initiated in 2013 and designed to target households and individuals to lift 89.62 million poor people out of absolute poverty defined by the 2010 national poverty line in rural areas by the end of 2020. TPA adopted a bottom-up approach to identify the poor in the village as the beneficiaries are often chosen by the village authorities in a decentralized approach, which could offer space for villager social capital to exert influence. As the largest poverty targeting program in the world, exploring the role of villager social capital in TPA's targeting could offer a useful Chinese experience for global antipoverty efforts.

Villager social capital is the resources embedded in social structures that can be acquired or mobilized based on purposeful actions (Lin, 1999), usually including trust, reciprocity, political connections, and other types of social networks. Social capital is a kind of capital (Lin, 2001; Narayan & Pritchett, 1999), which implies that it can benefit people and directly or indirectly lead to a higher level of welfare (Narayan & Pritchett, 1999). Many development studies have found that social capital contributes to poverty reduction, by providing financial support, emotional support, or credit (Grootaert, 1999; Yang, Chen, & Zhu, 2011; Yip et al., 2007). In the labor market, previous studies found that individual social capital provided job information and opportunities (Granovetter, 1995; Loury, 1977) and facilitated rural labor migration (Chen & Fan, 2011). However, can villager mobilize their social capital to capture public antipoverty resource allocation?

Theoretically, since villager social capital is "social"(Narayan & Pritchett, 1999), there are mainly two types of resources embedded in villager social structure: the influence of power and information (Bian, 2018). In a decentralized targeted transfer program, beneficiary selection usually relies on the community (Galasso & Ravallion, 2005), which provides the potential for villagers to mobilize their social capital to capture the benefits. First, villagers have social links to valuable nodes in the village, such as a member of the village executive committee, and use their social capital to exert influence on the committee those who can manipulate the selection process to favor these villagers. Second, villagers with rich social networks have access to unique information and can, therefore, take a more efficient lobby for beneficiary quotas (Caeyers & Dercon, 2012). As a result, villager social capital may divert antipoverty resources to the nonpoor and further squeeze out the poor.

In this paper, we empirically investigate the role of villager social capital in poverty targeting. Villager social capital is measured by a proxy index that combines reciprocity, support time, gift expense, and political connections in poverty targeting. The empirical analysis uses a unique village-census data in three administrative villages and seventeen natural villages[1] with a total of 824 households in Puding County, Guizhou Province. The data was collected in January 2018, which was approximately four years after the initial implementation of TPA in rural China. To address the concern of endogeneity, we used instrumental variable estimation. Furthermore, we test a competitive explanation that the driving force of social capital in hindering poverty targeting is political elite capture by excluding the political connections dimension of villager social capital.

This paper represents the first systematic study on the relation between villager social capital and poverty targeting error. It contributes to the large literature on exploring the causes of targeting errors when targeting the poor (Alatas, Banerjee, Hanna, Olken, & Tobias, 2012; Pan & Christiaensen, 2012; Panda, 2015). Many of these studies proved that the presence of elite capture is an important cause (Hu & Wang, 2017; Pan & Christiaensen, 2012; Panda, 2015), but neglected the possibility of how ordinary villagers can obtain policy benefits through their accumulated social capital. Our paper also contributes to the literature on investigating the role of villager social capital. Most sociological studies agreed that people can mobilize their social capital to access resources of interest (Bourdieu, 1986; Coleman, 1990; Lin, 2001), while only some economic literature found a positive role of villager social capital in poverty reduction (Grootaert, 1999; Narayan & Pritchett, 1999; Zhang, Zhou, & Lei, 2017) by mobilizing financial support or credit. The role of villager social capital in public antipoverty resource allocation in villages was largely ignored.

We find that the higher the level of social capital of the nonpoor villager, the higher the probability that they will be beneficiaries, and therefore the higher the program's probability of targeting error. Such effect persists after excluding the political connections dimension of villager social capital, which furtherly refutes furtherly refutes the potential argument that the effect of villager social capital on poverty targeting is political elite capture. Additionally, there is little evidence of the political elite capture phenomenon in TPA. These findings indicate that it is the villager social capital that caused the mistargeting in decentralized targeting programs, not political elite capture. These findings also lend support from China for the classic debate on social capital is not the capital of the poor (Gertler, Levine, & Moretti, 2006; Grootaert, 1999; Woolcock & Narayan, 2000; Zhao & Lu, 2009; Zhou, 2012).

The rest of this paper is organized as follows: Section 2 introduces TPA's targeting mechanism. Section 3 reviews the literature and sets up a conceptual framework by which social capital affects poverty targeting. Section 4 introduces the study area, data, and setting. Section 5 computes the targeting efficiency of TPA. Section 6 presents the empirical analysis and results of villager social capital on poverty targeting. Section 7 concludes with policy implications.

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[1] One administrative village in China consists of several natural villages.

2. Targeted poverty alleviation in China

China's central government initiated the Targeted Poverty Alleviation (TPA) program in 2013 to end absolute poverty defined by the 2010 poverty line in rural areas by the end of 2020. Specifically, the goal of TPA is to prevent the rural poor from worrying about food and clothing and to guarantee the rural poor's access to compulsory education, basic medical care, and safe housing under the so-called "two worry-free and three guarantees" framework. TPA helps reduce poverty by accurately targeting poor rural households and individuals and providing accurate assistance (Liu et al., 2017). Accurately targeting the poor determines the effectiveness of poverty reduction (Guo, Zhou, & Liu, 2019). To ensure accurate identification of the poor, TPA adopts a combination of a top-down approach and bottom-up approach in identifying the rural poor along with the subsequent implementation of a targeting correction policy.

The top-down approach is that the State Council Leading Group Office of Poverty Alleviation and Development (LGOPAD) decides and distributes the beneficiary quotas to the provinces. The total number of beneficiaries identified was 89.62 million poor people and 29.48 million poor households in 2014. First, LGOPAD set and distributed the beneficiary quotas for each province. The National Bureau of Statistics of China (NBS) was responsible for calculating the initial quotas of each province based on nationally representative household survey data. Second, the provincial government was responsible for distributing the quotas to each municipal government and then to each county government. Third, the NBS calculated the poverty incidence of each city and county. For each city and county, the total rural poor population was equal to the poverty incidence multiplied by the total rural population. Fourth, the county government distributed the beneficiary quotas to the townships and villages. Since it is difficult to calculate the incidence of poverty in each village, villages can apply the calculation method of poverty incidence conditional on a given quota.

