The Compactness of Benefit Coupling of Farmers' Cooperatives: An Investigation based on the Embedding of Poverty Alleviation Funds

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Abstract. In poverty-stricken areas of China, the investment in poverty alleviation funds has a positive impact on the future development of farmers' cooperatives and promotes the transformation of rural poverty alleviation methods. From the perspective of the embedding of poverty alleviation funds, this paper uses the field survey data of 68 farmers' cooperatives from 16 districts and counties in the Qinba and Wumeng poverty-stricken areas in Sichuan, China. Use the ordered probit model to analyze the direct influencing factors of compactness of benefit coupling of cooperatives, and use the mediating effect test to analyze the indirect influence factors of it. The results show that the biggest factor affecting the compactness of benefit coupling of cooperatives is the shareholding of poor members. The annual profit, the total amount of poverty alleviation funds, the proportion of poverty-stricken members occupying poverty alleviation funds, and the government's follow-up auditing variables have different degrees of influence on the compactness of benefit coupling of cooperatives. The total amount of poverty alleviation funds has the widest and most extensive impact on the compactness of the five forms of benefit coupling such as service connection, and indirectly affects the compactness of benefit coupling of cooperatives through the two mediating variables of annual profit and the shareholding of poor members.

Keywords: Farmers' cooperatives; benefit coupling; poverty alleviation funds; influencing factors.

1. Introduction

Farmers' cooperatives (hereinafter referred to as cooperatives) have natural prosperity, and poverty alleviation is regarded as the meaning of their problems [1]. With the embedding of poverty alleviation funds from government, cooperatives have further realized the transformation from transfusion-type poverty alleviation to hematopoietic poverty alleviation, and the compactness of their benefit coupling inevitably changes. This change is more pronounced in the poor cooperatives in the poverty-stricken areas where the original benefit coupling is looser and the ability is generally weaker. In reality, a considerable number of cooperatives in poverty-stricken areas have a virtualization of regulations and a large number of research gap in terms of benefit coupling, interest distribution, and membership access standards [2]. Moreover, with the low participation of poor farmers and the imbalance of core and ordinary members' rights [3, 4], the interests of cooperatives and members are closely related to each other, and the cooperative's poverty alleviation effect is not fully exerted. As a result, the interests of cooperatives in poverty-stricken areas and the role of poverty alleviation have received widespread attention from all walks of life.

The current research has less discussion on the compactness of benefit coupling of cooperatives. Relevant research pays more attention to the cooperatives' interest distribution and linkage mechanism [5, 6], and most of them belong to normative research or descriptive explanation, and empirical research is less, involving cooperatives' interests. Research on the influencing factors of linkages is particularly lacking. In terms of broadening, some studies have analyzed the factors affecting the interests of cooperatives or leading enterprises, and roughly formed two main views: First, based on the micro perspective, the main influencing factors are the types of agricultural products produced by farmers and the actual planting scale of farmers. The production management experience of farmers, the degree of mechanization of farmers' agricultural use, etc. [7]. The second is based on the perspective of meso, the main influencing factors are the basic status of cooperatives, property rights system and overall operating conditions [8, 9]. In addition, the institutional environment of macro-systems, laws and regulations, and administrative interventions is also crucial

to the development of cooperatives [10]. From the literature on the impact of current research policies on cooperatives, some studies based on individual case studies explored the impact of public policies on cooperative economic organizations, and argued that government power in some places is too strong, and there is a suspicion of destructive encouragement [11]. Based on multi-case analysis, it was found that the cooperatives were supported by the government in different degrees during the development process, which alleviated the financial problems of the cooperatives [12]. Another study based on the research data or panel data of the cooperatives, empirically analyzed the support of the cooperative policy effect and the extent to which policy support affects cooperative performance [13].

