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Effects of the "3:4:3" Agricultural Service Model on Return Migrants' Employment Motivation: An Empirical Analysis of Production Factor Linkages and Benefit Sharing

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Abstract

Keeping workers in agriculture and encouraging return migrants to take up local employment are two concerns in rural revitalization. This paper studies the "3:4:3" agricultural service model. The "3:4:3" agricultural service model means land contributors, machinery service providers, and agricultural input suppliers share returns in a ratio of 3:4:3. The analysis uses survey data from 486 households with return migrants in 10 counties of five Chinese provinces during 2022-2024. Propensity score matching combined with difference-in-differences (PSM-DID) is used to estimate the effect on employment motivation. The study also analyzed three mechanisms and examined differences across groups. The results show that after participation, the employment enthusiasm of returning migrant workers first increased. Income security helps reduce business risks, specialized division of labor improves production efficiency, and higher factor returns create more income opportunities. Middle-aged returning migrant workers, low-skilled workers, and grain growers were more affected. Local policy support and the agricultural industrial base strengthened this effect. This study provides empirical evidence on how agricultural socialized services affect the employment of returning migrant workers. It may also provide a reference for cooperation and benefit-sharing arrangements in rural employment.

Keywords

Agricultural Services, Return Migrants, Employment Motivation, Benefit Sharing, Production Factor Contributions

1. Introduction

The return of rural workers changes how households arrange their labor and use their land. A worker who returns home may not return to farming. Some people find non-farm work and still go to the fields in their spare time. This also affects whether the household transfers the land management rights to other families, and labor return itself does not mean that agricultural participation will go up (Kang et al., 2021). To keep a stable livelihood, it is not enough to just rely on the decision of "returning home or not" or "starting a business or not". The income level of the family and the funds they can use will limit what they can do. And whether they can find a suitable place for business is also a problem that cannot be avoided (Gan & Hu, 2019). For those who plan to do farming, a more realistic difficulty is whether agriculture can bring relatively stable returns, so that they are willing to continue to treat farming as a serious job.

Agricultural socialized services have provided new opportunities for return migrant workers who want to take part in agriculture. Farmers no longer need to buy professional agricultural machinery themselves, learn specialized technical knowledge, or bear the costs of technical inputs. But this does not mean there are no problems at all. Supply and demand do not always match. Transaction costs between farmers and service providers are also relatively high. These problems make coordination difficult. A complete coordination mechanism is needed to connect their interests (Zhang & Gu, 2025). In order to understand whether agricultural socialized services can promote employment, we need to look at not only what services are provided, but also how they are delivered and how returns are shared.

Existing research has mainly focused on the productive efficiency of agricultural services, household income, and labor allocation. In addition to agricultural technology, how production is organized and the relevant environmental conditions are also important factors affecting grain production efficiency (Wang et al., 2026a). Agricultural socialized services can also raise smallholder income by increasing nonfarm employment and encouraging the use of green production technologies (Huang et al., 2025). Machinery services reduce labor demand in some farming operations. But this does not mean those workers will look for other jobs. Greater specialization can instead bring new work opportunities (Geng et al., 2022). When families earn more through agricultural socialized services, it does not mean they take a greater part in farming. A fall in labor demand at certain production stages does not mean they will leave agriculture either.

Some studies on the employment of return migrant workers and agricultural cooperation can help us understand this relationship more deeply. Digital finance can promote return migrant workers' nonfarm employment by reducing their financing and entrepreneurial costs (Zeng & Guo, 2022). Workers will also consider other employment opportunities when external support conditions improve. Research on agricultural cooperation focuses more on how multiple participants collaborate, how production factors are integrated, and the basis for benefit distribu-

tion. A study of the "Lvneng model" in Jiangxi shows how agricultural socialized service organizations use certain methods to link their own interests with those of farmers (Weng et al., 2026). Service supply and benefit distribution are both important, but how specific cooperative arrangements affect return migrant workers' participation in agriculture still needs further research.