The bottom-up approach is that the village determines the list of beneficiaries and submits it to the upper levels of government. A typical process includes five steps: application from the poor households, democratic voting or participatory appraisal in the village, screening and publication in the village, appraisal by township government, and appraisal by county TPA administrators. Among these steps, participatory appraisal plays a crucial role in selecting potential beneficiaries (Wang & Guo, 2015). TPA's participatory appraisal was carried out by a village executive committee, which consists of village leaders (village chief and Communist Party leaders), Communist Party members, no fewer than 3 county TPA administrators, and some village representatives who are usually the natural village leaders, which is similar to *Dibao*[2] (Han & Gao, 2019). TPA is largely a decentralized targeting program. TPA adopts a method of multidimensional poverty to identify the poor. In addition to income, other indicators, such as health, housing, assets, and education expenditure are taken into consideration (Wang & Guo, 2015).

After implementing the top-down and bottom-up targeting approaches, TPA identified 89.62 million poor population, 29.48 million poor households in 2014, and established archives for those identified poor households (they are referred to "archived poor households", APHs). To further improve the targeting performance, LGOPAD started to implement the "looking-back" policy in 2015. This policy aimed to eliminate targeting errors and removed ineligible households. The policy clarified the ineligible criteria. Specifically, the beneficiary cannot (1) have any family member who works as a village leader, including the village chief, Communist Party leader ("*cunzhishu*"), or deputy Communist Party leader ("*cunfuzhishu*"); (2) have any family member who works at the government; (3) own real estate in the town or city; or (4) own a car or a van.[3] Therefore, this policy appeared conducive to improving targeting performance as it removed 9.29 million ineligible people and added 8.74 million eligible poor people. After the "looking-back" policy, beneficiaries who had been helped and lifted out of poverty, should be removed from the recipient list. If households that entered poverty and were not the beneficiaries, they should be added to the beneficiary list.

3. Literature review and conceptual framework

3.1. The role of villager social capital in poverty targeting

The concept of social capital is discussed at the macro, *meso*, and micro levels (Grootaert, 1999). As the aim of our paper is to investigate the importance of social capital in poverty targeting within the community, we focus on the individual level of social capital, defined as villager social capital. At the individual level, Coleman (1988) defined social capital as "social-structural resources owned by the individual or collective actors and beneficial to the actors themselves." Lin (1999) defined social capital as "resources embedded in social structures that can be acquired or mobilized based on purposeful actions". Based on these views, individual social capital is the resource embedded in the structure of people's relationships (Porters, 1998) Borrowing from the existing literature, villager social capital can be defined as the resource embedded in villagers' social structure and is characterized by trust and reciprocity (Lin, 1999; Narayan, 1999; Stone, 2001).

Development studies have extensively discussed the role of individual social capital. Since social capital is a kind of capital, these works focus on the relation between social capital and individual welfare, especially economic welfare, such as job opportunities (Granovetter, 1995) and poverty reduction (Narayan & Pritchett, 1999; Zhang et al., 2017). Social capital provides job information and influences the decisive role of getting a better job (Bian, 1997). In China's context, social capital facilitates rural labor migration to urban areas (Chen & Fan, 2011). Social capital can provide financial support (Zhou, 2012) and emotional support (Yip et al., 2007) in times of need, to help people cope with risks and get rid of poverty. The social network beyond the family connects people with more

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[2] *Dibao* is a social security project providing a basic living allowance for extreme poor person implemented in China.
[3] Source: Guiding Opinions on the Dynamic Adjustment of Archived Poor Household and the looking-back Policy in Poverty Alleviation. http://gkml.dbw.cn/web/CatalogDetail/F5E7C6F692F62875

knowledge and opportunities (Granovetter, 1995), which may facilitate people out of poverty by providing credit (Narayan, 1999; Yang et al., 2011) or getting a better job (Granovetter, 1995).

Most studies agreed that people can mobilize their social capital to access resources of interest (Bourdieu, 1986; Coleman, 1990; Lin, 2001). Not surprisingly, villagers probably mobilize their social capital to obtain public antipoverty resources if possible. However, like many other forms of capital, the distribution of social capital could well be skewed in favor of the rich (Grootaert, 1999; Zhao & Lu, 2009; Zhou, 2012). If the rich mobilize their social capital to obtain public resources that should be entitled to the poor, it will result in targeting errors. Therefore, villager social capital is likely to be an important cause of poverty errors.

How do the rich mobilize their social capital to influence the allocation of public resources? The existing literature on individual social capital has provided several potential links between social capital and targeted antipoverty resources, all of which can be conceptualized into two kinds of embedded resources: influence of power and information (Bian, 2018).

Firstly, villager social capital may exert an influence on powerful people (Lin, 1999). Social capital provides actors with the opportunity to acquire more goods or services with people of influence such as government agencies and banks (Woolcock & Narayan, 2000). For instance, the job seeker may influence the granters to deliver a higher-salary job to them (Ye & Wu, 2014). In decentralized allocation, villager social capital can be a source of favoritism (Caeyers & Dercon, 2012). In decentralized poverty targeting, beneficiary selection often relies on the community (Galasso & Ravallion, 2005), which is usually dominated by village authorities as they have better local knowledge than program administrators. Therefore, the village authorities may use their power to manipulate the beneficiary allocation to favor the villager who was closely connected with them.

Secondly, villagers with rich social capital have access to more information. Markets usually are imperfect in developing countries, leading people to hold a different level of information. Moreover, obtaining and disseminating information through social networks is considered to be ethical (Bian, 2018). Information can be spread among social networks, reducing the transaction cost of information, and accelerating information flow (Granovetter, 1995). Social capital helps actors access resource information to promote their interest. For instance, network-transmitted information helps job seekers find a better job, recruiters recruit suitable employees, and promote technology (Grootaert & Van Bastelaer, 2002; Lin, 1999; Reid & Salmen, 2000). In the decentralized program, villagers with larger and high-quality social networks have a higher probability of receiving program information and take more effective lobbying for support (Caeyers & Dercon, 2012).

It is worth noting that political connections[4] have received much attention in the existing studies (Caeyers & Dercon, 2012; Panda, 2015). In the decentralized program, the local authorities are not only a disseminator of information but also a resource allocator, which is prone to political elite capture (Pan & Christiaensen, 2012; Panda, 2015). A household connected with those who hold positions in the bureaucratic system can increase the probability of obtaining formal resources. Every villager is connected with the political elite directly or indirectly in the village, and the closeness of them connected with political elites constitutes a part of their social capital. In other words, political connection is one dimension of villager social capital. Political connections have been discussed extensively and proven to lead to mistargeting in poverty alleviation projects (Caeyers & Dercon, 2012; Panda, 2015), while the role of individual social capital as a whole has yet to be examined in decentralized policies.

3.2. The measurement of villager social capital

Appropriate measurement of social capital is particularly critical for the reliability of empirical investigation. The empirical works on individual social capital mainly focus on three dimensions of evidence: generalized trust, reciprocity, and social networks. In the empirical work, a typical question of generalized trust is about the trust of strangers, villagers, and neighbors (Putnam, 1995; Verhaeghe & Tampubolon, 2012). Researchers measure reciprocity by asking the frequency and type of households helping each other (Verhaeghe & Tampubolon, 2012; Zhou, 2012). Many studies use organization membership to measure the individual social network (Glaeser, Laibson, & Sacerdote, 2002; Grootaert, 1999; Putnam, 1993; Zhou, 2012). Additionally, extensive literature uses time investment, money investment, types of connections, and the size of social networks to measure social networks (Knight & Yueh, 2008; Yang et al., 2011; Zhao & Lu, 2009; Zhou, 2012).

