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China

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# Collective action improves elite-driven governance in rural development within China

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Rural areas are at the forefront of achieving sustainable development goals, and elite actors tend to be the most influential local decision-makers in rural development. Nevertheless, improving the effectiveness of governance by elites and avoiding or redressing “elite capture” remain key challenges for sustainable rural development globally. This research integrates a large-scale quantitative dataset consisting of 604 villages in seven counties of Jiangsu province in China with qualitative data from eight villages in three out of the seven counties to examine whether and how collective action mediates the correlation between rural elites and rural development. Our quantitative analysis using multiple regression and path analysis indicates that collective action is a mediator, but it is more influential in linking governing elites than in linking economic elites with rural development. Our case studies with interviews further illuminate that collective action fuels rural development by improving resource reallocation and resource-use efficiency with the participation of both elites and non-elites. Innovative collective action designs that leverage a reputation effect to foster reciprocity norms promote the participation of elites while discouraging elite capture. Additionally, this research contributes to longstanding debates in commons governance about the role of authority interventions: we find evidence justifying the benefits of authority in catalyzing and sustaining collective action while also corroborating the critical role of democratization in improving rural governance by elites.

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## Introduction

Despite continual improvements in the quality of life of rural populations, social inequality, poverty, hunger, and preventable illness are still widely observed in rural areas around the world (UN Secretary-General, 2021; Cattaneo et al. 2021; Lade et al. 2017; Rasolofson et al. 2018). It is broadly recognized that advancing rural development is vital for achieving sustainable development goals (SDGs) (Liu and Li, 2017; Xu et al. 2020). Elite actors, who have greater economic and governing power than most people and tend to be decision makers in local governance (Li et al. 2019), are crucial in achieving sustainable rural development.

But elite-driven governance does not always promote rural development. In some cases, it is true that innovative rural elites in leadership positions, driven by public service motives, have leveraged social and economic resources to boost the rural economy and promote rural development in general (Jones et al. 2020; Qin et al. 2020). However, studies indicate that elites tend to dominate and corrupt community-level planning and governance, thus leading to inefficient and ineffective distribution of public resources (goods and services) to local people (Platteau, 2004). This so-called elite capture is a potential risk of democratic decentralization and rural development (Johnson, 2001; Dutta, 2009).

Collective action by a group or representative to achieve a shared goal has been shown to affect elite-driven governance (Rao and Ibanez, 2005). A substantial body of empirical research has explored the role of collective action in engaging elites and non-elites in community affairs and decision-making matters for rural development (Laumann and Pappi, 1976; Houtzager, 2001; Classen et al. 2008). Collaborative networks are crucial to non-elites, who often lack resource mobilization opportunities in the absence of collective action efforts (Kim, 2018). Collective action efforts that are designed to promote the participation of non-elites have the potential to be a powerful tool in boosting rural community development. However, we do not have a clear understanding of under what conditions collective action can remedy elite capture.

Even when a variety of individuals and groups participate in collective action, local decisions are often made by a few powerful local elites (Labonne and Chase, 2009). Prior work suggests that trust and reciprocity between non-elites and elites failed to prevent corruption and elite capture due to a lack of administrative capacity (Matin and Hulme, 2003). Research conducted in Indonesia showed that collective action can successfully hold elites accountable. In a community-driven poverty alleviation project in which elites and non-elites participated the success of the project depended on: the design of the project; pre-existing community context; and the broader social, political, and economic context (Dasgupta and Beard, 2007). Although studies have shown that collective action can reduce elite-capture, the efficacy and mechanism of collective action in mediating the effect of elites on rural development should be further explored.

Two main types of collective action in rural communities in China—village collectives and farmer cooperatives—are ideal contexts to explore how different types of collective action influence elite governance and rural development because the former serves public affairs (Kan, 2016) while the latter centers on private agricultural business (Jia and Huang, 2011). Consequently, they require different institutions and collaborative networks. Differentiating between the two allows for the investigation of the diverse roles of elites in these collective actions. In rural China, village collectives are self-governing organizations that automatically include all village households. Each village has its own village collective, led by elected leadership positions who are composed of representatives from the local Communist Party

and the village leadership committee. The four principle functions of village collectives are: (1) to serve as a platform for broader engagement by members in local public affairs, (2) members of the collectives formulate plans and strategies for local development, (3) members manage the land and other property collectively owned by the villagers, and (4) members provide public goods and services—for example, physical infrastructure and educational services. Conversely, farmer cooperatives were formed to supplement household-based operations in rural China by 2000. These cooperatives were intended to counter the new challenges brought by globalization such as information asymmetry between smallholders and larger businesses. Farmer cooperatives act as an intermediary in transactions with the formal financial sector, larger businesses, or consumer goods market (Jia and Huang, 2011). They also provide a mechanism for alternative (i.e., non-public) service delivery—such as training in agriculture or other vocational skills and advancing agricultural production facilities.

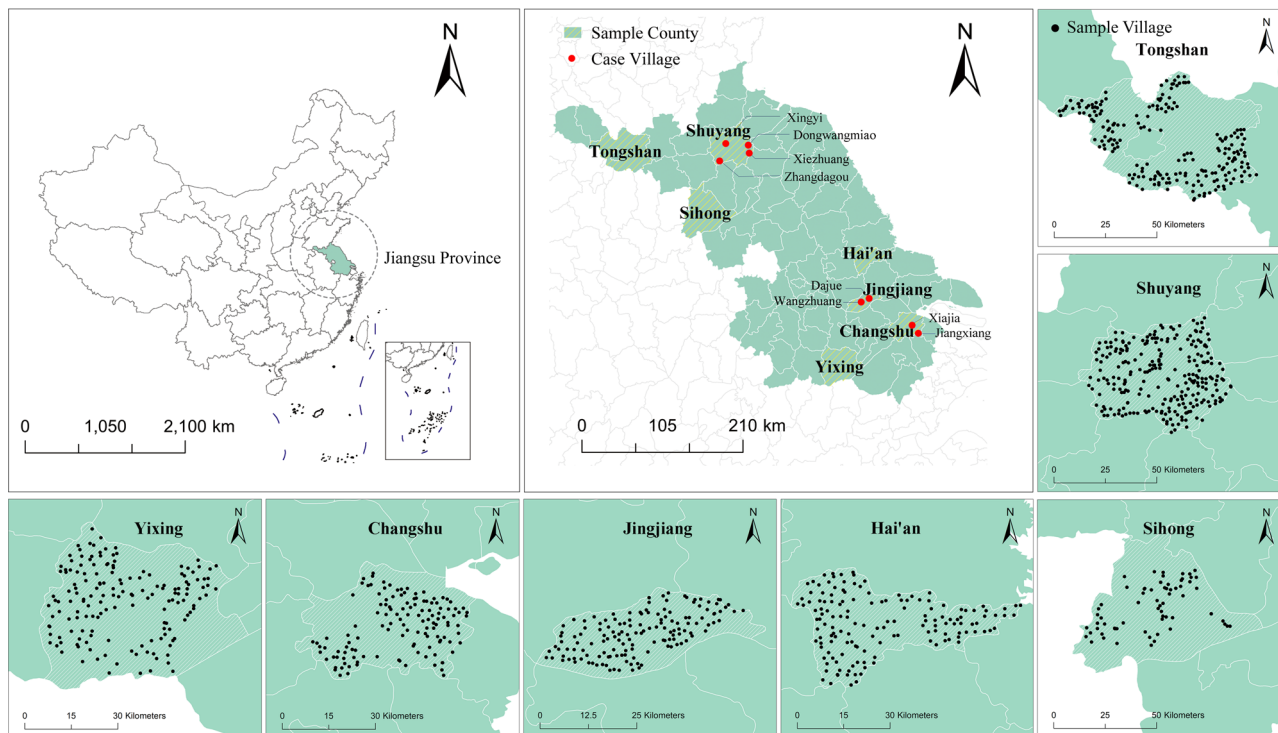
Additionally, to address the incomplete framing of elites in the existing collective action literature, this research categorizes rural elites into economic elites and governing elites. Governing elites possess broad political power (Pareto, 1935), while economic elites, independent of democratic elections, enjoy certain privileges and hold economic power in a society (Ilkben, 2020).

In sum, the primary goals of this study are (1) to elucidate the role of collective action (i.e., village collectives and farmer cooperatives) in mediating the link between elites (governing elites and economic elites) and rural development and (2) to articulate under what circumstances collective action can control elite capture. Our analysis unpacks the logic behind two collective action efforts (village collectives and farmer cooperatives) and assesses the mechanism mediating the relationship between elites and rural development, thereby providing insights for successful collective action designs and extending the discussions of many theorists, such as Olson (1965) and Ostrom (1990), on collective action. We ultimately contribute to optimizing rural community governance and consequently realizing the SDGs in rural areas.

