Article

Can Migrant Workers Returning Home for Entrepreneurship Increase Agricultural Labor Productivity: Evidence from a Quasi-Natural Experiment in China

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Abstract: One of the effective ways to crack the "Three Rural Issues" and promote rural revitalization is to improve agricultural labor productivity (ALP). However, at this stage, improving China's ALP is still facing many obstacles and bottlenecks. Promoting migrant workers returning home for entrepreneurship is an important breakthrough point for solving this problem. This paper regards the pilot policy of migrant workers returning home for entrepreneurship as a quasi-natural experiment and empirically investigates the influence of migrant workers returning home for entrepreneurship on ALP and explores its potential mechanism and heterogeneity using county area panel data from 2011–2019. It found the following: Firstly, the policy of migrant workers returning home for entrepreneurship significantly increases ALP. Secondly, migrant workers returning home for entrepreneurship indirectly leads to a rise in ALP through the promotion of agricultural mechanization production. Thirdly, the heterogeneity test demonstrates that migrant workers returning home for entrepreneurship purposes have a significant influence in enhancing ALP in the eastern areas, plains areas and non-agricultural strong areas. The findings of this paper not only provide an important real-world basis for the government to further support migrant workers returning home for entrepreneurship but also provide useful policy insights for the modernization and development of agriculture and rural areas.

Keywords: returning entrepreneurship; agricultural labor productivity (ALP); rural revitalization; quasi-natural experiment

1. Introduction

With the comprehensive victory of poverty alleviation in 2021, the primary emphasis of China's "Three Rural Issues" initiative has shifted to rural revitalization, and accelerating the development of agricultural modernization is one of the key initiatives for the comprehensive implementation of rural revitalization strategy [1]. The core objective of agricultural modernization is to enhance agricultural productivity, with a particular focus on improving agricultural labor productivity (ALP) [2]. Since the beginning of the 21st century, China's ALP has remained relatively low compared to the productivity levels in the secondary and tertiary industries [3], which is contrary to the expectations of economic theory. Currently, scholars frequently utilize the ratio of the primary sector's contribution to GDP to the ratio of primary sector employment in the overall workforce as a means to measure the comparative level of ALP [4], as shown in Figure 1. Before 1990, the ALP had consistently remained at approximately 0.40 over an extended duration, but the relative ALP has shown a downward trend since 1990. In 2018, China's primary industry added value accounted for 7.04%, the primary industry employed 26.1%, and the relative value dropped to 0.27.

The data presented indicate a growing disparity in labor productivity between China's agriculture sector and its secondary and tertiary industries in recent years. In addition, as depicted in Figure 2, based on the World Bank's World Development Indicators database,

China's ALP in 2019 was USD 5609 per person, which is only slightly higher than the world's average. However, there is still a need to enhance the level of ALP in comparison to other industrialized nations. The main goal of improving ALP is to promote the structural reform of China's agricultural supply side and develop a modernized agriculture system that is uniquely Chinese. Consequently, the enhancement of China's ALP has progressively emerged as a prominent concern in the academic sphere.
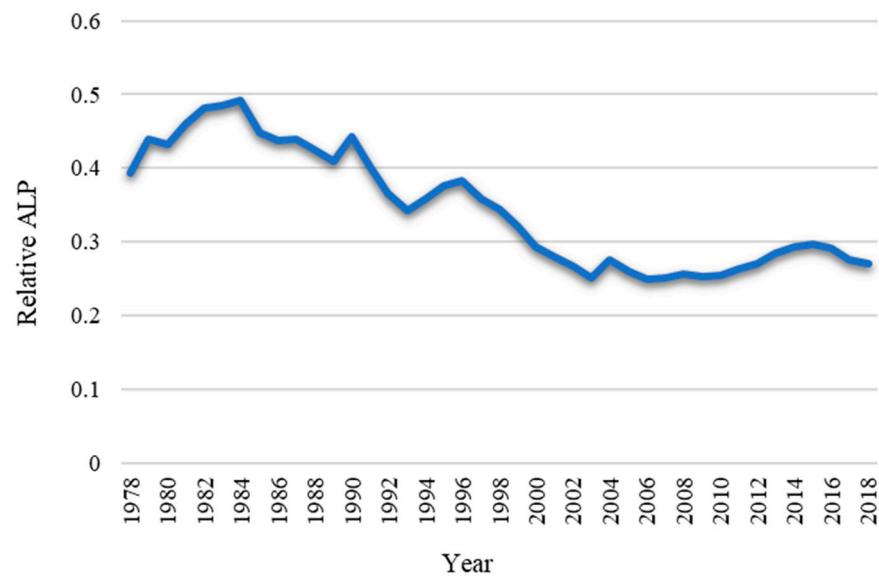

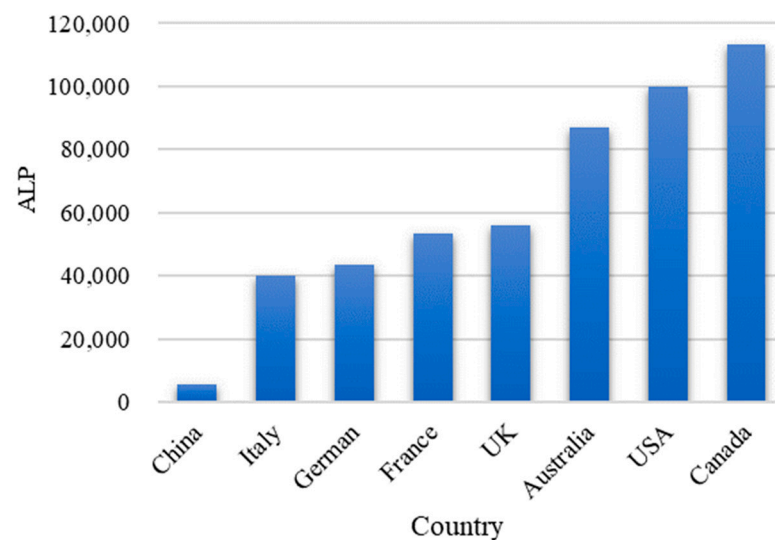**Figure 1.** Relative ALP in China.

