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Geographical Indication, Agricultural Products Export and Urban–Rural Income Gap

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Abstract: The Nineteenth National Congress of the Communist Party of China put forward the implementation of a rural revitalization strategy, which is an important way to achieve common prosperity for all the people, as promoting farmers' income increase and narrowing the urban–rural income gap are key to promoting rural revitalization and common prosperity. So, under the background of vigorously promoting the rural revitalization strategy in China, it is very important to explore the effect and realization mechanism of geographical indication (GI) on reducing the urban–rural income gap. Based on the statistical data of 31 provinces in China from 2008 to 2019, this empirical study uses the spatial Durbin model (SDM) to analyze the relationship between GI and urban–rural income gap, and the stepwise regression method is used to explore the mediating effect of agricultural product exports on it. The results show that: (1) The potential economic value of GI branding can reduce the urban–rural income gap, and each additional unit of GI in this region will reduce the urban–rural income difference of this region by 0.160 units, and the urban–rural income difference of neighboring regions by 0.133 units. The result is still consistent after changing the proxy variable of urban–rural income gap for robustness test; (2) The brand effect of GI can form a stronger competitive advantage in foreign trade and promote the export level of agricultural products; (3) GI can narrow the urban–rural income gap through the export of agricultural products, and agricultural product export plays an important mediating effect. In the future, the government should not only strengthen the management and protection of GI but also actively market GI products. Promoting the international mutual recognition and mutual protection of GI can ensure the agricultural product export of GI and improve the foreign trade level of GI.

Keywords: place branding; rural revitalization; geographical indications (GI); agricultural products export; urban–rural income gap

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1. Introduction

Geographical indication (GI) is a special intellectual property right formed by relying on the long-term practices and unique characteristics of a region. It has a natural connection with agriculture, rural areas, and farmers. Preliminary statistics from the Fourth National Geographical Indications Research Report indicate that by 2020, the total number of GI products in China reached 8 421, of which 98.24% are related to agricultural products. GI has a brand effect [1], agglomeration effect, and scale effect [2], which are of great significance in promoting regional development, especially rural development. It is an important intangible asset in promoting the reduction of the income gap between urban and rural areas. Research on GI focuses on the legal policy of GI protection [3–5], the behavior of GI stakeholders [6–8], and the economic effects of GI [9,10]. The good reputation of GI, based on land, plays an important role in improving economic level and enhancing competitiveness. It can organize producers to obtain the scale effect, which helps to resist

market risks. The establishment of GI also makes full use of regional characteristics to form regional industries and promote agricultural industrialization, and it has outstanding significance in promoting rural economic development and increasing farmers' income [11].

National policies and many studies on rural economy and regional development have always attached great importance to the issue of the urban–rural income gap. Scholars have also explored the causes of the urban–rural income gap and proposed some strategies to solve it [12,13]. GI is an important way for farmers to make use of local resources and give full play to local characteristics to obtain higher returns, and it can narrow the urban–rural income gap by increasing farmers' income. Poetschki et al. used an endogenous switching regression model to explore the impact of GI on farm incomes and found that GI adoption significantly improves farm incomes in both the olive and wine sectors [14]. Menggala et al. combined questionnaire surveys, interviews, and round table discussions to collect cinnamon harvesters' information and data. The result shows GI Koerintji cinnamon's presence has added value and credibility to Tani Sakti Alam Kerinci (TAKTIK) farmers, leading to price improvement [15].

GI is often closely linked to agriculture, so many scholars have placed GI and farmers' income in the same framework for research [11], such as Poetschki [14]. Vecchio [2] et al. affirmed the role of GI in the development of rural areas and found that it played an important role in increasing farmers' incomes. However, less attention has been paid to the role of GI in reducing the urban–rural income gap and its underlying mechanisms. GI, which depends on regional resource endowments, is a unique regional intangible asset formed by coupling regional resources, environmental factors, and humanistic factors, and it is the key element in the formation of regional economic competitive advantages, as well as in promoting regional agricultural development and people's well-being. The construction of GI can help to build the quality, reputation, and market demand for agricultural products, and then promote export of agricultural products [16,17], which can, through the transformation of labor demand and the promotion of employment [18], have an important impact on the urban–rural income gap. So, it is of great theoretical significance to consider GI, agricultural product, export and the urban–rural income gap. This not only helps to further expand the research on GI and rural economic development, but also further validates the scope of application of the existing research conclusions by taking China, a large agricultural country, as the research area.

Based on the statistical data of 31 provinces in China from 2008 to 2019, this empirical study uses the spatial Durbin model (SDM) to analyze the relationship between GI and urban–rural income gap. The contribution of this paper is that, firstly, we construct a unified analytical framework to explain the mechanism of the impact of geographical indications on the urban–rural income gap; secondly, we test the positive impact of geographical indications on reducing the urban–rural income gap by promoting agricultural product export, and explore policy recommendations. The rest of this paper is divided into four parts, namely, mechanism analysis and research hypothesis, research design, result analysis, and conclusions and recommendations.