## Methodology

**Site description and data collection.** Rural China serves as a representative area for the study of collective action and rural development. A small-scale peasant economy characterizes China's agriculture because of the shortage of per capita agricultural land resources and because of the household agricultural management system. Smallholder farmers in China often do not have access to information about prices in urban areas. Additionally, they are often unable to participate in new markets where larger quantities and standardization of products are often required and where they have little bargaining power with traders (Gyau et al. 2014). Collective action is one of the most important ways to overcome this information asymmetry between smallholder farmers and large-scale farmers and provide smallholder farmers with more market opportunities.

We collected quantitative and qualitative materials from two sources. The first dataset was drawn from the annual statistical system of 604 administrative villages in seven counties, including Changshu, Hai'an, Jingjiang, Shuyang, Sihong, Tongshan, and Yixing, in Jiangsu Province, China (see Fig. 1). The village-level statistical system, named "village card" was established in Jiangsu (Qin et al. 2020). This dataset covers more than 20 indicators in 2017 relevant to village development, including geographical location, natural resources and environment, population, employment, agriculture, infrastructure, elites, and collective action.



**Fig. 1 Research site.** Sample County is delineated by the green plot, and within it, eight qualitative case villages are represented as red dots. Furthermore, the quantitative dataset comprises 604 administrative villages, denoted by black dots, distributed across seven counties.

Jiangsu has been one of the most developed provinces in China since the reform and opening up, largely attributed to its rural transformational development (Lyu et al. 2019; Shen et al. 2020). In 2021, rural residents in Jiangsu province had a disposable income that was 1.42 times higher than the national average. Rural Jiangsu has active collective economies, yet there is also significant regional heterogeneity: southern Jiangsu is adjacent to Shanghai and has a strong collective economy (Cheng et al. 2015), with an average village-collectives-income of 5.28 million RMB per village; central Suzhou, which has taken over some of the industries in southern Jiangsu and Shanghai, comes second in terms of rural development, with an average village-collectives-income of 1.39 million RMB per village; and northern Jiangsu is relatively lagging behind in rural development with an average village-collectives-income of 610 thousand RMB per village. Because of these properties, the Jiangsu datasets provide ideal samples for this research.

To complement the quantitative analysis and assess mechanisms mediating the relationship between elites and rural development, we conducted a questionnaire survey and in-depth interview in 2021 covering eight villages selected from the first dataset. Given regional variation and sample distribution, we chose two villages, Jiangxiang and Xiajia, from Changshu in southern Jiangsu; two villages, Wangzhuang and Dajue, from Jinjiang in central Jiangsu; and four villages, Zhangdagou, Xingyi, Xiezhuang, and Dongwangmiao, from Shuyang in northern Jiangsu—all by stratified random sampling (see Fig. 1). We first conducted an in-depth interview with the local officials in each village (see interview outline in Appendix A) and then a questionnaire survey with elites and with non-elite farmers (see questionnaires in Appendix B). The survey respondents consisted of eight governing elites (the standing member of the local Communist Party), 29 economic elites (governing elites and villagers held them in high regard, and their income was in the top 5% of the village; see the definitions in the next section), and 197 non-elite farmers. In addition to interviews and questionnaire

surveys, we obtained materials about the socioeconomics, local governance rules, history, and other aspects from government websites and village archives that provided detailed information to help us evaluate the performance of local collective actions.

**Variables in quantitative analysis.** Our quantitative analyses examined the relationship between rural development (dependent variable), independent variables (governing and economic elites), mediator variables (two types of collective action – farmer cooperatives and village collectives), and control variables (sociodemographics and agriculture). We describe our operationalization of these variables next.

*Dependent variable.* The dependent variable was per capita net income of farmers, which was employed to measure rural development. Although per capita net income is a common measure of rural development (Singh and Shishodia, 2019), we should still consider its limitations for that purpose. For example, farmers’ per capita net income fails to fully reflect social conditions. To address this limitation, we used qualitative case studies to complement the quantitative analysis.

*Independent variables.* The independent variables were two types of elites in the study villages: economic and governing. The governing elite is defined as village leaders with political power and direct responsibility for village development strategies. An economic elite within a rural community is defined as a resident who specializes in a particular type of agricultural production or has access to a mature business network. Both types of elites enjoy a position of power and are influential in economic and political activities.

We use the standing member of the local Communist Party as an indicator of the governing elite. In China, the highest-level leader in a village is the standing member of the local Communist Party. This village leader has the final say in local governance. A

competent, dedicated, forward-looking elite leader can effectively direct local development. However, local authorities also face corruption risks when elite leaders build close ties with local companies. Financial decision-making, land-holding, and political party affiliation may become drivers of elite capture.

To explore the robustness of our results, we also used an alternative indicator for the governing elite—the head of the village leadership committee. Directly elected by the villagers, the head of the village leadership committee is the legal representative of the villagers. In some villages, the standing member of the local CP and the head of the village leadership committee are held by the same person.

To measure the leadership of governance elites, we use the salary of the standing member of the local Communist Party or the head of the village leadership committee in 2017 as a proxy variable. This rationale is based on The Basic Compensation Payment Standard for Village Cadres in Jiangsu Province, which indicates that village cadres' salaries consist of a basic component and a performance component. The performance component is linked to the implementation of job duties, the development of collective economy etc. Cadres with stronger leadership receive higher performance pay, making higher pay an effective indicator of superior leadership.

Economic elites in rural Chinese communities include new professional farmers and self-employed business owners. Although there is no standardized proxy for a new professional farmer, there is a consensus among scholars and practitioners on the operationalization of this concept (Yuan et al. 2019). First, they must be a full-time farmer, organizing large-scale and profitable production. Moreover, such a farmer typically has high social status and is respected by local people. This operationalization is broadly consistent with that of the concept of the economic elite; thus, we adopt this definition of new professional farmers in this study. Most of the self-employed business owners in rural China used to be local farmers. They are often viewed similarly to new professional farmers (e.g., entrepreneurial and respected). Most rural economic elites are local residents who have formed attachments to the “place” and have strong social ties with their neighbors, which motivates them to organize collective action and direct community development. However, in some instances, elite capture can also stem from kinship, lineage, and strong social ties (Kan, 2016).

Owing to the lack of data availability, it was challenging to find an acceptable indicator to evaluate the leadership of individual economic elites. To determine the extent of leadership exhibited by economic elites in a village, we employ a method of measurement that considers the proportion of economic elites, specifically the ratio between the total number of households in the village and the number of recently established professional farmers and self-employed entrepreneurs. In the case studies we found that the position of leader in a village collective or farmer cooperative was usually held by a member of the governing elite. Therefore, the possible bias brought by the absence of evaluating the leadership of economic elites is unlikely to critically limit our discussion.

**Mediator variables.** The mediator variables were two types of collective action: village collectives and farmer cooperatives. Collective action is often defined as including actions that foster collective maintenance of resources and active participation to improve group outcomes (Bardhan, 2001). We used the ratio of the number of households to the number of families that participated in a farmer cooperative to assess the capacity of farmer cooperatives.

However, we cannot adopt the same approach to measure the capacity of a village collective in Chinese rural communities,

where all villagers are members of village collectives. Another main approach to evaluate the capacity of collective action is assessing its outcomes in terms of natural resource management (e.g., use of common pastures, land allocation patterns) and provision of public goods (soil erosion control, reforestation activities) (Wang et al. 2016). Therefore, following this approach, we used the business income of a village collective per capita, instead of the participation rate, to assess the capacity of village collectives. This is effective because the village collective manages the land and other property collectively owned by the villagers, and its business income is used to provide public goods and services for the community.

Due to the limited data availability in such a fine scale, other comparable measures across villages are not available. While this is a genuine limitation for the quantitative evaluation of collective action, our qualitative survey allows us to understand the mechanism of how elites influence two contexts of collective action (village collectives and farmer cooperatives) and then promote village development. This qualitative data allows us to enhance the robustness of our analysis.