Figure 2. ALP in different countries.

Many researchers have tried to explore an effective and fast way to improve ALP from different directions. Contemporary research indicates that ALP is primarily influenced by factors such as capital inputs, technical services and external institutional systems. First of all, from the viewpoint of capital inputs, the increase in ALP can be achieved by augmenting the allocation of human capital and physical capital [5–7]. The allocation of human capital encompasses enhancing the vocational and technical proficiency of farmers and promoting scholars to advance the research and development of agricultural technology [8,9]. In addition, the physical capital includes accelerating the construction of agricultural infrastructure and improving the productive utilization of agricultural machinery [10–12]. Secondly, from the viewpoint of technical services, the supply of resources

such as agricultural machinery socialization services, rural inclusive financial services and non-farm employment services for farm households can enhance the ALP [13–15]. Thirdly, from the viewpoint of external institutional factors, land transfer, industrial agglomeration, a household registration system reform and an industrial integration system can facilitate the migration of excess labor from rural areas, realize the reintegration of production resources and contribute to the expansion of the magnitude of agricultural production, resulting in enhanced agricultural labor efficiency [16–22]. Nevertheless, the aging rural population, slow progress in promoting agricultural technology services, deficiencies in the land system and other practical challenges remain unresolved, thereby hindering the effective improvement of ALP to some extent.

Recently, the effective execution of new urbanization and rural revitalization policies has led to the continual optimization of the urban and rural regional development pattern, which has greatly stimulated the dynamic growth of returning entrepreneurship [23]. Migrant workers returning home for entrepreneurship refers to the act of rural laborers, who have previously worked in different locations, coming back to their registered households in villages and towns to pursue self-employment or non-agricultural jobs, which is an economic phenomenon with distinctive Chinese characteristics [24]. The state has issued a series of policies such as Opinions on Supporting Migrant Workers Returning Home for Entrepreneurship and Opinions on Promoting the High-quality Development of Entrepreneurship in Returning to Their Homes for Entrepreneurship, which greatly mobilized the enthusiasm of migrant workers for entrepreneurship, and the "wave of returning home" is intensifying. According to the statistics of the Ministry of Agriculture and Rural Affairs, before 2023, the cumulative total of various types of entrepreneurial talents returning home had reached 12.2 million people, driving rural employment to more than 34 million people, and the coverage rate of rural innovation and entrepreneurship in the countryside had reached 83.6%. By 2025, all kinds of entrepreneurs returning home are expected to reach more than 15 million nationwide, and more than 1 million rural entrepreneurial leaders will be cultivated.

Talent is the key to rural revitalization. The policy of migrant workers returning home for entrepreneurship helps to realize the coordinated development of urban and rural areas and is a key move in solving the "Three Rural Issues". The first is the agricultural production issue, and the migrant workers returning home for entrepreneurship can bring advanced production technology and management concepts to agriculture. Returning entrepreneurs usually have accumulated a wealth of experience and skills in the city, and they can improve the efficiency and quality of agricultural production by applying these advantages to agricultural production. At the same time, by introducing new agricultural technologies and business models, returning entrepreneurs can promote the transformation of agriculture from traditional mode to modern agriculture and improve the added value and market competitiveness of agriculture. The second is the rural development issue. Migrant workers returning home for entrepreneurship not only bring capital and technology but also market information and sales channels, which help promote the diversification of the rural economy. With the increase in the number of migrant workers returning home for entrepreneurship, the government has also vigorously invested in the improvement of rural roads, water conservancy, electricity and other infrastructure, which has greatly improved the rural infrastructure and public services and raised the production and living conditions in rural areas. The third is farmers' income issues. Migrant workers returning home set up enterprises or self-employment, providing more employment opportunities for local farmers and increasing their sources of income. Returning entrepreneurs usually also have certain skills and knowledge, and their entrepreneurial activities can drive local farmers to learn and master new skills and improve their employability and market competitiveness. Therefore, the policy of migrant workers returning home for entrepreneurship has played a positive role in solving the "Three Rural Issues". By promoting the upgrading of the agricultural industry, boosting rural economic development and increasing farmers' incomes, this policy contributes to the revitalization of the countryside. It has also been shown in

the literature that returning home for entrepreneurship can realize the return of talents, technology and other resources to rural areas, which is now a significant factor driving regional economic growth. It also exerts a beneficial impact on the integration of regional resources, upgrading the industrial structure, promoting the employment of the labor force, raising the income level of rural residents, promoting poverty alleviation in rural areas and realizing common prosperity [25–29]. However, there is presently a scarcity of studies about the correlation between migrant workers returning home for entrepreneurship and ALP, and it is not clear whether ALP will be affected by the relevant policies. Therefore, this research aims to identify an efficient approach to enhance ALP by focusing on migrant workers returning home for entrepreneurship and quantify the impact of migrant workers returning home for entrepreneurship on ALP.

The Circular on the Pilot Work of Supporting the Entrepreneurship of Migrant Workers and Others Returning to Homes in Combination with New Urbanization (NDRC Employment [2015] No. 2811, hereinafter referred to as the "Circular") promotes the development of the pilot work of entrepreneurship of migrant workers returning home, and this policy provides a quasi-natural experiment for this paper. In summary, this paper will empirically investigate the role of the pilot policy of returning-home entrepreneurship on ALP in China based on 2011–2019 Chinese county data using a multi-period double-difference model. This study will help to accurately identify the agricultural economic value provided by returning home for entrepreneurship, in order to provide new ideas for solving the "Three Rural Issues", and to provide empirical insights for the subsequent improvement of the policy of returning home for entrepreneurship.

2. Policy Context and Theoretical Analysis

2.1. Policy Context

Since the establishment of the People's Republic of China, the development of Chinese migrant workers returning home for entrepreneurship can be categorized into four distinct stages.

Stage I: 1992 to 2000. The 1992 Deng Xiaoping Southern Dialogue and the 1997 Fifteenth National Congress of the CPC fundamentally challenged the ideological constraints of China's traditional societal framework. As social reforms in rural areas continued, a significant surplus of rural labor was relocated to metropolitan areas, realizing the liberation of traditional thinking and the accumulation of resource endowments among some peasants. Nevertheless, due to the numerous barriers hindering the employment of migrant workers abroad, several individuals with a strong inclination toward entrepreneurship have opted to return home in order to establish their own enterprises, which began the budding stage of China's entrepreneurship in returning home.