2. Mechanism Analysis and Research Hypothesis

The agricultural food sector is gradually participating in the process of internationalization. Although it may encounter difficulties to compete and organize activities in an uncertain and complex environment, internationalization has become an important factor in improving the competitiveness of enterprises and regions [19]. It has an important impact on the performance of enterprises and the development of rural areas [20]. There are two main mechanisms for GI to promote the export of agricultural products (Figure 1). On the one hand, GI has a "marketing effect". As an important signal and reputation mechanism, GI can connect products, producing areas and consumption to reduce the cost of choice for consumers, and thus expand product demand and improve the bargaining power of products [16]. The demand for high-quality products generated by the improvement of people's living standards and the uneven quality of products makes GI, which

is often regarded as a symbol of high quality, more popular, and forms a certain degree of popularity and reputation in the minds of consumers. Especially in today's mature communication technology, information is easier to spread, and product flow is convenient and fast. GI products have a larger potential market and it is easy to form regional brands [21,22]. On the other hand, GI has an "agglomeration effect". The effective use of GI can promote the formation of scale effects and good reputation of regional characteristic industries, and form the competitive advantage of regional characteristic industries driven by the marketing effect [23,24]. The local factors of production are initially gathered based on the resource endowment advantages of regional characteristic industries [25]. Along with the growth of GI products and the expansion of market influence, these elements have been accumulated continuously and the degree of specialization has been improved. Specialized institutions for the division of work and cooperation have been gradually developed around GI. Production costs have been reduced, labor productivity has been improved, and agricultural industrial clusters have been gradually formed.

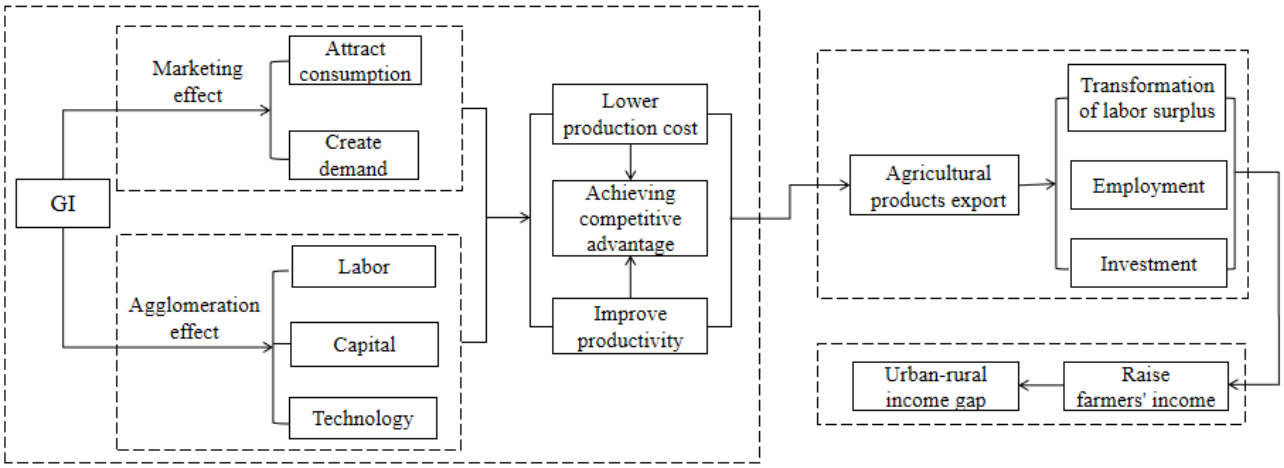

Figure 1. GI, agricultural products export and urban–rural income gap mechanism diagram.

According to international trade theory, the reason for trade between countries is the price difference. This difference is determined by production costs and production efficiency, which are considered to be determined by factors such as technology, resource endowment, supply and demand conditions in the domestic market [26]; brand as an important intangible asset is an important element of participation in domestic production. The GI brand is a special brand asset accumulated under the conditions of regional characteristic agricultural resource endowment or institutional culture, and its "marketing effect" and "agglomeration effect" effectively promote lower production costs and higher production efficiency, thereby facilitating the formation of sustainable competitive advantages for regional agricultural industries [27,28]. Many studies have demonstrated that GI can promote agricultural exports. Agostino and Trivieri used data from France, Italy, and Spain to investigate whether the designation of the production area has a positive pay-off in terms of greater export values, volumes and presence in different export markets, and found that quality wines produced in specified regions (QWPSR) are associated with higher export values [17]. Xu et al. based their research on the provincial panel data to examine the impact of GI certification on the technical complexity of China's export agricultural products. The result shows that GI certification can significantly improve the technical complexity of export agricultural products and the positive spillover effect of GI on the export of agricultural products is strengthened as the level of the technical complexity of products increases [16]. Therefore, building GI with a strong brand effect can gain more recognition in the world, enhance the advantages of domestic product trade, and promote agricultural exports. Based on this, this paper proposes hypothesis 1.

Hypothesis 1. *GI can significantly promote agricultural product export*.

