Research on the Mechanism of High-Quality Development of Urban-Rural Integration under the Perspective of Entrepreneurship in Agriculture, Rural Areas and Farmers Areas and Farmers

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Article

Research on the Mechanism of High-Quality Development of Urban-Rural Integration under the Perspective of Entrepreneurship in Agriculture, Rural Areas and Farmers Areas and Farmers

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Abstract: The high-quality development of urban-rural integration is a vital component of China's economy, serving as a strategic response to the in-depth deployment of new urbanization and rural revitalization strategies. This integration is underscored by the promotion of entrepreneurship in agriculture, rural areas, and among farmers, which acts as a driver for fostering high-quality development in urban-rural areas through market competition. The resulting influx of resources and commodities with similar characteristics plays a crucial role in bridging the urban-rural divide. To maintain objectivity, it is important to adopt a balanced approach and refrain from using biased language. This study delves into the connotation and internal mechanism of the high-quality development of urban-rural integration, centering on the principle of 'quality'. Specifically, it examines the role of entrepreneurship in agriculture, rural areas, and among farmers, and evaluates its direct impact and transmission mechanism. The research employs balanced panel data from 41 cities in the Yangtze River Delta region spanning from 2003 to 2021. The findings reveal that entrepreneurship in agriculture, rural areas, and among farmers serves as a catalyst for promoting high-quality urban-rural development through the construction of a virtuous cycle, whereby resource factors and commodity services are exchanged. Moreover, this deep integration yields diverse effects across economic, spatial, demographic, social, and ecological domains, underscoring the necessity of continued support for entrepreneurship in agriculture, rural areas, and among farmers to facilitate a seamless urban-rural economic cycle and fully realize the benefits of high-quality development.

Keywords: entrepreneurship in agriculture, rural areas and farmers; urban-rural integration and high-quality development; urban-rural economic cycle

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1. Introduction

In the report of the 20th Party Congress, General Secretary Xi Jinping unequivocally emphasized the urgency of fast-tracking the establishment of a new development model that places emphasis on driving high-quality development. In tandem with this, it is essential to comprehensively advance rural revitalization, foster coordinated regional development, and steadfastly pursue the integrated development of urban and rural areas. This call to action not only echoes a topic that garners

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widespread interest within academic research and social practice but also has a direct bearing on national governance. In the larger context of China's economic evolution, the integrated development of urban and rural areas assumes critical significance in attaining high-quality economic growth. It is through this trajectory that China's economy can undergo robust and swift development, offering a holistic perspective on sustainable advancement.

Although China has made progress in integrating urban-rural relations, there is still a significant income disparity between urban and rural residents. According to the National Bureau of Statistics, the per capita disposable income of urban residents in 2022 is projected to be 49,283 yuan, with per capita consumption expenditure at 30,391 yuan. In contrast, the per capita disposable income of rural residents is expected to be only 20,000 yuan. The per capita consumption expenditure in rural areas is only 16,632 yuan, while 133 yuan is spent on average. This highlights the significant imbalance and inadequacy in the urban-rural consumption gap, income gap, and social development gap [0].These phenomena reflect the structural imbalance and insufficient power that exist in China's economic development[Error! Reference source not found.]. Domestic and foreign theories and practices have shown that entrepreneurial activities in rural areas play an important role in promoting the transformation of economic structure and the transition from old to new forms of energy [Error! Reference source not found.][Error! Reference source not found.].These activities have innate advantages, such as expanding employment and improving people's livelihoods [Error! Reference source not found.], which can effectively address the development problems faced by rural areas, such as insufficient endogenous power. They also strengthen economic exchanges and collaboration between urban and rural areas, make up for the shortcomings of the rural market, and promote integration and win-win development between urban and rural areas. At the macro level, entrepreneurship in agriculture, rural areas and farmers promotes the integration of rural industries, facilitates the development of modernized agriculture to undertake the transfer of urban industries, and provides an objective basis for adjusting industrial layout and factor flow [Error! Reference source not found.].At the macro level, entrepreneurship in agriculture, rural areas and farmers promotes the integration of rural industries, facilitates the development of modernized agriculture to undertake the transfer of urban industries, and provides an objective basis for adjusting industrial layout and factor flow [Error! Reference source not found.][Error! Reference source not found.]. Even though existing research has made significant advancements in understanding the theoretical underpinnings and practical pathways of urban-rural integration and development, as well as acknowledging the positive impact of agricultural entrepreneurship on rural areas and farmers in this process, there remain notable deficiencies that warrant a more comprehensive examination and reflection. First, previous studies have primarily focused on the singular impact of agricultural entrepreneurship on urban-rural integration, neglecting the multi-dimensional effects and failing to provide a systematic and comprehensive research framework. Second, there is inadequate depth in integrating agricultural entrepreneurship with urban-rural integration in existing studies; considering agricultural entrepreneurship as a distinct perspective could elucidate the micro-mechanisms of urban-rural integration more effectively and assess its logical dynamics more accurately. Third, prior research emphasizes the role of agricultural entrepreneurship in driving the flow of common factors and commodities for urban-rural integration, but overlooks its important role in the flow of innovative and entrepreneurial factors, and upgraded consumer goods to meet the qualitative demand of high-quality development.

Therefore, it is crucial to contemplate how to grasp the scientific essence of urban-rural integration and high-quality development in the context of a new phase of urban-rural relations. Exploring the intrinsic mechanism of agricultural entrepreneurship in establishing a new model of urban-rural integrated development and promoting high-quality urban-rural integration development is imperative. Furthermore, it is essential to investigate the diverse mechanisms through which agricultural entrepreneurship affects deep integration across economic, spatial, demographic, social, and ecological aspects. Moreover, within the context of the comprehensive deployment of rural revitalization strategy, the focus should be on how to leverage agricultural entrepreneurship as a pivot to propel urban-rural integration and high-quality development. This paper aims to objectively and accurately analyze and evaluate the impact of agricultural

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entrepreneurship on the high-quality development of urban-rural integration, with the objective of identifying novel approaches to promote high-quality urban-rural integration through agricultural entrepreneurship in the current landscape marked by a growing trend of entrepreneurial activities returning to rural areas.

2. Conceptual analysis

Entrepreneurship in agriculture, rural areas and farmers is essentially a process of innovative allocation of urban and rural factor resources and goods and services to achieve a dynamic balance between production and consumption, and this innovative process is inherently characterized by qualitative changes in high-quality development. As Joseph A. Schumpeter[Error! Reference source not found.] pointed out that entrepreneurial activity is "creative destruction", three rural entrepreneurship will also continue to destroy the old structure, and constantly create a new structure, through the new factors, new commodities, new technologies, new sources of supply, new forms of combinations and other aspects of competition, change and replace the previous state of equilibrium. Therefore, from the point of view of the general characteristics of entrepreneurship, entrepreneurship in agriculture, rural areas and farmers is an economic activity in which three-peasant entrepreneurial subjects grasp the business opportunities brought about by the transient imbalance between demand and supply, and link up all kinds of development subjects, maximize the endogenous power of market subjects, stimulate the new kinetic energy of economic development, and take the market competition as the mechanism to communicate with the factor and commodity markets in urban and rural areas to form the mutual transmission and interaction of factors, resources, commodities, and services. The market competition is the mechanism that connects the factor markets and commodity markets in urban and rural areas, resulting in mutual transmission and interaction of factors, resources, commodities and services. However, based on the complexity of China's rural social system and the practical dilemma of China's "three rural" problem, we refer to Zhang Yuli and Feng Xiao (2019)[Error! Reference source not found.] and Zhuang Jinzai et al. (2023)[Error! Reference source not found.] to reveal the theoretical problems behind the phenomenon of entrepreneurship in China's rural areas in terms of entrepreneurial subject characteristics, environmental characteristics, industrial characteristics, and other multi-dimensional aspects. Entrepreneurship in agriculture, rural areas and farmers is defined as the economic activity of a new enterprise or a new business started in the space of rural environment.