To understand social capital, it is essential to recognize that the form of social capital varies considerably with geographic and social context (Tonts, 2005). For example, when discussing villager social capital in the Western world, researchers often measure social capital in terms of the type, number, and activities of rural civil organizations membership (Grootaert, 1999). However, if such indicators are used in China, the level of social capital will be underestimated due to the relative lack of organizations in rural areas (Xu, Perkins, & Chow, 2010). Therefore, we focused on the measurement of villager social capital in empirical studies under rural China's context.

The typical empirical evidence in rural China's social capital is mainly reciprocity and social network, including reciprocity frequency, political connections, time investment, and gift expenses (Knight & Yueh, 2008; Yang et al., 2011; Zhao & Lu, 2009; Zhou, 2012). Like many studies, we chose two dimensions of social capital as the measurement: reciprocity and social network. The rationale is that trust was not chosen that individual trust may not benefit the trustor but is beneficial to the trustee (Glaeser et al., 2002). Reciprocity was assessed with the frequency of helping each other. The social network was assessed with political connections, time investment, and money investment in the literature. Like the proxy indicators used by much literature, we chose gift expenses as the money invested in social capital (Knight & Yueh, 2008; Zhang et al., 2017; Zhao & Lu, 2009).

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[4] Some studies used the term of "guanxi" when discussing in China's context (Bian, 2018; Knight & Yueh, 2008).

4. Study area, data collection, and descriptive statistics

4.1. Study area and data collection

Existing empirical studies have discussed social capital using large-scale survey data and tended to ignore the social and cultural context where social capital operates (Wilshusen, 2009). Consequently, it is difficult to find a measurement that applies to the national or large-scale context. Especially in China, there are differences between urban and rural areas and differences between the north and south in a social context. For example, the patriarchal network is more important in the southeastern provinces than in other provinces (Freedman, 1965). Therefore, to measure social capital appropriately, we selected a census-type data from a poverty-stricken county, Puding, Guizhou Province in western rural China as the study area.

Puding County is in the western part and a representative impoverished county of Guizhou Province. More than 85% of the county is covered by mountains and hills,[5] which is close to that of Guizhou Province (92.5%). Puding is a karst landform county,[6] with less cultivated and low-quality land. Puding is one of the 592 state-supported impoverished counties and belongs to the "Dian-Gui-Qian Stony Desertification Area", one of the fourteen poor areas with special difficulties. In 2017, the GDP of Puding was 11.30 billion *yuan*, and the *per capita* GDP was 28,797 *yuan*, which was half of the national average. In 2015, 69,100 people in the county lived below the rural poverty line of 2300 *yuan* (measured at constant prices in 2010), and the poverty incidence was 15.1%. The average poverty incidence of all state-supported impoverished counties of Guizhou is 16% in the same year. In 2017, the total population of the county was approximately 500,000, of which the rural population accounted for 61.9%. The *per capita* disposable income of rural residents was 8337 *yuan*, accounting for 62.07% of the national average and closing to the average level of Guizhou (8869 *yuan*). In April 2019, Puding announced that it was no longer a state-supported poverty-stricken county.

The data collection was conducted as part of the tasks of the "Public Policy and Rural Poverty" project conducted jointly by International Food Policy Research Institute (IFPRI), Chinese Academy of Agricultural Sciences and Guizhou University in 2004–2018. Firstly, a town (one of 11 towns) was selected by random sampling. Secondly, the project applied stratified random sampling and selected three administrative villages with high, middle, and low incomes. Thirdly, the project conducted a census in these three administrative villages. The dataset used in the paper was collected in January 2018 using an in-depth questionnaire. As census data, it covers the information of all households in these three administrative villages. The total sample consisted of 17 natural villages and 824 households. The dataset of this project has been applied to study rural poverty and inequality (Xing, Fan, Luo, & Zhang, 2009), public transportation investment (Qin & Zhang, 2016), village-level economic development (Kleinwechter & Grethe, 2015)and impact evaluation of the social security policies (Filipski, Zhang, & Chen, 2015).

The characteristics of these three administrative villages are shown in Table 1. Village 1 is 10 km away from the county downtown, largely a minority village. Minorities accounted for 83% of the total village population. Village 2 is 8 km away from the county downtown. Village 3 is in the suburban area of the county, approximately 500 m from the county downtown. All three villages were connected to paved roads. In 2017, 10.32% of total households lived under the rural poverty line, and 21.24% of total households lived under 3.2 USD a day. Village 1 had the highest percentage of the poorest population, with 20.3% of people lived under the rural poverty line, 9.38% in village 2, and 4.24% in village 3. Additionally, Village 1 had the deepest poverty level, with a 15.86% poverty gap in 3.2 USD a day.[7] There were a total of 84 beneficiaries (APHs) of TPA in these three administrative villages. There are 39, 27 and 18 beneficiary households in Village 1, Village 2 and Village 3, respectively, in 2017.

4.2. Setting and descriptive statistics

As discussed above, we used "reciprocity", "support time", "gift expense", and "political connections" as proxies of villager social capital. The question about reciprocity in the questionnaire is "how often do you share production tools and draught animals with relatives and neighbors? 1 = few, 2 = less, 3 = fair, 4 = more, 5 = many". The questions about the support time in the questionnaire are "in 2017, how many days did your family help relatives and neighbors when they are busy with the farm", that is "agricultural supports"; and "in 2017, how many days did your family help relatives and neighbors when they are busy with building a house" that is "building supports". We added up these two parts to form the number of days of support the whole year. The question about the gift in the questionnaire is: "how much did your family spend on gifts in 2017?" The questions about the political connections in the questionnaire is: "do your family have any family members, relatives, or close friends who work as village leaders?" Using factor analysis, we combined these dimension into a social capital index (SCI). Specifically, we used principal component factor analysis and used a regression method (Thomson, 1951) to calculate the factor score. The index was weighted by the factors' variance contribution. The function is given:

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[5] Data Source: "14th Five-Year Plan" Modern Mountain High-efficiency Agriculture Development Plan [2021–2025] of Anshun (Draft for Solicitation of Comments) http://nyncj.anshun.gov.cn/gzdt/tzgg/202102/t20210208_66715821.html

[6] Karst landforms have 2 main characteristics: Limestone or other soluble rock layers; Shaped or dissolved by microscopic lifeforms, running water, waves, or weathering. http://worldlandforms.com/landforms/karst/

[7] The calculation method of the poverty gap comes from Foster, Greer, and Thorbecke (1984).