Stage II: 2001 to 2007. The concept of coordinating urban and rural development was initially introduced during the Third Plenary Session of the 16th CPC Central Committee in 2003. This proposal aimed to establish a system that would facilitate the transformation of the dual economic structure of urban and rural areas, as well as the integration of urban and rural economies. Subsequently, governments at various levels have begun to prioritize the vigorous development of county economies and the acceleration of the urbanization process. In 2007, Central Government Document No. 1 put forward the topic of supporting migrant workers returning home for entrepreneurship again, and the stage of China's entrepreneurship in returning home entered into rapid growth.

Stage III: 2008 to 2013. The commencement of the financial crisis in 2008 had a significant influence on China's job landscape, and many export-oriented labor-intensive enterprises were in trouble, with a large number of layoffs and closures, leading to a decrease in urban jobs and difficulties for migrant workers to maintain their lives in towns, which triggered a large-scale "wave" of migrant workers returning home.

Stage IV: 2014 to the present. In 2014 and 2017, the central government proposed the implementation of a new urbanization and rural revitalization policy. Migrant workers returning home for entrepreneurship began to be regarded as an important policy focus, and the national and local governments began to increase policy support for entrepreneurship

in returning home in an all-round manner, which provided new opportunities for the labor force in rural areas to go back to home to start their own businesses. The specific development history is shown in Figure 3.
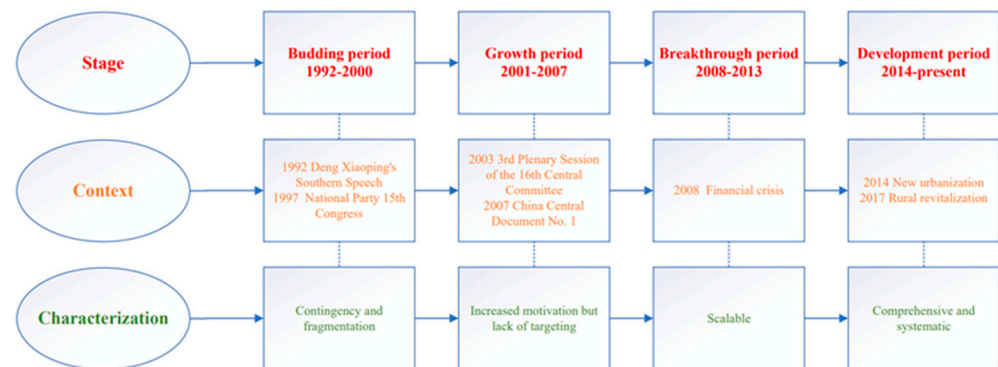

Figure 3. Development history of entrepreneurship of migrant workers returning home.

In October 2015, the National Development and Reform Commission, along with ten other agencies jointly released a circular and identified a total of 341 (90, 116 and 135) pilot counties (cities and districts) for entrepreneurship in rural areas in three batches in February 2016, December 2016 and October 2017 to execute pilot work in support of the migrant workers returning home for entrepreneurship.

As a result of this initial policy, the scope of entrepreneurial activities in China has progressively grown, resulting in a significant decrease in the gap between urban and rural regions and the promotion of comprehensive development in both areas. Specifically, it has facilitated the attraction of migrant workers returning home to engage in agricultural production and the modernization of agriculture and rural areas by means of policy support, the construction of entrepreneurial platforms, the provision of financial service support, the cultivation of entrepreneurial personnel and the development of industrial clusters. The first is policy support, which explicitly proposes to optimize the institutional environment for encouraging migrant workers returning home for entrepreneurship, including the provision of policy support, such as financial subsidies and tax incentives, in order to lower the threshold and cost of migrant workers returning home for entrepreneurship, so as to attract more migrant workers returning home to engage in agricultural production. The second is the construction of entrepreneurial platforms. The policy emphasizes the development of entrepreneurial projects and the construction of entrepreneurial platforms. This means that agriculture-related entrepreneurial opportunities and resources, such as agricultural science and technology parks and farmers' professional cooperatives, will be provided to provide an entrepreneurial arena for people returning to their homes and to promote their agricultural production. The third is financial service support. It is mentioned in the policy that financial support policies should be fully utilized. This includes the establishment of a risk compensation mechanism of government–bank guarantee and government–bank insurance and the provision of loans, guarantees and other financial services to migrant workers returning home for entrepreneurship to solve their capital problems in the process of starting up businesses, thereby encouraging them to engage in agricultural production. The fourth is to cultivate entrepreneurs. The policy proposes to strengthen entrepreneurial training and enhance the entrepreneurial ability and quality of migrant workers returning home for entrepreneurship. This will help migrant workers returning home to master modern agricultural technology and management knowledge and improve their agricultural production capacity so that they can better engage in agricultural production activities. The fifth is industrial cluster development. The policy advocates the in-depth development of characteristic advantageous resources according to local conditions. This will help to promote the clustering of agricultural industries, attract

more migrant workers returning home to participate in the agricultural production chain and promote the upgrading and development of agricultural industries.

2.2. Theoretical Analysis

The Schultz human capital hypothesis posits that enhancing human capital is crucial for the advancement of modern agriculture. Migrant workers returning home for entrepreneurship is beneficial for the reorganization of urban and rural resources, facilitating the movement of various resources, particularly human resources, to rural areas. This is an essential approach to strengthen and expand the achievements of poverty reduction and comprehensively promote the revitalization of rural areas.

The relevant literature points to the development of the mechanization of agricultural production as a major driver of labor productivity [17]. In Transforming Traditional Agriculture, it is emphasized that sustained agricultural development can be significantly promoted through the active introduction of advanced science and technology as well as the promotion of the specialization and socialization of agricultural production [30]. The theory of exogenous progress, on the other hand, asserts that the introduction and promotion of external scientific and technological advances, such as new mechanical technologies, is a key factor in facilitating the transformation of the agricultural production model, thereby realizing an increase in labor productivity. China's agriculture is currently in a critical period of transition. In recent years, the central No. 1 document repeatedly stressed that vigorously developing the mechanization of agricultural production is one of the important goals of China's agricultural progress.