The issue of the urban–rural income gap has long been a concern for policymakers and scholars, and some studies proved that the urban–rural income gap contributes to 40%–60% of the overall income gap in China [29]. It is generally believed that the transfer of rural labor and the acquisition of credit are conducive to the reduction of the urban–rural income gap [30,31] and it is clear that the key to reducing the urban–rural income gap is to raise the income of rural residents. Agricultural products export can increase farmers' income, thus helping to narrow the urban–rural income gap. On the one hand, the export of agricultural products is an important channel to expand the demand market, which can promote the transformation of the labor surplus of rural residents. In particular, high-quality agricultural products have higher added value and higher consumer loyalty and can expand the effective foreign market demand. On the other hand, the demand created by the export of agricultural products will lead to an increase in supply, thus driving employment and investment in the export sector [32]. This can help to raise their labor income [18], thus helping to narrow the urban–rural income gap.

GI branding can narrow the income gap between urban and rural areas. Firstly, the branding of GI can significantly increase the sales of GI agricultural products and attract the concentration of production factors, helping to form economies of scale. The formation of a scale economy can reduce production costs and improve production efficiency [33], which can increase farmers' income. Secondly, the branding of GI enhances the image of GI products and can significantly expand consumer demand for GI products. The change in supply and demand for GI agricultural products can lead to an increase in price, and the sales income of agricultural products, as an important source of income for farmers, will increase due to the increase in the price of GI products [15], thus helping to reduce the urban–rural income gap. Finally, GI agricultural products that can meet the market demand will have more competitive advantages, which can attract more agricultural labor. This helps to change the employment structure and expand the scale of employment, thus increasing the income of farm households and reducing the urban–rural income gap. Based on this, this paper proposes hypothesis 2.

Hypothesis 2. *GI can significantly reduce the urban–rural income gap, and agricultural products export act as the mediating effect*.

3. Study Design

3.1. Research Methodology

3.1.1. Spatial Autocorrelation Analysis

To explore the spatial dependence of the urban–rural income gap, concerning relevant studies [34,35], this paper applies the global Moran's I index for spatial autocorrelation test. The global Moran's I is used to test the overall spatial autocorrelation of spatial factors and their attributes within the study area and can explain the spatial agglomeration characteristics of the study factors and their evolutionary trends. The calculation formula is

$$I = \frac{n\sum_{i=1}^{n}\sum_{j=1}^{n} W_{ij}(y_i - \overline{y})(y_j - \overline{y})}{\sum_{i=1}^{n}\sum_{j=1}^{n} W_{ij}\sum_{i=1}^{n}(y_i - \overline{y})^2} \quad (1)$$

where n refers to the number of spatial cells, W_{ij} is the spatial weight matrix, 0–1 matrix is used in this paper, y_i, y_j are observations, and $\overline{y}$ is the mean value.

3.1.2. Spatial Econometric Models

The spatial spillover effect of the urban–rural income gap has been confirmed by many studies, so this paper uses a spatial panel model to examine the impact of GI on the urban–rural income gap and its spatial spillover effect. The spatial Durbin model (SDM) is as follows.

$$\log gap_{it} = \beta_0 + \rho W \times \log gap_{it} + \beta_1 \log gi_{it} + \rho_1 W \times \log gi_{it} + \sum \eta \log X_{it} + W \times \sum \rho_3 \log X_{it} + \varepsilon_{it} \quad (2)$$

where W is the spatial weight matrix, $W \times loggap_{it}$ is the spatial lagged variable of the urban–rural income gap, $W \times loggi_{it}$ is the spatial lagged variable of GI, and $W \times logX_{it}$ is the spatial lagged variable of control variables. The SDM examines both the impact of the urban–rural income gap in neighboring areas on the urban–rural income gap in the region and the impact of influencing factors in neighboring areas on the urban–rural income gap in the region.

3.2. Variable Selection and Measurement

In this paper, we obtained the original data of Chinese GI from the Trademark Office under the former State Administration for Industry and Commerce, and the data on agricultural products exported from the Ministry Of Commerce of China; the agricultural product classes are presented in the Appendix A. Other data are obtained from the statistical yearbook of each province and the data published by the National Bureau of Statistics. Variable information is shown in Table 1.

Table 1. Variable selection and indicator description.

Variables	Meaning	Unit	Expected Sign
Urban–rural income gap (*loggap*)	Thiel index	%	
Geographical indication (*loggi*)	Number of GI trademarks	Hundreds	-
Agricultural product export (*logtrade*)	The value of agricultural product export	10 billion	-
Education expenditure level (*logedu*)	The ratio of financial expenditure on education by provinces to general budget expenditure by provinces	%	+
Industrial structure upgrading (*logind*)	The ratio of the output value of the tertiary industry to the output value of the secondary industry	%	-
Population density (*logpeople*)	The ratio of land area to year-end resident population	Hundred hectares	-
Aging level (*logold*)	The ratio of the elderly population to the working-age population	%	+

3.2.1. Explanatory Variable

Urban–rural income gap (*loggap*). There are four main proxy indicators of the urban–rural income gap in the existing literature, namely, the ratio of disposable income of urban residents to the net income of rural residents, the ratio of per capita consumption expenditure of urban residents and rural residents, the Thayer index, and the Gini index. [34,35]. The Thiel index not only takes into account the influence of disposable income, but also the demographic structure, which can give a more comprehensive consideration of the urban–rural income gap. So, this paper chooses the Thiel index as a proxy variable. The lower the index, the smaller the urban–rural income gap.