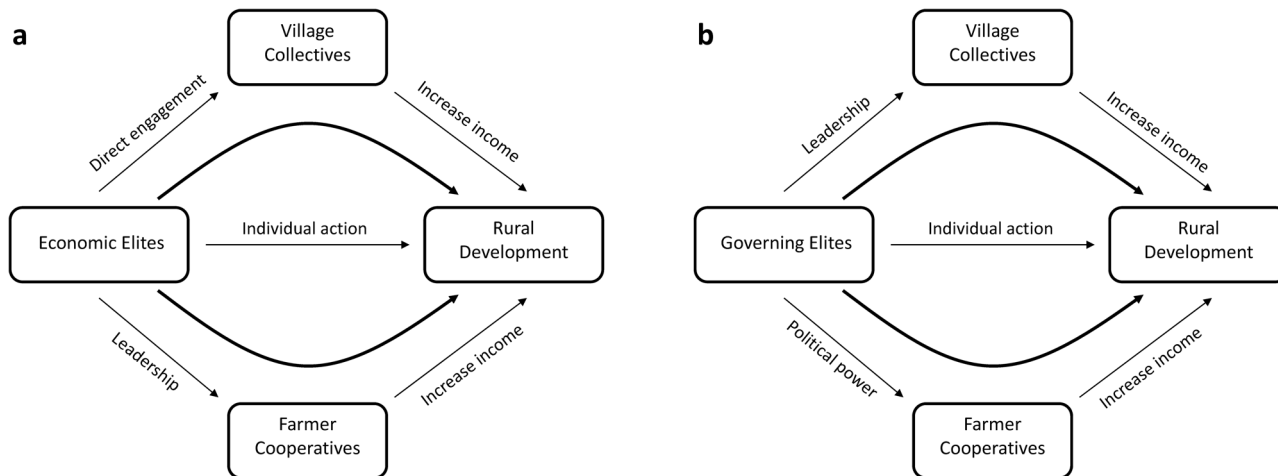
**Control variables.** Consistent with the empirical commons literature (Wang et al. 2016), we included community attributes and agriculture as control variables, with 11 indicators in total: township government residence, landform, total area, resident population, population density, proportion of permanent residents to registered population, construction land for a village collective, arable land, land transfer, facility agriculture, and drainage and irrigation stations. Detailed variable definitions and descriptive statistics are shown in Appendix C.

**Model specification.** Using Stata, we employed multiple regression and path analysis models to examine the relationships among elites, collective action, and rural development. The quantitative analysis is based on a representative large-scale dataset from 2017, drawn from the annual statistical system of 604 administrative villages in Jiangsu Province, China (see Site Description).

**Multiple regression models.** To test whether rural development is associated with two types of collective action and the two types of elites, respectively, we fitted four models using multiple regression analysis with OLS estimation and rural development (RD) as the dependent variable. In Eq. (1), independent variables refer to community attributes, natural conditions, and agriculture: geographical location (GL), topography (TO), total area (TA), resident population (RP), population density (PD), population inflow/outflow (PI), construction land (CL), arable land (AL), land transfer (LT), facility agriculture (FA), and drainage and irrigation station (DIS). These 12 indicators are control variables in the other three equations. In Eq. (2), we added two collective action indicators to the control variables as the independent variables—village collectives (VC) and farmer cooperatives (FC). In Eq. (3), we added two elite indicators to the control variables as the independent variables—economic elite (EE) and governing elite (GC). The independent variables of Eq. (4) consist of 12 control variables, two collective action indicators, and two elite indicators. These four equations are shown below.

$$\begin{aligned} \ln(\text{RD}) = & \theta_1 \text{GL} + \theta_2 \text{TO} + \theta_3 \text{TA} + \theta_4 \text{RP} + \theta_5 \text{PD} + \theta_6 \text{PI} \\ & + \theta_7 \text{CL} + \theta_8 \text{AL} + \theta_9 \text{LT} + \theta_{10} \text{FA} + \theta_{11} \text{DIS} + \lambda_i + \varepsilon \end{aligned} \quad (1)$$

where  $\theta_1, \theta_2, \theta_3, \theta_4, \theta_5, \theta_6, \theta_7, \theta_8, \theta_9, \theta_{10}, \theta_{11}$  are slopes of the regression lines for geographical location, topography, total area, resident population, population density, population inflow/outflow, construction land, arable land, land transfer, facility



**Fig. 2 Hypothesis of the relationship between elites, collective actions, and rural development.** Panels (a) and (b) differentiate between two types of elites: economic elites and governing elites.

agriculture, and drainage and irrigation station, respectively.  $i$  is the region index (northern, central, and southern Jiangsu),  $\lambda_i$  is the region fixed effect, and  $\varepsilon$  is the error term.

$$\ln(\text{RD}) = \gamma Z + \alpha_1 \text{VC} + \alpha_2 \text{FC} + \tau_i + \delta \quad (2)$$

where  $Z$  is a set of control variables;  $\alpha_1, \alpha_2$  are slopes of the regression lines for village collectives and farmer cooperatives;  $\tau_i$  is the region fixed effect; and  $\delta$  is the error term.

$$\ln(\text{RD}) = \chi Z + \beta_1 \text{EE} + \beta_2 \text{GE} + \varphi_i + \mu \quad (3)$$

where  $Z$  is a set of control variables;  $\beta_1, \beta_2$  are slopes of the regression lines for economic elite and governing elite;  $\varphi_i$  is the region fixed effect; and  $\mu$  is the error term.

$$\ln(\text{RD}) = \rho Z + \eta_1 \text{VC} + \eta_2 \text{FC} + \eta_3 \text{EE} + \eta_4 \text{GE} + \omega_i + \nu \quad (4)$$

where  $Z$  is a set of control variables;  $\eta_1, \eta_2, \eta_3, \eta_4$  are slopes of the regression lines for village collectives, farmer cooperatives, economic elite, and governing elite;  $\omega_i$  is the region fixed effect;  $\nu$  is the error term.

We applied min-max normalization to continuous variables and converted a sequence  $x_1, x_2, \dots, x_n$  as below:

$$X_{ji} = \frac{x_{ji} - \min\{x_j\}}{\max\{x_j\} - \min\{x_j\}} \quad (5)$$

where  $j$  is a set of continuous variables; and the new sequence,  $X_{j1}, X_{j2}, \dots, X_{j604} \in [0, 1]$ , is dimensionless.

**Path analysis.** We additionally used path analysis to untangle the complex association of rural development with elites and collective action. To specify the path structure, our basic proposition was as follows: Through their ability, elites can powerfully promote rural development in general and also catalyze collective action (Esparcia Perez, 2000). Elites attend, facilitate, organize, or direct collective action—thus gathering rural resources and promoting rural development. In this regard, the number and the leadership of elites should affect the capacity of collective action and rural development. We tested two path models (Fig. 2). The first path model started with economic elites, and the second path model started with governing elites. These two models both had three paths: one was direct to rural development, and two were indirectly associated with village collectives and farmer cooperatives to rural development.

**Results**

**Collective action is a valuable mediator linking elites and rural development.**

Consistent with our theorizing, the multiple linear regressions showed that rural development is significantly correlated with two types of collective action—village collectives and farmer cooperatives. An increase of one standard deviation in village collectives was associated with an increase of 0.0038 standard deviation in rural development, while a change of one standard deviation in farmer cooperatives was associated with a change of 0.0015 standard deviation in rural development (Table 1, model 4). This finding suggests that village collectives are more than twice as accurate as farmer cooperatives in predicting rural development, assuming that both village collectives and farmer cooperatives roughly followed the same distribution. Between the two types of elites (governing and economic), only governing elites showed a positive relationship with rural development, with a standardized coefficient of 0.29 (Table 1, model 4).

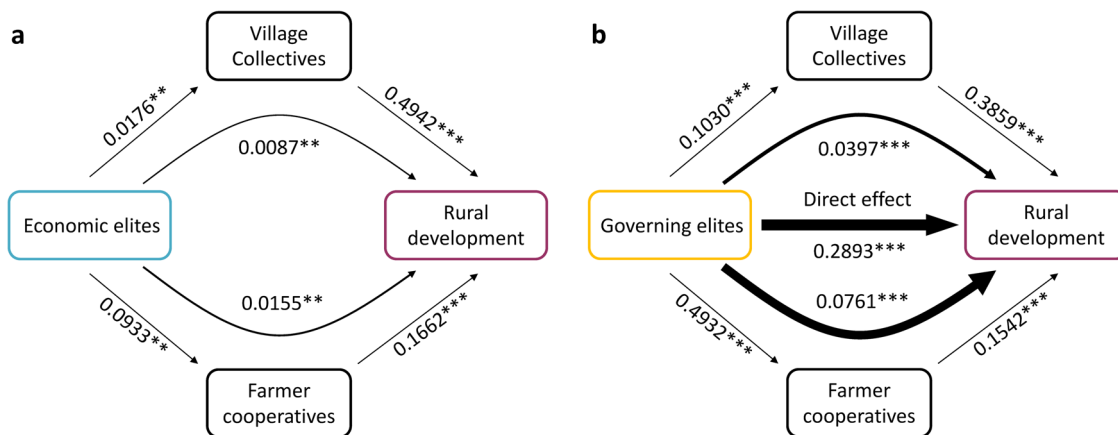
The path analysis and multiple mediator models allowed us to explicitly differentiate between direct and indirect relationships. Although this model showed that economic elites had no significant direct effects on rural development (Fig. 3), the indirect relationship among economic elites, collective action, and rural development was significant. Economic elites drove rural development through two paths. The first path is from economic elites to village collectives and from village collectives to rural development ( $0.0176 \times 0.4942 = 0.0087$ ). The second is from economic elites to farmer cooperatives and from farmer cooperatives to rural development ( $0.0933 \times 0.1662 = 0.0155$ ). In contrast, governing elites showed a direct relationship with rural development, with a coefficient of 0.2893, which is higher than its indirect counterpart (Fig. 3). An increase of 1% in the index of governing elites brought a rise in rural development of 0.04 ( $0.1030 \times 0.3859 = 0.0397$ ) through the path of village collectives and of 0.08 ( $0.4932 \times 0.1542 = 0.0761$ ) through the path of farmer cooperatives. Finally, the total effect of governing elites on rural development (0.4051) was larger than that of economic elites (0.0242).