With the emergence of the large-scale "homecoming tide", the return of migrant workers and the return of information, technology and other resources injected new vitality into rural areas [31]. The increase in the proportion of high-quality, high-income labor in rural areas is expected to adjust the original mode of agricultural resource allocation to some extent and promote its transformation to mechanized production. Mechanized agricultural production can not only liberate a large number of rural laborers and reduce the labor intensity of farmers but also make the production process more refined. This approach avoids the waste of resources that may be caused by manual labor and significantly improves the utilization of resources and labor productivity. Therefore, this paper argues that it is important to realize the increase in ALP by upgrading the level of agricultural mechanization through migrant workers returning home for entrepreneurship, a view that coincides with the core view of the theory of exogenous progress.

Consequently, relying on the aforementioned studies, this paper proposes two hypotheses and establishes the theoretical analytical framework seen in Figure 4.
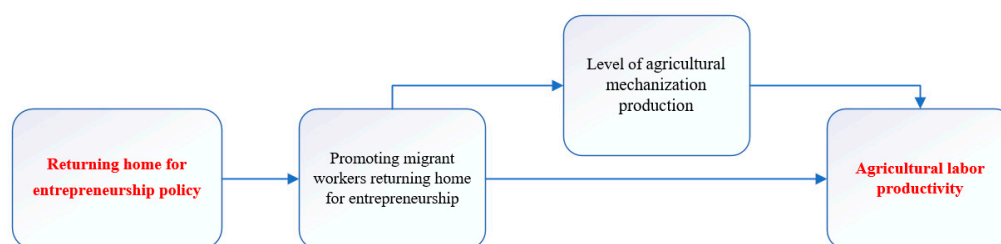

Figure 4. Theoretical framework diagram.

H1: *The pilot policy of migrant workers returning home for entrepreneurship can increase ALP.*

H2: *The pilot policy of migrant workers returning home for entrepreneurship indirectly influences ALP through increasing the level of agricultural mechanization production.*

3. Data and Methods

3.1. Data Source

Benchmark regression sample contains unbalanced panel data of 1803 counties from 2011–2019, totaling 6229 observations. The data are mainly divided into three parts: Firstly, the list of pilot entrepreneurs returning to their homes and the year are sourced from the official website of the National Development and Reform Commission of the People's Republic of China. Secondly, the key explanatory variables, control variables and mechanism variables are from the China County Economic Statistics Yearbook, China Urban Statistics Yearbook, China Rural Statistics Yearbook and the statistical yearbooks of each province. Thirdly, the control variables added in the robustness test: the list of e-commerce in rural-area comprehensive demonstration counties and the corresponding implementation year are from the official website of the Ministry of Commerce; the list of national pilot counties for information on villages and households is from the official website of the Ministry of Agriculture and Rural Development.

3.2. Variable Definition and Descriptive Statistical Analysis

Dependent variable is ALP. It refers to the amount of agricultural goods produced by agricultural laborers within a specific time frame, measured in terms of output value or quantity. Based on the existing studies [19], this variable is defined as the ratio of the value added of the primary sector in the counties to the number of people employed in agriculture, forestry, animal husbandry and fisheries.

Independent variable is a dummy variable of the returning home for entrepreneurship pilot policy. Counties are assigned a value of 1 in the year they are selected as pilot counties and thereafter; otherwise, they are assigned a value of 0.

The mechanism variable is the level of agricultural mechanization production. It is defined as the logarithm of the ratio of the total power of agricultural machinery to the total area sown in agriculture [19].

To mitigate the potential bias in model estimate resulting from omitted variables, this work makes reference to prior research and incorporates control variables [32,33]: sown area, income level, economic level, structure of the primary industry, structure of the secondary industry, government finance, financial level and communication base.

Table 1 displays the definition of main variables and descriptive statistics results.

Table 1. Definition of main variables and descriptive statistics results.

	Variables	Definitions	Mean	Standard Deviation
Dependent Variable	ALP	Ratio of the value added of the primary sector in the counties to the number of people employed in agriculture, forestry, animal husbandry and fisheries	2.67	5.54
Independent Variable	Returning Home for Entrepreneurship Policy	Counties are assigned a value of 1 in the year they are selected as pilot counties and thereafter; otherwise, they are assigned a value of 0	0.03	0.16
Control Variables	Sown Areas	Logarithmic value of total sown areas of crops	3.89	0.86
	Income Level	Logarithmic value of rural residents' per capita disposable income	0.90	0.45
	Economic Level	Logarithmic value of per capita GDP	2.41	4.60
	Primary Industry Structure	Ratio of primary sector value added to GDP	18.96	11.18
	Secondary Industry Structure	Ratio of secondary sector value added to GDP	45.23	15.82
	Government Finance	Logarithmic value of general budget revenue of the local finances	10.86	1.14
	Financial Level	Logarithmic value of the balance of loans from financial institutions at the end of the year	13.13	1.14
	Communication Base	Logarithmic value of the number of fixed-line telephones at the end of the year	10.50	1.08
Mechanism Variable	Agricultural Mechanization Production Level	Logarithm of the ratio of the total power of agricultural machinery to the total area sown of crop	3.46	0.93

3.3. Model Setup

3.3.1. Benchmark Regression Model

This study investigates the influence of the pilot policy of returning home for entrepreneurship on ALP using a quasi-natural experiment. Through the utilization of the multi-period double-difference model, this paper takes the counties chosen as the pilot of returning home for entrepreneurship as the treatment group and the non-chosen areas as the control group. Thus, the dummy variable for pilot counties $treat_i = 1$, and the dummy variable of the non-pilot counties $treat_i = 0$. In addition, this paper needs to construct the time dummy variable $time_t$: 0 before the sample is selected, and 1 after the sample is selected. The setting of the multi-period DID model is as follows:

$$Y_{it} = \alpha_0 + \alpha_1 treat_i time_t + \alpha_2 Z_{it} + \lambda_i + \lambda_t + \varepsilon_{it} \tag{1}$$

In Equation (1), i stands for county, county-level city and municipal district, and t stands for year. λ_i and λ_t stand for the fixed effects of region and year, respectively, ε_{it} stands for the random disturbance term, α_0 is the constant term, and Z_{it} stands for the control variable. Y_{it} stands for the ALP of region i in period t. The cross term $treat_i time_t$ is the core variable of this paper, and its estimated coefficient α_1 reflects the average difference in agricultural productivity between pilot and non-pilot counties before and after the policy shock of migrant workers returning home for entrepreneurship. If $\alpha_1 > 0$, it indicates that the ALP of the pilot counties has increased more substantially compared with that of the non-pilot counties. It can be concluded that the policy of migrant workers returning home for entrepreneurship promotes the increase in ALP.