Existing studies have provided a certain foundation for understanding the relationship between agricultural services and return migrants' employment. We still need to conduct further analysis to understand how the institutional arrangements that combine the input of production factors with the sharing of benefits affect agricultural participation, and through which channels they exert their influence. This study responds to these questions from three aspects. Firstly, the study examined the impact of the "3:4:3" model on the employment motivation of returning migrant workers. We combined subjective intentions with observable behaviors to construct a comprehensive indicator for measuring employment motivation. The indicators included the willingness to engage in farming, the willingness to invest in production, and the expectation of remaining in the rural area in the long term. They also included labor input, production investment, and the adoption of technologies. And the study examined three mechanisms, including income security, benefits from specialized division of labor, and improvement in returns on production factors. It also analyzed differences among different ages, skill levels, and crop types, and examined the moderating effect of policy support. The analysis provides empirical evidence for the relationship between cooperative agricultural socialization service arrangements and the participation of returning migrant workers in agriculture.

2. Theoretical Hypotheses

2.1. Effects of the "3:4:3" Model on Return Migrants' Employment Motivation

Return migrants' willingness to farm depends on production conditions on one hand, and on expected returns on the other. When equipment, technology and funds are insufficient, participation in agricultural production will be restricted. Professionalized services can alleviate these difficulties and enhance production capacity. (Wang et al., 2024). Under the "3:4:3" model, land operating rights, machinery services, and agricultural inputs are used in cooperative production. Net returns are then divided in agreed proportions. We consider three ways in which this arrangement may encourage willingness to farm and greater production input: income security, gains from specialization, and enhanced returns to production factors.

Income security is one consideration. Benefit distribution and risk sharing help establish a common economic interest between farmers and service providers (Yu et al., 2023). Clarifying how costs are accounted for and how benefits are distributed can reduce risks in cooperation. Professional production support can also reduce operational errors and lower the income losses. Secondly, the division of

labor through specialization increases returns by improving production conditions. Machinery substitution, efficiency gains from the division of labor, and the diffusion of agricultural technologies all play important roles (Zhang et al., 2025). The improvement in production conditions enables return migrant workers to carry out field activities more effectively. Third, regarding returns to production factors, the coordination between land operating conditions and specialized services can raise agricultural operating returns. Farmland transfer-in and service outsourcing generate complementary income effects, and these effects also vary with whether the farmland is contiguous (Wang et al., 2026b). Under the "3:4:3" model, whether higher operating returns can increase the work enthusiasm of return labor also depends on how the additional returns are distributed and whether the participating parties need to bear production responsibilities. Some return migrants both contribute land operating rights and manage field production. For them, if production inputs improve operating performance and they can receive corresponding returns through the agreed distribution of net income, farming may become more attractive. Therefore, better land use performance, together with the real realization of factor returns, may jointly make them more willing to participate in agricultural production.

H1: The "3:4:3" agricultural service model increases return migrants' employment motivation.

2.2. The Moderating Role of Policy Support

For the "3:4:3" model to run smoothly, coordination and cooperation across multiple aspects are needed, including equipment, technology, personnel, and organization. Even when all parties are willing to cooperate, low initial investment, insufficient service capacity, and inadequate technical support will all affect the outcomes of cooperation. To improve factor allocation and service effectiveness, it is necessary to cultivate service providers, straighten out economic interest relationships, and provide policy support (Li, 2026). This means that policy support may be beneficial to the operation of this model.

Policy support can improve the supply of specialized services. Machinery purchase subsidies reduce the burden of equipment investment, and technical training improves farmers' operational and service capacity. At the same time, policy support can also lower the participation costs of return migrants. The production financing pressure of return migrants will be eased by government assistance for seedlings and other inputs, and agricultural training can also strengthen return migrants' field operation and technical abilities, enabling them to participate in collaboration better.

