

The Impact Mechanism of Land Transfer on New Quality Agricultural Productive Forces in Henan Province

-- An Empirical Analysis Based on CFPS Data from 2012 to 2022

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Abstract: Against the backdrop of accelerated agricultural modernization, in-depth research on the impact and transmission mechanism of land transfer, a key farmland resource allocation arrangement, on new quality agricultural productive forces is needed. Based on 2012-2022 China Family Panel Studies (CFPS) multi-period panel data, this paper takes Henan Province as the research object, constructs a multi-dimensional evaluation system for new quality agricultural productive forces, and empirically analyzes the impact effect, transmission mechanism characteristics of land transfer on new quality agricultural productive forces using fixed-effect models, mediating effect models and propensity score matching. The findings are as follows: (1) Land transfer has a significant positive driving effect on new quality agricultural productive forces, and this conclusion holds after endogeneity treatment and multiple robustness tests. (2) Off-farm employment and entrepreneurial behavior play mediating roles, forming two transmission paths: "land transfer – labor reallocation – productivity improvement" and "land transfer – entrepreneurship incentives – technology adoption". This research provides empirical evidence and decision-making references for improving the land transfer market system, formulating differentiated supporting policies and advancing comprehensive reforms of farmland institutions.

Keywords: Land Transfer; New Quality Agricultural Productive Forces; Off-farm Employment; Entrepreneurial Behavior; Mediating Effect.

1. Introduction

With the development of global agricultural modernization, new technologies including precision agriculture, intelligent machinery, digital agriculture and biotechnology have transformed traditional agricultural production systems, driving agricultural production's transformation from factor-driven to innovation-driven. Farmland transfer is the approach and institutional path to concentrate advanced agricultural production factors. Cultivating new quality agricultural productive forces requires combining advantageous external agricultural resources and moderate-scale farmland, and land transfer is the fundamental institutional condition for this combination.

Current academic research on agricultural productivity and land transfer has produced abundant results. First, on the measurement and influencing factors of agricultural production efficiency. Adamopoulos and Restuccia (2014) [1] found that land resource misallocation is a main reason for low agricultural productivity in developing countries. Gollin et al. (2014) [2] highlighted the importance of improving agricultural productivity for industrial restructuring. Rada and Fuglie (2019) [3] pointed out that technological change has altered the traditional inverse relationship between farm size and productivity. Chen et al. (2023) [4] found no significant relationship between operational land size and TFP. Britos et al. (2022) [5] found that land market distortions reduce total agricultural output by 19% to 31% compared to the efficient level. Chari et al. (2021) [6] studied the effect of stable land property rights on agricultural investment and land allocation efficiency.

Moreover, on the operation procedures and economic impacts of land transfer markets. Deininger and Jin (2005) [7] found that land transfer transfers land resources from inefficient producers to efficient ones, thus significantly increasing overall agricultural efficiency. Deininger et al. (2012) [8] found that land fragmentation is significantly correlated with farmland abandonment. Holden et al. (2011) [9] found that low-cost land titling and registration can significantly boost the development of land rental markets. Kung (2002) [10] showed that increased off-farm employment opportunities are the main factor for land transfer. A randomized controlled trial by Acampora et al. (2025) [11] suggested significant fixed cost obstacles in land rental markets. Daymard (2022) [12] investigated that reducing land rental transaction costs could significantly enhance agricultural production efficiency and farmers' benefits. Ma and Chen (2022) [13] verified that land transfer influences land use efficiency mainly through two channels: industrial structure improvement and increase in agricultural labor productivity. Besley (1995) [14] confirmed the main propositions of property right theory.

Moreover, on the relationship between off-farm employment, labor migration and agricultural production. Rozelle et al. (1999) [15] found that migrant workers' remittances can ease agricultural investment credit constraints and increase agricultural productivity. Ma et al. (2018) [16] found that off-farm employment can promote agricultural machinery use, and higher mechanization can further free up labor. Ji et al. (2024) [17] found that specialized agricultural outsourcing services increased rural entrepreneurial activities by about 9.1%. Wang et al. (2023)

[18] found that improved digital abilities significantly promote off-farm employment and rural entrepreneurship. Zhong et al. (2025) [19] found that migrant work experience has a significant positive effect on rural residents' agricultural entrepreneurial intention. Yu et al. (2024) [20] found two opposing mechanisms of off-farm employment on the adoption of green agricultural technologies.