3.3.2. Mechanism Test Model

According to the theoretical analysis of this paper, migrant workers returning home for entrepreneurship mainly promote the improvement of ALP indirectly through improving the level of agricultural mechanization. In order to verify the mechanism conjecture of this paper, the mediation effect model is constructed in this paper:

$$M_{it} = \beta_0 + \beta_1 treat_i time_t + \beta_2 Z_{it} + \lambda_i + \lambda_t + \varepsilon_{it} \tag{2}$$

$$Y_{it} = \delta_0 + \delta_1 treat_i time_t + \delta_2 Z_{it} + \lambda_i + \lambda_t + \varepsilon_{it} \tag{3}$$

In Formulas (2) and (3), Y_{it} stands for the ALP of region i in period t, M_{it} denotes the value of the mechanism variable in period t in region i, Z_{it} stands for the control variable, β_0 and δ_0 are the constant terms, β_1, β_2, δ_1 and δ_2 are the coefficients to be estimated, λ_i and λ_t stand for the fixed effects of region and year, respectively, and ε_{it} stands for the random disturbance term.

4. Result Analysis

4.1. Baseline Regression Results

Results are in Table 2. Model (1) controls only for year and region-fixed effects, and the effects of the pilot policy of migrant workers returning home for entrepreneurship on ALP are significantly positive without the inclusion of control variables. The outcomes for the fundamental variables remain positive and significant after adding the agricultural resource endowment variable in model (2) and the agricultural external environmental factors variable in model (3). All three regression results indicate that migrant workers returning home for entrepreneurship is conducive to increasing ALP, so H1 can be verified.

Considering the control factors, the coefficient of sown area is notably positive, suggesting that extensive planting is more favorable for the efficient use of agricultural machinery on a wide scale and in batches, leading to enhanced ALP. The positive coefficient of per capita disposable income suggests that an increase in farmers' income can enhance ALP to some degree. One probable explanation is that farmers with higher incomes have greater disposable income, which allows them to have more purchasing power when it

comes to agricultural implements. The coefficient of GDP per capita exhibits a notable positive correlation, indicating that places with higher economic development generally have higher ALP. The coefficients of the primary and secondary industry structure exhibit a notable positive correlation, suggesting that the enhancement of the local agricultural and industrial structure is a driving force behind the increase in ALP. The financial level coefficient exhibits a strong positive correlation, suggesting that the level of local financial development exerts a favorable influence on ALP. Specifically, the ongoing enhancement of the rural financial market fosters the sustainable growth of the rural economy. Additionally, the implementation of various government financial policies enhances the rate of land transfer, thus stimulating an increase in the agricultural labor rate.

Table 2. Results of regression analysis.

Variables	(1) ALP	(2) ALP	(3) ALP
Returning Home for Entrepreneurship Policy	0.244 *** (0.065)	0.193 *** (0.066)	0.218 *** (0.059)
Sown Area		1.135 *** (0.315)	0.829 *** (0.319)
Income Level			1.632 *** (0.328)
Economic Level			0.030 ** (0.012)
Primary Industry Structure			0.090 *** (0.006)
Secondary Industry Structure			0.029 *** (0.004)
Government Finance			−0.005 (0.040)
Financial Level			0.219 ** (0.117)
Communication Fundamentals			−0.031 (0.022)
_cons	2.661 *** (0.012)	−1.754 (1.232)	−7.621 *** (2.833)
Year	Yes	Yes	Yes
Area	Yes	Yes	Yes
R^2	0.979	0.971	0.981
Observations	6229	6229	6229

Note: ** $p < 0.05$, *** $p < 0.01$. Robust standard errors in parentheses.

4.2. Mechanism Test

This paper utilizes the level of agricultural mechanization production as a mechanism variable. The empirical findings are presented in Table 3. Models (4) and (5) are the regression results after bringing the mechanism variables into the model. The coefficients in regressions exhibit a statistically significant positive trend, which suggests that the policy of pilot counties for returning home for entrepreneurship can enhance ALP by improving regional agricultural mechanization. H2 can be verified.

Table 3. Mechanism test results.

Variables	(4) Mechanization of Agriculture	(5) ALP
Returning Home for Entrepreneurship Policy	0.114 *** (0.025)	0.199 *** (0.057)
Mechanization of Agriculture		0.169 *** (0.063)
Control	Yes	Yes
Year	Yes	Yes
Area	Yes	Yes
R^2	0.973	0.981
Observations	6229	6229

Note: *** $p < 0.01$. Robust standard errors in parentheses.

4.3. Robustness Tests

4.3.1. Parallel Trend Test

This paper uses a multi-period double-difference model to identify the impact of the pilot policy of migrant workers returning home for entrepreneurship on ALP. The parallel trend assumption is a necessary condition for accurately determining the influence of a policy. It helps address the issue of endogeneity caused by both observable and unobservable elements, ensuring the reliability and strength of the identification results.

The model that was approximated is presented below:

$$Y_{rt} = \gamma_0 + \gamma_1 \sum_{k=1}^{K} treat_i \times event_{t-k} + \gamma_2 \sum_{m=0}^{M} treat_i \times event_{t+m} + \gamma_3 Z_{it} + \lambda_i + \lambda_t + \varepsilon_{it} \quad (4)$$

In Equation (4), Y_{it} represents ALP. $treat_i \times event_{t-k}$ denotes the antecedent term in the kth ($k = 1, \ldots, K$) period of policy implementation in the pilot county, and $treat_i \times event_{t+m}$ denotes the consequent term in the mth ($m = 1, \ldots, M$) period of policy implementation in the pilot county. If the coefficient γ_1 corresponding to the antecedent term is not significant, and the coefficient γ_2 corresponding to the posterior term is significant, then it indicates that the parallel trend hypothesis is satisfied, and the policy of returning to the home village to start a business has an effect on the agricultural labor rate. γ_0 is the intercept term, and the other variables conform to Equation (1).