3.2.2. Key Explanatory Variable

Geographical Indication (*loggi*). There are different practice models for the protection system of GI. In China, the former General Administration of Quality Supervision, Inspection, and Quarantine (AQSIQ), the former Ministry of Agriculture (MOA), and the Trademark Office under the former State Administration for Industry and Commerce (SAIC) administer GI of origin, GI of agricultural products, and GI trademarks, respectively, and the number of GI trademarks are used in this article to measure GI.

3.2.3. Mediating Variable

Agricultural product export (*logtrade*). The indicator for agricultural product export is measured by the value of agricultural product export, obtained from the Ministry Of Commerce of China. Since the original data are all in thousands of dollars, in this paper, the annual average exchange rate is used to convert the agricultural product export (thousands of dollars) into a comparable proxy variable for agricultural product export.

3.2.4. Control Variables

Education expenditure level (*logedu*): The impact of education investment on the level of human capital has changed the employment situation [36]. A highly educated workforce tends to be able to perform jobs with high incomes that are not easily replaced, while a less educated workforce can only perform simple labor that is easily replaced and has a lower level of income. However, due to the lack of social security, low family income, and the lack of the concept of poverty alleviation through education, the residents in rural areas spend less on their children's education, which, to some extent, restricts the accumulation of human capital in rural areas [36]. What is more, rural education resources are relatively scarce in comparison to urban areas in China. Increasing the gap in education levels may further widen the urban–rural income gap. Therefore, this paper uses the ratio of financial expenditure on education by provinces to general budget expenditure by provinces as a proxy variable for the education expenditure level.

Industrial structure upgrading (*logind*): Industrial structure upgrading is conducive to the flow of labor factors between industries, and the difference of labor remuneration in different production sectors can prompt the flow of rural labor to secondary and tertiary industries, thus raising the income level of farmers [37]. On the other hand, the transformation and upgrading of industrial structures is conducive to promoting the development of agriculture in a more efficient direction, promoting the modernization of agriculture and raising the income level of farmers, which can help to narrow the income gap between urban and rural areas. Therefore, the proportion of the output value of the tertiary industry to the output value of the secondary industry is chosen to measure industrial structure upgrading in this paper.

Population density (*logpeople*): The population density of a region reflects the intensity of its economic activities [38]. After the reform and opening up, many rural surplus laborers have entered the cities to engage in socio-economic activities with the main purpose of earning a living. Due to the positive externalities of knowledge and skills in labor intensive areas, the low-skilled labor force, especially the rural surplus labor force, have more learning opportunities and are able to raise their incomes, thereby reducing the urban–rural income gap. Therefore, the ratio of land area to year-end resident population is chosen to measure population density in each province.

Aging level (*logold*): On the one hand, social security expenditure in China tends to be urbanized and the transfer income of urban residents is higher than that of rural residents [36]. So, the income of the urban elderly population is higher compared to the rural elderly group, which exacerbates the urban–rural income gap. On the other hand, as most of the urban population are engaged in high-skilled jobs, there may be a positive increase in age and wages, while most of the rural labor force is engaged in low-skilled jobs, facing a decline in income with age, so aging will increase the urban–rural income gap. Therefore, the ratio of the elderly population to the working-age population is chosen to measure the level of aging level in each province.

3.3. Descriptive Statistics

This paper uses statistical data from 2008–2019 for 31 provinces, and the results of descriptive statistics and collinearity tests for each variable are conducted before the regressions. Generally speaking, taking logarithms of the data will not change the nature and relationship of the data, and it is easy to eliminate the heteroskedasticity problem of the data, so the logarithmic processing of each variable is carried out. The descriptive statistics of each variable are shown in Table 2. The results show that there are no extreme outliers in all the variables, the data fluctuate normally, and the smoothness is good. What is more, the variance inflation factor of all variables is less than five, indicating that there is no serious collinearity problem.

Table 2. Descriptive statistical results of main variables.

Variables	Sample Size	Average	Standard Deviation	Minimum	Maximum	vif
loggap	372	−2.361	0.564	−3.936	−1.363	-
loggi	372	−0.490	1.110	−2.813	2.555	1.85
logtrade	372	−0.608	1.503	−5.347	2.513	2.41
logedu	372	−1.829	0.169	−2.313	−1.504	1.62
logind	372	0.00817	0.410	−0.694	1.643	1.22
logpeople	372	3.901	1.461	1.200	8.323	2.36
logold	372	2.576	0.237	1.902	3.170	1.84

4. Results Analysis

4.1. Spatial Feature Analysis

The spatial and temporal distribution patterns of GI, agricultural product export, and the urban–rural income gap are shown in Table 3. Firstly, the spatial differences in urban–rural income gap are obvious, showing an overall "east middle west" step by step increase. The urban-rural income gap in eastern provinces is small, while that in western regions is the largest. Over time, the urban-rural income gap in 2019 narrowed significantly compared to 2008, and the imbalance was reduced. Secondly, agricultural product export varies greatly, mainly concentrated in the eastern region, which accounts for more than two-thirds of exports, followed by the central and western regions. As time goes by, the export value of all regions increased in 2019 compared to 2008, with the fastest growth in the west, followed by the central and eastern regions, but the differences are still relatively obvious. Finally, there are significant regional differences in the level of GI, with more in the east and least in the west overall. The overall level of GI has increased significantly over time, but the imbalance in spatial distribution has widened sharply. The eastern region is significantly better than the central and western regions on the whole.