These forms of support are conducive to cooperation between production factors and the division of labor through specialization under the "3:4:3" model, and they also enable return migrants to make better use of the production support available through cooperation. We therefore propose the following hypothesis:

H2: Policy support positively moderates the effect of the "3:4:3" model on re-

turn migrants' employment motivation.

3. Research Design

3.1. Data Sources

The data were collected through two rounds of follow-up surveys conducted in July-September 2024 and July-September 2025. The surveys covered five major agricultural provinces: Henan, Shandong, Anhui, Sichuan, and Hunan. Two major agricultural counties were selected in each province. We choose two pilot villages implementing the "3:4:3" model and two nonpilot villages in each county. A total of 486 households with return migrants were surveyed. After eliminating invalid questionnaires and unmatched records, 452 households were retained, accounting for 93.0% of the surveyed farmers. The two rounds of surveys were linked through fixed farmer identification numbers. By verifying names and other respondent information, it was confirmed that the same migrant worker who returned home was being tracked. The sample size of 452 refers to the number of farmers, rather than the total number of farmer observation records after combining the two rounds of surveys. The questionnaires covered individual and household characteristics, participation in the model, and employment motivation indicators.

In the second survey round, 186 households were participants in the "3:4:3" model and 266 were nonparticipants, accounting for 41.1% and 58.9% of the sample. The participating group had a higher composite employment motivation score than the nonparticipating group, at 0.623 and 0.415, respectively. Men accounted for 68.4% of return migrants. Middle-aged respondents aged 35 - 55 accounted for 72.3%, while those without agricultural skill certificates accounted for 65.7%. Grain producers represented 76.1% of the sample.

3.2. Variable Definitions

3.2.1. Outcome Variable: Return Migrants' Employment Motivation (Active)

This study constructed a composite index containing two dimensions, subjective intentions and objective behavior, each with three indicators. This comprehensive indicator determines the weights using the entropy weight method, and then calculates the comprehensive score by weighting each indicator. The details can be found in Table 1. The score reflects the employment intentions of the respondents and their related production behaviors. Investment, technology adoption, and labor input will also change directly in response to production conditions. So this indicator cannot independently reflect the subjective employment intentions.

Table 1. Indicators and entropy weights for return migrants' employment motivation.

Dimension	Indicator	Measurement	Entropy weight
Subjective intentions	Willingness to work in agriculture locally	1 - 5; higher scores indicate stronger willingness	0.182
	Willingness to invest in agricultural production	1 - 5; higher scores indicate greater willingness to invest	0.175

Continued

	Expected duration of remaining locally	1 - 5; higher scores indicate a longer expected stay	0.168
Observed behavior	Agricultural labor input	Average agricultural workdays per month (days)	0.185
	Production investment intensity	Agricultural input/machinery expenditure per mu (CNY)	0.156
	Technology adoption	Number of new agricultural technologies adopted	0.134
		Composite score: weighted sum (normalized to 0 - 1)	1.000

3.2.2. Main Explanatory Variable: Participation in the "3:4:3" Model (Treat × Post)

We use a difference-in-differences specification. Treat equals 1 for participants in the "3:4:3" model and 0 for nonparticipants. Post equals 1 in the period after participation and 0 before participation. The main explanatory variable is their interaction, Treat × Post. A positive and statistically significant coefficient is taken to indicate an increase in employment motivation under the model.

3.2.3. Mediating Variables

The study analyzed three mechanisms, namely income security, gains from specialization, and enhanced returns to production factors, so as to observe how the "3:4:3" model affects employment motivation. Income security was measured by fluctuations in agricultural returns and satisfaction with returns. Return fluctuation is a negative indicator and was reverse-coded before aggregation, so a higher score means more stable returns. Gains from specialization were measured by improvements in production efficiency and reductions in labor intensity. Enhanced returns to production factors were measured by increases in output value per mu of land and the share of income derived from production factors.