Figure 5 displays the outcome of the parallel trend test estimation, with the horizontal coordinate indicating the periods before and after the policy pilot and the vertical coordinate indicating the estimated coefficient of kernel density. Dashed lines indicate confidence intervals. The analysis reveals that the estimated coefficients lack significance during the policy pilot year (2016) and the initial 5 years of implementation. There is no significant difference between the control group and the treatment group before the pilot, therefore verifying the validity of the parallel trend hypothesis. Following the introduction of the pilot policy to encourage the migrant workers returning home for entrepreneurship, the ALP of the treatment group surpasses that of the control group in the first, second and third years. Furthermore, the policy's impact on ALP steadily improves with each passing year after its implementation.
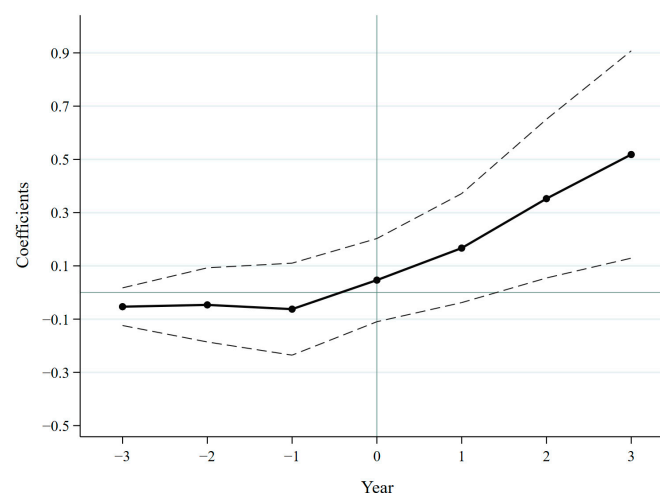

Figure 5. Parallel trend test.

4.3.2. Placebo Test

This paper pertains to the practice of previous scholars to utilize the method of randomly generating the time and area of the pilot policy of returning home for entrepreneurship as a placebo test. The model that was approximated is presented below:

$$\hat{\partial} = \partial + \tau \frac{cov(treat_i time_t, \varepsilon_{it}|W)}{var(treat_i time_t|W)} \tag{5}$$

In Equation (5), ∂ is the unbiased estimator of the return-to-business policy, τ is the correlation coefficient, *cov* denotes the covariance, *var* denotes the variance, and *W* represents all other control variables and fixed effects. Using the condition that the time and region of the randomly generated policy have no effect on the explanatory variables, it can be concluded that if the estimator $\hat{\partial}$ is equal to 0 under the randomized policy, then τ is equal to 0, which means the estimation bias is 0. This suggests that the pilot strategy of returning home for entrepreneurship had a substantial positive impact on ALP in the benchmark regression of this article.

This paper covers a total of 256 pilot counties published on the NDRC website from 2011 to 2019, so a total of 256 counties, randomly selected from a pool of 1804 counties, are used to construct policy grouping dummy variables and policy time dummy variables by matching them with the original data. On this basis, we utilize the estimation method of model 4 to test the real effect of the pilot policy of migrant workers returning home for entrepreneurship by cycling this random process 500 times. In this paper, the estimation results are shown in Figure 6, in which the dummy estimates are far away from the real estimates (vertical dashed line). The p value is also far away from the significant interval. It shows that the pilot policy of returning home for entrepreneurship does have a significant role in promoting ALP.
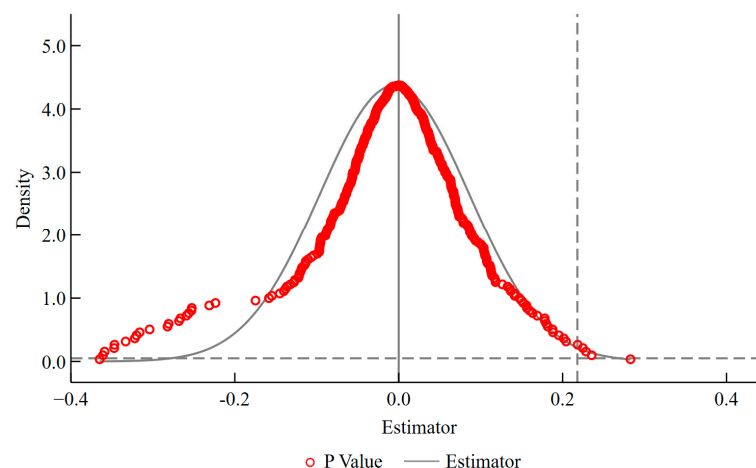

Figure 6. Placebo test.

4.3.3. Other Robustness Tests

Firstly, using the PSM-DID methodology for re-estimation. The sample may suffer from a self-selection problem, which leads to a bias in the estimation results, which means that counties with more resource endowments are more likely to be selected for the pilot. Hence, this study recalculates the sample employing the Propensity Score Matching DID approach to examine the resilience of the policy's impact on ALP. Specifically, drawing on the Logit model's great likelihood approach, eight dimensions (sown area, income level, economic level, primary industry structure, secondary industry structure, government finance, financial level and communication base) are used as screening criteria to derive a propensity score, which is subsequently compared using the nearest-neighbor matching method. This paper reassesses the impact of the pilot policy of returning home for entrepreneurship on ALP by eliminating the matching results that contradict the common support hypothesis. The precise results are displayed in model (6).

Secondly, shortening the sample time. Since the pilot policy of migrant workers returning home for entrepreneurship has only been implemented mainly since 2016, considering

the large time span of the pre-policy sample, we employ the 2013–2019 dataset to recalibrate the findings, which are displayed in model (7).