Table 1
Characteristics of three administrative villages in 2017.

	Village 1	Village 2	Village 3	Full sample
Distance to county downtown, km	10	8	0.5	–
Whether connected to a paved road	Yes	Yes	Yes	–
Proportion of minorities, %	83.00	5.51	7.31	31.92
Headcount ratio, % (2952 *yuan*/year)	20.30	9.38	4.24	10.32
Poverty gap, % (2952 *yuan*/year)	4.95	2.08	0.93	2.43
Headcount ratio, % (3.2 USD/day)	35.93	22.66	11.29	21.24
Poverty gap, % (3.2 USD/day)	10.81	5.40	2.45	5.75
Beneficiaries	39	27	18	84
Households	271	128	425	824

Note: The poverty line in rural China was 2952 *yuan* per person in 2017 (Data source: Poverty Monitoring Report of Rural China in 2017). The international poverty line is 3.2 USD per person per day, which equals 3982 *yuan* per person per year after adjusting to PPP (The USD 3.2 poverty line was first converted to the poverty line in RMB based on the rural PPP in 2011, and then the poverty line was deflated with the rural CPI and adjusted to 2017. The rural PPP data comes from the World Bank (Atamanov, Lakner, Mahler, Tetteh Baah, & Yang, 2020). The rural CPI data comes from China Statistical Yearbook 2019).

$$SCI = \frac{1}{\sum\limits_{i=1}^{n} \lambda_i} \left(\sum_{i=1}^{n} \lambda_i f_i \right) \qquad (1)$$

where n is the number of retained factors, λ_i is the variance contribution of the factor i, and f_i is the factor score of the factor i.

We investigated the distribution of social capital and showed the results in Table 2. We calculated the mean of villager social capital in the nonpoor group and the poor group, respectively, and tested the significance of the conditional difference after controlling the village effect, based on income poverty and multidimensional poverty.[8] The income poverty line used here is China's rural poverty line. The average of reciprocity was 1.438. The average number of days of agricultural support was 1.822, and the average building reciprocity was 2.538, thus the average support time was 4.360. The average gift expense was 5582 *yuan*. We took the logarithm of gift expenses when calculating SCI. Approximately 14.8% of households had relatives or close friends who worked at the government.

We found that the nonpoor had more social capital than the poor, which was consistent with the finding from the previous studies (Grootaert, 1999; Zhao & Lu, 2009; Zhou, 2012). Table 2 shows that the conditional difference of support time and average gift expense are positive and significant statistically, meaning that the support time and average gift expense of nonpoor household groups were significantly higher than those of poor households with income poverty. Conditional differences of reciprocity, support time, average gift expense, and political connections are positive and significant statistically, meaning that all dimensions of villager social capital of nonpoor are higher than those of poor with multidimensional poverty. And the average SCI of the nonpoor households was significantly higher than that of poor household groups under both poverty standards.

In addition, we investigated the distribution of social capital among the three villages, and found that Village 1 has the highest average level of social capital, Village 2 takes second place, and Villages 3 has the lowest level. The proportion of minorities in Village 2 is only 5.51%, which is lower than that in Village 3, while its level of social capital is higher than that in village 3. Therefore, there is no evidence showing that the more ethnic minorities in the village, the higher the level of villager social capital.

Table 3 shows the descriptive statistics of the variables used in the empirical model. The control variables included human capital, physical capital, household characteristics and village characteristics. The human capital variables mainly were the educated years and the self-rated health of the household head. The average years of schooling of the household head were 4.607 years, and the average of self-rated health was 2.756. The physical capital variables were mainly the land area per person and the wealth index. The average land area *per capita* was 0.798 mu. The average house area *per capita* was 35.209 m^2. There were many types of durables owned by households, we chose durables with an ownership rate between 3% and 95%, and used the principal component analysis to calculate the household wealth index. The household characteristics mainly were the characteristics of the household head, demographic characteristics, and the distance to market. 91.31% of household heads were men. The average age of household heads was 52.104 years old, and 31.1% of households were minorities. The average number of family members in each household was 4.553. The average proportion of older people among family members in each household was 23.70%, and the average proportion of children among family members in each household was 22.66%. The average distance from the dwelling of the household to the market was 7.68 km.

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[8] The method of multidimensional poverty is described in Section 5.

Table 2
Distribution of villager social capital between the poor and nonpoor.

Social capital	Full sample	2952 *yuan*/year			Multidimensional poverty		
	$n = 824$	Nonpoor ($n = 739$)	Poor ($n = 85$)	Conditional difference	Nonpoor ($n = 650$)	Poor ($n = 193$)	Conditional difference
Reciprocity	1.438	1.436	1.459	−0.162	1.436	1.446	0.154*
	(0.941)	(0.941)	(0.946)	(0.107)	(0.925)	(0.994)	(0.078)
Agricultural support (total days per year)	1.822	1.894	1.188	1.387**	1.913	1.523	0.986**
	(5.240)	(5.463)	(2.528)	(0.609)	(5.347)	(4.875)	(0.444)
Building support (total days per year)	2.538	2.540	2.518	0.998	2.664	2.127	1.443***
	(5.871)	(5.890)	(5.729)	(0.678)	(6.068)	(5.166)	(0.491)
Support time (total days per year)	4.360	4.435	3.706	2.385**	4.577	3.650	2.429***
	(9.153)	(9.347)	(7.262)	(1.052)	(9.322)	(8.561)	(0.763)
Gift expense (1000 *yuan*)	5.582	6.143	0.705	4.007***	6.780	1.663	4.018***
	(7.578)	(7.801)	(1.100)	(0.847)	(8.099)	(3.287)	(0.609)
Political connections, %	0.148	0.156	0.082	0.067	0.165	0.093	0.068**
	(0.355)	(0.363)	(0.277)	(0.042)	(0.371)	(0.292)	(0.304)
Social capital index (SCI)	0.000	0.063	−0.548	0.647***	0.105	−0.343	0.489***
	(0.712)	(0.684)	(0.722)	(0.081)	(0.674)	(0.727)	(0.059)

Notes: Mean value is reported, and the standard errors are in parentheses. For reciprocity and political connections, we performed the Wilcoxon-Mann-Whitney test and reported the Z value, and for the others, we performed the *t*-test. $k = 33.33\%$ is used to calculate the number of poor and nonpoor under multidimensional poverty measurement, for more detail, please refer to Section 5 of the paper.

   * $p < 0.1$.
   ** $p < 0.05$.
   *** $p < 0.01$.

Table 3
Descriptive statistics of variables.