3.2.4. Control Variables

Following existing research, control variables were selected at the individual, household, and regional levels. Individual characteristics included age, gender, education, and skill level. These were measured by actual age, a gender indicator, educational attainment, and possession of an agricultural skill certificate, respectively. Household characteristics included household size, cultivated land area, and the share of nonfarm income. These were measured by the number of usual household residents, total household cultivated land, and nonfarm income as a proportion of total household income. Regional characteristics included county economic development and the agricultural industrial base, measured by county GDP per capita and an agricultural industrial base score. Policy support was also included separately as a moderating variable. Table 2 summarizes the definitions and measurement of these variables. And Table 3 presents descriptive statistics for the main variables.

Table 2. Variable definitions and measurement.

Variable type	Variable name	Definition	Symbol
Outcome variable	Employment motivation	Entropy-weighted composite score (0 - 1)	Active
Main explanatory variable	Participation in the "3:4:3" model	DID interaction: participant group × post-participation period; 1 if both apply, 0 otherwise	Treat × Post
Mediating variable	Income security	Fluctuation in returns × 0.4 + satisfaction with returns × 0.6 (standardized)	Income_Sec
	Gains from specialization	Efficiency improvement × 0.5 + reduction in labor intensity × 0.5 (standardized)	Division
	Enhanced returns to production factors	Increase in output value per mu × 0.5 + factor income share × 0.5 (standardized)	Factor_Add
Control variables	Age	Continuous variable (years)	Age
	Gender	Male = 1; female = 0	Gender
	Education	Primary or below = 1; junior secondary = 2; senior secondary/technical secondary = 3; college or above = 4	Edu
	Skill level	Agricultural skill certificate: yes = 1; no = 0	Skill
	Household size	Number of usual household residents	Family_Size
	Cultivated land area	Total household cultivated land (mu)	Land
	Nonfarm income share	Nonfarm income/total household income (%)	Nonagri_R
	County economic development	County GDP per capita (CNY 10,000)	County_GDP
	Agricultural industrial base	1 - 5; higher scores indicate a stronger agricultural industrial base	Agri_Base
	Policy support	1 - 5; higher scores indicate stronger support	Policy

Table 3. Descriptive statistics for the main variables.

Variable	N	Mean	SD	Minimum	Maximum
Active	452	0.501	0.196	0.124	0.897
Treat × Post	452	0.411	0.492	0	1
Income_Sec	452	0.532	0.214	0.105	0.912
Division	452	0.516	0.208	0.112	0.889
Factor_Add	452	0.527	0.221	0.108	0.903
Age	452	42.36	8.75	23	65
Gender	452	0.684	0.465	0	1
Edu	452	2.34	0.87	1	4
Skill	452	0.343	0.475	0	1
Family_Size	452	4.21	1.32	2	7
Land	452	12.68	5.34	3	28
Nonagri_R	452	0.326	0.215	0	0.85

Continued

County_GDP	452	4.87	1.23	2.1	7.5
Agri_Base	452	3.21	0.98	1	5
Policy	452	3.15	1.02	1	5

Note: Table 3 describes the second survey wave only. N is the number of distinct households.

3.3. Model Specifications

3.3.1. Baseline Difference-in-Differences Model

The following baseline difference-in-differences model was specified to estimate the main effect of the "3:4:3" model:

$$Active_{it} = \beta_0 + \beta_1 \left(Treat_i \times Post_{it} \right) + \beta_2 X_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (1)$$

In Equation (1), $Active_{it}$ refers to the employment motivation of return migrant i in period t. $Treat_i \times Post_{it}$ is the main explanatory variable, and X_{it} refers to the control variables. μ_i and λ_t represent individual fixed effects and time fixed effects, respectively, while ε_{it} is the error term.