Macro sense of urban-rural integration of high-quality development is in the context of the new normal China's economic development has entered a high-quality development transition stage with "slowing down the growth rate, structural optimization, power transformation" as the basic characteristics, in line with the new urbanization and rural revitalization strategy under the in-depth deployment of the urban-rural integration of the development of a higher level, and from the point of view of the three rural entrepreneurship The high-quality development of urban-rural integration is characterized by the following four realities. First, the high-quality development of urban-rural integration is industrial integration (the extension of industrial chain to the countryside) centered on innovative and entrepreneurial talents. Specifically, urban-rural integration requires all kinds of talents to flow to rural areas in an orderly manner, with professional and technical talents guiding the diffusion of industrial high technology to the countryside, management talents rationally planning and operating idle resources in the countryside, and general service talents effectively guaranteeing the supply of basic public services in the countryside, but high-quality development of urban-rural integration also emphasizes giving full play to the intellectual support of innovative and entrepreneurial talents, integrating the production functions and production space of urban and rural areas, and providing the best service through engaging in agriculture or innovative and entrepreneurial talents. production space, accelerating the process of urban-rural industrial transfer and interaction by engaging in agriculture or innovatively exploring secondary and tertiary industries extended by agriculture, forming a symbiotic urban-rural industrial chain, balancing the positions of urban and rural industries in the value chain, driving the development of industries in rural areas, developing the rural productivity, and constructing a modern urban-rural industrial modernization system. Secondly, the high-quality development of urban-rural integration is the

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urban-rural integration of innovative and entrepreneurial factors that surpass ordinary production factors in terms of efficiency and profitability to gather in the countryside and form new business forms and new industries. The primary solution to urban-rural integration and high-quality development is the problem of unbalanced and insufficient development in urban-rural resource allocation. In this sense, urban-rural integration and high-quality development expands the connotation of the necessary premise of resource factor flows between urban and rural areas, and urban-rural integration and high-quality development is not limited to the urban-rural flows of basic factors of production, such as labor, land, capital, and technology, but also manifests itself in the production factors of innovation and entrepreneurship, such as data, market, system, and information, and so on. and information, and other innovative and entrepreneurial factors of production or even the flow of new combinations of factors of production to form new business forms and new industries, which can create higher market value, making factor transformation more profitable and economic operation more efficient[Error! Reference source not found.]. Once again, the high-quality development of urban-rural integration is the urban-rural integration in which consumption and exchange between urban and rural areas are upgraded in quality. The value orientation and goal pursuit of high-quality development of urban-rural integration should still be anchored in meeting the growing needs of urban and rural residents for a better life in terms of products, services, social environment and ecological environment[Error! Reference source not found.], so that both urban and rural residents can enjoy the fruits of development. This is manifested in the fact that the consumption demand of urban residents has led to the gradual derivation of a series of new industries and new functions in the countryside, and the provision of high-value and high-quality ecological, leisure, experiential, creative and other services and products to the city. Similarly, although the consumption ability and demand of rural residents are relatively low, they have also strengthened their demand for diversified industrial products and realized consumption upgrading under the effect of increasing income and consumption demonstration. Finally, the driving force for high-quality development of urban-rural integration comes from the interaction between the government, market and society. In the process of China's urban-rural relations from urban-rural dual structure to urban-rural integrated development to urban-rural integrated development, and then to the stage of urban-rural integrated development[Error! Reference source not found.], the government has always been the dominant player in the evolution of urban-rural relations, however, the evolution of urban-rural relations under the sole reliance on the government's domination is not in line with the intrinsic requirements of high-quality development, and is also not sustainable. Therefore, the high-quality development of urban-rural integration is also to form a mechanism for the realization of the evolution of the government, the market and social synergy, through the policy and institutional forces to actively guide the creation of a fair and open market development environment, focusing on giving full play to the autonomy, creativity and competitiveness of the social subject of the development of the endogenous impetus to the formation of a close linkage mechanism of interests between urban and rural areas.

3. Mechanism analysis

The continued promotion of entrepreneurship in agriculture, rural areas and farmers will inevitably reshape the new pattern of urban-rural economic circulation, thereby promoting the high-quality development of urban-rural integration. According to the definition of the connotation mentioned above, the basic operation of the economic activity of entrepreneurship in agriculture, rural areas and farmers is based on the circulation and exchange of factors and commodities, which essentially depends on the expected returns and real returns, and similarly, the two-way free flow and optimal allocation of factors and commodities are also the economic foundation and necessary precondition for the realization of urban-rural integration[Error! Reference source not found.]. Therefore, from this logic, on the basis of recognizing the differences between urban and rural areas, entrepreneurship in agriculture, rural areas and farmers, by playing the role of the market main body to explore and develop the characteristic advantages of the rural areas, and by giving full play to the effects of economies of scale and economies of scope that may exist in the rural areas, improves the rate of return of the entrepreneurial business, so as to strengthen the endogenous interaction of factors and

 doi:10.20944/preprints202401.1808.v1

commodities between urban and rural areas, and to build up a benign relationship of the urban-rural two-way cycle, and to form a resource factor The virtuous cycle of factor convection and commodity convection with basically equivalent consumption quality[Error! Reference source not found.]. On the one hand, as an important path for the market allocation of resource factors, entrepreneurship in agriculture, rural areas and farmers can effectively overcome the shortcomings of the market mechanism, information asymmetry and institutional rigidity in rural areas, reflect the supply and demand relationship and the degree of scarcity of the factor market through the cost of use and expected returns in a real and flexible manner, promote the flow of urban entrepreneurial resources and factors to the rural areas, and the orderly return of rural residual resources and factors to the urban areas, so as to realize the flow of resource factors between the urban and the rural areas. The flow of resources and factors between urban and rural areas is realized. On the other hand, as an important means of efficiently matching the supply and demand of urban and rural commodities, entrepreneurship in agriculture, rural areas and farmers effectively plays the dual functions of guiding production and promoting consumption, accelerates the upgrading and transformation of rural industries by tapping into the new trends of consumption, leading the creation of new market demand, increasing the effective supply of the market to meet the multi-level and diversified consumption needs of urban and rural residents, and continuously promotes the expansion of urban and rural consumption to improve the quality of urban demand for high-quality ecological products to match with the supply of rural areas. ecological product demand in the city is matched with the supply in rural areas, and the demand for diversified industrial products in rural areas is matched with the supply in urban areas, so as to realize the flow of urban and rural commodities and services. Therefore, entrepreneurship in agriculture, rural areas and farmers strengthens the economic cycle between urban and rural areas in the process of market competition, laying the foundation for high-quality development of urban-rural integration. As a result, the following hypotheses are proposed.

H1, under other conditions, entrepreneurship in agriculture, rural areas and farmers can build a two-way circular flow of resource factors and commodity services between urban and rural areas, and further promote the high-quality development of urban-rural integration.