We first checked the robustness of the results by using the bootstrap method on multiple mediation effects tests. The bootstrap method has many desirable features for assessing total and specific indirect effects. It does not require the mediator and outcome variables to be normally distributed, and it is least vulnerable to the influence of outliers (Duan et al. 2020; Esubalew and Raghurama, 2020). Table 2 shows the percentile, bias corrected (BC), and bias corrected and

**Table 1 Results of OLS estimation.**

Response variable	Rural development			
	model 1	model 2	model 3	model 4
<b>Explanatory variables</b>				
Geographical location	-0.0279 (-0.71)	-0.0220 (-0.60)	-0.0235 (-0.61)	-0.0164 (-0.45)
Topography	0.0627*** (2.65)	0.0521** (2.32)	0.0639*** (2.78)	0.0519** (2.35)
Total area	0.0809 (0.53)	0.1771 (1.23)	0.1847 (1.23)	0.2429* (1.71)
Resident population	0.2845*** (4.04)	0.2570*** (3.90)	0.2028*** (2.92)	0.1996*** (3.02)
Population density	0.2018*** (2.85)	0.2123*** (3.21)	0.2520*** (3.63)	0.2488*** (3.78)
Population inflow/outflow	-0.1621 (-0.89)	-0.0276 (-0.16)	-0.1282 (-0.72)	-0.0317 (-0.19)
Construction land	0.2612*** (2.68)	0.2394*** (2.63)	0.2573*** (2.72)	0.2402*** (2.68)
Arable land	0.3376*** (3.43)	0.2760*** (2.90)	0.3105*** (3.24)	0.2781*** (2.96)
Land transfer	0.0723* (1.71)	0.0332 (0.84)	0.0477 (1.16)	0.0201 (0.51)
Facility agriculture	0.0029 (0.09)	-0.0365 (-1.18)	0.0060 (0.19)	-0.0289 (-0.94)
Drainage and irrigation station	-0.0463 (-0.89)	-0.0171 (-0.35)	-0.0448 (-0.88)	-0.0248 (-0.51)
Village collectives		0.4975*** (3.82)		0.3834*** (2.93)
Farmer cooperatives		0.1667*** (8.00)		0.1539*** (7.42)
Economic elites			0.0244 (1.02)	0.0052 (0.23)
Governing elites			0.4022*** (6.10)	0.2891*** (4.49)
Constant	9.7927*** (360.20)	9.7399*** (373.35)	9.6681*** (288.07)	9.6599*** (300.58)
Observations	604			
F	108.80	114.23	102.77	105.11
Prob. > F	0.0000			
R <sup>2</sup>	0.7057	0.7445	0.7239	0.7530

Asymptotic t statistics are in parentheses.  
 \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1.



**Fig. 3 Direct and indirect association of rural development with elites.** Panels (a) and (b) differentiate between two types of elites: economic elites and governing elites.

**Table 2 Results of multiple mediation model.**

	Point Estimate	Product of Coefficients		Bootstrapping					
		SE	Z	Percentile 95% CI		BC 95% CI		BCa 95% CI	
				Lower	Upper	Lower	Upper	Lower	Upper
<b>Rural development</b>									
<i>Analysis with economic elites</i>									
Village collectives	0.0087**	0.0038	2.26	0.0015	0.0165	0.0020	0.0175	0.0026	0.0189
Farmer cooperatives	0.0155**	0.0079	1.96	0.0001	0.0314	0.0015	0.0332	0.0015	0.0332
TOTAL	0.0242***	0.0092	2.63	0.0057	0.0423	0.0074	0.0442	0.0076	0.0443
<i>Analysis with governing elites</i>									
<i>(The standing member of the local Communist Party)</i>									
Village collectives	0.0397**	0.0178	2.23	-0.0008	0.0709	0.0016	0.0724	0.0064	0.0777
Farmer cooperatives	0.0761***	0.0243	3.13	0.0322	0.1276	0.0364	0.1351	0.0356	0.1337
TOTAL	0.1158***	0.0311	3.72	0.0564	0.1797	0.0618	0.1885	0.0626	0.1902

BC bias corrected, Bca bias corrected and accelerated; 5000 bootstrap samples.

**Table 3 Results of path analysis.**

Response variables	Path analysis			
	Explanatory variables	Coefficient	SE	t
<b>Analysis with economic elites</b>				
c'	0.0067	0.0233	0.29	0.77
Village collectives				
a	0.0176**	0.0074	2.39	0.02
b	0.4942***	0.1307	3.78	0.00
Farmer cooperatives				
a	0.0933**	0.0460	2.03	0.04
b	0.1662***	0.0209	7.96	0.00
<b>Analysis with governing elites (The standing member of the local Communist Party)</b>				
c'	0.2893***	0.0644	4.49	0.00
Village collectives				
a	0.1030***	0.0198	5.19	0.00
b	0.3859***	0.1304	2.96	0.00
Farmer cooperatives				
a	0.4932***	0.1251	3.94	0.00
b	0.1542***	0.0207	7.45	0.00

\*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1.

**Table 4 Results of OLS estimation using an alternative indicator for the governing elite, the head of village committee.**

Response variable	Rural development	
	model 6	model 7
Township government residence	-0.0235 (-0.61)	-0.0164 (-0.45)
Landform	0.0639*** (2.78)	0.0519** (2.35)
Total area	0.1847 (1.23)	0.2429* (1.71)
Resident population	0.2028*** (2.92)	0.1996*** (3.02)
Population density	0.2520*** (3.63)	0.2488*** (3.78)
Proportion of permanent residents to registered population	-0.1282 (-0.72)	-0.0317 (-0.19)
Construction land for village collective	0.2573*** (2.72)	0.2402*** (2.68)
Arable land	0.3105*** (3.24)	0.2781*** (2.96)
Land transfer	0.0477 (1.16)	0.0201 (0.51)
Facility agriculture	0.0060 (0.19)	-0.0289 (-0.94)
Drainage and irrigation station	-0.0448 (-0.88)	-0.0248 (-0.51)
Village collectives		0.3834*** (2.93)
Farmer cooperatives		0.1539*** (7.42)
Economic elite	0.0244 (1.02)	0.0052 (0.23)
Governing elites (the head of village leadership committee)	0.3628*** (6.10)	0.2608*** (4.49)
Constant	9.6558*** (278.23)	9.6511*** (290.40)
Observations		
F	102.77	105.11
Prob. > F	0.0000	0.0000
R2	0.7239	0.7530

Asymptotic t statistics are in parentheses.  
\*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1.

accelerated (BCa) confidence intervals (CI) of the mediation models. No zero in the 95% CI indicates that the variable was a mediator.

The bootstrapping results demonstrated that two types of collective action are significant mediators of the relationship between elites and rural development. Although the percentile

95% CI bootstrapping for village collectives (analysis with governing elites) contains zero, the differences between the percentile 95% CI, BC 95% CI, and BCa 95% CI bootstrapping are small. The total indirect effect of the economic and governing elites on rural development was 0.0242,  $p < 0.01$ ; and 0.1158,  $p < 0.01$ , respectively (Table 2). These results were consistent with the path analysis (Table 3).

To address the concern that beyond the standing member of the local Communist Party, members of the village leadership committee can also be governing elites who influence rural development, we first checked the robustness of the results using an alternative indicator for the governing elite: the head of the village leadership committee.