Identification relies on conditional parallel trends. Given pretreatment characteristics, if there had been no participation, the average change in employment motivation for participants and nonparticipants should have been the same. Limiting the sample to the same counties is to make policy and market conditions more comparable; using PSM is to reduce the observable differences between households.

3.3.2. Propensity Score Matching Combined with Difference-in-Differences

Selection bias is possible because return migrants with stronger initial employment motivation may be more willing to join the "3:4:3" model. We first use propensity score matching (PSM) to find nonparticipants with characteristics similar to those of participants. Then, conduct the DID estimation.

The Logit propensity-score specification is the following form:

$$p\left(X_{i0} \right) = \Pr\left(Treat_i = 1 \middle| X_{i0} \right) = \exp\left(\alpha + X_{i0}' \gamma \right) \Big/ \left[1 + \exp\left(\alpha + X_{i0}' \gamma \right) \right]$$

$Treat_i$ indicates participation in the "3:4:3" model. X_{i0} is the vector of pretreatment covariates. It includes age, gender, education, agricultural skill certification, household size and other characteristics. Their definitions are given in Table 2. In the Logit specification, α is the intercept and γ contains the covariate coefficients.

3.3.3. Mediation Models

To see clearly through what mechanisms the "3:4:3" model affects employment motivation, the study put three mediating variables into the baseline DID framework one by one. These three mediators are income security, gains from specialization, and enhanced returns to production factors. In the first step, each mediator replaced the outcome variable in the baseline specification, so as to estimate the effect of participation on the corresponding mechanism:

$$M_{(it)} = \alpha_0 + \alpha_1 Treat_i \times Post_{(it)} + \alpha_2 X_{(it)} + \mu_i + \lambda_t + \varepsilon^M_{(it)} \quad (2)$$

The mediator was included in the baseline model to examine its relationship with employment motivation:

$$Active_{(it)} = \beta'_0 + \beta'_1 Treat_i \times Post_{(it)} + \beta'_2 X_{(it)} + \beta_3 M_{(it)} + \mu_i + \lambda_t + \varepsilon^A_{(it)} \quad (3)$$

In Equations (2) and (3), M_{it} stands for income security, gains from specialization, or enhanced returns to production factors, and these three are entered separately one at a time. $Treat_i \times Post_{it}$, X_{it}, μ_i, and λ_t have the same definitions as in the baseline model, namely the participation interaction term, control variables, individual fixed effects, and time fixed effects. The error terms of the two equations are denoted by ε^M and ε^A, respectively.

4. Empirical Results

4.1. Baseline Regression Results

4.1.1. Baseline DID Estimates

Table 4 shows that the double difference (DID) estimated coefficient of the interaction term Treat × Post is 0.186, and it is significantly positive. This means the "3:4:3" model has enhanced the employment enthusiasm of the returnees. And the coefficients of education level, cultivated land area, and policy support are all significantly positive. The coefficient of non-agricultural income proportion is significantly negative.

Table 4. Baseline DID regression results.

Variable	Coefficient	SE	t statistic	*p* value
Treat × Post	0.186***	0.042	4.43	0.000
Age	0.003	0.002	1.50	0.134
Gender	0.025	0.018	1.39	0.165
Edu	0.052***	0.015	3.47	0.001
Skill	0.038*	0.020	1.90	0.058
Family_Size	0.012	0.008	1.50	0.134
Land	0.045***	0.014	3.21	0.001
Nonagri_R	−0.089***	0.025	−3.56	0.000
County_GDP	0.021	0.014	1.50	0.134
Agri_Base	0.068***	0.020	3.40	0.001
Policy	0.075***	0.022	3.41	0.001
Constant	0.215***	0.053	4.06	0.000
Individual fixed effects	Included	-	-	-
Time fixed effects	Included	-	-	-
R^2	0.423	-	-	-
Households	452	-	-	-

Note: ***$p < 0.01$, **$p < 0.05$, and *$p < 0.10$. The same significance notation applies to the following tables.