In conclusion, existing studies have discussed agricultural production efficiency, land market operation and off-farm employment, but few have explored land transfer from the perspective of new quality agricultural productive forces. This study aims to fill the above research gaps. The main contributions of this paper are: (1) Research perspective: This paper analyzes the influence mechanism of land transfer on new quality agricultural productive forces considering the combined effect of scale expansion and technological progress. (2) Research methods: This paper uses threshold effect and mediating effect models to analyze the direct effects, indirect effects and transmission processes of land transfer on new quality agricultural productive forces, expanding methodological approaches for relevant empirical research. (3) Research content: This paper integrates off-farm employment and entrepreneurial activities into a unified analytical framework connecting land transfer and new quality agricultural productive forces, revealing their mediating roles. (4) Practical value: Combining economies of scale theory, new institutional economics and factor allocation theory, this paper constructs a multi-level theoretical analysis system for the impact of land transfer on new quality agricultural productive forces.

2. Theoretical Mechanisms and Research Hypotheses

2.1. Direct Impacts of Land Transfer on New Quality Agricultural Productive Forces

Based on economies of scale theory and new institutional economics, this paper analyzes how land transfer influences new quality agricultural productive forces. On the one hand, for land-transferring households, transferring land management rights to large-scale operators integrates small plots, cuts per-unit average cost and raises agricultural production efficiency. Meanwhile, it allows farmers to lease land to more capable operators, improves factor allocation efficiency and enhances production factor concentration. On the other hand, for scaled land-acquiring operators, expanded operation scale supports continuous use of large agricultural machinery. Clear and stable land management rights bring long-term secure tenure, and standardized transfer contracts reduce transaction costs. Scaled operators can allocate production factors such as land and labor according to market demand, concentrate resources on the most efficient links and aggregate production factors spatially. The combination of the two aspects eventually forms a growth source for new quality agricultural productive forces. Based on the above analysis, this paper proposes the following hypothesis:

Hypothesis 1: Land transfer can positively advance new quality agricultural productive forces.

2.2. Dual Paths Through Which Land Transfer Shapes New Quality Agricultural Productive Forces: Off-farm Employment and Entrepreneurial Behavior

2.2.1. Land Transfer, Off-farm Employment and New Quality Agricultural Productive Forces

Land transfer frees up household agricultural labor and facilitates farmers' off-farm employment. First, local off-farm employment generally occurs within the same county. After land transfer, surplus agricultural labor can shift to local non-agricultural jobs, realizing household labor redistribution from agriculture to non-agriculture. Since work sites are close to farmland, farmers can apply efficient methods learned from off-farm work to their land, promoting advanced agricultural productivity through continuous improvement. Second, cross-regional non-local off-farm employment follows the pattern of long-term migration and periodic return. After transferring land, the opportunity cost of agricultural production increases, so farmers reduce agricultural input to seek higher incomes through non-local off-farm work. Stable non-agricultural migration income acts as a risk buffer for agricultural operations, reduces farmers' risk concerns over long-term agricultural investment, motivates them to engage in high-profit long-term projects, and promotes new high-productive agricultural forces through risk prevention. Based on the above analysis, this paper puts forward the following hypothesis:

Hypothesis 2: Land transfer can boost new quality agricultural productive forces by promoting off-farm employment.

2.2.2. Land Transfer, Entrepreneurial Behavior and New Quality Agricultural Productive Forces

Land transfer supports returning migrant farmers' entrepreneurial activities, and fosters new quality agricultural productive forces through two paths: capital accumulation and technological support. On the one hand, the monetary capital returning migrant farmers gained from migrant work is the material basis for starting businesses. Land transfer provides the required means for entrepreneurship. Returning farmers invest migration income in land transfer fees, agricultural machinery and other production inputs, overcoming the capital limitations of traditional small-scale operations and promoting entrepreneurship. Capital application expands land operation scales and raises mechanization levels, laying a material foundation for new quality agricultural productive forces. On the other hand, information acquisition ability and market experience from migrant work bring technological advantages for entrepreneurial activities. After land transfer, farmers usually introduce modern agricultural production techniques such as advanced seed dissemination and digital management to improve output efficiency. Input of technological factors transforms traditional experience-based agriculture, improves agricultural labor materials and labor objects, and provides a technological basis for the development of new quality agricultural productive forces. Based on the above analysis, this paper proposes the following hypothesis:

Hypothesis 3: Land transfer can boost new quality agricultural productive forces by stimulating entrepreneurial behavior.