In summary, the existing research is mainly based on the two perspectives of micro-farmers and meso-collaboration cooperatives, and few of them carefully examine the interests of cooperatives from the perspective of macro-government. The literature on the impact of most research policies on cooperatives focuses on the analysis of the effects of cooperative support policies and their impact on cooperative performance. The common forms of research are theoretical discussions and case studies. Few studies have influenced the impact of a policy as a cooperative interest. Based on, and less poverty-stricken areas as the main research area. However, in the construction of embedded social structure theory, the government as the most important management subject has a pivotal position and role. Especially in poverty-stricken areas, the development of cooperatives is still incomplete. In the coming period, the government is still the main driving force for the development of cooperative industries in poverty-stricken areas and the poverty-stricken households to get rid of poverty. Therefore, this paper draws on the analytical thinking of intervention-oriented government functions and supplemented government functions [14], examines government's role in cooperatives in poverty-stricken areas, and analyzes the impact of the embedding of poverty alleviation funds on the compactness of benefit coupling of cooperatives. This will help to accurately identify the benefit coupling of cooperatives in poverty-stricken areas under the poverty alleviation policy, and propose in a targeted manner to promote the long-term development of cooperatives in poverty-stricken areas, and promote cooperatives to further strengthen benefit coupling and expand poverty alleviation benefits in a precise poverty alleviation environment.

2. Theoretical Analysis and Research Hypothesis

2.1 Theoretical Analysis

The new economic sociology holds that individual economic activities are not completely atomized and isolated, and they are subject to social relations [15]. The theory of embedded social structure expands this view. Under the social relationship, any economic activity is embedded in the whole social structure. The self-constraints of economic activities are independent factors, and the external constraints are embedded factors [16]. From the perspective of benefit coupling, farmers usually associate with cooperatives for the purpose of reducing transaction costs and obtaining external benefits of cooperation. Cooperatives usually associate with farmers for reasons such as economies of scale, externalities, and distribution of interests. And the form of connection between the two is usually characterized by unpaid technical guidance, contract signing in sales, shareholding dividend in equity, surplus distribution in rebate, and establishment of employment relationship in cooperation. Therefore, the cooperation between cooperatives and members is linked. The form is divided into five categories: service connection, sales linkage, equity linkage, rebate connection, and cooperation connection.

Based on this, we first discuss the three characteristics of the basic characteristics of cooperatives, the characteristics of cooperative property rights, the characteristics of cooperative institutions, and the direct influence of the two embedded factors of poverty alleviation capital embedding characteristics and government intervention characteristics on the compactness of five forms of connection and cooperative benefit coupling. In terms of autonomy, the basic characteristics of cooperatives include: the proportion of poor members and annual profits. The characteristics of cooperative property rights include: the shareholding of poor members. The characteristics of the cooperative system include: the main mode of earnings distribution and the degree of disclosure of

financial information. In terms of embedded factors, the characteristics of poverty alleviation funds include: the total amount of poverty alleviation funds, the form of poverty alleviation funds, and the proportion of poverty-stricken members in poverty alleviation funds. Government intervention features include: government sales assistance, government tracking audits. A brief analysis framework is shown in Fig. 1.
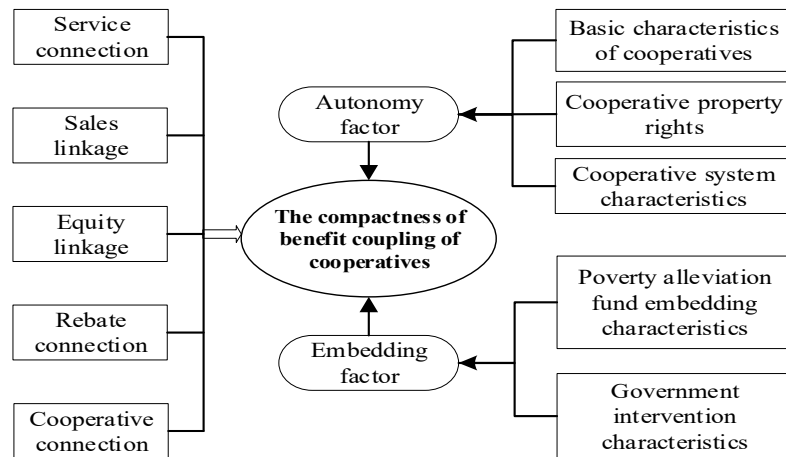