The estimated results of ordinary least squares (OLS) (Table 4), multiple mediator models (Table 5), and path analysis (Table 6) were robust and similar to those shown in Table 1, Table 2, and Table 3, respectively. The total indirect effect of governing elites (the head of the village leadership committee) on rural development was also significant, with a point estimate of 0.1045,  $p < 0.01$  and a 95% BCa bootstrap CI of 0.0560 to 0.1718 (Table 5). The head of the village leadership committee's leadership and competence were both directly and indirectly associated with rural development. Two types of collective action (village collectives and farmer cooperatives) were significant mediators of rural development.

**The mechanism of collective action's mediating effect.** Our quantitative analysis elucidates the direct and indirect correlation between elite governance and rural development and the mediating role that collective action plays. Nevertheless, how collective action exerts such mediating effect remains unclear. We thus examined alternative explanations for the mechanisms driving these effects using qualitative data from our field sites.

To establish a baseline for interpreting factors driving differences in rural development, we found that rural development in Jiangsu province was spatially differentiated. Our survey provided evidence that the rural economy and living environment in southern Jiangsu are generally better developed compared with central and northern Jiangsu. We found that, apart from location advantages, the leadership of pioneering elites and stronger collective action capacity also account for the prosperity of rural southern Jiangsu (Fig. 4).

Our case studies disentangle the logic of some crucial collective action efforts in rural China. Both the farmer cooperatives and the village collectives help facilitate economic activities that result in resource reallocation, accumulation, and efficiency improvement with the participation of both elites and non-elites. The main contribution of farmer cooperatives to rural development is that they transfer arable land from smallholders to professional agricultural producers after land-use planning, land circulation, and consolidation. China's rural development used to be hindered by inefficient smallholder agriculture (Schneider, 2015). The collective action of the farmer cooperatives promotes agricultural modernization that requires an appropriate scale of operation and capital inputs, thus sustaining and enhancing crop production. Farmer cooperatives reduce information asymmetry between smallholder farmers and larger businesses, and their crops are more likely to sell above the average market price. Farmer cooperatives also facilitate livelihood transitions from agriculture to industry because many smallholders transfer their land to the farmer cooperatives, often increasing their income and facilitating industrialization (Tian and Zhu, 2013). Notably, all of the surveyed villages reported that farmer cooperatives were organized, directed, and supervised by governing elites on the village committee. Economic elites were thus key actors but not leaders in this collective action.

**Table 5 Results of multiple mediation model using an alternative indicator for the governing elite (i.e., the head of the village leadership committee).**

	Point Estimate	Product of Coefficients		Bootstrapping					
				Percentile 95% CI		BC 95% CI		BCa 95% CI	
				SE	Z	Lower	Upper	Lower	Upper
<b>Rural development</b>									
Analysis with governing elites (The head of the village leadership committee)				Indirect Effects					
Village collectives	0.0359**	0.0162	2.21	-0.0006	0.0650	0.0015	0.0666	0.0063	0.0737
Farmer cooperatives	0.0686***	0.0220	3.11	0.0291	0.1167	0.0326	0.1231	0.0320	0.1220
TOTAL	0.1045***	0.0281	3.72	0.0496	0.1609	0.0549	0.1702	0.0560	0.1718

BC bias corrected, Bca bias corrected and accelerated; 5000 bootstrap samples.

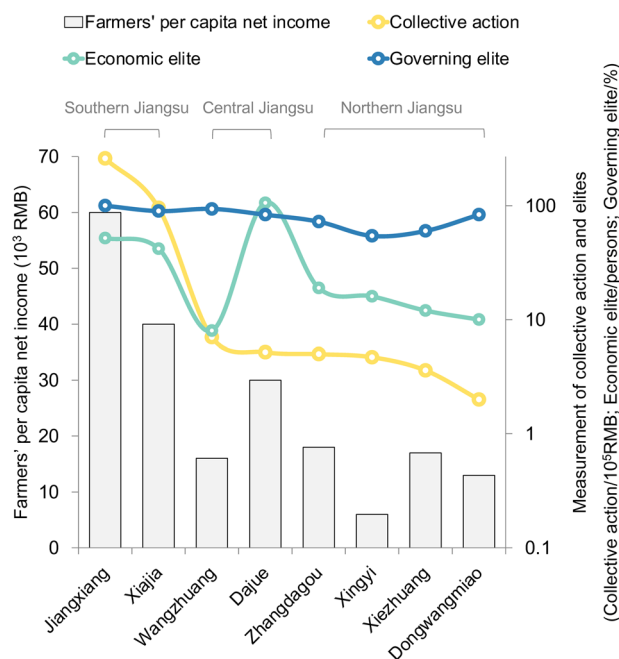
**Table 6 Results of path analysis using an alternative indicator for the governing elite, the head of the village committee.**

Response variables	Path analysis			
	Coefficient	SE	t	p
<b>Analysis with governing elites (the head of village leadership committee)</b>				
c'	0.2610***	0.0581	4.49	0.00
Village collectives				
a	0.0929***	0.0179	5.19	0.00
b	0.3859***	0.1304	2.96	0.00
Farmer cooperatives				
a	0.4449***	0.1129	3.94	0.00
b	0.1542***	0.0207	7.45	0.00

\*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1.

The income of village collectives stems mainly from asset leasing (Appendix D). Governing elites mobilize and organize villagers to clean up public spaces and reclaim fragmented idle land. These spaces and land are then leased directly or indirectly after a factory has been built. The income of a village collective is first used to provide physical infrastructure (electricity, roads, sports facilities, etc.) and health care services; any remaining income is returned to villagers as an equal year-end share. Note that in most of the less developed villages, the main function of village collectives is to provide public goods and services and socially power rural development, which is unclear when only examining the results of the quantitative analysis. Meanwhile, the land and factory leases bring enterprises that increase job opportunities for locals, serving as another pathway to promote rural development. In most cases, governing elites control decision-making in a top-down manner in this collective action context, although the planning and development process is partially participatory and democratic. For example, all villagers are included in public meetings of village collectives, but a number of them reported that they felt constrained by the governing elite's ideas and decisions. That said, the governing elites were accountable to the needs of their communities in the eight surveyed villages.

The quantitative results of our questionnaire survey indicate that one plausible explanation for the absence of elite capture is collective action's mediating effect. The social capital—i.e., reputation, trust, reciprocity norms, and rules—within each collective action network may effectively constrain the self-interested behavior of elites. As shown in Fig. 5, more than half of



**Fig. 4 Rural development, elites, and collective action in surveyed villages.** The bar chart compares rural development in eight villages in 2020, on the basis of farmers' per capita net income. Because of the great differences among the investigated villages in terms of income of the village collective, we used the line chart with a log axis. The yellow line is the income of the village collective (10<sup>5</sup> RMB) in 2020, the indicator of collective action capacity. The green line is the number of economic elites, and the blue line is the leadership of the governing elite. We measured the leadership of the governing elite (the standing member of the local Communist Party) using the proportion of respondents (%) reporting that the governing elite has strong leadership.

the respondents (elites and farmers) believed that participation in a village collective or a farmer cooperative increased their income. These two collective action contexts create spaces for a reciprocal relationship between elites and non-elites. Beyond the financial impact, collective action also influenced social capital, which is critical to governance processes. For example, 28.83, 49.46, and 62.79% of surveyed ordinary farmers reported that village collectives, farmer cooperatives, and other collective actions enhanced mutual trust and strengthened social ties, respectively. Close to 30% of respondents claimed that collective action guarantees a more equitable society.

We find that a higher level of participation and democracy can enhance the success of collective action. As Fig. 6 shows, the more villagers felt they were active participants in the village collective and possessed strong influence, the better the outcome of the village collective (in terms of income). The incomes of the village collectives in Jiangxiang and Xiajia, at 26 million and 9.59 million, respectively, far surpass those in other villages. The percentage of villagers who feel they are an important member of their village collectives in those two villages are also dramatically higher than the percentages for the other villages. In Zhangdagou, Xingyi, and Dongwangmiao, no respondents claimed they were active participants in a village collective. Further, only residents of Jiangxiang (10.3% of the respondents across all village collectives) assessed themselves as enjoying very strong representation in a village collective. Approximately half of surveyed village collective members in Jiangxiang believed they had a strong voice in the village collective, but almost no one in the other seven villages felt they were influential (Fig. 6). In Xiajia and Dajue, a majority of respondents said that they had virtually no influence in the village collective, and no respondents in Xiezhuang believed they could influence decision-making.