Table 3. The development degree of GI, agricultural product export, and urban–rural income gap in 2008 and 2019.

Region	Urban–Rural Income Gap		Agricultural Products Export		GI	
	2008	2019	2008	2019	2008	2019
East	0.088	0.053	1.973	3.608	0.390	5.047
Mid	0.128	0.074	0.372	0.853	0.215	1.714
West	0.199	0.111	0.271	0.641	0.182	1.558

4.2. Spatial Correlation Analysis

To explore the spatial dependence of the urban–rural income gap, this paper applies the global Moran's *I* index for spatial autocorrelation test (Formula 1). The global Moran's *I* is used to test the overall spatial autocorrelation of spatial factors and their attributes within the study area, which can explain the spatial agglomeration characteristics of the study

factors and their evolutionary trends. The Moran's *I* ranges from [–1,1], with values greater than 0 being positive correlation, less than 0 being negative correlation, and equal to 0 being no correlation. Table 4 shows that Moran's *I* are in the range of 0.22–0.32 and the z-scores are all greater than 3.68, $p < 0.01$, indicating that the urban–rural income gap has positive spatial correlation and presents the spatial distribution characteristics of agglomeration. In the next hypothesis testing, we will also choose the spatial regression model to conduct regression analysis.

Table 4. Spatial autocorrelation results of the urban–rural income gap.

Year	I	z	*p*
2008	0.303	3.685	0.000
2009	0.302	3.684	0.000
2010	0.308	3.745	0.000
2011	0.309	3.764	0.000
2012	0.310	3.781	0.000
2013	0.311	3.794	0.000
2014	0.318	3.878	0.000
2015	0.318	3.871	0.000
2016	0.316	3.847	0.000
2017	0.218	2.817	0.002
2018	0.316	3.856	0.000
2019	0.320	3.904	0.000

4.3. Baseline Regression

4.3.1. Regression Model Selection

The results of the spatial autocorrelation analysis showed that the urban–rural income gap was significantly spatially correlated, so spatial dependence needs to be considered when conducting the regression analysis. To further discriminate the estimation effects of the SAR, SEM, and SDM, the LM test, LR test, and Hausman test are used for model selection. The LM test results show (Table 5) that the statistics are all highly significant, so the results support both the SAR and SEM models, and a more robust SDM model should be constructed. Subsequently, the LR test results show that the SDM model could neither degenerate into a SAR model nor a SEM model, so we chose the SDM model for regression. The *p*-value in the Hausman test rejects the original hypothesis of using a random model at the 10% significance level and accepts the alternative hypothesis of regression using a fixed effects model. Therefore, this paper uses the SDM model for regression under the fixed effects condition.

Table 5. LM, LR, and Hausman test results.

Model Type	Testing	Test Value
Spatial Error Model (SEM)	LM	43.482 ***
	Robust LM	12.470 ***
	LR	44.71 ***
Spatial lag model (SAR)	LM	36.786 ***
	Robust LM	5.774 **
	LR	45.05 ***

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

4.3.2. Variable Regression

In the SDM regressions under individual fixed, time fixed, and bivariate fixed (Formula 2), individual fixed works best, so the results of the SDM under individual fixed effects are chosen for analysis in this paper. To increase the robustness of the results, the SDM without the inclusion of control variables is constructed as a reference (Table 6).

Table 6. Variable regression results.

Variables	*loggap*	
	Model 1	**Model 2**
loggi	−0.152 ***	−0.153 ***
	(0.015)	(0.015)
logedu		0.022
		(0.087)
logind		−0.110 **
		(0.045)
logpeople		0.290
		(0.242)
logold		0.134
		(0.083)
$W \times loggi$	−0.014	−0.059 **
	(0.021)	(0.028)
$W \times logedu$		0.017
		(0.137)
$W \times logind$		0.175 **
		(0.079)
$W \times logpeople$		−0.562
		(0.400)
$W \times logold$		0.022
		(0.135)
rho	0.297 ***	0.281 ***
	(0.062)	(0.063)
sigma2_e	0.011 ***	0.011 ***
	(0.001)	(0.001)
N	372	372
R^2	0.733	0.749

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

(1) From R^2, model 2 with control variables has a better fit, which is higher than the fitting level of corresponding model 1, again demonstrating the usefulness of the selection of control variables. The spatial lag coefficients of model 1 and model 2 both pass the 1% significance level test, and the spatial effect is significantly positive, indicating that the urban–rural income gap has a more obvious spatial dependence. That means the reduction of the urban–rural income gap in neighboring regions will affect the reduction of the urban–rural income gap in the region. This reflects that changes in regional agricultural development factors caused by changes in the regional urban–rural income gap have a spatial spillover effect, which will promote changes in the urban–rural income gap in neighboring regions.