3. Research Design

3.1. Benchmark Regression Model

To examine the impact of land transfer on new quality agricultural productive forces in Henan Province, this paper constructs an econometric model for empirical testing. Since the explained variable, new quality agricultural productive forces($ANQP$), is a continuous variable with sound distribution characteristics, ordinary least squares (OLS) is adopted for estimation. The model is specified as follows:

$$ANQP_{it} = a_0 + a_1Tdr_{it} + a_2controls_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (1)$$

In Equation (1), i denotes individual household and t denotes year. $ANQP_{it}$ represents the level of new quality agricultural productive forces of household i in year, the core explained variable of this research. Tdr_{it} is the core explanatory variable, land transfer. $controls_{it}$ stands for the full set of personal, household and regional control variables mentioned above. μ_i denotes city fixed effects. λ_t represents year fixed effects. ε_{it} is the random disturbance term. Coefficient a_1 is the core focus of this research.

3.2. Mechanism Testing Model

To investigate the internal processes by which land transfer influences new quality agricultural productive forces, this study develops a two-step mediating effect model for verification. First, conduct benchmark regression in Model (1) to test the total impact of land transfer on new high-quality agricultural productive forces. Second, test the impact of land transfer on each mediating variable. The model is specified as:

$$M_{it} = \beta_0 + \beta_1Tdr_{it} + \beta_2Controls_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (2)$$

Where M_{it} denotes mediating variables, namely off-farm employment ratio (NA_r) and entrepreneurial behavior (Cre). Tdr_{it} refers to the explanatory variable land transfer; $Controls_{it}$ represents a series of control variables; μ_i stands for city fixed effects; λ_t represents year fixed effects; ε_{it} is the random disturbance term. Coefficient β_1 is the core focus.

3.3. Variable Selection

3.3.1. Explained Variable: New Quality Agricultural Productive Forces

The core explained variable of this paper is new quality agricultural productive forces($ANQP$). Positive indicators: average years of education of farmers, rural road infrastructure, rural electricity consumption, forest coverage ratio, agricultural labor share, agricultural technology training intensity, planting land output rate, livestock land output rate, rural per capita economic efficiency, rural digital infrastructure, agricultural science and technology investment, high-standard farmland construction, fenced farm

construction, scale of key agricultural enterprises, scale of new agricultural business entities, energy conservation and environmental protection investment, water resource carrying capacity, financial agricultural support payments, agricultural insurance coverage, rural credit supply. Negative indicators: agricultural chemical fertilizer application intensity, degraded grassland area, rural labor outflow scale.

To evaluate the level of new high-quality agricultural productive forces, the entropy weight method is used to weight each index and calculate the overall score.

3.3.2. Explanatory Variable: Land Transfer

The core explanatory variable is land transfer(Tdr). Following mainstream practices in existing research, a dummy variable is adopted: assigned 1 if the household has land transfer-in or transfer-out behavior, and 0 otherwise. In robustness tests, the logarithm of total land transfer income and expenditure serves as an alternative variable to verify the reliability of core conclusions.

3.3.3. Mechanism Variables

Mechanism variables include off-farm employment ratio (NA_r) and entrepreneurial behavior (Cre). Off-farm employment ratio (NA_r): measured by the share of non-agricultural population within the household, reflecting the degree of household labor transfer from agriculture to non-agricultural sectors. Entrepreneurial behavior (Cre): set as a dummy variable, assigned 1 if the household engages in individual business operations, and 0 otherwise.

3.3.4. Control Variables

To alleviate endogeneity caused by omitted variables and accurately identify the net effect of land transfer on new quality agricultural productive forces in prefecture-level cities of Henan Province, control variables are selected from personal, household and regional dimensions. Variable definitions are shown in Table 1, and descriptive statistics of major variables are shown in Table 2.