However, the economic cycle between urban and rural areas is not equivalent to urban-rural integration and high-quality development, and studies have also recognized that urban-rural integration and high-quality development is a multidimensional, all-round, high-quality urban-rural relationship, which includes factor integration, industrial integration, residential integration, social integration and ecological integration[Error! Reference source not found.][Error! Reference source not found.]. Based on the two-way flow of factors and commodities between urban and rural areas will lead to endogenous interaction between urban and rural industries, and narrowing the urban-rural development gap will further lead to in-depth spatial, demographic, social and ecological integration of urban and rural areas. Therefore, this paper will further try to analyze the influence path of entrepreneurship in agriculture, rural areas and farmers on the high-quality development of urban-rural integration from economic, spatial, demographic, social and ecological dimensions, and construct the theoretical framework of the mechanism of entrepreneurship in agriculture, rural areas and farmers on the high-quality development of urban-rural integration, starting from the logic of "entrepreneurship in agriculture, rural areas and farmers → urban-rural bidirectional circulation → multi-dimensional development path". From the logic of "entrepreneurship in agriculture, rural areas and farmers → urban-rural two-way cycle → multidimensional development path", the theoretical framework of entrepreneurship in agriculture, rural areas and farmers on the mechanism of high-quality development of urban-rural integration is constructed (see Figure 1), the intrinsic evolution mechanism between the two is elaborated, and the corresponding hypothesis is put forward.

 doi:10.20944/preprints202401.1808.v1

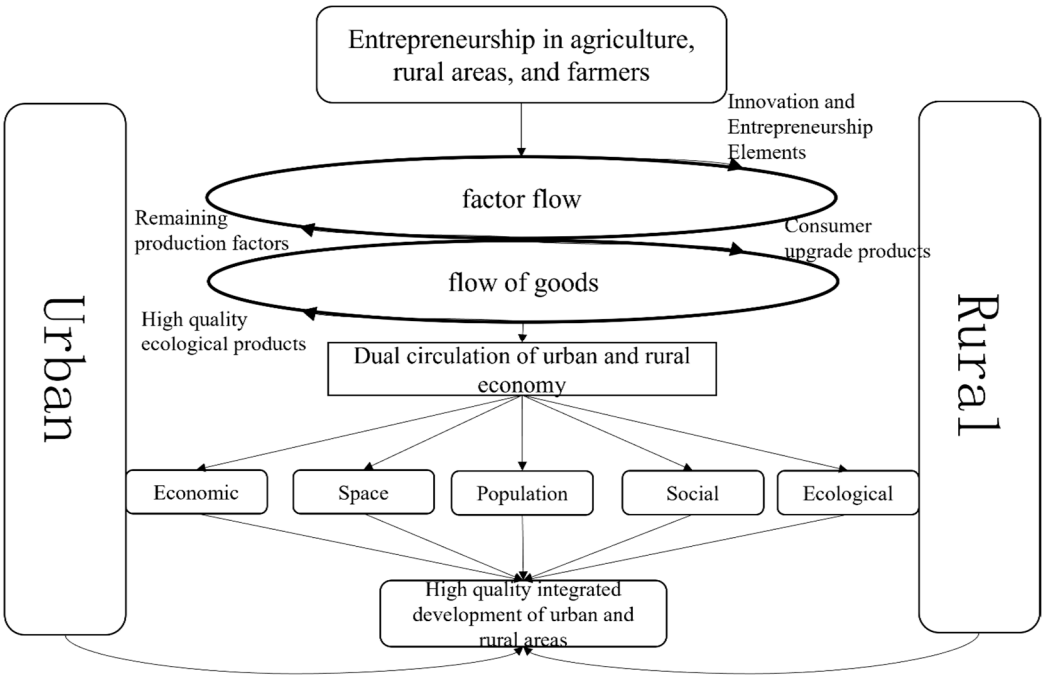

Figure 1. Theoretical framework diagram of the mechanism of entrepreneurship in agriculture, rural areas and farmers to promote high-quality development of urban-rural integration.

3.1. "Population circulation" between urban and rural areas

Entrepreneurship in agriculture, rural areas and farmers strengthens the flow of human capital between urban and rural areas by meeting the endogenous needs of human capital development. On the one hand, based on the push-pull theory, human mobility is subject to the joint effect of the pull force of the place of moving in and the push force of the place of moving out, and the problems of single industrial structure, weak collective economy, and scarce development opportunities in the countryside weaken the attractiveness of the rural areas and block the mobility of the urban residents to the countryside[Error! Reference source not found.]. While the three rural entrepreneurship derived from new industries, new forms and new modes, especially the maturity of rural secondary and tertiary industries has led to the integration and development of rural industries to strengthen the rural economy, which creates more employment opportunities and occupational demand[Error! Reference source not found.], expands the space for the transfer of labor force to the secondary and tertiary industries in rural areas, and also provides industrial carriers for the conversion of value from urban human capital to the rural areas to meet the demands of the mobile population for employment and income, etc. The basic problems of the migrant population such as employment and income have been satisfied. Further, under the thrust of the rising cost of living in cities and the pull of the ever-enriching development opportunities in rural areas, the willingness of urban residents and urban migrant workers to move to rural areas has been strengthened, and the mobility and integration of urban residents and urban migrant workers into rural areas has been promoted. On the other hand, the new technologies, models and products brought about by the three rural entrepreneurship drive the deepening of rural human capital, which is manifested in the fact that rural workers actively explore new fields and learn new skills in order to adapt to the needs of career development and improve remuneration; enterprises carry out vocational and technical training and other forms of human capital investment for rural workers in order to adapt to the development of the market and improve the competitive advantage of enterprises. In the end, due to the inherent demand for human capital appreciation, rural human capital is once again led to flow and conversion to the city, and thus the two-way flow of human capital between urban and rural areas forms a cycle and is continuously strengthened. Based on the above analysis, the following hypotheses are proposed

 doi:10.20944/preprints202401.1808.v1

H2: Ceteris paribus, three-farm entrepreneurship reinforces the flow of human capital between urban and rural areas.

3.2. Organic renewal of industrial space

Entrepreneurship in agriculture, rural areas and farmers has accelerated the internal spatial transformation and upgrading of rural areas, and optimized the spatial layout of urban and rural industries. On the one hand, entrepreneurship in agriculture, rural areas and farmers promotes industrial upgrading and transformation in rural areas, and rural industries have changed from single function of agricultural production to multiple functions such as tourism and recreation, and rural land spatial planning is synchronized with the transformation of agricultural functions[Error! Reference source not found.]. Under the practical functional zoning, the production area combines various production and operation forms, and builds multiple types of industrial parks and trade zones in an orderly manner[Error! Reference source not found.]; the living area carries out landscape development and design in order to adapt to the development of new industries such as rural tourism and recreation, and carries out regulated re-construction of countryside buildings, and comprehensively supports the tourism services. Therefore, it can be seen that under the impetus of three-farmer entrepreneurship, the internal space of the countryside has been transformed and upgraded, and its layout and construction are as rational and orderly as that of the city, and the quality of the living environment is as high as that of the city. On the other hand, entrepreneurship in agriculture, rural areas and farmers connects all kinds of economic subjects in the industrial chain, makes up for the lack of industrial chain, promotes the extension of the rural industrial chain to the front-end cultivation of varieties and the extension of the back-end processing and sales, and improves the industrial acceptance capacity of the rural areas in research and development, purchasing, production, processing, warehousing, transportation, digitalization network and other aspects. This provides an opportunity for rural areas to undertake urban industrial spillover against the background of gradually rising agglomeration costs such as land prices and housing prices in urban areas[Error! Reference source not found.][Error! Reference source not found.]. As a result, the functional replacement brought about by undertaking the transfer of urban industries dilutes the urban-rural industrial boundaries, provides the possibility of spatial readjustment in urban and rural areas, enhances the efficiency of urban and rural land use, optimizes the urban-rural spatial layout, and promotes urban-rural spatial integration. Based on the above analysis, the following hypotheses are proposed

H3: Ceteris paribus, entrepreneurship in agriculture, rural areas and farmers can contribute to the realization of upgrading of urban and rural industrial space.