(2) From model 2, GI can contribute to reducing the urban–rural income gap at the 1% significance level. This result has a degree of similarity with the result of Poetschki [14], Vecchio [2] and others also affirmed the role of GI in the development of rural areas and its important role in increasing farmers' incomes. The new sample range of this paper further expands the scope of application of existing research conclusions. Development conditions in rural areas have always been weaker than those in urban areas, and this is especially true in the central and western regions. In the past, local governments focused on the overall benefits and neglected the partial benefits; there was a significant difference in the strength of their policies towards urban and rural areas, resulting in a growing gap between urban and rural areas. In recent years, national policies have attached great importance to the economic development of rural areas, and the application of GI has been taken as an important catch-up for the economy of rural areas. For example, in 2020, the Central Government's Document No. 1 pointed out that it should continue to adjust and optimize the structure of agriculture, strengthen the certification and management of GI agricultural products, create locally renowned brands of agricultural products, and increase the supply

of high-quality green agricultural products. In 2021, the No. 1 Document of the Central Government again proposed that the development of GI agricultural products must be emphasized in the promotion of the task of agricultural modernization and the revitalization of the countryside. The natural link between GI and rural farmers in agriculture also prompts that the expansion of GI trademarks can promote the growth of farmers' income, thus narrowing the urban–rural income gap. The first half of hypothesis 2 is validated.

(3) From the spillover effect of model 2, the GI of the neighboring regions can promote the reduction of the urban–rural income gap in the region at the 5% significance level. The possible reasons for this are: on the one hand, the economic effects of GI branding in the neighboring regions can attract more enterprises to move in, bringing more knowledge, skills, and management experience. These intangible elements, especially knowledge, have spillover effects [39], which can improve the knowledge and skills of farmers in the region and improve the quality of production, thus promoting the income of farmers and narrowing the urban–rural income gap. On the other hand, the pro-agricultural attribute of GI and the continuous improvement of infrastructure in neighboring regions can also promote the development of related industries, such as tourism, which may increase the level of population mobility in the region and help to better play the role of GI in the region, promoting consumption and increasing the income of farmers. What is more, the region can also provide supporting facilities for neighboring areas to promote the increase of employment, thus narrowing the urban–rural income gap.

In order to further explore the impact of GI and related control variables on the urban–rural income gap, a partial differential is obtained to decompose the impact of GI and control variables on the urban–rural income gap into direct effect, indirect effect, and total effect, as shown in Table 7.

Table 7. Direct effect, indirect effect, and total effect of GI.

Variables	Direct Effect	Indirect Effect	Total Effect
loggi	−0.160 ***	−0.133 ***	−0.293 ***
	(0.015)	(0.028)	(0.029)
logedu	0.020	0.032	0.053
	(0.083)	(0.176)	(0.191)
logind	−0.095 **	0.185 *	0.090 **
	(0.044)	(0.103)	(0.118)
logpeople	0.255	−0.590	−0.335
	(0.222)	(0.485)	(0.458)
logold	0.139 *	0.078	0.217
	(0.079)	(0.157)	(0.159)

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, standard errors are in parentheses.

Among them, the direct effect refers to the impact of changes in GI and control variables on the urban–rural income gap in the province. The estimated result shows that the direct effect coefficient of GI is −0.160, which indicates that the construction of GI brand will help to narrow the urban–rural income gap, and the urban–rural income gap will decrease by 0.160 units for each unit of GI. The indirect effect refers to the impact of GI and control variables in neighboring regions on the urban–rural income gap in the region. The estimated result shows that the indirect effect coefficient of GI is −0.133, which indicates that the construction of GI brand in neighboring areas will help to narrow the urban–rural income gap in the region, and the urban–rural income gap in the region will decrease by 0.133 units for each unit of GI in neighboring areas. The total effect is the sum of the direct effect and indirect effect.

4.4. Robustness Test

In order to further verify that GI can reduce the urban–rural income gap, this paper will change the proxy variable of urban–rural income gap to test the robustness of the results, using the ratio of urban residents' per capita disposable income to rural residents'

per capita disposable income. The higher the value, the greater the urban–rural income gap. Due to the lack of data on rural residents' per capita disposable income before 2013, the net income per rural resident is used instead, and the results are shown in Table 8. From R^2, model 4 has a good degree of fit, and the fitting level is higher than that of corresponding model 3. The first half of hypothesis 2 is again tested. GI is able to reduce the urban–rural income gap at the 1% significance level.

Table 8. Robustness test.