Variable	Description/unit	Mean	SD	Min	Max
Dependent variable					
Beneficiary	Is the household selected as a TPA beneficiary? 1 = yes, 0 = no	0.102	–	–	–
Independent variables					
SCI	Social capital index is constructed by combining reciprocity, support time, the logarithm of gift expenses, and political connections using factor analysis	0.000	0.581	−1.476	2.844
Education	The number of schooling years of household head	4.607	3.421	0	18
Health	Self-rated health of household head,1 = very good, 2 = good, 3 = fair, 4 = bad, 5 = very bad	2.756	0.980	–	–
Wealth	Wealth index[a]	0.000	1.832	−4.807	3.828
Land	The land area owned *per capita, mu*[b]	0.798	1.370	0	13.33
House owned	Squared meters *per capita*, m^2	35.209	28.564	0	260
Gender	Gender of household head, 1 = male, 0 = female	0.911	–	–	–
Age	Age of household head, years	52.104	14.040	14	98
Minority	1 = Minorities, 0 = Han	0.311	–	–	–
Household	The number of family members in the household	4.553	2.057	1	13
The elderly	Proportion of older people (age≥60) among family members	0.237	0.333	0	1
Children	Proportion of children (age < 18) among family members	0.227	0.223	0	1
Distance	Distance to the market, km	7.682	6.923	0	50[c]
IVs					
LSCI	Villager social capital index in 2011	0.000	0.718	−1.015	2.524
Times of building house	The average number of times other villagers of the same natural village built a house from 2012 to 2017.	0.082	0.075	0	0.409

[a] The method we used to calculate the wealth index comes from WFP (2009).
[b] 1 *mu* = 0.0667 ha.
[c] Some households live far away from the village-level administrative center.

5. Targeting efficiency of TPA

Before empirically examining the relation between social capital and poverty targeting error, we firstly discussed targeting efficiency of TPA. The most commonly used indicators to evaluate the targeting efficiency are leakage rate and undercoverage rate (Van De Walle, 1998; Weiss, 2005). The leakage rate (LR) reflects the leakage error(the nonpoor are included in the antipoverty programs), that is, the proportion of nonpoor beneficiaries to all beneficiaries. The undercoverage rate (UR) reflects the undercoverage error,(the real poor are excluded from the antipoverty programs), that is, the proportion of households that are excluded from the antipoverty programs to all poor households.

As the concept of multidimensional poverty is applied with the TPA, this paper employed multidimensional poverty to identify poor

households. Some researchers believed that some targeting errors are caused by poverty measurement errors (Alatas et al., 2012; Ravallion, 2008). Therefore, it is critical to accurately identify the poor when evaluating targeting efficiency. Income is an important eligible criterion in TPA, according to the requirements of the central government.[9] Additionally, because of the lack of income information, some villages considered the poverty status of households in health, housing, and education when electing beneficiaries (Wang & Guo, 2015). For example, Weining County, Guizhou Province developed the "investigating four dimensions" ("*sikanfa*") method for identifying the poor, which includes living standards, agricultural production, demographics, and education. A multidimensional method has been widely applied in identifying the poor. We combined consumption, living standards, health, and education into the multidimensional poverty index (MPI) to identify the poor to avoid poverty measurement errors as much as possible. We used consumption as a proxy of income because consumption is a better measure of permanent income and is more reliable to measure and thus more accurate than income in household surveys (Narayan & Pritchett, 1999).

We used the multidimensional poverty measurement method (A-F method) of Alkire and Foster (2011). Considering the policy implementation, and existing suggestions from the current research (Han & Gao, 2019; Wang, Feng, Xia, & Alkire, 2016; Zhu & Li, 2019), we included 4 dimensions: consumption, living standards, health and education, and equal-nested weights to construct an MPI (see Table 4).

Table 5 reports TPA's targeting performance based on multidimensional poverty under different cutoffs, namely the *k* value, which reflects the share of weighted indicators in which a household was deprived. The incidence of multidimensional poverty was 38.47% - 11.77% with $k = 20\%$ - 50%. The smaller the *k* value is, the lower the proportion of nonpoor households, and the lower the LR. LR was 40.48% - 77.38% when with $k = 20\%$ - 50%. UR was more than 80% under the different cutoff.

We selected the widely used cutoff of $k= 33.33\%$ (Alkire & Santos, 2014), namely the household that were deprived in more than one-third of weighted indicators were defined as the multidimensional poor. Furthermore, this paper selected another cutoff of $k=40\%$ to test the robustness of the main estimated results, and the main results stand.[10]

We found that, contrary to the common perception from the government, the TPA's targeting performance is rather poor in our study area. LR was 63.10% with the cutoff of $k= 33.33\%$, meaning that more than half of the beneficiary quotas were allocated to the nonpoor villagers according to the MPI used in the paper. UR was approximately 80%, meaning that 80% of the poor villagers were not included in TPA. The higher LR is consistent with previous studies (Wang & Guo, 2015; Yang, 2017). Using different large-scale sample survey data and income poverty, Wang and Guo (2015) found that LR was 40% - 49% in 2013 of TPA, the Yang (2017) found that LR was 58% in 2015 of TPA. Zhan and Zhang (2017) found that the LR of TPA was 88.5% through a survey in an administrative village in 2016.

The higher LR and UR were also found in *Dibao* in previous studies, in which the selection process of the beneficiary is similar to that in TPA.[11] Using the same nationally representative datasets and income poverty, previous studies found that LR was as high as 82.20% - 90.82% in 2013, UR was 81.89% - 87.89% (Kakwani, Li, Wang, & Zhu, 2019; Zhu & Li, 2019). Using nationally representative datasets and multidimensional poverty, previous studies found that LR of rural *Dibao* was 83.5% in 2009 (Golan, Sicular, & Umapathi, 2017), 58.31% in 2012 (Han & Gao, 2017) and 57.96% in 2013 (Zhu & Li, 2019), and UR was 83.5 in 2009 (Golan et al., 2017), 60.44% in 2012 (Han & Gao, 2017), and 85.34% in 2013 (Zhu & Li, 2019).

We tested the robustness of targeting efficiency with a new MPI with different weights, and the results show that the targeting efficiency is consistent with our main findings. Furthermore, we recalculated the targeting efficiency based on consumption poverty, and the results show that targeting efficiency based on income poverty is worse than multidimensional poverty, meaning that the multidimensional poverty method helps reduce targeting errors.[12]

6. Empirical analysis

6.1. Empirical model

We began our empirical analysis by specifying the following equation:

$$Beneficiary_{ij} = \alpha + \beta \bullet SC_{ij} + \gamma \bullet X_{ij} + \xi \bullet V_j + \varepsilon_{ij} \tag{2}$$

where *i* denotes the household, *j* denotes the administrative villages. *Beneficiary$_{ij}$* is an indicator variable of whether household *i* in village *j* was selected as the beneficiary of TPA in any year ranged from 2014 to 2017 (whether the household is or was the "archived poor household"). SC_{ij} is a variable of villager social capital measured in household *i* in village *j*. X_{ij} is a vector of household characteristics. V_j is village dummy variables to capture village fixed effects. ε_{ij} is the error term. β is the parameter of interest.