Our case studies also revealed how innovative institutional design, for example, making data about what others are doing public, would sustain collective action. Jiangxiang and Xiajia, two villages in southern Jiangsu, apply a points-based reward system in collective action and maintenance of outdoor household and public spaces (e.g., clearing trash) (Appendix D). The appraisal system is well structured and clearly written. Under this system, each village committee gives points to households monthly. These points can be redeemed for monetary incentives if the households are above defined thresholds, and importantly, are displayed on community bulletin boards and door signs. One respondent commented:

In Xiajia, if our house is clean and tidy without random stacking, we can get 15 points. When I clean the public space, my family can get 10 points at a time. Those who receive more than 45 points this month will be rewarded 50 RMB from the village committee, and those who receive more than 40 points but no more than 45 points can only get 40 RMB. Every family wants to be a civilized household, which can be displayed on the bulletin board.

Additionally, the governing elite proposed several public infrastructure programs. Economic elites who currently lived in or who migrated from the village were able to select programs to sponsor, and the sponsorship was posted publicly on bulletin boards. Economic elites are motivated and gladly contribute more financially, for the sake of reputation. Therefore, these approaches are cost-efficient ways to foster volunteer public service. The monetary incentive for villagers is less expensive than hiring cleaners for public places, and the sponsorship of public infrastructure substantially reduces the financial burden of the village committee.

## Discussion

**Stimulating reputation effect to promote elite participation and discourage elite capture.** The case studies in village collectives indicate that making member efforts public (i.e., public posting of members' actions and adoption of an innovative points system) may be useful in promoting collective action. Such strategies foster transparency and build awareness of people's habits, shape the reputations of households, and ultimately help strengthen social capital and create norms of reciprocity. Given the relatively low monetary incentive, the points-based reward system implemented by Jiangxiang and Xiajia did not generate a

transactional relationship; rather, the system fostered a social comparison between neighborhoods by making knowledge of others' actions accessible through the public bulletin boards. The outcome of the innovative points system was that a reputation effect created an incentive for villagers to engage in community maintenance without intervention from governing elites. This case provides strong evidence that reputation effects are a powerful motivator in collective action. But we note that the formation of social capital (reputation effects, trust, reciprocity norms, etc.) in collective action networks is built upon increased democracy and transparency (Annen, 2003), which places a demand on the institutional design for collective action.

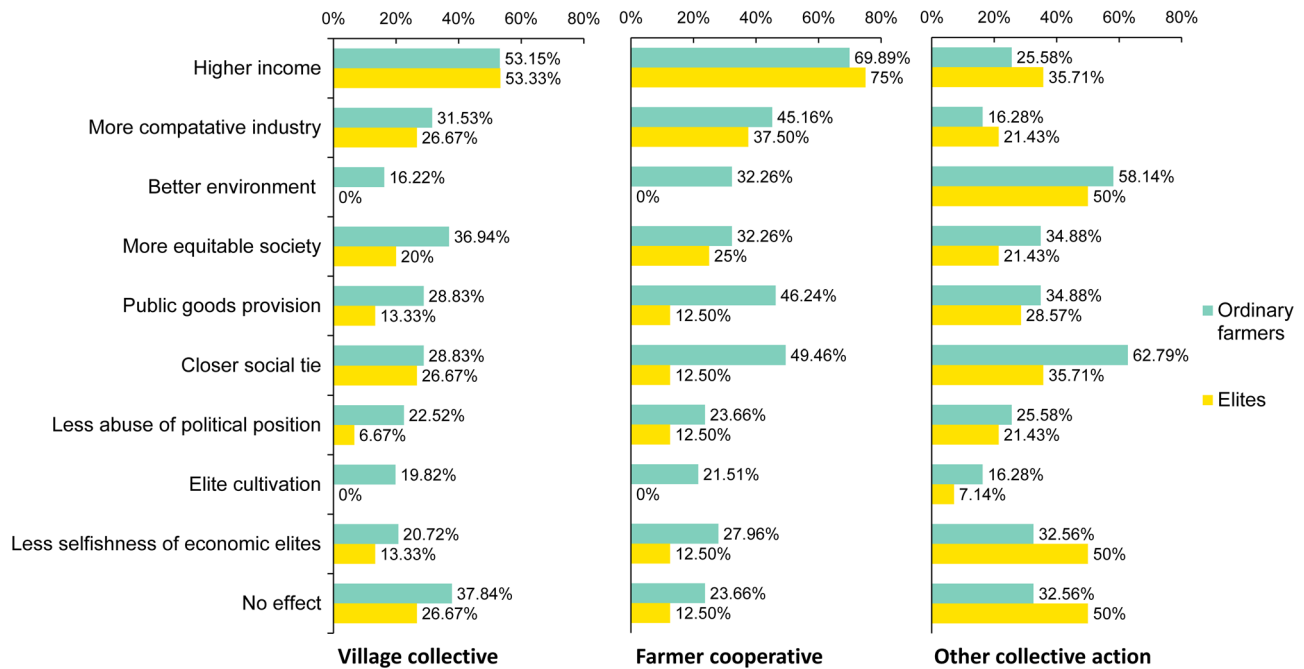
Furthermore, based on quantitative analysis of the questionnaire survey, we also find that social capital such as reputation, trust, reciprocity norms, and rules within each collective action network can constrain the behavior of self-interested elites. This finding is in line with the lessons learned from evolutionary psychology—that is, connectedness in collective action networks may change individuals' moral values, with individuals becoming more tolerant, less cynical, and more empathetic to the misfortunes of others (Putnam, 2000; Barkow et al. 1992). The reputation effect stemming from this connectedness also results in cooperative behavior by selfishly motivated individuals (Annen, 2003). Moreover, according to evolutionary game theory (Nash, 1951) and the bounded rationality and behavioral rational choice theories of collective action (Ostrom, 1998), in economic games, this is partially because for players to maximize their gains over time, they must maintain their reputation to earn the trust and reciprocity required for long-term cooperation (Fudenberg and Maskin, 1986; Ahn and Ostrom, 2002). In such scenarios, the selfish motives of players translate into norms of reciprocity and trustworthiness embedded in networks.

## Mobilizing the authoritative capacities of governing elites.

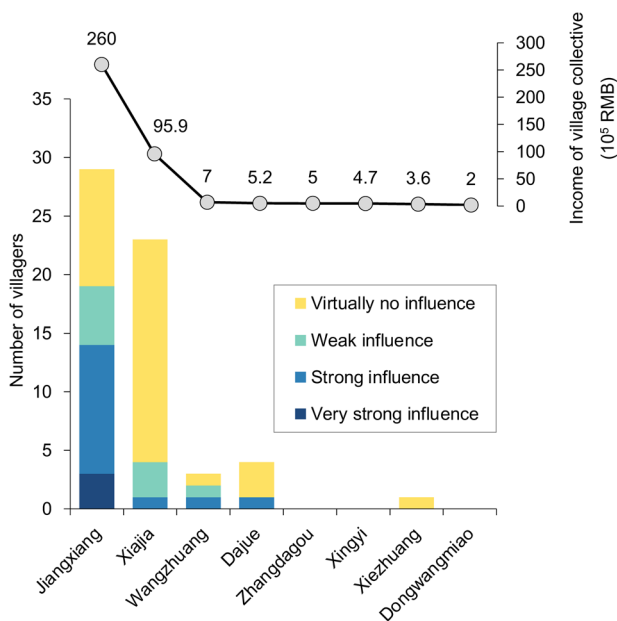
Given their vast economic influence, economic elites are considered to be in a better position to govern economic activities and groups (Böröcz and Róna-Tas, 1995) such as farmer cooperatives. However, our quantitative and case studies do not support this hypothesis. The results show that, although the two separate collective actions—village collectives and farmer cooperatives—have different objectives, purposes, and collaboration networks, both are effectively led by governing elites who coordinate the economic elite and smallholder farmers. These findings justify the role of authority intervention in collective action.

Governing elites can exert authoritative power over others to participate and comply (Bodin, 2017), thereby catalyzing the formation of collective action. A top-down approach is important, especially when individuals cannot perceive a harmful situation (Sullivan et al. 2017). Governing elites are also vital in sustaining collective action, even if the action is centered on agricultural business, because their authoritative capacities can help gather government and social resources and recruit investment. They can seek preferential policies such as subsidized projects to help expand publicity for the products of farmer cooperatives.