4.1.2. PSM-DID Estimates Addressing Selection Bias

In the PSM-DID model, the estimated coefficient of the interaction term Treat × Post is 0.168, which remains positive and is statistically significant at the 1% level. This coefficient is slightly lower than the baseline estimate, but the main conclusion remains consistent. After adjusting for selection bias, the estimated results of the matched sample still support the robustness of this positive effect.

4.2. Robustness Checks

We also employed three methods to further verify the robustness of the research results.

(1) Alternative outcome measure. We use the average monthly number of agricultural working days as an alternative to the comprehensive score of employment motivation. The estimated coefficients remained significantly positive.

(2) Placebo test with random group assignment. Keeping the investigation period unchanged, randomly generate virtual processing groups at the actual processing allocation level. The estimated coefficients are not statistically significant.

(3) Alternative sample restriction. Households whose nonfarm income exceeded 50% of total income were excluded. Re-estimating the baseline model produced a significantly positive coefficient.

The robustness checks summarized in Table 5 all supported the main conclusion that the "3:4:3" model increased return migrants' employment motivation.

Table 5. Robustness check results.

Robustness check	Main variable	Coefficient	SE	*p* value	Conclusion
Alternative outcome (agricultural workdays)	Treat × Post	0.172***	0.045	0.000	Robust
Placebo test (random assignment)	Treat × Post	0.021	0.038	0.582	Robust
Subsample (excluding high nonfarm income)	Treat × Post	0.195***	0.048	0.000	Robust
PSM-DID (matched sample)	Treat × Post	0.168***	0.043	0.000	Robust

4.3. Mechanism Analysis

Table 6 presents the analysis results for income security, gains from specialization, and enhanced returns to production factors.

For income security, the coefficient on participation in the "3:4:3" model is 0.213, significant at the 1% level. After income security was included, its coefficient is 0.292, significant at the 1% level. The participation coefficient drops from 0.186 to 0.124, with a reported mediated share of 33.3%. This shows the mediating effect of income security. Income security eases return migrants' worries about economic losses by stabilizing benefit distribution and reducing income fluctuations. And it strengthens their enthusiasm for employment.

As for gains from specialization, the participation coefficient is 0.196, significant at the 1% level. In the joint regression, the coefficient on this mediator is 0.280, also significant at the 1% level. The participation coefficient decreased to

0.131, with a reported mediated share of 29.6%. Specialization among the three parties allowed return migrants to concentrate on field management tasks suited to their capabilities. Specialized machinery and input services reduced labor intensity and improved production efficiency, thereby strengthening willingness to work in agriculture.

For enhanced returns to production factors, the participation coefficient was 0.205, significant at the 1% level. After this mediator was included, its coefficient was 0.276, also significant at the 1% level. The participation coefficient decreased to 0.128, with a reported mediated share of 31.2%. The "3:4:3" model facilitated larger-scale land operations and increased the value generated by land. Return migrants received both remuneration for their labor and returns on their land contributions. These two income sources strengthened employment motivation.

Putting these results together, the "3:4:3" model raises employment motivation through three paths.

Table 6. Mediation analysis results.

Mediating variable	Regression stage	Variable	Coefficient	SE	*p* value	Mediated share
Income security	Baseline regression	Treat × Post	0.186***	0.042	0.000	
	Mediator regression	Treat × Post → Income_Sec	0.213***	0.045	0.000	
	Joint regression	Treat × Post	0.124***	0.038	0.001	
		Income_Sec	0.292***	0.052	0.000	33.3%
Gains from specialization	Baseline regression	Treat × Post	0.186***	0.042	0.000	-
	Mediator regression	Treat × Post → Division	0.196***	0.043	0.000	-
	Joint regression	Treat × Post	0.131***	0.039	0.000	29.6%
		Division	0.280***	0.051	0.000	
Enhanced returns to production factors	Baseline regression	Treat × Post	0.186***	0.042	0.000	-
	Mediator regression	Treat × Post → Factor_Add	0.205***	0.044	0.000	-
	Joint regression	Treat × Post	0.128***	0.038	0.000	31.2%
		Factor_Add	0.276***	0.050	0.000	

4.4. Heterogeneity Analysis

Table 7 reports heterogeneity results from three dimensions, involving the individual characteristics of return migrants and crop types.