3.3. Upgrading urban and rural consumption

Entrepreneurship in agriculture, rural areas and farmers promotes the quality and upgrading of urban and rural consumption and realizes the synergistic development of urban and rural areas. Consumption upgrading is the core of economic development and an important feature of the high-quality development of urban-rural economic integration, and the improvement of the urban and rural consumption structure also means that the quality of life of urban and rural residents has been improved[Error! Reference source not found.]. On the one hand, in terms of the content and form of consumption, entrepreneurship in agriculture, rural areas and farmers identifies technological, market and policy opportunities in the business environment[Error! Reference source not found.], and aims at the consumption needs of urban residents to tap into potential supply deficiencies in order to bring about high-quality eco-agricultural products, tourism products, and emerging products such as "Internet+" eco-service products. "ecological service products and other emerging consumption content and consumption forms, releasing the consumption potential of urban residents, and promoting the quality and upgrading of the consumption structure of urban residents to a high level of enjoyment-based consumption. On the other hand, from the point of view of consumers' consumption ability and consumption concepts, entrepreneurship in agriculture, rural areas and farmers creates and provides a variety of employment opportunities for the rural labor market, thus increasing the income of rural residents and improving the consumption ability of rural residents[Error! Reference source not found.]. At the

 doi:10.20944/preprints202401.1808.v1

same time, the mutual exchange and connection between urban and rural areas strengthens the consumption demonstration effect between the high consumption groups in urban areas and the low consumption groups in rural areas, and changes the consumption concepts of rural residents[Error! Reference source not found.]. Further, with the improvement of consumption ability and the change of consumption concept, the consumption level of rural residents has been expanded and improved. Based on the above analysis, the following hypotheses are proposed

H4: Other things being equal, entrepreneurship in agriculture, rural areas and farmers realizes the quality of urban and rural residents' consumption.

3.4. Equalization of public services in urban and rural areas

Entrepreneurship in agriculture, rural areas and farmers promotes the civicization of rural residents and the standardization of rural governance, accelerating the equalization of urban and rural public services and the modernization of public governance. On the one hand, entrepreneurship in agriculture, rural areas and farmers has made rural areas a gathering place for population and enterprises. The development demand for enterprise integration of resources and commodity circulation promotes the continuous extension of public transportation to the countryside, and the population's real-life demand for legal residence and social security promotes the coverage of social undertakings to the countryside, which brings about considerable demand for urbanization[Error! Reference source not found.], which leads to the gradual construction of a social public service system in rural areas for education, medical care, culture, transportation and other supporting services, and the boundaries of social public service The boundaries of social public services are constantly expanding to the countryside, promoting the gradual synergization and equalization of basic public services in urban and rural areas. On the other hand, entrepreneurship in agriculture, rural areas and farmers promotes the combination of rural self-governance, rule of law and moral rule, and promotes the modernization of rural governance. First, the embedding of the enterprise's complete institutional culture and innovation and entrepreneurship culture will improve the contractual spirit and innovation consciousness of rural residents, and spread the awareness of the market economy and the concept of the rule of law economy to the rural areas[Error! Reference source not found.], deepen the construction of the rule of law in the countryside and the innovation of the system, and empower the public governance of the countryside. Secondly, due to their own resource endowment, political ability and management experience, there is no lack of three-agriculture entrepreneurial subjects who have become elites in the countryside, and have effectively made up for the shortcomings and deficiencies in rural public governance by directly participating in rural public governance or acting as a "think-tank" to provide strategic advice on rural public governance. Thirdly, enterprises contribute to rural governance by establishing party branches, actively developing Communist Party members, and giving full play to the cohesion and exemplary role of grassroots party organizations[Error! Reference source not found.]. Based on the above analysis, the following hypotheses are proposed

H5: Ceteris paribus, entrepreneurship in agriculture, rural areas and farmers promotes the equalization of public services between urban and rural areas.

3.5. Promoting ecological integration of urban and rural areas

Entrepreneurship in agriculture, rural areas and farmers effectively promotes the green development of the countryside and builds a community of ecological interests between urban and rural areas, thereby promoting ecological integration. On the one hand, entrepreneurship in agriculture, rural areas and farmers accelerates the upgrading and transformation of rural industries[Error! Reference source not found.], and promotes ecological production characterized by technological efficiency and resource conservation. Based on the introduction of urban technological innovations, entrepreneurship in agriculture, rural areas and farmers digests, absorbs and re-innovates green technologies or ecological products adapted to rural areas, transforms backward and inefficient production methods in rural areas, and realizes green production based on improved technological efficiency[Error! Reference source not found.][Error! Reference source not found.]. At the same time, entrepreneurship in

 doi:10.20944/preprints202401.1808.v1

agriculture, rural areas and farmers has given rise to numerous private small and micro enterprises and agricultural new business subjects and gradually developed into entrepreneurial clusters or industrial clusters[Error! Reference source not found.], where large-scale production and operation reduces input costs, and origin processing reduces supply chain losses, releasing economies of scale and economies of scope, and realizing resource conservation based on improving production efficiency. On the other hand, ecological products are universal livelihood benefits, and entrepreneurship in agriculture, rural areas and farmers transforms the ecological advantages of rural areas into economic advantages, realizing the transformation of ecological products in rural areas into society, and in this process, urban residents enjoy high-quality ecological products while rural residents obtain multiple forms of economic premiums. Under this ecological benefit distribution mechanism, both urban and rural residents become stakeholders in ecological environmental protection, thus forming a community of ecological interests between urban and rural areas.

Based on the above analysis, the following hypotheses are proposed

H6: Ceteris paribus, three-farm entrepreneurship promotes rural-urban ecological integration.

4. Research design

4.1. Modeling

In order to analyze the impact of entrepreneurship in agriculture, rural areas and farmers on the high-quality development of urban-rural integration in a more systematic way, and to discuss the possible transmission mechanism of the urban-rural economic cycle for the high-quality development of urban-rural integration, based on the aforementioned, to test whether the urban-rural resource factor cycle and the urban-rural goods and services cycle are the mediator variables in order to test Hypothesis H1, this paper sets up mediation effect regression model (1), model (2) and (3). Where subscripts i and t denote city and year respectively, Y_{it} is the explanatory variable of urban-rural integration level, $Entrep_{it}$ is the core explanatory variable of entrepreneurship in agriculture, rural areas and farmers activity, $Control_{it}$ denotes a series of control variables, μ_i is the area fixed effect, v_t is the time fixed effect, and ε_{it} denotes the random disturbance term. $Medium_{it}$ is a mediating variable characterizing the urban-rural resource factor cycle and urban-rural commodity service cycle. First, through the regression coefficient α_1 in model (1) to determine whether entrepreneurship in agriculture, rural areas and farmers can promote urban-rural high-quality integrated development, and to test the overall effect of entrepreneurship in agriculture, rural areas and farmers to promote urban-rural high-quality integrated development in the county. Secondly, by constructing the linear regression equation of the mediating variable $Medium_{it}$ and the core explanatory variable $Entrep_{it}$, as well as the regression equation of the explanatory variable Y_{it} , the mediating variable $Medium_{it}$, and the core explanatory variable $Entrep_{it}$, the significance of the regression coefficients β_1 , γ_1 , and γ_3 is determined to determine the existence or not of the mediation effect and to test the degree of the mediation effect. Finally, in order to test the multidimensional path of entrepreneurship in agriculture, rural areas and farmers to promote the high-quality development of urban-rural integration, the explanatory variable Y_{it} of model (1) is replaced by the level of integration between urban and rural areas in the economic, demographic, spatial, social, and ecological dimensions, respectively, and the test judgment of the regression coefficient α_1 is performed to test the hypotheses H2 to H6.

$$Y_{it} = \alpha_0 + \alpha_1 Entrep_{it} + \alpha_2 Control_{it} + \mu_i + \vartheta_t + \varepsilon_{it} \quad (1)$$

$$Medium_{it} = \beta_0 + \beta_1 Entrep_{it} + \beta_2 Control_{it} + \mu_i + \vartheta_t + \varepsilon_{it} \quad (2)$$

$$Y_{it} = \gamma_0 + \gamma_1 Entrep_{it} + \gamma_2 Control_{it} + \gamma_3 Medium_{it} + \mu_i + \vartheta_t + \varepsilon_{it} \quad (3)$$