Economic elites are key actors in knowledge diffusion, resource sharing, and efficiency improvement despite not being collective action leaders. For example, when economic elites and smallholder farmers collaborate on agricultural production, smallholder farmers can acquire substantial agricultural knowledge and information and may be incorporated into the commercial networks of the economic elite (Kim, 2018). The co-production is founded on integrating different forms of knowledge in practices of decision-making (Maas et al. 2022). This process efficiently addresses information asymmetry between smallholders and



**Fig. 5 Impact of collective actions reported by elites and farmers.** *Higher income*: collective action increases villagers’ income; *More competitive industry*: collective action strengthens the competitiveness of the local industry; *Better environment*: collective action improves the environment, makes people more environmentally aware, and reduces pollution; *More equitable society*: collective action helps guarantee equal status of individuals and a more equitable society; *Public goods provision*: collective action supports infrastructure delivery and public services; *Closer social ties*: collective action enhances mutual trust and build up stronger social ties; *Less abuse of political position*: collective action forces the village committee to be transparent and reduces the possibility of corruption and bribery; *Elite cultivation*: collective action cultivates elites; *Less selfishness of economic elites*: collective action encourages elites to contribute more to the community.



**Fig. 6 Villagers' assessment of self-influence in village collectives.** Three surveyed villages, Zhangdagou, Xingyi, and Dongwangmiao, where no respondents claimed they were active participants of a village collective, show no data in this figure.

elites while promoting village development. Another example is when land resources are reallocated through land transfer from smallholders to economic elites; agricultural inputs are thus substantially increased by elites, and intense-scale production on agglomerated land can also improve output efficiency (Anigbogu

et al. 2015). In addition, in collective actions relating to public affairs, economic elites provide essential financial support for rural infrastructures and services, which is crucial for local governance where funds are scarce.

**Implications for sustainable rural development.** Our quantitative findings and case studies elucidate the role of collective action in mediating the link between elites and rural development. Specifically, collective action effectively promotes rural development by integrating existing resources and using resources more efficiently. Collective action goes beyond land resource reallocation, accumulation, and efficiency improvement in Jiangsu, but it is a highly adaptable model for nations with various resource-to-population ratios.

The lessons are that collective action, involving both elites and non-elites, is essentially a social process associated with resources to enhance productivity and decision-making flexibility. It wisely uses either social or natural resources, shedding new light on planning for rural resource use in socioecological systems. In the face of a lack of vision, resources, and projects, many villages hold a belief that developing the village collective economy is unnecessary and infeasible, which becomes an ideological barrier to the development of these places. We highlight the need for a shift in both policy mindset and political will that the governance models and organizational frameworks themselves must evolve (Joss, 2018), from centralization to collective action, to achieve inclusive and sustainable rural development.

While integrating resources, the authoritative capacities of governing elites are essential, for example, to enforce decisions that reinforce the facilitators of collective action or to potentially introduce policies that could alter the existing problematic situation altogether (Jagers et al. 2020). Our study supports that

a top-down authority figure to help facilitate bottom-up collective action and rural community governance is required. We further recommend an institutional design to give governing elites more voice and flexibility in seeking policies from higher governments; create a healthy and innovative culture for policy- and decision-making at the community level to enhance dialogue among governing elites, economic elites, and non-elites; and ensure equity in the discourse.

Another lesson learned from this research is that collective action leveraging social capital (reputation effects, trust, reciprocity norms, etc.) catalyzes the beneficial contributions of elites while discouraging elite capture. We recommend implementing institutional rules that guarantee a higher level of participation, democracy, and transparency. In villages with a strong collective action capacity, we found that some villagers enjoyed stronger representation and greater influence in decision-making. However, a bottom-up partnership was rare in most of the analyzed villages. Many villagers felt constrained by the governing elite's ideas and decisions in the meetings, which might create distrust (Sullivan et al. 2019). It is important to increase opportunities for participation to allow villagers to negotiate better deals, veto decisions, share funding, or put forward requests that are at least partially fulfilled (Arnstein, 1969).

To encourage elites to organize, facilitate, and contribute to collective action, the government should craft and promote innovative collective action designs to make full use of social capital. The innovation seen in our case studies, such as point-based reward systems and infrastructure sponsorship programs, provides a potential model for other countries interested in strengthening collective action and fostering norms of reciprocity. The drivers and outcomes of these innovative governance approaches advance our understanding of how to generate financial and social support from elites. Specifically, we learned that fostering transparency and norms of reciprocity by making information on others' decisions publicly accessible resulted in a low-cost method of sustaining collective action. Other government elites in financially constrained areas (e.g., low-income countries) (Ho and McPherson, 2010; Nock et al. 2020) or higher-income countries facing financial hardships (Jungsberg et al. 2020; Pires, 2020), might consider implementing similar low-cost points-based systems to support collective action in rural areas.

In conclusion, adopting collective action as a governing tool will contribute to realizing multiple SDGs. Specifically, collective action helps ensure significant mobilization of social and natural resources to improve the livelihood and agricultural productivity of smallholders, thus effectively helping to alleviate poverty and achieve food security. The institutional designs focusing on partnership and transparency help limit and control elite capture and ensure equal opportunity in local planning and governance decision-making. Such designs are fundamental to a diversity of legislation, policies, and actions leading to sustainable development.

**Theoretical contributions.** An ongoing debate in common-governance scholarship is whether and when outside intervention or authority is necessary to avoid the tragedy of the commons. Although Olson explained the inherent dilemma of collective action (i.e., the "free-rider problem") and justified the intervention of a public authority (Olson, 1965), Ostrom argued that resource users could successfully establish rules to economically and environmentally sustain common governance without any regulation by central authorities (Ostrom, 1990). Our research advances this classic debate by integrating these two hypotheses to analyze elite governance in Chinese rural communities. Although we did not analyze alternative cases where no elites were present, the collective action cases we analyzed aligned with

Olson's justification for authority intervention. We found that governing elites were more successful than economic elites in organizing, facilitating, and contributing to collective action. In addition, our research also demonstrates the advantage of democratic participation in village collectives and farmer cooperatives that allows non-elites to redress elite capture and improve elites' contributions through reputation effects, trust, reciprocity norms, and social rules created in collective action situations. This finding develops Ostrom's theory of collective action (Ostrom, 1990; Ostrom, 1998), moving beyond the effectiveness of collective action to the norms that collective action situations can create to improve elite governance. Our study advances others that examine the connection between collective action and elite capture (e.g., Dasgupta and Beard, 2007) by providing quantitative evidence of the relationship and unpacking the logic behind it using qualitative data.

Future efforts are needed to research interactions between the economic and governing elite in collaborative networks. In particular, researchers lack an understanding of what context these elites form and in what types of networks these elites collaborate most effectively. Furthermore, collective action is not confined to local communities, suggesting that future analysis should also consider the external flow of various forms of collective action across scales and spatial proximity (i.e., regional, national, global).

## Conclusion

Our analysis demonstrates that collective action acts as a mediator connecting elites with rural development. Collective action serves as a governing tool involving both elites and non-elites to mobilize social and natural resources to improve the livelihood and agricultural productivity of smallholders. By studying two types of collective action - village collectives and farmer cooperatives—we found that democratic participation enables non-elites to counteract elite capture and enhance the contributions of elites through reputation effects and reciprocity norms that arise in collective action situations. Furthermore, the comparison between the two types of elites shows that governing elites were more successful than economic elites in organizing, facilitating, and contributing to collective action. These findings underscore the importance of creating innovative institutional designs that mobilize authority intervention while emphasizing partnership and transparency. Such institutions are crucial to the development of diverse legislation, policies, and actions that lead to sustainable development.

## Data availability

Our specific datasets generated in this study are not publicly available, as they are part of the authors' ongoing research. These data are available from the corresponding authors upon reasonable request.

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## References

- Ahn TK, Ostrom E (2002) Social capital and the second-generation theories of collective action: an analytical approach to the forms of social capital. Paper presented at the 2002 Annual Meeting of the American Political Science Association, Boston, Massachusetts, 29 August–1 September 2002
- Anigbogu TU, Agbasi OE, Okoli IM (2015) Socioeconomic factors influencing agricultural production among cooperative farmers in Anambra State, Nigeria. *Inter J Acad Res Econ Manag S* 4:43–58