Variables	*loggap*	
	Model 3	**Model 4**
loggi	−0.031 ***	−0.036 ***
	(0.005)	(0.005)
$W \times loggi$	−0.000	−0.022 **
	(0.006)	(0.010)
Control variables	No	Yes
rho	0.643 ***	0.595 ***
	(0.044)	(0.048)
sigma2_e	0.001 ***	0.001 ***
	(0.000)	(0.000)
N	372	372
R^2	0.724	0.750

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

4.5. Mediating Effect Test

The previous article verified that there is a significant contribution of GI branding to the reduction of the urban–rural income gap, so is there a channel for this effect? As a symbol of high quality, GI products can form a stronger competitive advantage in foreign trade and promote the level of agricultural export trade, thus narrowing the urban–rural income gap. In view of this, this paper explores the mediating effect of agricultural products export in the construction of GI brand and the urban–rural income gap (Table 9). In the mediating effect test, this paper mainly adopts the stepwise regression method and bootstrap test, and the stepwise regression model is constructed as follows.

$$\log gap_{it} = \alpha_1 + \varphi_1 \log gi_{it} + \sum \theta_j \log X_{it} + \varepsilon_{1it} \quad (3)$$

$$\log trade_{it} = \alpha_2 + \varphi_2 \log gi_{it} + \sum \varphi_j \log X_{it} + \varepsilon_{2it} \quad (4)$$

$$\log gap_{it} = \alpha_3 + \varphi_3 \log gi_{it} + \varphi_4 \log trade_{it} + \sum \lambda_j \log X_{it} + \varepsilon_{3it} \quad (5)$$

4.5.1. Stepwise Regression Method

(1) From model 6 (Formula 4), GI can promote agricultural products export at the 1% significance level. The good reputation and unique competitive conditions of GI products can form a strong competitive advantage, and with the support of all parties, especially the government, they have more stable and formal supply channels for production and goods. It can help buyers judge the quality of products under the condition of asymmetric consumer information, especially when there is a certain physical and psychological distance between the buyer and the demander. It plays an important role in improving the level of agricultural products export. Hypothesis 1 is tested.

(2) Model 7 (Formula 5) shows that GI and agricultural products export have a negative impact on the urban–rural income gap at the 1% significance level. That means that they can contribute to the reduction of the urban–rural income gap. Based on the regression results of model 5 (Formula 3) and model 6, it can be seen that GI can reduce the urban–rural income gap through agricultural product export, and agricultural product export plays a part in mediating role. GI branding can enhance the competitiveness of GI products and

promote the agricultural product export trade; while the products enter the international market, the original conditions of production and consumption of GI are no longer suitable for the expanded new market (domestic and international market). This will lead to the replacement of smallholder production practices by large-scale mechanized production and standardized management. This is conducive to the formation of scale effect and the provision of more jobs to promote an increase in farmers' income. The second point is that the scarcity of GI will change the relationship between supply and demand when the market expands and demand increases dramatically, resulting in higher prices, which will increase farmers' income and thus reduce the urban–rural income gap. Hypothesis 2 is tested.

Table 9. The result of mediating effect test.

Variables	Model 5	Model 6	Model 7
	loggap	***logtrade***	***loggap***
loggi	−0.201 ***	0.224 ***	−0.170 ***
	(0.023)	(0.079)	(0.022)
logtrade			−0.135 ***
			(0.032)
logedu	−0.031	−0.064	−0.040
	(0.108)	(0.350)	(0.082)
logind	−0.126	0.099	−0.113 *
	(0.080)	(0.300)	(0.058)
logpeople	0.373	0.985	0.505
	(0.460)	(1.013)	(0.420)
logold	0.122	0.001	0.122
	(0.115)	(0.272)	(0.099)
_cons	−4.284 ***	−4.460	−4.884 ***
	(1.515)	(3.663)	(1.403)
N	372	372	372
R^2	0.721	0.294	0.751
Bootstrap inspection	Indirect effects	95% confidence interval	
	−0.030 ***	−0.043	−0.017
	Direct effects	95% confidence interval	
	−0.170 ***	−0.195	−0.146

Note: * $p < 0.1$, *** $p < 0.01$, standard errors are in parentheses.

4.5.2. Bootstrap Test

The direct and indirect effects in the bootstrap test are both significant, with confidence intervals not containing 0. The mediating effect of agricultural products export on the GI and the urban–rural income gap is also verified, and agricultural product export plays a partially mediating role. Hypothesis 2 is again tested.