Fig. 1 Factors affecting the compactness of benefit coupling of cooperatives

Second, the government fulfills its intervention function, injects poverty alleviation funds into cooperatives in poverty-stricken areas, and requires cooperatives to absorb poor households into the society and promote the income increase of poor members in the form of quantitative investment in poverty alleviation funds. In this process, as an external embedding factor, poverty alleviation funds inevitably have an impact on the original income status and ownership structure of the cooperative, which ultimately affects the compactness of the cooperatives' benefit coupling. At the same time, the annual profit of cooperatives is an important basis for the distribution of benefits, which can best reflect the income status of cooperatives. The level of stocks of poor members is an important basis for measuring the equity of members. It can best reflect the ownership structure of cooperatives after they are included in poor households. Therefore, the total amount of poverty alleviation funds embedded in the characteristics is taken as the core independent variable, and the remaining characteristics are used as control variables to test and explore whether the total amount of poverty alleviation funds is indirectly linked to the interests of cooperatives by affecting the two factors of annual profit and the shareholding of poor members. The analysis process is shown in Fig. 2.
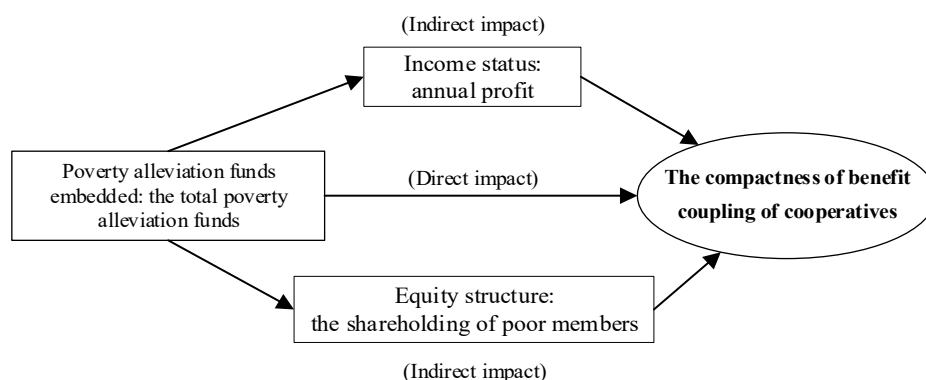

Fig. 2 Impact of poverty alleviation funds on the compactness of benefit coupling of cooperatives

2.2 Research Hypothesis

This paper focuses on the impact of poverty alleviation funds on the compactness of benefit coupling of cooperatives. Because of the total amount of poverty alleviation funds invested by the government in cooperatives, it reflects the amount of poverty alleviation funds embedded in cooperatives from the perspective of quantity, and can most intuitively express the impact from

poverty alleviation funds to the compactness of benefit coupling of cooperatives. So, investigate the total amount of poverty alleviation funds as the core influencing factors.

Service connection and sales linkage are mainly based on the output of agricultural products by members, and the connection form is relatively loose, and the embedding of poverty alleviation funds may break the original connection state. Equity linkage and rebate connection are mainly based on the funds, land or labor resources invested by the members, and establish a cooperative relationship between the cooperatives and the members of "resource sharing, benefit sharing, and risk sharing", which belong to a higher-level connection form. Moreover, the compactness of the connection is relatively high, and the embedding of poverty alleviation funds urges the cooperative to change the original business distribution mode and shareholding structure, so that the interest relationship between the cooperative and the members changes. The cooperation is mainly based on the formation of the cooperative relationship between the cooperative and the employees, clearly defining the distribution relationship between the cooperative and the members, and the rights and obligations that the two parties should perform in the process of cooperation. From the field investigation, this is managed by the cooperative. The form of connection between the members and the workers is the main form of the benefit coupling of the cooperatives in the current poverty-stricken areas, and the embedding of poverty alleviation funds may further stabilize the cooperative relationship between the cooperatives and the members. As mentioned above, the embedding of poverty alleviation funds may be related to the five different forms of linkage, which is likely to have an impact on the compactness of the cooperative's interest, so the research hypothesis H_1 is:

H_1: The total amount of poverty alleviation funds has a positive and direct impact on the compactness of benefit coupling of cooperatives.

In addition, based on theoretical analysis, in order to further verify whether the total amount of poverty alleviation funds affects the annual interest and the shareholding of poor members, thus affecting the compactness of benefit coupling of cooperatives, the research hypothesis H_2 and H_3 are:

H_2: In the impact of the total amount of poverty alleviation funds on the compactness of benefit coupling of cooperatives, the annual profit plays a positive mediating role;

H_3: In the impact of the total amount of poverty alleviation funds on the compactness of benefit coupling of cooperatives, the shareholding of poor members plays a positive mediating role.