Thirdly, excluding the interference of other policies. Previous research has demonstrated that the implementation of policies such as the dissemination of information to households in villages and the introduction of e-commerce in rural areas have, to some extent, enhanced farmers' information accessibility and streamlined the integration of agricultural machinery services. Consequently, ALP has significantly increased. However, it is important to consider the potential influence of other related policies implemented during the same period that may introduce bias in the estimation results. Therefore, this paper adds two dummy variables of information entry policy and e-commerce policy, and the results are displayed in model (8).

The above robustness test results all demonstrate that the pilot policy of returning home for entrepreneurship continues to have a significant positive effect on the growth of ALP (Table 4).

Table 4. Robustness tests.

Variables	(6) PSM-DID	(7) Reduced Sample Time	(8) Excluding Contemporaneous Policy Interference
Returning Home for	0.207 ***	0.211 ***	0.177 ***
Entrepreneurship Policy	(0.058)	(0.047)	(0.805)
Control	Yes	Yes	Yes
Area	Yes	Yes	Yes
Year	Yes	Yes	Yes
R^2	0.986	0.992	0.981
Observations	3109		6229

Note: *** $p < 0.01$. Robust standard errors in parentheses.

4.4. Heterogeneity Analysis

4.4.1. Regional Differences

China possesses an extensive land area, and there exists a notable disparity in regional progress. According to current research, China can be divided into three areas depending on their economic development levels: east, central and west. Given the small disparity in economic development between the central and western regions, this study examines the varying effects of returning home for entrepreneurship in the east, as well as the central and western regions, on ALP. Results are shown in Table 5, models (9) and (10) reveal that the eastern region exhibits a significantly positive effect, while the central and western regions are non-significantly negative. It indicates that there is a significant regional difference in the promotion of the policy of returning home for entrepreneurship on ALP.

Table 5. Heterogeneity analysis.

Variables	(9) Regional Differences East	(10) Regional Differences Midwest	(11) Topographic Differences Plains	(12) Topographic Differences Hills and Mountains	(13) Agricultural Resource Differences Agricultural Strong	(14) Agricultural Resource Differences Non-Agricultural Strong
Returning Home for	0.451 ***	−0.053	0.456 ***	−0.102	−0.009	0.403 ***
Entrepreneurship Policy	(0.098)	(0.079)	(0.098)	(0.070)	(0.090)	(0.084)
Control	Yes	Yes	Yes	Yes	Yes	Yes
Area	Yes	Yes	Yes	Yes	Yes	Yes
Time	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.966	0.982	0.978	0.982	0.982	0.982
Observations	2565	3664	3640	2588	2588	3695

Note: *** $p < 0.01$. Robust standard errors in parentheses.

Firstly, the difference in economic fundamentals. Eastern regions are better developed economically and usually have better infrastructure, richer resources and broader markets, which provide more opportunities and a better environment for returning entrepreneurs. As a result, the policy of migrant workers returning home for entrepreneurship may be more likely to produce significant effects in these regions and promote the improvement of ALP. In contrast, economic development in the central and western regions is relatively lagging behind, and infrastructure, resources and market conditions may be less mature than in the eastern regions. This may lead to a relatively limited effect of the implementation of the policy of migrant workers returning home for entrepreneurship in these regions and a less obvious effect on the enhancement of ALP.

Secondly, capital and technology inputs. In the eastern region, due to a more developed economy, returning entrepreneurs may have easier access to capital and technical support, which may enable them to introduce more advanced agricultural equipment and technology and significantly improve ALP. In the central and western regions, capital and technology may be relatively scarce, limiting the input of migrant workers returning home for entrepreneurship to agricultural production and thus affecting the policy's effect on ALP.

Thirdly, the attraction of talents. Eastern regions are usually better able to attract and retain high-quality talents due to their higher level of economic development and quality of life. These talents can play an important role in the process of returning home for entrepreneurship, promoting the innovation of agricultural production methods and the improvement of production efficiency. The central and western regions may have relatively weak talent attraction due to the limitations of economic conditions and the living environment, thus affecting the promotion of ALP by the policy of migrant workers returning home for entrepreneurship.

Finally, market demand and industry chain development. The eastern region has a more robust market demand and a more complete industry chain, which provides more market opportunities and value-added space for returning entrepreneurs. In such an environment, the policy of returning to the hometown to start a business is more likely to promote a significant increase in ALP. In the central and western regions, the market demand may be relatively small, and the development of the industrial chain may also be relatively lagging behind, thus limiting the role of the policy of migrant workers returning home for entrepreneurship on the enhancement of ALP. It is worth noting that the statistics of Taobao villages in recent years also reflect this imbalance in geographical development, with the proportion of Taobao villages in the eastern region as high as 92.8%, while the proportion in the central and western regions is very small. This difference further reflects the advantages of the eastern region in terms of capital, technology, talent and market demand, which in turn has a more significant effect on the promotion of ALP.

4.4.2. Topographic Differences

It has been shown that differences in topographic conditions can lead to differences in agricultural development regions [34]. Plain agriculture represented by Northeast and North China and hilly and mountainous agriculture represented by Southwest China are the two extreme manifestations of agricultural production development. The differences in the level of agricultural mechanization caused by different terrains are undoubtedly a major challenge for China to achieve agricultural modernization. This study utilizes elevation data to categorize the topography. The sample is subsequently partitioned into two discrete categories of locations, namely plains and hilly and mountainous regions, for the purpose of conducting a heterogeneity test. The estimation results in Table 5 of models (11) and (12) reveal that ALP in the plains is much greater than in hilly and mountainous regions. The intricate topographical features in hilly and mountainous regions pose additional challenges and limitations to the functioning of agricultural machinery. Therefore, this makes the implementation of the pilot policy of returning home for entrepreneurship more favorable for improving ALP in plains.

4.4.3. Agricultural Resource Differences

The degree of superiority or inferiority of local agricultural resource endowment will, to a limited degree, affect the decision of whether migrant workers return home for entrepreneurship. This paper categorizes county regions by analyzing the ratio of the primary industry's contribution to the regional GDP, drawing on the methods employed by previous scholars. Counties with a proportion of less than 15% are labeled as non-agricultural strong counties, while counties with a proportion greater than 15% are labeled as agricultural strong counties [19]. The precise estimation results are displayed in models (13) and (14) within Table 5. From the findings, it is evident that the pilot program has a more pronounced impact on the enhancement of ALP in non-agricultural strong counties. The possible reason is that compared with the strong agricultural counties, the non-agricultural counties have more room for improvement, and the effect of the pilot policy to drive the local agricultural production labor rate is more obvious.