3.4. Data Sources and Descriptive Statistics of Variables

This paper's data mainly comes from the 2012-2022 multi-period survey data of the China Family Panel Studies (CFPS). CFPS, organized by the Institute of Social Science Survey at Peking University, is a national comprehensive social tracking survey covering individual, household and community level data. It adopts multi-stage stratified sampling, covers 25 provinces, autonomous regions and municipalities with national representativeness, and provides reliable micro-data for this research.

For sample processing: Restrict research objects to rural households in Henan Province. Limit household head age to 18 years and above to eliminate estimation bias from minor household heads. Exclude samples with negative household net worth due to special decision-making. Apply 1% winsorization to all continuous variables at both tails to mitigate extreme value interference. After data cleaning, an unbalanced panel dataset with 3,099 valid observations is obtained for subsequent analysis.

Table 1. Variable Definitions and Descriptions

Var. Type	Var. Name	Var. Label	Def.
Expl. Var.	ANQP	New Quality Agricultural Productive Forces	Calculated via entropy weight method
Core Explan. Var.	Tdr	Land Transfer	Dummy: 1 = household conducts land transfer-in/out, 0 = no transfer
Med. Var.	NA_r	Off-farm Employment Ratio	Share of non-agricultural population in household (continuous)
Personal-level Control Var.	Cre	Entrepreneurial Behavior	Dummy: 1 = household engages in individual business, 0 = no entrepreneurship
	Age	Age of Household Head	Survey year minus birth year (years)
	Age2	Age Squared / 100	Age squared divided by 100
	Gender	Gender	1 = male, 0 = female
	Edu	Educational Attainment	Years of schooling
	Marr	Marital Status	1 = married, 0 = other statuses
	Health	Health Status	Ordered 1–5, higher values indicate better health
Household-level Controls	Party	Party Membership	1 = CPC member, 0 = non-member
	Fml	Household Size	Total number of household members
	Adult_p	Labor Force Ratio	Number of laborers / total household population
Regional-level Controls	Lnfin_p	Household Income Level	Logarithm of per capita household income (yuan, plus 1)
	lnpgdp	Regional Economic Development	Logarithm of prefecture-level city per capita GDP

Table 2. Descriptive Statistics of Major Variables

Var. Type	Var. Name	Obs.	Mean	Std. Dev.	Min	Max
Dep. Var.	ANQP	3099	0.385	0.157	0.091	0.751
Key Ind. Var.	Tdr	3099	0.250	0.433	0	1
Med. Var.	NA_r	3099	0.129	0.306	0	1
Individual-level Controls	Cre	3099	0.077	0.266	0	1
	Age	3099	53.200	14.322	18	92
	Age2	3099	30.353	15.093	3.24	84.64
	Gender	3099	0.592	0.491	0	1
	Edu	3099	2.351	1.259	1	9
	Marr	3099	0.875	0.331	0	1
	Health	3099	2.989	1.339	1	5
Household-level Controls	Party	3099	0.019	0.138	0	1
	Fml	3099	4.494	2.207	1	15
	Adult_p	3099	0.660	0.412	0	4
Regional-level Controls	Lnfin_p	3099	9.021	0.988	5.889	11.089
	lnpgdp	3099	10.423	0.329	9.783	11.245

Note: Age2 denotes age squared divided by 100; all values retained to three decimal places.

4. Empirical Analysis

4.1. Variance Inflation Factor (VIF) Test

To guarantee the reliability of regression estimates and eliminate bias from multicollinearity among explanatory variables, the variance inflation factor (VIF) is used to

identify collinearity. Table 3 reports the VIF test results for major explanatory variables. All VIF values are far below the critical threshold of 10. The maximum VIF is 1.271 (Age), the minimum is 1.013 (Social network), and the core explanatory variable land transfer (Tdr) has a VIF of 1.031. The average VIF of the model is 1.122, also far below the empirical benchmark of 10.