3. Data and Variable Selection

3.1 Data

The analysis data of this paper is the field research of China. It selects the areas where the poverty alleviation funds in Sichuan Qinba and Wumeng poverty-stricken areas are relatively more extensive and the cooperative development is relatively better, including 16 national or provincial poverty-stricken counties (or districts) in 9 cities. A stratified sampling method was used to extract 3 to 5 sample cooperatives in each poverty-stricken county. The survey method was a questionnaire survey, a total of 71 cooperative questionnaires were distributed, and 68 valid questionnaires were collected, with an effective rate of 95.77%.

3.2 Variable Selection

3.2.1 Explained Variables

This paper focuses on the analysis of the influencing factors of compactness of benefit coupling of cooperatives. The measurement method and valuation of that are only briefly described as follows: using principal component analysis method for the compactness of service connection (expressed by F_1), sales linkage (expressed by F_2), equity linkage (expressed by F_3), rebate connection (expressed by F_4) and cooperative linkage (expressed by F_5), and the cumulative variance contribution rates of the five principal component factors were respectively 20.75%, 14.61%, 17.12%, 25.38%, 17.09%. Calculate the scores of F_1 to F_5, and finally calculate the score of the compactness of benefit coupling of cooperatives (expressed by F). In order to satisfy the consistency of the distribution criteria of each

interval, the actual variables are simultaneously expanded by 3 times of standardization processing, and the scores are assigned: the score is assigned to 1 in the interval (0, 1), 2 in the interval (1, 2) and 3 in the interval (2, 3), which gives the assignment of the compactness of each, see Table 1.

Table 1. Compactness of benefit coupling of cooperatives under the embedding of poverty alleviation funds

Connection form	Assigned to 1		Assigned to 2		Assigned to 3	
	Quantity	Percentage	Quantity	Percentage	Quantity	Percentage
F_1	22	39.28	17	30.36	17	30.36
F_2	19	33.93	25	44.64	12	21.43
F_3	23	41.07	17	30.36	16	28.57
F_4	15	26.79	25	44.64	16	28.57
F_5	1	1.79	3	5.36	52	92.85
F	8	14.29	45	80.36	3	5.36

Note: The empirical part only uses sample cooperatives involving the embedding of poverty alleviation funds, a total of 56.

3.2.2 Explanatory Variables

Based on cooperative research, embedded social structure theory and property rights theory, select five primary variables, including the basic characteristics of cooperatives, cooperative property rights, cooperative system characteristics, poverty alleviation fund embedding characteristics and government intervention characteristics are selected. Specifically divide the five primary variables into ten secondary variables, as factors influencing the compactness of benefit coupling of cooperatives in poverty-stricken areas in Sichuan, see Table 2.

Table 2. Variable system of influencing factors

Primary variable	Secondary variable	Variable description
Basic characteristics of cooperatives	X_{11}: Percentage of poor members (%)	1= Less than or equal to 20; 2= 20 to 40; 3= 40 to 60; 4= 60 to 80; 5= More than 80.
	X_{12}: Annual profit (ten thousand yuan)	1= Less than or equal to 40; 2= 40 to 80; 3 =80 to 120; 4= 120 to 160; 5= More than 160.
Cooperative property rights	X_{21}: Poor members' shareholding (%)	1= Less than or equal to 20; 2= 20 to 40; 3= 40 to 60; 4= 60 to 80; 5= More than 80.
Cooperative system characteristics	X_{31}: Main way of surplus distribution	1= Allocated by transaction amount (or amount); 2= Distribution by stock; 3= Equally distributed; 4= Combined by transaction amount and share-based distribution; 5= Others.
	X_{32}: Financial information disclosure	1= Completely private; 2= Very few public; 3= Partially public; 4= Most public; 5= Fully public.
Poverty alleviation fund embedding characteristics	X_{41}: Total poverty alleviation funds (ten thousand yuan)	1= Less than or equal to 5; 2= 5 to 10; 3= 10 to 20; 4= 20 to 50; 5= More than 50.
	X_{42}: Poverty alleviation fund form	1= Direct grant; 2= Purchase facility; 3= Development of industrial projects; 4= Poor households.
	X_{43}: Percentage of poverty alleviation funds among poor members (%)	1= Less than or equal to 20; 2= 20 to 40; 3= 40 to 60; 4= 60 to 80; 5= More than 80.
Government intervention characteristics	X_{51}: Government provides sales assistance	1=Yes; 2=No.
	X_{52}: Government tracking audit	1=Yes; 2=No.