5. Discussions

Increasing ALP can solve the "three rural" problems and promote rural revitalization. Continuously promoting the policy of migrant workers returning home for entrepreneurship has become an effective tool for increasing ALP. Currently, the existing research on the relationship between migrant workers returning home for entrepreneurship and ALP is relatively small, and whether ALP will be affected by related policies is unclear and has not yet been fully explored.

This paper finds that the migrant workers returning home for entrepreneurship has a positive impact on increasing ALP, which is consistent with H1 and the existing research [35]. This paper proposes H2 to illustrate the mechanism of the impact of migrant workers returning home for entrepreneurship on ALP. Consistent with most studies [19,27,36], the study shows that migrant workers returning home for entrepreneurship can indirectly affect ALP by improving the level of agricultural mechanization production. In addition, it investigates the effects of differences in terrain, region and the level of agricultural foundation on ALP, and the conclusions are consistent with existing studies [33,34,37]. This paper not only remedies some of the shortcomings of previous studies by assessing the effectiveness of the implementation of the policy of migrant workers returning home for entrepreneurship but also prompts the government to be aware of the importance of solving the problem of employment of surplus rural labor in order to increase ALP and to ensure the effective implementation of the strategy of the revitalization of the countryside in China.

However, this study is also limited in some aspects. On the one hand, there are limitations in the measurement of ALP due to the availability of data at the county level, and at the same time, microdata at the farm household and family level are not available in the county statistical yearbooks, such as the proportion of agricultural labor force in the family, gender, age and education, etc., while the labor force plays a relatively more important role in agricultural production, and the changes in the proportion of labor force and the number of labor forces directly affect the increase or decrease in ALP. Therefore, in the search for micro-databases, combining macro-level statistical yearbook data with micro-level farm household research data, adjusting the ALP measure, and adding farm household level, family level and even production and operation level variables to the control variables for further analysis may be more accurate and complete. On the other hand, due to the heterogeneity of China's rural areas, where farmers use land and agricultural production in different ways, treating all regions as a unified whole may affect the results of the study. Unfortunately, data limitations prevented the above problems from being corrected. In the future, this paper will look for more detailed and comprehensive data and methods to remedy the above shortcomings, thus providing richer data for the research results.

6. Conclusions and Policy Recommendations

Based on China's pilot policy on returning home for entrepreneurship, this paper empirically tests the impact of returning home for entrepreneurship on ALP using quasi-natural experiments with county panel data from 2011–2019 and explores its potential mechanisms and heterogeneity. The results show the following: Firstly, the policy of migrant workers returning home for entrepreneurship promotes the "wave of returning home", dilutes the decline of the "hollowing out" of the countryside and significantly improves the ALP. Secondly, through further mechanism analysis, it was shown that encouraging the advancement of mechanization production can lead to an increase in ALP among returning entrepreneurs. Thirdly, the heterogeneity test shows that the effect of migrant workers returning home for entrepreneurship on ALP depends to a certain extent on the local economic level, natural conditions and the basis of agricultural development, specifically, counties located in the east and the plains and the agricultural basis of the existence of a larger space for improvement by the policy to promote the role of the larger area.

To better utilize the positive impact of returning home for entrepreneurship on agricultural development in county areas and provide empirical evidence for the digital village strategy, this paper presents the subsequent policy insights derived from the analytical findings.

First, returning home for entrepreneurship is a "New Engine" for rural revitalization, which plays a crucial role in enhancing ALP and achieving the high-quality advancement of agriculture. The government should strengthen the support and publicity of the pilot policy of migrant workers returning home for entrepreneurship, improve the service mechanism and guarantee system of migrant workers returning home for entrepreneurship, strengthen the construction of the carrier of migrant workers returning home for entrepreneurship, consolidate the industrial foundation of returning home to get employment, strengthen the vocational skill training of migrant workers returning home for entrepreneurship and strengthen the organizational guarantee of migrant workers returning home for entrepreneurship. At the same time, the level of mechanized agricultural production should be strengthened.

Second, with regard to the regional differences that exist in various regions of China, the government should prioritize and allocate sufficient resources to address the disparities in development levels and available resources and implement policies according to local conditions and classifications, rather than "one size fits all", giving priority to supporting the eastern regions, plain regions and non-agricultural strong counties, while also basing itself on the resource endowments of the central and western regions, hilly and mountainous areas and agricultural strong counties, and give guidance through the policy to further support migrant workers returning home for entrepreneurship, so as to improve ALP. The aforementioned recommendations will effectively leverage the policy of entrepreneurship in rural regions, facilitate the advancement of agricultural modernization, strengthen and broaden the outcomes of poverty alleviation and foster the revival of rural areas.

Third, for other countries with low rural living standards and ALP, it is necessary to gain an in-depth understanding of the actual situation of the target countries in terms of rural living standards, ALP, employment conditions, policy environment, etc., before drawing on and promoting the policy. Then, a targeted policy program should be formulated based on the actual situation of the target country and draw on the policy concepts, such as the provision of funds for entrepreneurial support, tax relief and simplification of the approval process. After formulating the policy program, it is necessary to strengthen the publicity and promotion of the policy. Various channels, such as government promotion, media reports, social networks, etc., can be used to publicize the policy content and preferential policies to migrant workers in the target countries, so as to attract them to return home for entrepreneurship. In addition, some entrepreneurship training and exchange activities can be organized to provide entrepreneurship guidance and consulting services to help them better understand the policy and entrepreneurial environment. Finally, a policy evaluation

and feedback machine have to be established in the process of policy promotion. The effect of policy implementation should be regularly evaluated, problems should be identified, and adjustments should be made in time. At the same time, an information platform for migrant workers returning home for entrepreneurship can be established to collect feedback and suggestions and continuously improve and optimize the policy.

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