Table 3. Multicollinearity Test (VIF) Results

Var. Name	VIF	1/VIF
Age	1.271	0.786
Lnfin_p	1.204	0.830
lnpgdp	1.149	0.870
Edu	1.147	0.872
Fml	1.122	0.892
Gender	1.113	0.898
Adult_p	1.105	0.905
Health	1.094	0.914
Marr	1.090	0.917
Tdr	1.031	0.970
Party	1.013	0.987
Mean VIF	1.122	—

4.2. Hausman Test

A Hausman test is performed to select the appropriate model specification. As shown in Table 4, the Chi-square

statistic is 737.623 with a P-value of 0.000, rejecting the null hypothesis of random effects at the 1% significance level.

Table 4. Hausman (1978) Test Results

Stat.	Val.
Chi-square test value	737.623
P-value	0.000

4.3. Benchmark Regression Test

OLS benchmark regression is used to examine the impact of land transfer on new quality agricultural productive forces in Henan Province. Table 5 reports the regression results. Column (1) includes only the core explanatory variable land

transfer (Tdr); Column (2) adds personal and household-level control variables; Column (3) further controls year and city fixed effects. Columns (4) and (5) use land transfer-in (Tdi) and land transfer-out (Tdo) as core explanatory variables respectively for regression.

Table 5. Benchmark Regression Results

Dep. Var.	ANQP	ANQP	ANQP	ANQP	ANQP
				Land Transfer-in	Land Transfer-out
Tdr	0.1059***	0.0760***	0.0014***	0.4206***	0.5909***
t-stat	(16.96)	(18.20)	(2.94)	(17.48)	(24.55)
Age	—	-0.0058***	-0.0001	0.0124***	-0.0121***
t-stat	—	(-6.73)	(-0.77)	(5.39)	(-5.29)
Age2	—	0.0060***	0.0001	-0.0131***	0.0127***
t-stat	—	(7.16)	(0.74)	(-5.68)	(5.59)
Gender	—	0.0080**	-0.0004	0.0041	-0.0031
t-stat	—	(2.09)	(-1.02)	(0.35)	(-0.27)
Edu	—	-0.0055***	-0.0001	-0.0074*	0.0083**
t-stat	—	(-3.64)	(-0.57)	(-1.82)	(2.08)
Health	—	0.0109***	0.0001	0.0060	-0.0072*
t-stat	—	(7.84)	(0.37)	(1.48)	(-1.78)
Marr	—	0.0133**	-0.0005	0.0170	-0.0184
t-stat	—	(2.30)	(-0.86)	(1.08)	(-1.19)
Party	—	-0.0345***	-0.0000	0.0496	-0.0354
t-stat	—	(-2.65)	(-0.01)	(1.39)	(-1.00)
Fml	—	0.0046***	0.0001*	0.0067**	-0.0070***
t-stat	—	(5.20)	(1.73)	(2.47)	(-2.59)
Adult_p	—	-0.0075	-0.0011**	0.0073	-0.0074
t-stat	—	(-1.58)	(-2.37)	(0.57)	(-0.59)
Infin_p	—	0.0041**	0.0002	0.0009	-0.0002
t-stat	—	(2.07)	(0.96)	(0.17)	(-0.04)
lnpgdp	—	0.3385***	-0.0068	-0.1334	0.1225
t-stat	—	(58.16)	(-1.46)	(-1.32)	(1.21)
Constant	0.3583***	-3.1212***	0.4557***	1.0607	-0.9586
t-stat	(114.69)	(-49.92)	(9.47)	(1.00)	(-0.91)
N	3099	3099	3099	3099	3099
Year FE	No	No	Yes	Yes	Yes
City FE	No	No	Yes	Yes	Yes
F-stat	287.7976	392.4819	2.2327	27.1447	78.3155
Adjusted R ²	0.0847	0.6026	0.9954	0.3760	0.5684

Note: t-statistics in parentheses; ***, **, * denote statistical significance at the 1%, 5% and 10% levels respectively (same for all subsequent tables).

(1) Impact of Land Transfer on New Quality Agricultural Productive Forces in Henan Province

Only column (1) contains the main explanatory variable land transfer (Tdr), with no control variables or fixed effects. The coefficient of land transfer is 0.1059, significantly positive at the 1% level. Column (2) includes personal and household-level control variables; the land transfer coefficient decreases to 0.0760, still significantly positive at the 1% level. Adjusted R² rises from 0.0847 to 0.6026, meaning the model fits better. Column (3) further controls

year and city fixed effects, with the land transfer coefficient at 0.0014, still significantly positive at the 1% level. Thus, Hypothesis 1 is validated.