4. Methodology and Results

4.1 Methodology

4.1.1 Ordered Probit Model

This paper reflects that the assignment of compactness of benefit coupling of cooperatives is discrete data based on classification data. It is an ideal estimation method to use the probability model when analyzing discrete selection problems. At the same time, because the discrete value of the dependent variable is greater than two categories, this paper selects the ordered probit model to analyze the direct influencing factors of the interests of farmers cooperatives in poverty-stricken areas in Sichuan. The model is specifically stated as follows:

$$
\begin{aligned}
prob(M = 1 \mid N) &= prob(M^* > 0 \mid N) \\
&= prob\{[\alpha > -(\beta + \lambda N)] \mid N\} \\
&= 1 - \Phi[-(\beta + \lambda N)] \\
&= \Phi[(\beta + \lambda N)]
\end{aligned}
\tag{1}
$$

Among them, M^* is an unobservable latent variable; M is the actual observable explanatory variable, which is specifically expressed as the cooperative benefit coupling; N is an explanatory variable, which is specifically expressed as the influencing factor of the compactness of the cooperatives' interest connection; α is a random error term that obeys the standard normal distribution; λ is the explanatory variable coefficient; Φ is a standard normal distribution function.

4.1.2 Mediating Effect Test

Based on the analysis of the direct influencing factors of the cooperative benefit coupling, this paper further examines whether the embedding factor of poverty alleviation funds has influence on the compactness of cooperative interest. The mediating effect model is used to test whether the total amount of poverty alleviation funds has a role in the compactness of benefit coupling of cooperatives through the two mediating variables of annual profit and the shareholding of poor members. The specific expression of the model is shown in Fig. 3.
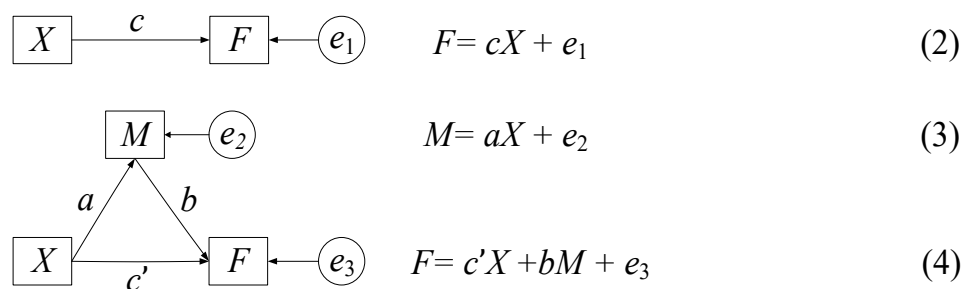

$$F = cX + e_1 \tag{2}$$

$$M = aX + e_2 \tag{3}$$

$$F = c'X + bM + e_3 \tag{4}$$

Fig. 3 Mediating effect model diagram

Wherein, the coefficient a represents the effect of the independent variable X on the mediating variable M; the coefficient b represents the control of the independent variable X, the effect of the mediating variable M on the dependent variable F; the coefficient c represents the total effect of the independent variable X on the dependent variable F; the coefficient c' indicates the direct effect of the independent variable X on the dependent variable F when the mediating variable M is controlled.; e_1, e_2 and e_3 represent the regression residual, where the mediating effect is equal to the indirect effect, that is the coefficient ab. The effect relationship is:

$$c = c' + ab \tag{5}$$

4.2 Results

4.2.1 Regression Analysis of Direct Influence Factors

This paper focuses on service connection, sales linkage, equity linkage, rebate connection and cooperation connection, and analyzes the influencing factors of the compactness of the five linkages (F_1 to F_5) and the compactness of the cooperatives' benefit coupling (F). The regression results are shown in Table 3.