First, age. This study divided the respondents into three groups based on age. The young group under 35 years old, the middle-aged group aged 35 to 55, and the elderly group over 55. The coefficient of Treat × Post in the middle-aged group was 0.215, significant at the 1% level. The coefficient for the young group was 0.102, significant at the 5% level. The coefficient for the elderly group was not significant. Most of the middle-aged migrant workers who returned to their hometowns are

the main income providers for their families, and they have a stronger demand for stable income. The income security mechanism plays a more prominent role in this group.

For skill level, respondents were divided into a low-skill group and a high-skill group according to whether they hold agricultural skill certificates. The estimated coefficients for the two groups are 0.198 and 0.113, significant at the 1% and 5% levels, respectively. Low-skill workers can get some compensation from gains from specialization, some of their skill shortcomings are made up for, and the employment threshold is lowered. High-skill workers already have more options, so the incentive effect is relatively weaker.

Finally, crop type. Respondents were divided into grain crop producers and cash crop producers, with estimated coefficients of 0.203 and 0.096, significant at the 1% and 10% levels, respectively. Grain production is more standardized, so the division of labor among the three parties is easier to put into practice and returns are more stable. By contrast, cash crops face greater market fluctuations, so the role that risk sharing can play is limited.

Table 7. Heterogeneity analysis results.

Variable	Age			Skill level		Crop type	
	Younger	Middle-aged	Older	Low skill	High skill	Grain	Cash crops
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Treat × Post	0.102**	0.215***	0.056	0.198***	0.113**	0.203***	0.096*
	(0.048)	(0.051)	(0.045)	(0.046)	(0.049)	(0.044)	(0.051)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Households	28	326	98	297	155	344	108

5. Further Analysis

5.1. Assessing the Return-Sharing Ratio of the "3:4:3" Model

In the "3:4:3" model, machinery service providers earn 40% of the returns, which is higher than that of land contributors and agricultural input suppliers. The study determines the rationality of this distribution by estimating the marginal contributions of the three types of production factors. The results show that the marginal output contribution of machinery services accounts for 42.3%, land accounts for 29.8%, and agricultural inputs account for 27.9%. These numbers are quite close to the 3:4:3 distribution ratio. The results indicate that this ratio roughly reflects the marginal contributions of the factors, and this also provides a basis for the incentive effects of the model.

5.2. The Moderating Effect of Policy Support

Table 8 reports the estimation results of the moderating effect, done by putting in

the interaction between policy support and the main explanatory variable. The coefficient of this interaction term is 0.086, which is significantly positive at the 5% level. This indicates that local policy support has further strengthened the positive impact of the "3:4:3" model. Measures such as seedling subsidies, agricultural machinery subsidies, and technical training can reduce cooperation costs and increase returns, thereby enhancing the incentive effect on returning migrant workers.

Table 8. Regression results for the moderating effect of policy support.

Variable	Coefficient	SE	t statistic	*p* value
Treat × Post	0.162***	0.045	3.60	0.000
Treat × Post × Policy	0.086**	0.036	2.39	0.017
Policy	0.058**	0.024	2.42	0.016
Control variables	Included	-	-	-
Fixed effects	Included	-	-	-
R^2	0.456	-	-	-
Households	452	-	-	-

5.3. Comparison with Conventional Agricultural Service Models

This study compared the land trusteeship model and the "leading enterprise plus farmers" model. In the "3:4:3" model, the estimated coefficient of employment motivation was 0.168, which was higher than 0.092 for the land trusteeship model and 0.076 for enterprise-farmer cooperation. The "3:4:3" model combines factor contributions with benefit sharing. Return migrants can not only participate in agricultural activities but also benefit from them. The other two models distribute the returns more favorably to the enterprises, and their effect on increasing return migrants' employment motivation is relatively weak.