We used Probit model to estimate Eq. (2) in three samples, full sample, subsample excluding multidimensional poor, and subsample excluding non-multidimensional poor (Cameron & Trivedi, 2005). When estimating Eq. (2) within the subsample excluding multidimensional poor, β reflects the effect of social capital on the probability of non-multidimensional households being selected as TPA beneficiaries, that is, leakage error. Similarly, when estimating Eq. (2) within the subsample excluding non-multidimensional poor, $-\beta$

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[9] Work plan for establishing archives for poor households. http://www.cpad.gov.cn/art/2014/4/11/art_27_22097.html
[10] The results are available from the corresponding author upon request.
[11] For the selection process of the beneficiary in *Dibao*, please refer to Han and Gao (2019).
[12] These results are available from the corresponding author upon request.

Table 4

Multidimensional poverty dimensions, indicators, deprivation cutoff, and weights.

Dimension	Indicator	Deprivation cutoff	Weights
Consumption	*per capita* consumption	*per capita* consumption less than rural poverty line(2952 *yuan* per year)	1/4
Living standards	Durables	Household owns only one of the following appliances: TV, washing machine, refrigerator, heater	1/16
	Vehicle	Household owns none of the following vehicles: car, motorcycle, electric motorcycle, tricycle	1/16
	Housing	The house is classified as unsafe by the government or *per capita* housing area $\leq 10\ \mathrm{m}^2$	1/16
	Drinking water	The distance of accessing drinking water exceeds 1000 m	1/16
Health	Self-rated health	One or more family members reporting very bad health	1/8
	Medical expenditure	Out-of-pocket medical expenses exceed 40% of household nonfood consumption	1/8
Education	Maximum years of education	The highest educational level of adult family members is a junior high school (excluding who are attending school)	1/8
	Education expenditure	Education expenditure exceeds 40% of household nonfood consumption	1/8

Notes: "Education expenditure" is included as an indicator of multidimensional poverty because the village committee considers education expenses when identifying the poor. In medical expenditure, the threshold of 40% of nonfood expenditure is a definition of catastrophic medical expenditure (Xu et al., 2003). We also use this threshold for education expenditure.

Table 5

Leakage rate and under-coverage rate with different multidimensional poverty cutoff.

k value	20%	30%	33.33%	40%	50%
Poor households	317	243	193	139	97
Headcount ratio (% of total households)	38.47	29.49	23.42	16.87	11.77
Leakage households	34	45	53	60	65
Leakage rate (LR) (% of total beneficiaries)	40.48	53.57	63.10	71.43	77.38
Under-coverage households	267	204	162	115	78
Under-coverage rate (UR) (% of total poor households)	84.23	83.95	83.94	82.73	80.41

reflects the effect of villager social capital on the multidimensional poor households that cannot be TPA beneficiaries, that is, undercoverage error. We removed a few households with missing household head information and finally have 813 observations of the full sample, in which 623 non-multidimensional poor observations, and 190 multidimensional poor observations.

However, we are aware there could be some concern about the endogeneity of villager social capital on poverty targeting. The endogeneity of social capital has been discussed in previous studies in examining the effect of social capital on the labor market and poverty reduction. They found that endogenous problems are often caused by omitted variables and two-way causality (Narayan & Pritchett, 1999; Grootaert, 1999; Chen & Fan, 2010). For example, "eloquence" is often omitted, which would not only affect the ability to mobilize social capital, but also the possibility of finding a job (Chen & Fan, 2010) A common concern is related to the presence of two-way causality when estimating empirically the relation between social capital and poverty reduction (Grootaert, 1999; Narayan & Pritchett, 1999).

Similarly, when empirically exploring the relation between social capital and poverty targeting, reverse causality is worthy of attention, especially in targeted programs that have been implemented for a long time. When receiving public resources, poor beneficiaries could spend more money on gifts and more leisure time on social activities or support others. Their villager social capital will accumulate through social interactions in the villages (Wilshusen, 2009). Except for these, in TPA, beneficiaries are more likely to interact or make friends with government officials and village authorities, because of the "paired-up assistance" policy,[13] thereby increasing their level of social capital.

In order to address the concern of endogeneity caused by reverse causality, we used instrumental variable (IV) estimation. Two IVs were used: lagged social capital index (LSCI) and the times of building houses. The former is the villager social capital index in 2011, which we calculated using the same variables, methods, and data from the same sample in 2011. The latter is the average number (per household) of times other villagers of the same natural village built a house from 2012 to 2017. The correlation of LSCI and villager social capital is obvious, and the current level of social capital is indeed largely derived from the accumulation of social capital in the past. It is impossible for TPA to affect the level of villager social capital in 2011 because it started in 2014. The times of built houses from 2012 to 2017 reflect the accumulation of villager social capital during the gap between LSCI and SCI, and the more times other villagers built houses in the natural villages from 2012 to 2017, the more they would directly increase the building support time and social interactions of the household, increasing their social capital. The number of times other villagers built houses does not directly affect the possibility of the household being identified as a beneficiary by the government. The descriptive statistics of IVs are shown in Table 3.

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[13] Paired-up assistance is a unique practice in TPA. Generally, each beneficiary has at least one government official or village official who is responsible for helping them get rid of poverty.

6.2. Estimation results

We began our empirical analysis by presenting the probit estimation results on the effect of villager social capital on the probability of being a TPA beneficiary in Table 6. Columns (1)–(3) present the results of full-sample, subsample excluding multidimensional poor, and subsample excluding non-multidimensional poor, respectively.

The marginal effects of SCI are positive and significant statistically as indicated in Columns (1–3), suggesting that households with higher levels of social capital have a significantly higher probability of becoming TPA beneficiaries. The positive and significant marginal effect of SCI in Column (2), meaning that the non-multidimensional poor households with higher levels of social capital have a significantly higher probability became TPA beneficiaries than other non-multidimensional poor. Specifically, a unit increase in the villager social capital index, the probability of non-poor households becoming beneficiaries increases by 2.7% significantly. Similarly, the positive and statistically significant marginal effect of SCI in Column (3), indicating that the higher the level of social capital, the higher the probability of becoming a beneficiary of TPA even for the poor.

Next, Table 7 presents the IV estimates of the villager social capital's effect on being TPA beneficiaries. The coefficients of SCI now are strongly statistically significant in full sample and subsample excluding multidimensional poor and subsample excluding non-multidimensional poor (in Column (1–3)), suggesting that villagers with a higher level of social capital are more likely to become TPA beneficiaries. And the F statistic value of the IV estimation in the first stage is 13.32, which is larger than the threshold value of the Stock-Yogo, indicating that there is no weak instrumental variable problem. These results support the causal effect of villager social capital on poverty targeting in the village, indicating that villager social capital is the root cause of poor targeting efficiency in the decentralized antipoverty programs.