Table 3. Regression results of direct influence factors

Variable	F_1	F_2	F_3	F_4	F_5	F
X_{11}	0.163**	0.068	0.175	0.294***	0.181	0.058
X_{12}	0.013***	0.11*	0.193**	0.252**	0.136*	0.178*
X_{21}	0.132	0.163	0.232*	0.074	0.268**	0.438*
X_{32}	0.078	0.134	0.027	0.110	0.114**	0.085
X_{41}	0.260*	0.222**	0.234***	0.310***	0.308**	0.057*
X_{43}	0.083*	0.029*	0.105***	0.180**	0.056**	0.090**
X_{51}	0.242	0.158***	0.225	0.040	0.072	0.105*
X_{52}	0.125**	0.019*	0.054*	0.029**	0.018*	0.096**
R^2	0.619	0.521	0.665	0.557	0.602	0.591
SIG.F	0.002	0.005	0.002	0.015	0.031	0.007

Note: P-values are reported in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Compactness of service connection. The total amount of poverty alleviation funds and the proportion of poverty-stricken members occupying poverty alleviation funds have a significant positive impact on the compactness of service connection at a significant level of 10%, indicating that the higher the total amount of poverty alleviation funds, the more poverty-stricken members possess the poverty alleviation funds, and the services provided by cooperatives to members. The better, the wider the coverage, the higher the compactness of the service connection; the proportion of poor members in the cooperative and the government's follow-up audit have a significant positive impact on the compactness of the service connection at a significant level of 5%; the annual profit is 1%. At a significant level, there is a significant positive impact on the compactness of service connection.

Compactness of sales connection. The annual profit, the proportion of poverty-stricken members occupying poverty alleviation funds and the government's follow-up audit have a significant positive impact on the compactness of sales linkage at a significant level of 10%, indicating that the better the operating efficiency of cooperatives, the more poverty alleviation funds allocated by poor members, the government The higher the frequency of tracking audits, the more cooperative the company is willing to provide sales assistance to the members, the higher the sales behavior is tighter; the total amount of poverty alleviation funds has a significant positive impact on the compactness of sales linkage at a significant level of 5%, indicating that the government is embedded. The more poverty alleviation funds, the more cooperative companies are willing to provide sales services to their members, the closer the sales link is; the government provides sales assistance, which has a significant positive impact on the compactness of sales linkage at a significant level of 1%, indicating that the government acts as a cooperative in poverty-stricken areas in Sichuan. The main support subject, the higher the frequency of providing sales assistance to cooperatives, the closer the cooperative sales activities are.

Compactness of equity linkage. Annual profit, the shareholding of poor members, the total amount of poverty alleviation funds, the proportion of poverty-stricken members occupying poverty alleviation funds and the government's follow-up audit have a significant positive impact on the compactness of equity linkage at all significant levels, indicating that the annual profit of cooperatives can be increased. The more surplus is distributed, the more benefits are allocated to the members, and the closer the cooperatives' equity linkages are. The amount and distribution standards of poverty

alleviation funds affect the distribution ratio of cooperatives to poor members, and the size of the members' shareholding. In the case of distribution according to the stock, the higher the shareholding of the poor members, the higher the compactness of the equity linkage. At the same time, the more frequent the government conducts follow-up audits on poverty alleviation funds, the closer the cooperatives' equity linkages are. This is because the fundamental purpose of poverty alleviation funds is to help poor members to obtain sustainable benefits through cooperatives, such as share dividends.

Compactness of rebate connection. The annual profit, the proportion of poverty-stricken members occupying poverty alleviation funds and the government's follow-up audit have a significant positive impact on the rebate connection at a significant level of 5%, and the annual profit variable has the greatest impact. For each percentage point increase of the variable, the compactness of the rebate connection the average increase was 25.2%. Explain that the better the operating efficiency of the cooperative, the more funds can be allocated for distribution, and the closer the cooperative rebate is. The proportion of poor members and the total amount of poverty alleviation funds have a significant positive impact on the compactness of rebate connection at a significant level of 1%.

Compactness of cooperative connection. Annual profit and government tracking audits have a significant positive impact on the compactness of cooperation at a significant level of 10%. The shareholding of poor members, the total amount of poverty alleviation funds, the degree of openness of financial information, and the proportion of poverty-stricken members occupying poverty alleviation funds have a significant positive impact on the compactness of cooperation connection at a significant level of 5%, with the most affected members of the poor. It shows that in the context of the embedding of poverty alleviation funds, the more shares that join the cooperative and own the cooperative, the cooperation between cooperatives and poor members is more closely linked. At the root of it, the participation of poor members has enabled cooperatives not only to obtain government funds, but also to expand the scale of cooperatives and develop industrial projects. It has also acquired the capital of labor, land and other resources of poor members, which is conducive to the overall development of cooperatives, so the cooperative connection is closer.