4.2. Variable measurement and description

4.2.1. Measurement of entrepreneurship in three rural areas.

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According to existing studies, the Global Entrepreneurship Monitor (GEM) has two main methods for measuring entrepreneurial activity: the labor market method and the ecological method[Error! Reference source not found.]. The difference between the two measurement methods is that the ecological method uses the number of existing firms in the region as the standardized base, while the labor market method uses the regional labor force population aged 15-64 as the standardized base[Error! Reference source not found.]. Considering that the ecological method ignores the heterogeneity of firm size, it is easy to overestimate the regional entrepreneurial activity to bring a large bias, and at the same time, in the reality of China's entrepreneurship in agriculture, rural areas and farmers, individuals such as new farmers or agro-entrepreneurs are still the main force, and an important result of entrepreneurship in agriculture, rural areas and farmers is the creation of private enterprises and individual economic entities. Therefore, this paper chooses the labor market method, which is comparable with the total entrepreneurial activity index (TEA) and is also in line with the reality of entrepreneurship in agriculture, rural areas and farmers in China, and the specific calculation is shown in formula (4).

$$\mathrm{TEA} = \frac{\text{number of rural private enterprise households+ number of rural self-employed households}}{\text{number of working population aged 16-64 in the region}} \quad (4)$$

4.2.2. Measurement of the high-quality development level of urban-rural integration

In terms of the measurement of the level of high-quality development of urban-rural integration, an indicator system for the level of high-quality development of urban-rural integration is constructed on the basis of Zhou Jianing et al.'s (2019)[Error! Reference source not found.] study on the selection of indicators, the attributes of indicators and the types of indicators (see Table 1). At the same time, some of the indicators are appropriately adjusted while following the basic characteristics and scientific connotations of the basic characteristics and scientific connotations of urban-rural integration and high-quality development under the perspective of entrepreneurship in agriculture, rural areas and farmers in the previous article. The specific performance is as follows: first, it characterizes the flow of high-efficiency production factors. The flow of high-efficiency innovative and entrepreneurial production factors to rural areas brings about an increase in the productivity of the agricultural industry, and the use of the indicator of the binary comparison coefficient not only reflects the structure of the urban-rural economy, but also reflects the mismatch of production factors between urban and rural areas[Error! Reference source not found.], and its formula also happens to be the ratio of the productivity between the agricultural industry and the non-agricultural industry. Second, it characterizes the consumption upgrade of urban and rural residents. Consumption upgrading of urban and rural residents is essentially a dynamic change in the consumption structure of urban and rural residents, taking into account that there are certain differences in the consumption ability and consumption concepts of urban and rural residents that may lead to the heterogeneity of the content and form of consumption upgrading, and according to the macro-data view of the upgrading of urban and rural residents' consumption expenditures except food expenditures, there are different characteristics[Error! Reference source not found.]. Therefore, the comparison of Engel's coefficient between urban and rural areas is used here to characterize the upgrading of urban and rural consumption, and as the urban and rural Engel's coefficient tends to decrease, it indicates the upgrading of urban and rural residents' consumption. Third, it characterizes urban-rural population mobility. Drawing on the practice of Liu et al. (2015)[Error! Reference source not found.] of measuring labor force transfer, we use the proportion of rural secondary and tertiary industry employees to the number of rural employees to characterize urban-rural population mobility, in which the number of rural secondary and tertiary industry employees is obtained by subtracting the number of rural employees from the number of agriculture, forestry, animal husbandry and fishery employees (both indicators are employees under the statistical caliber of the rural population). Changes in the number of rural workers in secondary and tertiary industries in the numerator of this indicator reflect both the increase in the number of rural workers in secondary and tertiary industries caused by the urban population seeking employment opportunities in secondary and tertiary industries in the rural areas or in new industries under the integration of industries and the transfer of the rural population from the primary industry

 doi:10.20944/preprints202401.1808.v1

in the rural areas to the urban areas. Fourth, it characterizes ecological efficiency. The design of the indicators in this dimension of ecological integration highlights the maximization of economic benefits (i.e., considering GDP) with less resource consumption and lower pollution emissions, which better reflects the ecological efficiency and ecological sustainability of high-quality development of urban-rural integration. Finally, the entropy weight method is used to measure the level of high-quality development of urban-rural integration in 41 prefecture-level cities in the Yangtze River Delta based on this evaluation index system of high-quality development level of urban-rural integration.

Table 1. Indicator system for the level of high-quality development of urban-rural integration.

Target Level	Indicators Level	Description of indicators	Indicator properties	Type of indicator [Error! Reference source not found.]
economics	Ratio of urban to rural per capita income	Urban per capita income/rural per capita income	Negative	comparison
	Ratio of per capita consumption in urban and rural areas	Urban per capita consumption/rural per capita consumption	Negative	comparison
	Consumption upgrading in urban and rural areas	Urban Engel coefficient/rural Engel coefficient	Positive	comparison
	Mobility of factors of production in urban and rural areas	Comparative primary output per capita/comparative secondary and tertiary output per capita	Positive	comparison
demographic	Ratio of non-farm to agricultural workers	Non-farm payrolls/population working in agriculture	Positive	comparison
	Employment contrast factor	Urban unemployment rate/rural unemployment rate	Negative	comparison
	Main body of space circulation	Passenger turnover	Positive	propulsion
	Urban-rural population movements	(Rural workers - agriculture, forestry and fishery workers)/Rural workers	Positive	state of affairs
	Population urbanization level	Population urbanization rate	Positive	state of affairs
spatial	Level of land urbanization	Built-up area/total land area	Positive	state of affairs
	Urban and rural land allocation	Sown area of agricultural land/built-up area	Positive	state of affairs

 doi:10.20944/preprints202401.1808.v1

	Transportation network density	Miles of road in operation/total land area	Positive	state of affairs
	Circulation of goods in urban and rural spaces	Cargo turnover	Positive	propulsion
societies	Pension insurance coverage	Insured population/total population	Positive	state of affairs
	Unemployment insurance coverage	Insured population/total population	Positive	state of affairs
	Medical insurance coverage	Insured population/total population	Positive	state of affairs
ecologically	Urban and rural ecological greening	Greening coverage in built-up areas	Positive	state of affairs
	Energy saving factor	Social electricity consumption per unit of GDP	Negative	propulsion
	Green space per capita in parks	Green space per capita in parks	Positive	propulsion
	Waste reduction factor	Wastewater discharge per unit of GDP	Negative	propulsion
	Wastewater reduction factor	Waste emissions per unit of GDP	Negative	propulsion

4.2.3. Mediating variables.

According to the theoretical analysis in the previous section, entrepreneurship in agriculture, rural areas and farmers changes the urban-rural dichotomy by accelerating the circulation of resource factors and commodity services between urban and rural areas, and realizes the high-quality development of urban-rural integration. In order to test this transmission mechanism, this paper introduces the mediating variable of urban-rural economic cycle to explore the mechanism of the role of entrepreneurship in agriculture, rural areas and farmers on the high-quality development of urban-rural integration, respectively. In economic activities, the circulation of resource factors and commodity services are affected by the market, and market prices can flexibly reflect the trend and degree of their circulation. Consumer price index and retail price index of commodities refer to the relative number of changes in the price level of goods and services consumed by urban and rural residents over time, and the relative number of changes in the trend and extent of urban and rural retail prices of commodities, respectively, and the difference between the price indices reflects the difference in circulation links, consumption environment and market demand between urban and rural areas. The larger the difference indicates that the urban-rural circulation is blocked, while the smaller the difference indicates that the urban-rural circulation is smooth. Therefore, this paper chooses the ratio of consumer price index and retail commodity price index between urban and rural areas to measure and characterize the urban-rural economic circulation respectively. The specific calculation formula is as follows (5).

$$\boldsymbol{r} = \frac{urban\ cpi/urban\ rpi}{rural\ cpi/rural\ rpi} \tag{5}$$

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4.2.4. Control variables.