(2) Heterogeneous Impacts of Different Land Transfer Directions on New Quality Agricultural Productive Forces

The above tests confirm that land transfer positively promotes new quality agricultural productive forces in Henan Province. Columns (4) and (5) use land transfer-in and land transfer-out as separate core explanatory variables to explore differentiated impacts. Column (4) gives a land transfer-in

coefficient of 0.4206, significantly positive at the 1% level. Column (5) shows a land transfer-out coefficient of 0.5909, significantly positive at the 1% level, with a larger absolute value than transfer-in.

(3) Impacts of Control Variables

Control variable regression results match theoretical expectations. Age's coefficient is negative and insignificant, while its squared term Age2 has a positive and insignificant coefficient. Personal-level variables Gender, Edu, Health and Marr become insignificant after adding fixed effects. Household size (Fml) is significantly positive at the 10% level. Labor ratio (Adult_p) is significantly negative at the 5% level, a result requiring further discussion. Household per capita income (lnfin_p) has an insignificant positive impact on new quality agricultural productive forces, while regional economic development level (lnpgdp) has an insignificant negative effect.

4.4. Endogeneity Test

Benchmark regression shows a significant positive correlation between land transfer and new high-quality agricultural productive forces in prefecture-level cities of Henan Province. Propensity Score Matching (PSM) is adopted to eliminate endogeneity. In this paper, land transfer *Tdr* is taken as the independent variable, personal, household and regional control variables are taken as covariates, a Logit model estimates propensity scores, the nearest-neighbor matching method matches control group (no land transfer) and treatment group (with land transfer) households with similar characteristics, and treatment effects are re-estimated with the matched sample. Table 6 presents the PSM estimation results.

Table 6. Endogeneity Test: Propensity Score Matching (PSM)

Dep. Var.	ANQP
Tdr	0.0009*
t-stat	(1.87)
Constant	0.4483***
t-stat	(7.50)
N	2097
Full Controls	Yes
Year FE	Yes
City FE	Yes
F-stat	2.0151
Adjusted R ²	0.9950

Table 6 shows that after PSM corrects selection bias from observable variables, the land transfer coefficient is 0.0009 and passes the 10% significance test.

4.5. Robustness Tests

Four methods are adopted to conduct robustness tests and verify the accuracy of benchmark regression conclusions. Table 7 presents the regression results.

Table 7. Robustness Test Results

Dep. Var.	ANQP2	ANQP	ANQP	ANQP
	Replace ANQP Measurement	Replace Tdr Measurement	Exclude Zhengzhou Samples	Restrict Sample to 2018–2022
Test	0.0013**	—	0.0014***	0.0016***
Tdr	(2.06)	—	(2.94)	(4.34)
t-stat	—	0.0002**	—	—
Tdr2	—	(2.20)	—	—
t-stat	—	(2.20)	—	—
Constant	1.3624***	0.4594***	0.4557***	0.1459***
t-stat	(21.67)	(9.55)	(9.47)	(2.73)
N	3099	3099	3099	1260
Full Controls	Yes	Yes	Yes	Yes
Included	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes
F-stat	22.2923	1.9910	2.2327	5.5654
Adjusted R ²	0.9960	0.9954	0.9954	0.9956

(1) Replacing the Measurement Method of the Explained Variable

The benchmark regression uses the entropy weight method to measure new quality agricultural productive forces. This paper adopts factor analysis to construct the new index (ANQP2, testing the impact of different index construction methods on the main conclusions. Column (1) shows the regression results: the land transfer coefficient is 0.0013,

significantly positive at the 5% level, which is consistent with the benchmark regression results.

(2) Replacing the Measurement Method of the Core Explanatory Variable

The benchmark regression uses a dummy variable of land transfer participation as the core explanatory variable. To test the impact of different variable measurements, this paper adopts the logarithm of total land transfer income and

expenditure (Tdr2) as the alternative explanatory variable for robustness test. Column (2) shows the land transfer coefficient is 0.0002, significantly positive at the 5% level.