Compactness of benefit coupling of cooperatives. The annual profit, the shareholding of poor members, the total amount of poverty alleviation funds and the government's sales assistance have a significant positive impact on the compactness of benefit coupling of cooperatives at a significant level of 10%. Among them, the shareholding of poor members has the greatest impact, and hypothesis H_1 is established. The more funds that the government has embedded in poverty alleviation, the more incentive the cooperatives must strengthen the interests of the members. Poor members have a proportion of poverty alleviation funds and government follow-up audits, which have a significant positive impact on the compactness of benefit coupling of cooperatives at a significant level of 5%. The results show that most of the factors affecting the close relationship of cooperative interest are embedded factors, indicating that the compactness of benefit coupling of cooperatives is largely influenced by the embedding factors of government poverty alleviation and government intervention factors. Therefore, the embedded factor is an important aspect to strengthen the compactness of benefit coupling of cooperatives.

4.2.2 Mediating Effect Test and Analysis

In the regression analysis of direct influencing factors, this paper has verified the significance of the compactness of each variable to the cooperative interest, indicating that the coefficient c' is significant, that is, the direct effect is significant, not the complete mediating effect, but part of the mediating effect. Among them, the regression analysis of direct influencing factors shows that the total amount of poverty alleviation funds has the widest and most extensive impact on the five kinds of connection compactness, and the annual profit and the contribution of the poverty-stricken members have the largest margin, and the other variables have relatively small influence. Based on the theoretical analysis and the results of direct influencing factors analysis, the total amount of poverty alleviation funds is taken as the core independent variable, the annual profit and the shareholding of the poor members are used as the intermediate variables, and the remaining variables

are used as the control variables. Respectively, test and analyze the mediating effect of annual profit and the shareholding of poor members. The test results are shown in Tables 4 and 5.

Table 4. Mediating effect test of annual profit

Variable	F	Mediating variable X_{12}	F
X_{11}	0.00284	0.0210	0.00374
	(0.0104)	(0.0948)	(0.0110)
X_{12}			0.0428^{**}
			(0.0200)
X_{32}	0.0148	0.151	0.0113
	(0.0124)	(0.0948)	(0.0125)
X_{41}	0.0118^{*}	0.111^{*}	0.00708^{*}
	(0.00690)	(0.0646)	(0.00407)
X_{43}	0.0217^{*}	0.1586^{*}	0.0205^{*}
	(0.0126)	(0.0917)	(0.0117)
X_{51}	0.0679^{*}	0.230	0.0585^{*}
	(0.0388)	(0.329)	(0.0334)
X_{52}	0.0986^{*}	0.324	0.1003^{*}
	(0.0569)	(0.287)	(0.0578)
Constant	0.613^{***}	1.512^{*}	0.678^{***}
	(0.106)	(0.817)	(0.102)
Observations	56	56	56
R^2	0.043	0.101	0.157

Note: P-values are reported in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Mediating variable: annual profit. The results in Table 4 show that the proportion of poverty-stricken members who have poverty alleviation funds, the government's sales assistance, and the government's follow-up audit have a significant positive impact on the compactness of benefit coupling of cooperatives, consistent with the regression analysis of direct impact factors. The total effect of total poverty alleviation funds on the compactness of benefit coupling of cooperatives is 0.0118, which has a significant positive impact on the significant level of 10%. The effect of total poverty alleviation funds on annual profit is 0.111, indicating that the mediating effect is significant. Controlling the total amount of poverty alleviation funds, the effect of annual profit on the compactness of benefit coupling of cooperatives is 0.0428, so the mediating effect is 0.00475. The direct effect of controlling annual profit and total poverty alleviation funds on the compactness of benefit coupling of cooperatives is 0.00708. The annual profit and the total amount of poverty alleviation funds showed a significant positive impact on the significant levels of 5% and 10%, indicating that in addition to the annual profit, there are other mediating variables, and the ratio of the mediating effect to the total effect is reported (0.111×0.0428) /0.0118=0.4026, namely 40.26%. The data show that after adding the annual profit of the mediating variable, there is a partial mediating effect, indicating that the total amount of poverty alleviation funds can affect the benefit coupling of the cooperative indirectly by affecting the annual profit variable. In the impact of the total amount of poverty alleviation funds on the compactness of benefit coupling of cooperatives, the annual profit plays a positive role, and hypothesis H_2 is established.