In order to more comprehensively analyze the spillover effects of entrepreneurship in agriculture, rural areas and farmers in the process of high-quality development of urban-rural integration, it is also necessary to set control variables that may have an impact on high-quality development of urban-rural integration. (1) Science and technology input. Regional S&T inputs continuously promote regional S&T progress, which changes urban-rural production methods and lifestyles, and reduces the urban-rural income gap[Error! Reference source not found.][Error! Reference source not found.]. In addition, urban-rural integration is an inevitable product of economic development at a certain stage[Error! Reference source not found.], and S&T investment, as an endogenous driving force of economic development, also accumulates energy for urban-rural integration. In this paper, the ratio of science and technology expenditure to general financial expenditure is selected to measure science and technology investment. (2) Education input. Regional education investment plays a direct role in regional education, and plays an important role in the enhancement and accumulation of human capital of regional residents, and the deepening of human capital narrows the income gap and accelerates urban-rural integration[Error! Reference source not found.]. In this paper, the ratio of regional education expenditure to general fiscal expenditure is selected to measure education investment. (3) Fiscal decentralization. Fiscal decentralization as a key institutional arrangement for regional development, fiscal decentralization enables local governments to better understand the preferences of regional residents to provide better quality public products and services, and at the same time reduces the urban-rural gap by boosting the development of regional industries and economy[Error! Reference source not found.]. However, when the degree of fiscal decentralization is too high, it will strengthen the traditional performance competition among local governments, and the fiscal bias towards cities will restrict the development of urban-rural integration[Error! Reference source not found.][Error! Reference source not found.]. In this paper, the ratio of local per capita fiscal revenue to central per capita fiscal revenue is chosen to measure the degree of fiscal decentralization. (4) Openness to the outside world. The degree of regional openness to the outside world is closely related to foreign direct investment (FDI), but FDI has a strong preference for returns, which may lead to the flow of investment to more efficient cities and exacerbate the urban-rural gap. This paper chooses the ratio of the amount of actual utilization of foreign investment to the regional GDP to measure the degree of regional openness. (5) Fixed asset investment. Fixed asset investment provides basic and mass service projects and facilities for the region, which is the basic condition for the survival and development of the society, and is also the necessary material foundation for the integration of urban and rural areas. In this paper, the amount of regional fixed asset investment is chosen to characterize the fixed asset investment as the ratio of regional GDP. (6) Foreign trade dependence. Economic openness brings global factor mobility and commodity trade, which is also conducive to narrowing the income gap between urban and rural areas[Error! Reference source not found.]. Therefore, this paper chooses the ratio of total regional import and export amount to regional GDP to measure the degree of foreign trade dependence.

4.3. Data sources and descriptive statistics

The Yangtze River Delta (YRD) region is one of the most vibrant and economically powerful regions in China, including the provinces of Shanghai, Jiangsu and Zhejiang, forming a close-knit urban agglomeration. Firstly, as one of the most economically dynamic and development potential regions in China, the Yangtze River Delta region provides a broad development market for entrepreneurship, as well as rich resources for science and technology innovation and a highly qualified talent pool. Secondly, as one of the important pillars of national development, the Yangtze River Delta region is at the forefront of China in terms of government policy support and reform and innovation in promoting urban-rural integration in the region. Finally, the rapid urbanization process in the YRD region and the strong demand for urban-rural integration development require enhanced research and practice to explore new urban-rural integration development models and release the development effectiveness of urban-rural integration. Therefore, this paper selects the panel data of 41 cities in the Yangtze River Delta from 2003-2021 to study the relationship between entrepreneurship in agriculture, rural areas and farmers and high-quality development of urban-

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rural integration. The data are obtained from China Statistical Yearbook, Shanghai Statistical Yearbook, Jiangsu Statistical Yearbook, Zhejiang Statistical Yearbook, Anhui Statistical Yearbook, and Zhejiang Statistical Yearbook of Natural Resources and Environment for the years 2004-2022. The missing values appeared in them were supplemented and deflated by consulting the statistical yearbooks of each city in the past years or interpolation, and some indicators were deflated by using the consumer price index in the past years and transformed into the comparable prices with 2003 as the base period. Table 2 shows the results of descriptive statistics for each variable.

Table 2. Variable names and descriptive statistics results.

variant	variable name	Number of observations	average value	(statistics) standard deviation	minimum value	maximum values
explanatory variable	Urban-rural integration index	779	0.0612	0.0443	0.0201	0.4376
	Urban-rural economic integration index	779	0.0081	0.0028	0.0026	0.0211
	Urban-rural population integration index	779	0.0132	0.0145	0.0019	0.1337
	Urban-rural social cohesion index	779	0.0131	0.0073	0.0003	0.0376
	Urban-rural spatial integration index	779	0.0182	0.0298	0.0005	0.2919
	Urban-rural ecological integration index	779	0.0085	0.0161	0.0026	0.2040
explanatory variable	Entrepreneurial activity in agriculture and agriculture	779	0.0278	0.0191	0.0058	0.0714
control variable	External trade dependence	779	0.3286	0.3843	0.0048	2.8345
	Level of scientific and technological inputs	779	0.0283	0.0230	0.0004	0.2164
	Egypt's open-door policy towards the outside world	779	0.0287	0.0225	0.0001	0.2011
	Level of investment in education	779	0.1835	0.0491	0.0199	0.3946
	fixed-asset investment	779	0.4936	0.2146	0.0755	1.2420

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	fiscal decentralization	779	1.0092	0.8468	0.0823	7.8524
intermediary variable	Urban-rural economic cycle	779	1.0163	0.0414	0.9263	1.2715

5. Empirical analysis

5.1. Baseline regression results

According to the mediation effect regression model, sequentially through the unit root test, cointegration test and Hausman test[Error! Reference source not found.] , this paper finally chose to use fixed effect panel regression in order to analyze the overall effect of entrepreneurship in agriculture, rural areas and farmers affecting the high-quality development of urban-rural integration as well as the mediation effect, and for the purpose of validating the hypothesis of this mechanism of action H1 (Table 3).

Table 3. Basic regression results.

variant	Integration of urban and rural areas		Urban-rural economic cycle	Integration of urban and rural areas
	(1)	(2)	(3)	(4)
TEA	0.2200**	0.1955**	-0.1248**	0.1658*
	(0.0981)	(0.0958)	(0.0575)	(0.0886)
Urban-rural economic cycle				-0.2380*
				(0.1260)
control variable	uncontrolled	Controlled	Controlled	Controlled
R-squared	0.1597	0.2073	0.3139	0.2189
observed value	779	779	779	779
time fixed effect	Controlled	Controlled	Controlled	Controlled
area fixed effect	Controlled	Controlled	Controlled	Controlled

Note: ***, **, and * denote 1%, 5%, and 10% significance levels, respectively; robustness standard errors in parentheses.