- Annen K (2003) Social capital, inclusive networks, and economic performance. *J Econ Behav Organ* 50:449–463
- Arnstein SR (1969) A ladder of citizen participation. *J Am Inst Plann* 35:216–224
- Bardhan P (2001) Distributive conflicts, collective action, and institutional economics. *Front Dev Econ* 7:269–290
- Barkow JH, Cosmides L, Tooby J (1992) *The Adapted Mind: Evolutionary Psychology and the Generation of Culture*. Oxford Univ Press, New York
- Bodin Ö (2017) Collaborative environmental governance: achieving collective action in social-ecological systems. *Sci* 357:eaan1114
- Böröcz J, Róna-Tas Á (1995) Small leap forward: emergence of new economic elites. *Theor Soc* 24:751–781
- Cattaneo A, Nelson A, McMenomy T (2021) Global mapping of urban–rural catchment areas reveals unequal access to services. *Proc Natl Acad Sci USA* 118:e2011990118
- Cheng L, Xia N, Jiang P et al. (2015) Analysis of farmland fragmentation in China Modernization Demonstration Zone since “Reform and Openness”: a case study of South Jiangsu Province. *Sci Rep* 5:11797
- Classen L, Humphries S, FitzSimons J et al. (2008) Opening participatory spaces for the most marginal: learning from collective action in the Honduran hillsides. *World Dev* 36:2402–2420
- Dasgupta A, Beard VA (2007) Community driven development, collective action and elite capture in Indonesia. *Dev Change* 38:229–249
- Duan Y, Wang W, Zhou W (2020) The multiple mediation effect of absorptive capacity on the organizational slack and innovation performance of high-tech manufacturing firms: evidence from Chinese firms. *Int J Product Econ* 229:107754
- Dutta D (2009) Elite capture and corruption: concepts and definitions. *Natl Council Appl Econ Res* 4:1–16
- Esparcia Perez J (2000) The leader Programme and the Rise of Rural Development in Spain. *Sociol Ruralis* 40:200–207
- Esubalew AA, Raghurama A (2020) The mediating effect of entrepreneurs’ competency on the relationship between Bank finance and performance of micro, small, and medium enterprises (MSMEs). *Eur Res Manag Bus Ec* 26:87–95
- Fudenberg D, Maskin E (1986) The folk theorem in repeated games with discounting or with incomplete information. *Econometrica* 54:533–54
- Gyau A, Franzel S, Chiatoh M et al. (2014) Collective action to improve market access for smallholder producers of agroforestry products: key lessons learned with insights from Cameroon’s experience. *Curr Opin Env Sust* 6:68–72
- Ho DH, McPherson M (2010) *Land policy for socioeconomic development in Vietnam*. Harvard University, Cambridge
- Houtzager PP (2001) Collective action and political authority: Rural workers, church, and state in Brazil. *Theor Soc* 30:1–45
- Ilkben A (2020) *Comparative Approaches to Old and New Institutional Economics*. IGI Global, Hershey
- Jagers SC, Harring N, Löfgren Å et al. (2020) On the preconditions for large-scale collective action. *Ambio* 49:1282–1296
- Jia X, Huang J (2011) Contractual arrangements between farmer cooperatives and buyers in China. *Food Policy* 36:656–666
- Johnson C (2001) Local democracy, democratic decentralisation and rural development: theories, challenges and options for policy. *Dev Policy Rev* 19:521–532
- Jones IJ, MacDonald AJ, Hopkins SR et al. (2020) Improving rural health care reduces illegal logging and conserves carbon in a tropical forest. *Proc Natl Acad Sci* 117:28515
- Joss S (2018) Future cities: asserting public governance. *Palgrave Commun* 4:36
- Jungsborg L, Copus A, Herslund LB et al. (2020) Key actors in community-driven social innovation in rural areas in the Nordic countries. *J Rural Stud* 79:276–285
- Kan K (2016) The transformation of the village collective in urbanising China: a historical institutional analysis. *J Rural Stud* 47:588–600
- Kim H-Y (2018) Effects of social capital on collective action for community development. *Soc Behav Personal: Int J* 46:1011–1028
- Labonne J, Chase RS (2009) Who is at the Wheel When Communities Drive Development? Evidence from the Philippines. *World Dev* 37:219–231
- Lade SJ, Haider LJ, Engström G et al. (2017) Resilience offers escape from trapped thinking on poverty alleviation. *Sci Adv* 3:e1603043
- Laumann EO, Pappi FU (1976) *Networks of Collective Action: A Perspective on Community Influence Systems*. Academic Press, New York
- Li Y, Fan P, Liu Y (2019) What makes better village development in traditional agricultural areas of China? Evidence from long-term observation of typical villages. *Habitat Int* 83:111–124
- Liu Y, Li Y (2017) Revitalize the world’s countryside. *Nature* 548:275–277
- Lyu H, Dong Z, Roobavannan M et al. (2019) Rural unemployment pushes migrants to urban areas in Jiangsu Province, China. *Palgrave Commun* 5:92
- Maas TY, Pauwelussen A, Turnhout E (2022) Co-producing the science-policy interface: towards common but differentiated responsibilities. *Humanit Soc Sci Commun* 9:93
- Matin I, Hulme D (2003) Programs for the poorest: learning from the IGVGD Program in Bangladesh. *World Dev* 31:647–665
- Nash J (1951) Non-Cooperative Games. *Ann Math* 54:286–295
- Nock D, Levin T, Baker E (2020) Changing the policy paradigm: a benefit maximization approach to electricity planning in developing countries. *Appl Energ* 264:114583
- Olson M (1965) *The Logic of Collective Action: Public Goods and the Theory of Groups*. Harvard Univ Press, Cambridge
- Ostrom E (1990) *Governing the Commons: The Evolution of Institutions for Collective Action*. Camb Univ Press, Cambridge
- Ostrom E (1998) A behavioral approach to the rational choice theory of collective action: presidential address, American Political Science Association, 1997. *Amer Polit Sci Rev* 92:1–22
- Pareto V (1935) *The mind and society*. Har Brace Com, New York
- Pires E (2020) *Recuperative modes of action: Reciprocity, dependence and resistance to austerity policies in Rural Portugal*. Routledge, London
- Platteau J-P (2004) Monitoring elite capture in community-driven development. *Dev Change* 35:223–246
- Putnam RD (2000) *Bowling alone: The collapse and revival of American community*. Sim Schus, New York
- Qin X, Li Y, Lu Z et al. (2020) What makes better village economic development in traditional agricultural areas of China? Evidence from 338 villages. *Habitat Int* 106:102286
- Rao V, Ibanez AM (2005) The social impact of social funds in Jamaica: a ‘participatory econometric’ analysis of targeting, collective action, and participation in community-driven development. *J Dev Stud* 41:788–838
- Rasolofoson RA, Hanauer MM, Pappinen A et al. (2018) Impacts of forests on children’s diet in rural areas across 27 developing countries. *Sci Adv* 4:eaat2853
- Schneider M (2015) What, then, is a Chinese peasant? Nongmin discourses and agroindustrialization in contemporary China. *Agr. Human Values* 32:331–346
- Shen F, Yang L, He X et al. (2020) Understanding the spatial-temporal variation of human footprint in Jiangsu Province, China, its anthropogenic and natural drivers and potential implications. *Sci Rep* 10:13316
- Singh K, Shishodia A (2019) *Rural Development*. SAGE Publishing India, New Delhi
- Sullivan A, White DD, Hanemann M (2019) Designing collaborative governance: Insights from the drought contingency planning process for the lower Colorado River basin. *Environ Sci Policy* 91:39–49
- Sullivan A, York AM, An L et al. (2017) How does perception at multiple levels influence collective action in the commons? The case of Mikania micrantha in Chitwan, Nepal. *Forest Policy Econ* 80:1–10
- Tian L, Zhu J (2013) Clarification of collective land rights and its impact on non-agricultural land use in the Pearl River Delta of China: a case of Shunde. *Cities* 35:190–199
- UN Secretary-General (2021) *Progress towards the Sustainable Development Goals, Report of the Secretary-General*. UN, New York
- Wang Y, Chen C, Araral E (2016) The effects of migration on collective action in the commons: evidence from rural China. *World Dev* 88:79–93
- Xu Z, Chau S, Chen X et al. (2020) Assessing progress towards sustainable development over space and time. *Nature* 577:74–78
- Yuan P, Zhao X, Zeng S (2019) Extenics based innovation of new professional farmer cultivation under the strategy of rural vitalization. *Proc Comput Sci* 162:131–138

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## Author contributions

Conceptualization: YL, XFQ, AS, YSL; Data curation: YL, XFQ, WP; Formal analysis: YL, XFQ, GQC; Funding acquisition: YL, YSL; Investigation: YL, XFQ, WP; Methodology: YL, XFQ; Project administration: YL, YSL; Supervision: YL, YSL, AS; Validation: YL, XFQ, WP; Writing—original draft: YL, XFQ, ZL; Writing—review & editing: YL, AS, GQC, ZL, YSL.

## Competing interests

The authors declare no competing interests.

## Ethical approval

All procedures performed in this study were in accordance with the Declaration of Helsinki. It was also carried out according to guidance from the Science Ethics

Committee of the Chinese Academy of Sciences, whereby the need to obtain formal ethical approval for the study is not applicable as participation in the focus group sessions and household interviews was entirely voluntary.

### Informed consent

Informed consent was obtained from all individual participants included in the study.

### Additional information

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