Table 5. Mediating effect test of the shareholding of poor members

Variable	F	Mediating variable X_{21}	F
X_{11}	0.00284	0.134	0.000768
	(0.0104)	(0.129)	(0.0105)
X_{21}			0.0155^*
			(0.009)
X_{32}	0.0148	0.0697	0.0138
	(0.0124)	(0.120)	(0.0120)
X_{41}	0.0118^*	0.0723^*	0.0107^*
	(0.00690)	(0.0425)	(0.006)
X_{43}	0.0217^*	0.186	0.0215^*
	(0.0126)	(0.127)	(0.0123)
X_{51}	0.0679^*	0.458	0.0664^*
	(0.0388)	(0.371)	(0.0384)
X_{52}	0.0986^*	0.211	0.0985^*
	(0.0569)	(0.328)	(0.0566)
Constant	0.613^{***}	1.506	0.590^{**}
	(0.106)	(1.013)	(0.113)
Observations	56	56	56
R^2	0.043	0.157	0.064

Note: P-values are reported in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Mediating variable: the shareholding of poor members. The results in Table 5 show that the proportion of poverty-stricken members in poverty alleviation funds, government sales assistance, and government follow-up audits have a significant positive impact on the compactness of benefit coupling of cooperatives, consistent with the regression analysis of direct impact factors. The total effect of total poverty alleviation funds on the compactness of benefit coupling of cooperatives is 0.0118, which has a significant positive impact on the significant level of 10%. The effect of total poverty alleviation funds on the shareholding of poor members is 0.0723, indicating that the mediating effect is significant. Controlling the total amount of poverty alleviation funds, the effect of the shareholding of poor members on the compactness of the interests of cooperatives is 0.0155, so the mediating effect is 0.00112. The direct effect of controlling the shareholding of poor members and the total amount of poverty alleviation funds on the compactness of cooperative interests is 0.0107. The shareholding of poor members and the total amount of poverty alleviation funds showed a significant positive impact on the significant level of 10%, indicating that in addition to the shareholding of poor members, there are other mediating variables, and the ratio of the mediating effect to the total effect is reported $(0.0723 \times 0.0155) / 0.0118 = 0.095$, namely 9.5%. The data shows that after joining the mediating variable poverty-stricken members, there is a partial mediating effect, indicating that poverty alleviation funds can affect the cooperative company's benefit coupling indirectly by affecting the shareholding of poor members. In the impact of the total amount of poverty alleviation funds on the compactness of cooperative interests, the shareholding of poor members plays a positive role, and hypothesis H_3 is established.

5. Conclusion

Based on the perspective of poverty alleviation fund embedding, the field survey data of 68 cooperatives in 16 districts and counties in the Qinba and Wumeng poverty-stricken areas of Sichuan were used. Among them, 56 cooperatives were embedded in poverty alleviation funds, and 12 cooperatives were not embedded in poverty alleviation funds. Using the ordered probit model to demonstrate the direct influencing factors of the compactness of benefit coupling of cooperatives, using the mediating effect test to analyze the indirect factors affecting it. The following main research conclusions are drawn: First, most of the factors affecting the compactness of benefit coupling of cooperatives are embedded factors, indicating that the compactness is largely influenced by the characteristics of poverty alleviation funds embedded and government intervention characteristics.

Second, the shareholding of poor members has the greatest impact on the compactness of benefit coupling of cooperatives. Annual profit, total poverty alleviation funds, proportion of poverty-stricken members in poverty alleviation funds, and government follow-up audits have different degrees of influence on the compactness of service connection, sales linkage, equity linkage, rebate connection and cooperation connection, as well as the compactness of benefit coupling of cooperatives. Third, the total amount of poverty alleviation funds not only has the widest and most extensive impact on the compactness of the five linkages, but also affects the compactness of benefit coupling of cooperatives through annual profits and the shareholding of poor members. The mediating effect of annual profit and the shareholding of poor members was 40.26% and 9.5% respectively.

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