In columns (1) and (2) of Table 3, the estimated coefficients of the core explanatory variable, three-agricultural entrepreneurship activity, are both significantly positive, which suggests that three-agricultural entrepreneurship promotes high-quality development of urban-rural integration. In column (3) of Table 3, there is a significant negative effect of entrepreneurship in agriculture, rural areas and farmers activity on the urban-rural economic cycle, which suggests that entrepreneurship in agriculture, rural areas and farmers effectively strengthens the linkage of factor and commodity markets between urban and rural areas, and reduces the differences in factor and commodity prices between urban and rural areas. Meanwhile, in column (4) of Table 3, the coefficient of entrepreneurship in agriculture, rural areas and farmers activity is still significantly positive, but its coefficient has declined compared to the benchmark results in columns (1) and (2). This means that the urban-rural economic cycle is the conduction path for entrepreneurship in agriculture, rural areas and farmers to promote the high-quality development of urban-rural integration, and entrepreneurship in agriculture, rural areas and farmers can enhance the rural industrial chain and supply chain, improve the efficiency of urban-rural factor allocation, the industrial linkage effect and the efficiency of market circulation by strengthening the linkage between urban and rural markets[Error! Reference source not found.], and realize the complementary development of urban-rural economy and promote the high-quality development of urban-rural integration, which also confirms the

 doi:10.20944/preprints202401.1808.v1

research hypothesis H1. Therefore, the three rural entrepreneurial activities can identify the advantages of urban and rural resources to realize the complementarity of urban and rural resources, and through the market linkage of urban and rural entrepreneurial elements, introduce urban information, technology, capital and other entrepreneurial elements into the countryside, and transport the ecological products of rural entrepreneurship to the city, which has successfully built a bridge of interconnection between urban and rural areas. It is foreseeable that, with the combined efforts of the three rural entrepreneurial activities, the flow of factors and commodities between urban and rural areas will gradually break through the original dualistic institutional barriers and accelerate the high-quality integrated development of urban and rural areas characterized by the flow of high-quality urban and rural factors and commodities through market forces.

5.2. Robustness tests

Selecting reasonable instrumental variables for the core explanatory variables is an important way to address endogeneity and to test the robustness of the results and conclusions. Considering that the influence effect of entrepreneurship in agriculture, rural areas and farmers on the high-quality development of urban-rural integration may have a strong bidirectional causality, i.e., as the level of urban-rural integration continues to improve, the business environment in rural areas is optimized, and entrepreneurship in agriculture, rural areas and farmers activity continues to increase. The data of geologic disasters (natural disasters such as landslides, avalanches, mudslides and ground collapses) in the region in the past years are selected as instrumental variables in this paper, on the one hand, as the saying goes, many disasters make a country prosperous, and natural disasters strengthen the uncertainty and affect the risk preference in the individual's personality traits[Error! Reference source not found.], and the impacts on the individual's economic income, credit rationing, and social capital all influence the individual's choice of entrepreneurial behavior[Error! Reference source not found.], which in turn shapes regional entrepreneurial cultures, such as the better-known Hui and Zhejiang business cultures in the Yangtze River Delta. On the other hand, geologic disaster is a common natural disaster although it has a certain regularity, but compared with the high-quality development of urban-rural integration, it has a strong exogeneity and exclusivity.

It should be noted that considering the availability of data, the instrumental variable is a dummy variable for whether or not each region is exposed to geohazards from 2010 to 2020, and time fixed effects are not added considering that the observed values of the instrumental variable do not vary over time in most samples, which in turn tends to lead to covariance problems causing estimation bias[Error! Reference source not found.]. To refine this result, the discussion of endogeneity will be optimized again later through systematic GMM estimation using the lagged terms of the explanatory and core explanatory variables. After confirming the existence of endogeneity through the Hausman test, and applying the Kleibergen-Paap rk LM and Kleibergen-Paap rk Wald F statistics to the instrumental variables, such as unidentifiable and weak instrumental variables, the results show that the instrumental variables are selected with a certain degree of reasonableness, and the instrumental variables method is applied to the estimation, and the regression results are shown in Table 4. Table 4 column (1) is the regression results of the first stage, the coefficients of instrumental variables are significantly negative at 1% level, which indicates that entrepreneurship in agriculture, rural areas and farmers is highly dependent on land, and frequent geologic disasters may inhibit the entrepreneurship in agriculture, rural areas and farmers, which confirms the relevance of instrumental variables. Column (2) shows the regression results of the second stage, and the results indicate that entrepreneurship in agriculture, rural areas and farmers can still significantly promote high-quality development of urban-rural integration after using the instrumental variable method.

Table 4. Endogeneity test.

variant	venture capitalism in three rural areas	Integration of urban and rural areas
	(1)	(2)

 doi:10.20944/preprints202401.1808.v1

TEA		0.7822**
		(0.2770)
natural disaster	-0.0069***	
	(0.0022)	
control variable	Controlled	Controlled
observed value	451	451
time fixed effect	uncontrolled	uncontrolled
area fixed effect	Controlled	Controlled
Hausman test	259.62	P= 0.0000
Kleibergen-Paap rk LM statistic	10.21	P=0.0014
Kleibergen-Paap rk Wald statistic	10.36	P=0.0013
Kleibergen-Paap rk Wald F statistic	10.19	{8.96}

Note: ***, **, and * denote 1%, 5%, and 10% significance levels, respectively; robustness standard errors in parentheses; { } values are critical values at the 15% level of the Stock-Yogo weak identification test.

In addition in order to make the empirical measurement results more convincing and to improve the robustness and credibility of the empirical results, the following three additional methods are adopted to conduct the robustness test. First, replacing explanatory variables. Drawing on the method of Jiang Nan et al.(2021)[Error! Reference source not found.] the score of the sub-dimension of new business entry published in the China Regional Innovation and Entrepreneurship Index released by Peking University is used to replace the explanatory variables to characterize the entrepreneurial activity in three rural areas. The results in column (1) of Table 5 suggest that the previous findings remain robust. Second, the measurement methodology is replaced. A systematic GMM model is set up to introduce lagged terms of the explanatory and interpreted variables for estimation, which also solves to some extent the endogeneity problem due to bidirectional causality. The results in column (2) of Table 5 show that the previous findings remain robust. Third, event shocks are added. Considering the impact of major events in the socio-economic field such as SARS, financial crisis and New Crown Epidemic, especially on private firms and self-employed households, the dummy variable of event shocks has been added to the model to control for the impact of event shocks, as well as the interaction effect of event shocks with the entrepreneurial activity in the three rural areas. The results in column (3) of Table 5 indicate that the previous findings remain robust.

Table 5. Robustness Tests.

variant	(1)	(2)	(3)
New Business Entry	0.0002**		
	(0.0000)		
TEA		0.3639**	0.2388**
		(0.1676)	(0.1017)
observed value	680	779	779
R-squared	0.3234		0.2099
control variable	Controlled	Controlled	Controlled
time fixed effect	Controlled	Controlled	Controlled
area fixed effect	Controlled	Controlled	Controlled
First order serial correlation test		-2.85 (p=0.004)	
Second-order serial correlation test		1.03 (p=0.301)	

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Hansen test		22.13 (p=1.000)	

Note: ***, **, and * denote 1%, 5%, and 10% significance levels, respectively; robustness standard errors in parentheses.

5.3. Further analysis

The previous paper analyzed the power mechanism of urban-rural integration under the perspective of entrepreneurship in agriculture, rural areas and farmers from five dimensions, such as demographic, spatial, economic, social and ecological, etc. In order to test the hypotheses of multidimensional power mechanism, H3 to H7, this paper, on the basis of the model (1), divides the comprehensive index of high-quality development of urban-rural integration into subindexes in five dimensions for testing and the regression results are shown in Table 6.

Table 6. Heterogeneity regression results.

	(1)	(2)	(3)	(4)	(5)
variant	economic integration	Population integration	social integration	spatial integration	ecological integration
TEA	-0.0215**	-0.0171	0.0411**	0.1758**	0.0172
	(0.0069)	(0.0241)	(0.0169)	(0.0766)	(0.0231)
control variable	Controlled	Controlled	Controlled	Controlled	Controlled
observed value	779	779	779	779	779
R-squared	0.2434	0.4409	0.5521	0.2044	0.0385
time fixed effect	Controlled	Controlled	Controlled	Controlled	Controlled
area fixed effect	Controlled	Controlled	Controlled	Controlled	Controlled

Note: ***, **, and * denote 1%, 5%, and 10% significance levels, respectively; robustness standard errors in parentheses.