6.3. Removing political elite capture

A potential concern about the above results is that one can argue that villagers with rich social capital are elites in the villages, so the causal impact of social capital on targeting error could reflect a widespread phenomenon of elite capture in antipoverty programs. As we discussed in Section 3, political connection is one dimension of villager social capital. Villagers who are or are closely related to political elites may capture the benefit, resulting in political elite capture in programs (Caeyers & Dercon, 2012). Hence, political elite capture is one of the situations in which social capital affects poverty targeting. However, what is of concern is whether the effect of village social capital on poverty targeting is entirely the role of political connection.

To dispel this concern, we reconstructed the social capital index by excluding the political connections called the new SCI. The mean of the new SCI was 0.000 with a standard deviation of 0.579. Similarly, we used IV estimation by three samples as conducted in Section 6.2. The estimation results are shown in Table 8.

We found that after excluding the political connection, the effect of villager social capital on targeting errors persists. The results show that the coefficients of new SCI are positive and significant statistically in all columns of Table 8. This indicates that the new SCI still has a positive and significant causal effect on the probability of being TPA beneficiaries for all households even the poor, which are consistent with our main findings. These results refute the argument that the impact of social capital on poor targeting performance is the phenomenon of political elite capture, as the villagers with rich social capital are elites in the villages, and show convincingly that the villager social capital is the cause of targeting error. The social capital that villagers can mobilize is not just the political connection dimension in targeting, but those dimensions that are built and maintained by investing time and gift money in rural China.

Additionally, we found that political connections have no significant impact on targeting. The coefficients of the political connections are insignificant in Columns (1)–(3). These results show that there is no political elite capture in TPA's targeting. Caeyers and Dercon (2012) found that households with political connections have a ten percentage points higher probability of obtaining the food in rural Ethiopia's targeted food aid program. In China's context, previous studies have found that there was serious elite capture in *Dibao* targeting (Han & Gao, 2019). Furthermore, Hu and Wang (2017) provided evidence showing that 25% of the beneficiaries are elites in TPA's early stage (in 2012 and 2013). And, the "looking-back" policy implemented in 2015 removed village leaders and some other ineligible groups such as elites. Building on their paper, our results show that there is no political elite capture in TPA in 2017, suggesting that the "looking-back" policy effectively eliminated the political elite capture phenomenon.

These findings indicate that despite the implementation of a correction policy to address targeting errors, the impact of villager social capital on targeting errors remains. The elite usually is a small politically or economically influential group and has some obvious features in the village (Zannoni, 1978; Dutta, 2009; Alatas et al., 2019). Thus, as one dimension of villager social capital, the elite capture effect may easily be identified by program administrators and can be eliminated through project design (World Bank, 2004). However, the other dimensions of villager social capital such as friendships, neighborhoods, and business connections, are hidden and difficult to avoid, since they were formed of long-term interactions between villagers (Wilshusen, 2009).

6.4. Robustness checks

Firstly, given that our data comes from only one county, to count for the potential concern about the external validity of our results, we have replicated our analysis using a representative data on rural western China from the China Household Financial Survey Project

Table 6
Probit estimation of the effects of villager social capital on being a TPA beneficiary.

Independent variables	Full sample (1)	Subsample excluding multidimensional poor (Leakage error) (2)	Subsample excluding non-multidimensional poor (Undercoverage error) (3)
SCI	0.031**	0.027**	0.074**
	(0.014)	(0.014)	(0.038)
Education	−0.002	−0.001	−0.005
	(0.003)	(0.003)	(0.011)
Health	0.001	−0.004	0.011
	(0.009)	(0.010)	(0.020)
Wealth	−0.016***	−0.011**	−0.016
	(0.006)	(0.005)	(0.016)
Land	0.013**	0.016***	−0.019
	(0.006)	(0.005)	(0.021)
House owned	−0.001	−0.001**	0.001
	(0.000)	(0.000)	(0.001)
Age	−0.001	−0.001	−0.006**
	(0.001)	(0.001)	(0.003)
Gender	−0.015	0.026	−0.119*
	(0.032)	(0.036)	(0.072)
Minority	−0.015	−0.014	−0.046
	(0.027)	(0.027)	(0.074)
Household size	−0.003	−0.005	0.005
	(0.005)	(0.005)	(0.015)
The elderly	0.048	0.022	0.233**
	(0.037)	(0.038)	(0.095)
Children	−0.020	−0.025	−0.065
	(0.053)	(0.049)	(0.150)
Distance	0.001	0.002	0.002
	(0.002)	(0.002)	(0.003)
Villages fixed effects	Yes	Yes	Yes
Observations	813	628	190
Pseudo R^2	0.112	0.134	0.138
Log pseudolikelihood	−237.776	−158.712	−71.374
Wald chi^2	71.08***	61.05***	27.36**

Notes: The estimated result of Column (1) to answer the question: Does villager social capital help villagers to become beneficiaries of TPA? The estimated result of Column (2) to answer the question: Does villager social capital cause leakage errors in TPA? The estimated result of Column (3) to answer the question: Does villager social capital cause undercoverage errors in TPA? The village dummy variables were added in all regressions. Marginal effects are reported in the table, and robust standard errors are in parentheses.
* p < 0.1.
** p < 0.05.
*** p < 0.01.

Table 7
IV estimation of the effects of villager social capital on being a TPA beneficiary.

	Full sample (1)	Subsample excluding multidimensional poor (Leakage error) (2)	Subsample excluding non-multidimensional poor (Undercoverage error) (3)
Second stage: TPA beneficiary			
SCI	1.259***	1.230**	1.720***
	(0.377)	(0.577)	(0.241)
First stage: Social capital			
LSCI	0.109***	0.088**	0.156**
	(0.030)	(0.037)	(0.061)
Times of building house	0.323	0.580*	−0.777
	(0.287)	(0.332)	(0.561)
Control variables	Yes	Yes	Yes
Villages fixed effects	Yes	Yes	Yes
Observations	813	623	190
Log pseudolikelihood	−941.543	−696.358	−218.883
Wald chi^2	129.25***	91.63***	114.31***

Notes: IVprobit method are used for estimations. Coefficients are reported in the table, and standard errors are in parentheses.
* p < 0.1.
** p < 0.05.
*** p < 0.01.

Table 8

IV estimation on the effects of villager social capital and political connections on being a TPA beneficiary.