6. Conclusions and Policy Recommendations

6.1. Conclusions

Using survey data from 452 households with return migrants in five provinces, this study applied PSM-DID and mediation models. After conducting an investigation into the impact of the "3:4:3" agricultural service model on the employment motivation of returning migrants, the following conclusions were drawn.

The "3:4:3" agricultural service model has enhanced the motivation for agricultural employment in three aspects. Income security reduces operating risks, gains from specialization improve production efficiency, and higher returns to production factors expand income sources. In terms of group differences, this incentive effect is more prominent among middle-aged workers, low-skill workers, and grain producers. Policy support further strengthens the above positive effect. Compared with conventional agricultural service arrangements, the incentive generated by this model is stronger.

6.2. Policy Recommendations

The following recommendations aim to promote the "3:4:3" model and strengthen return migrants' motivation for rural employment.

6.2.1. Expand the "3:4:3" Model and Improve Cooperation among the Three Parties

Local governments can designate the "3:4:3" model as a priority-supported agricultural social service model and promote it first in major grain-producing areas. The land providers, agricultural machinery service providers, and agricultural input suppliers should sign standardized agreements to clearly define the cooperation content and revenue distribution. The government also needs to establish a platform that connects agricultural machinery cooperatives, agricultural input enterprises, and return migrants to reduce information asymmetry and transaction costs.

6.2.2. Strengthen the Three Mechanisms and Improve Returns for Return Migrants

Establish a minimum-return mechanism. When market fluctuations lead to a decrease in returns, the three parties should negotiate to adjust the distribution ratios, giving priority to ensuring that return migrants receive basic returns. Increase investment in specialized machinery and input services. And enhance the field management capabilities of return migrants by free agricultural skills training. Participants should also be supported in expanding standardized production and increasing the value added of agricultural products. Improvements to land transfer markets can further enhance returns to land.

6.2.3. Tailor Support to Return Migrants' Needs

Support policies can be tilted somewhat toward middle-aged and low-skill return migrants, with more targeted training and subsidies that follow suit. It can lower the threshold for their participation and strengthen the incentive effect of this model for this group. Support in major grain-producing areas still needs to be increased. Farmland protection subsidies and machinery purchase subsidies can give priority to participants in the "3:4:3" model, which is beneficial for stabilizing grain production and raising the profitability of grain farming.

6.2.4. Improve Supporting Institutions and Operating Conditions

Increase fiscal subsidies for participants in the "3:4:3" model. For instance, offer appropriate tax and fee reductions, provide low-interest loans, and reduce operating costs. Combine agricultural insurance with risk reserve funds to address risks such as natural disasters and market fluctuations, and alleviate the risks borne by each party. It is necessary to standardize return distribution, protect the legitimate entitlements of return migrants, and prevent their returns from being misappropriated.

6.3. Limitations and Future Research

The study only covers five major agricultural provinces and has not examined the

impact of this model on long-term employment stability. The selection of pilot villages is influenced by local agricultural conditions and organizational capacity, and the matching method is difficult to completely solve this problem. Nonparticipants will also be indirectly affected through technology diffusion and shared services. The composite index combines subjective intentions with production behavior, so an increase in the index cannot be entirely attributed to an increase in employment intentions. In future research, the sample range can be expanded and longer-term follow-up surveys can be conducted. Additionally, further exploration can be carried out on how this model can be combined with digital agriculture and agricultural branding.

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Author Contributions

The authors contributed to the conception, literature review, analysis, and preparation of the manuscript. The authors reviewed and approved the final version.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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