In column (1) of Table 6, there is a significant negative effect of entrepreneurship in agriculture, rural areas and farmers on the economic integration between urban and rural areas, which indicates that although entrepreneurship in agriculture, rural areas and farmers can promote the development of urban-rural integration as a whole, compared with urban entrepreneurship, entrepreneurship in agriculture, rural areas and farmers is not at a high level, technological and competitive, and imitation and convergence are serious, and at the same time, in combination with the measurement of entrepreneurship in agriculture, rural areas and farmers activeness, entrepreneurship in agriculture, rural areas and farmers has a lower proportion of the actual entrepreneurship in agriculture, rural areas and farmers, and entrepreneurship in agriculture, rural areas and farmers is still to be further improved, which indicates that the economic pattern of urban and rural areas has not yet substantially changed, and the diffusion effect of regional economy is still weaker than the polarization effect, instead of widening the economic gap under the high rate of return of the city. Table 6, column (2) of the three rural entrepreneurship on the demographic integration between urban and rural areas has a negative effect but fortunately not significant, which indicates that urban enterprises still have a strong path dependence on rural low-end labor, "household registration discrimination" and other not yet eliminated the rigidity of the system and the inertia of the expenditure may cause high-quality labor force to the city of the flow of preferential treatment, the long-term effect of the three rural entrepreneurship has yet to be stimulated. The long-term effect of entrepreneurship in the three rural areas has yet to be stimulated. In columns (3) and (4) of Table 6, entrepreneurship in agriculture, rural areas and farmers has a significant positive effect on social and spatial integration between urban and rural areas, which is basically consistent with the reality of entrepreneurship in agriculture, rural areas and farmers. First, entrepreneurship in agriculture, rural areas and farmers accelerates the transformation of rural industrial functions, thereby promoting rural operations and planning, unclogging the agglomeration of many urban functions, and

 doi:10.20944/preprints202401.1808.v1

advancing the optimal use of urban and rural space. Secondly, the development of entrepreneurship in agriculture, rural areas and farmers promotes the interaction between urban and rural industries, which is manifested in the mutual transmission and exchange of factors, resources, information, commodities and services among different development subjects, and the resulting property rights transaction activities will accelerate the transformation of rural areas from relational governance to contractual governance[Error! Reference source not found.]. Finally, entrepreneurship in agriculture, rural areas and farmers promotes the agglomeration of population in rural areas and gradually improves the endogenous demand for rural social and public services deepening the coverage of the social security system. In addition, in column (5) of Table 6, entrepreneurship in agriculture, rural areas and farmers has a positive but not significant effect on the ecological integration between urban and rural areas, which indicates that although entrepreneurship in agriculture, rural areas and farmers can promote the ecological integration between urban and rural areas through the promotion of intensive production, entrepreneurship in agriculture, rural areas and farmers in the process of development of the low value-added and the resistance to stress and risk are still constrained by the path of industrial ecological transformation such as industrial innovation and industrial transformation.

6. Conclusions and responses

This paper explores the connotation of high-quality development of urban-rural integration from the perspective of three-farmer entrepreneurship. It explains the inner mechanism of the intersection of the value of entrepreneurship in agriculture, rural areas, and farmers with high-quality development of urban-rural integration in the urban-rural economic cycle. Additionally, the paper aims to investigate the mechanism of high-quality development of urban-rural integration based on three-farmer entrepreneurship, using the balanced panel data of 41 cities in the Yangtze River Delta region from 2003 to 2021. Scientific evaluation of the direct and multidimensional effects of entrepreneurship in agriculture, rural areas, and farmers on the high-quality development of urban-rural integration was conducted using the individual fixed-effects model, with the use of the balanced panel data of 41 cities in the Yangtze River Delta region from 2003 to 2021. The study further examined the transmission mechanism of entrepreneurship in agriculture, rural areas, and farmers in promoting urban-rural circularity to advance the high-quality development of urban-rural integration, using the mediation-effects model. The findings indicate that entrepreneurship in agriculture, rural areas, and farmers significantly promotes the high-quality development of urban-rural integration, mainly through the transmission mechanism of promoting the construction of a virtuous cycle of resource factors and commodity services between urban and rural areas. Furthermore, entrepreneurship in agriculture, rural areas, and farmers has a significant positive impact on urban-rural spatial integration and social integration, and a significant negative impact on urban-rural economic integration. Based on these conclusions, the paper draws the following countermeasures revelations.

Firstly, the urban-rural economic cycle should be unblocked, and supply creation and demand leadership should be promoted. It is undeniable that entrepreneurship in the three rural areas creates huge demand and improves effective supply, but it is still necessary to lead demand and optimize supply with a focus on unclogging the urban-rural economic cycle. We should speed up the completion of a high-standard market system in urban and rural areas, improve the property rights system, and promote market-oriented reforms through market prices and property rights to realize equal exchange and two-way flow of resource elements and commodity services in urban and rural areas. In addition, new consumer demand should be fully tapped, and consumption should be actively boosted through policy publicity, the issuance of consumption vouchers and tax reductions, leading urban residents to go to the countryside to spend money, thereby tapping into the new functions and modes of agriculture and providing new supplies, thus promoting the integration of urban and rural areas and high-quality development.

Secondly, we should continue to support entrepreneurship in the three rural areas and promote high-quality urban-rural integration. In order to further accelerate rural revitalization and narrow the development gap between urban and rural areas, support for entrepreneurship in the three rural

 doi:10.20944/preprints202401.1808.v1

areas should be continued to better promote high-quality development of urban-rural integration. At this stage, there is still a big gap between urban and rural entrepreneurship in terms of quantity and quality, and the pattern of urban and rural economic development has not yet undergone a substantial transformation, so it is still necessary to vigorously promote the practice of entrepreneurship in agriculture, rural areas and farmers, do a good job in the early guidance and planning, and based on the advantages of the rural area and the industrial base to take the initiative to undertake the transfer of urban industrial functions, space and even the development of specialty industries. In addition, we should pay attention to the cultivation of three-agriculture entrepreneurial subjects to carry out entrepreneurial training, and at the same time, we should also strengthen the organizational construction and ideological leadership of three-agriculture entrepreneurial subjects, and give play to the exemplary role of the "rural elites" in order to promote the modernization of rural governance.

Thirdly, attention should be paid to the rooting of talents in the countryside and the full release of the effectiveness of human resources. The core element of high-quality development in urban-rural integration remains talent, and the exodus of people from the countryside not only restricts population integration, but also constrains the overall development of rural areas. Therefore, it is not only necessary to pay attention to guiding urban technicians to go to the countryside to start businesses, but also to pay attention to the return of public service providers, such as teachers, doctors and lawyers, etc., to set up an effective incentive mechanism and absorption mechanism for talents, support the local settlement of returning talents through the formulation of special programs and policies for absorption, give appropriate preferential treatment to and increase the development opportunities and space for the development of talents in returning to their hometowns, guarantee the return of returning talents, and strengthen the attractiveness of rural areas, and fully release their talents to the countryside. areas, and fully release their ability to contribute to the high-quality development of urban-rural integration.

Fourth, extend the agricultural industry chain and enhance the ecological effectiveness of entrepreneurship in agriculture, rural areas and farmers. In the short term, the ecological efficacy of entrepreneurship in agriculture, rural areas and farmers has not yet appeared, which indicates that the ecological effect of entrepreneurship in agriculture, rural areas and farmers has yet to be upgraded. We should actively encourage the main body of entrepreneurship in agriculture, rural areas and farmers to develop various forms of business, promote the integration of one, two and three industries in rural areas, aim at the ever-escalating consumer demand, develop recreation and leisure, agricultural experience, cultural creativity, and other forms of new business, extend the industrial chain, and improve the added value of products. At the same time, encouraging multiple entrepreneurial subjects "chain" into the industrial chain, the establishment of "benefit-risk" cooperation mechanism to form an ecological community, improve production constraints to reduce the cost of ecological supervision.

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