	Full sample (1)	Subsample excluding multidimensional poor (Leakage error) (2)	Subsample excluding non-multidimensional poor (Undercoverage error) (3)
Second stage: TPA Beneficiary			
New SCI	0.839***	0.805*	1.122***
	(0.287)	(0.461)	(0.096)
Political connections	−0.040	−0.089	−0.111
	(0.184)	(0.226)	(0.451)
First stage: Social capital			
LSCI	0.089***	0.066*	0.100
	(0.032)	(0.036)	(0.098)
Times of building house	−1.090*	−1.170*	1.857
	(0.649)	(0.681)	(2.042)
Control variables	Yes	Yes	Yes
Village fixed effects	Yes	Yes	Yes
Observations	813	623	190
Log pseudolikelihood	−1264.468	−1030.945	−161.298
Wald chi2	157.23***	110.20***	155.64***

Notes: Coefficients are reported for IV estimation in the table, and standard errors are in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

(CHFS) in 2015 (Gan et al., 2014). Rural western China is chosen because of comparable data on social capital, while 2015 is chosen because of the availability of social capital measurement in 2015. We found that the marginal effects of SCI are positive and significant statistically, which are consistent with our findings. This lends a support that our findings based on Puding sample are valid in rural western China as well.[14]

Secondly, we employed three approaches to check the robustness of our main estimated results. We used principal component analysis (PCA) to construct the social capital index, then estimate the Eq. (2), and the results are shown in Panel A of Table 9. We identified poor households based on income poverty, where we used consumption as a proxy for income. We used China's rural poverty line to identify the income poor. There are 85 income-poor households, in which, the under-coverage households are 69, and the leakage households are 70. We replaced the non-multidimensional poverty household samples with non-income poverty samples to estimate Eq. (2), and the results are shown in Panel B of Table 8.

We found that our findings are robust. In both Panel A and Panel B, the marginal effects of SCI are positive and significant in Columns (1)–(3). These results of Panel A indicate that the SCI constructed using the PCA method has a significant positive impact on being TPA beneficiaries for all households. The results of Panel B indicate that the SCI has a significant positive impact on being TPA beneficiaries for the non-income poor households. These results are consistent with our main findings, indicating that our findings are robust.

7. Conclusion and implications

To end absolute poverty in rural China by 2020, China introduced PTargeted Poverty Alleviation (TPA) Policy in 2013. TPA is the largest decentralized targeted poverty reduction policy in the world. Its success hinges on how well villagers under poverty are targeted. The decentralized program often provides a space for villager social capital to influence who becomes beneficiaries. Representing the first study, we attempt to investigate the causal effect of village social capital on poverty mistargeting in decentralized programs by using instrumental variable estimation. The empirical analysis used census-type data from three administrative and seventeen natural villages of Puding, a poverty-stricken county in western China, Guizhou Province in 2017. Factor analysis method are used to combine reciprocity, support time, gift expense, and political connections into a proxy index for villager social capital.

There are three key findings. Firstly, the targeting performance of TPA is poor in the studied villages. The leakage rate was found to be ranged from 40.48% - 71.43% with the cutoff of k= 20% - 40% based on multidimensional poverty. This indicates that more than half of the beneficiary quotas of TPA are seized by the nonpoor villagers in the villages. The higher leakage rate was also found in rural social program *Dibao* (57.96% - 83.5%), based on multidimensional poverty (Golan et al., 2017; Han & Gao, 2017; Zhu & Li, 2019). The poor targeting performance is considered to be a common concern of poverty-targeted programs (Coady et al., 2004). Our results provide further support for previous findings. However, caution is needed since the identification method and the efforts of local authorities vary in different regions and our study area is only focused on one poverty-stricken county. We could not evaluate the targeting efficiency of the overall TPA in China. This requires further research using nationally representative data when made available.

Secondly, villager social capital is the root cause of poor targeting performance. The results show that the villager with rich villager social capital is more likely to be a beneficiary of TPA by using instrumental variable estimation. The nonpoor can mobilize their higher level of social capital than the poor to capture the beneficiary quotas that should be allocated to the poor, resulting in mistargeting.

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[14] The results are available from the corresponding author upon request.

Table 9
Robustness test results.

Panel A. The social capital index constructed using the PCA method			
Independent variables	Full sample (1)	Subsample excluding multidimensional poor (Leakage error) (2)	Subsample excluding non-multidimensional poor (Undercoverage error) (3)
SCI	0.015**	0.014**	0.035*
	(0.007)	(0.007)	(0.019)
Control variables	Yes	Yes	Yes
Village fixed effects	Yes	Yes	Yes
Observations	813	623	190
Pseudo R^2	0.112	0.135	0.134
Log pseudolikelihood	−238.035	−156.758	−71.732
Wald chi^2	70.98***	61.69***	25.57**

Panel B. Targeting error was defined based on income poverty			
Independent variables	Full sample (1)	Subsample excluding income poor (Leakage error) (2)	Subsample excluding non-income poor (Undercoverage error) (3)
SCI	0.031**	0.034**	0.001
	(0.014)	(0.014)	(0.063)
Control variables	Yes	Yes	Yes
Village fixed effects	Yes	Yes	Yes
Observations	813	735	83
Pseudo R^2	0.113	0.118	0.294
Log pseudolikelihood	−237.776	−194.898	−30.626
Wald chi^2	71.08***	62.46***	26.4**

Notes: Marginal effects are reported in the table, and robust standard errors are in parentheses. In panel B, the marginal effect of SCI is insignificant in column (3), which is probably caused by the small sample size ($n = 83$) of the non-income poor.

* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

This finding survives after a number of tests and is valid in western China as well. This finding provides new negative evidence from China for this classic debate that social capital is the capital of the poor (Grootaert, 1999; Yip et al., 2007). Our finding shows that even in the benefit exclusively allocated to the poor, it is difficult for the poor villager to mobilize their social capital to obtain benefits as they usually have less social capital in the village.

Thirdly, there is little evidence of political elite capture in the studied villages. Even after excluding political connection, the effect of villager social capital on the probability of being a TPA beneficiary persists. This finding further supports the villager social capital is the cause of targeting error even if political connections are excluded. Additionally, since the evidence of elite capture is mixed, our finding echoes those with little evidence of elite capture in other decentralized programs (Alatas et al., 2019; Bardhan & Mookherjee, 2000). They found that enhancing the transparency and equity of the targeting process could help control elite capture effects (Bardhan & Mookherjee, 2006). We found that the political elite capture could be eliminated by a better project design. For example, the "looking-back" policy is designed to cancel the eligibility of political elites in TPA and appears to work well in containing the political capture.

The above findings suggest that village social capital causes poor targeting in decentralized poverty targeting programs and also lends new support from China to the classic debate on social capital, which is not the capital of the poor and could have an important policy implication. Successful poverty targeting is difficult, particularly in decentralized programs, targeting efficiency probably is weakened by the structure of social networks and resources in the village. More importantly, such weakening strength comes from inside the village, cannot be easily eliminated. Unlike the elite is a small group with obvious characteristics (Dutta, 2009), the villager social capital is hidden in rural social networks and is an endowment that every villager holds at various levels and is difficult to identify and eliminate through arrangements from the outside the village. This explains why even after eliminating the elite capture, there are still targeting errors. Therefore, there are tradeoffs for decentralized targeting programs between using better local knowledge and avoiding villager social capital's effect to achieve better targeting, which needs attention in policy-making. In addition, what kind of policy tools help create and expand poor villager social capital needs to be explored further.

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