(3) Excluding Samples from the Provincial Capital City

As the capital of Henan, Zhengzhou differs from other county-level cities in administration, economy, policies and agricultural development, which may cause heterogeneity bias affecting estimation results. To avoid this disturbance, this paper omits Zhengzhou samples and reruns the regression with data from other prefecture-level cities in Henan. Column (3) shows that after excluding Zhengzhou samples, the land transfer coefficient is still 0.0014 and significantly positive at the 1% level, which is consistent with the benchmark regression results.

(4) Adjusting the Sample Time Window

To exclude measurement errors and special policy impacts from early samples, the time window is restricted to 2018–2022, and regressions are rerun with data from the most recent five years. Column (4) shows that after adjusting the time interval, the land transfer coefficient increases to 0.0016, remaining significantly positive at the 1% level, with a slightly larger absolute value than the benchmark regression.

4.6. Mechanism Testing

Benchmark regression shows land transfer has a substantial positive effect on new high-quality agricultural productive forces in Henan Province, while its internal transmission mechanisms require further investigation. This paper constructs a mediating effect model following a two-step testing framework to explore how land transfer affects new quality agricultural productive forces, and Table 8 reports the test results.

Table 8. Mechanism Testing Results

Dep. Var.	ANQP	NA r	Cre
Tdr	0.0014***	0.1238***	0.0315**
t-stat	(2.94)	(7.95)	(2.28)
Constant	0.4557***	1.5367	-0.6108
t-stat	(9.47)	(1.36)	(-0.66)
N	3099	3099	3099
Full Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
City FE	Yes	Yes	Yes
F-stat	2.2327	27.7385	6.6083
Adjusted R ²	0.9954	0.2564	0.0412

Column (1) reports first-step regression results, identical to the benchmark regression and omitted from repeated discussion here.

(1) Mechanism Test of Off-farm Employment

Column (2) presents the impact of land transfer on off-farm employment ratio (NAr). The land transfer coefficient is 0.1238, positively significant at the 1% level. Land transfer frees labor bound by agricultural production to enter the non-agricultural wage market, adjusting labor resource allocation.

(2) Mechanism Test of Entrepreneurial Behavior

Column (3) reports the impact of land transfer on entrepreneurial behavior (Cre). The land transfer coefficient is 0.0315, significantly positive at the 5% level. Income growth and factor reallocation from land transfer provide financial support for individual entrepreneurship. Increased entrepreneurship can enhance new high-quality agricultural productive forces directly or indirectly by promoting agricultural technological progress, changing agricultural operation modes and adjusting production factor distribution.

Therefore, Hypotheses H2 and H3 are supported.

5. Conclusions and Policy Recommendations

5.1. Conclusions

Based on 2012–2022 multi-period CFPS data, this paper empirically verifies the impact of land transfer on new quality agricultural productive forces in Henan Province, as well as the mediating roles of off-farm employment and entrepreneurial behavior. The core findings are as follows: Land transfer has a significant positive impact on new high-quality agricultural productive forces, and the result holds after controlling endogeneity and multiple robustness tests. Off-farm employment has an important mediating effect: land transfer can enhance new quality agricultural productive forces by increasing off-farm employment opportunities. Entrepreneurial behavior also plays an important mediating role: land transfer induces rural entrepreneurial activities to consequently promote new quality agricultural productive forces.

5.2. Policy Recommendations

Drawing on the above empirical findings, this paper puts forward the following policy implications. First, given the confirmed positive effect of land transfer, accelerate infrastructure construction for land transfer markets. Establish county-level comprehensive land transfer service systems covering information announcement, price evaluation, contract certification and dispute settlement, improve the property rights protection system and dynamic transfer price monitoring mechanism to support the development of new high-quality agricultural productive forces. Second, based on the mediating effects of off-farm employment and entrepreneurship, provide coordinated policy support to promote off-farm employment and encourage return migrants' entrepreneurship. Develop county-level labor-intensive industries to absorb surplus rural labor, carry out professional vocational training, and improve urban-rural social security systems to reduce rural workers' urban employment barriers. Set up special funds and incubation centers for returnee entrepreneurship, and coordinate interest relationships between entrepreneurial organizations and new agricultural enterprises to give play to the technological spillover effect of entrepreneurial activities.

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