5. Conclusions and Recommendations

5.1. Conclusions

In the context of China's vigorous promotion of the rural revitalization strategy, it is important to seek multiple and high-quality development paths. As an important intangible asset, GI is deeply involved in regional economic production. Many studies have demonstrated the effect of GI on agricultural products in promoting distinctive and high-quality development of agricultural industries, but less attention has been paid to the effect of GI in driving down the urban–rural income gap and its realization path. Based on panel data from 2008–2019 for 31 provinces in China, this paper explores the relationship between GI and urban–rural income gap, and the mediating effect of agricultural product export through the spatial econometric model SDM. The main findings of the study are as follows. Firstly, 2008–2019 data show that GI can narrow the urban–rural income gap. The pro-agricultural qualities of GI have become the focus of narrowing the urban–rural gap in today's rural revitalization. The application of GI in rural areas can form new growth points and receive more support, thus narrowing the urban–rural income gap. Secondly,

data from 2008–2019 show that an increase in the number of GIs can significantly boost agricultural products export. The marketing effect of GI can more easily establish the visibility and reputation of GI products. At the same time, GI has unique competitive advantages that are difficult to replicate, and its agglomeration effect has gained more support and attention from the government and foreign capital, which promotes the strong ability of GI branding. The branding of GI can form a stronger competitive advantage in foreign trade and promote the improvement of the agricultural product export trade. Thirdly, 2008–2019 data show that GI can narrow the urban–rural income gap through agricultural product export. GI branding can easily form a scale effect, employment effect, and price effect in the agricultural products export, which can promote employment level, agricultural production efficiency, and price advantage of agricultural products, thus raising farmers' income and narrowing the urban–rural income gap.

5.2. Recommendations

The characteristics of GI are already destined to become an important factor in the process of rural revitalization in China. How it can play a role in raising farmers' incomes and narrowing the urban–rural income gap is an issue that cannot be ignored, especially in the process of globalization. Based on the above research, the main recommendations of the study are as follows.

(1) Strengthen the management and protection of GI, and effectively enhance the role of GI in the urban–rural income gap. The protection of GI has always belonged to a state that can be strict or lax. If we want to promote the positive role of GI in narrowing the urban–rural gap, we must establish a clearer protection law at the overall level of China. In addition to stricter legal protection, the government needs to develop a comprehensive management system. A few years ago, "Xiaoyao Town" and "Tongguan Rougamo" were ordered by the State Intellectual Property Office to stop charging franchise fees. There has always been a phenomenon that local associations or relevant institutions use GI to collect "protection fees". This chaotic market state is not conducive to the benign development of GI, which may damage the reputation of GI and create a crisis in which a few people benefit and most people are poor.

(2) In the process of opening up to the outside world, more actively "marketing" GI products can enhance the popularity of GI, reduce the distance to foreign consumers, and promote the level of export trade of GI products. Many tangible products and intangible qualities have become "trappings" of China's opening-up process, and China has increased the exposure of these products in intercountry exchanges. For example, China's high-speed railways have gone global in the Belt and Road, and have been well received. If we can take GI products as the finishing touch in the process of national diplomacy or opening up, it will certainly increase the attention of foreign consumers. It helps to form a positive impression, improve the psychological distance between products and consumers, and promote the level of export trade of GI products, which in turn will drive the economic development of the relevant regions and narrow the income gap between urban and rural areas.

(3) Actively promote the international mutual recognition and protection of GI. GI products have good cost advantages and production efficiency advantages that shape the competitive advantages of GI products. It can help GI products to compete in a larger market and gain revenue through agricultural trade, helping farmers to increase production and income, and reducing the income gap between urban and rural areas. However, the prerequisite for such trade is that GI products are recognized by the international market, and international mutual recognition and protection is the guarantee for GI products to go abroad. Therefore, in the process of GI protection and application, we should actively promote international mutual recognition and protection, implement orderly agreements related to GI intellectual property rights, create the institutional advantage of "blood-making" rural revitalization by protecting GI property rights, and transform the institutional advantage into brand advantage, industrial advantage, and regional economic development advantage.

5.3. Limitations and Future Research

Similar to all empirical studies, this research has certain limitations. Although this paper discusses the role of GI in increasing farmers' income and narrowing the urban–rural income gap in more detail, the sample data are mainly at the provincial level, which may lead to the omission of some more detailed information. If we consider multi-level samples and various methods, we may reveal more internal logic and put forward more constructive suggestions for rural development. Therefore, in the future, we can explore from more levels and methods, such as using county-level data or individual questionnaire data for analysis, or using a case study method to improve the role of GI in rural development in the reduction of the urban–rural income gap.

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Appendix A

Table A1. The agricultural product classes.

Number	Class	Number	Class
1	Live animals	15	Vegetable plaiting materials
2	Animal meat and meat offal	16	Animal or vegetable fat oils and their cleavage products
3	Poultry meat and meat offal	17	Preparations of meat
4	Aquatic and marine products	18	Preparations of aquatic products
5	Dairy produce, birds' eggs, natural honey and edible products of animal origin, not elsewhere specified or included	19	Sugars and sugar confectionery
6	Products of animal origin, not elsewhere specified or included	20	Cocoa and its products
7	Live trees and other plants, and flowers	21	Preparations of cereals, grain flour, starch, pastrycooks' products
8	Edible vegetables	22	Preparations of vegetables, fruit, nuts, and other products
9	Edible fruit and nuts	23	Miscellaneous food
10	Coffee, tea, mate, and spices	24	Beverages, spirits, and vinegar
11	Cereals	25	Residues and waste from the food industries, prepared animal fodder
12	Products of the milling industry	26	Tobacco and its products
13	Oilseeds, industrial or medicinal plants, thatch, straw, and feed	27	Other agricultural products
14	Vegetable saps and extracts		

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