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The Influence of the Urban-Rural Income Disparity on the Industrial Structure—Taking the Yangtze River Delta Region as an Example

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Abstract

In this paper, the effect of the mediation effect is mainly used to test and analyze the regression model, and most scholars have studied the impact of the modernization of the industrial structure on the income gap. However, this paper is from another perspective, based on the social background of high-quality development, the main study is the impact mechanism of urban and rural income gap on the industrial structure, taking the Yangtze River Delta as the main research object, and specifically selecting 22 central cities in the Yangtze River Delta region, which is also one of the highlights of this study. The regression model is constructed by using the intermediary effect, and the four intermediary variables of fiscal expenditure (M_1), fixed asset investment (M_2), number of patent applications (M_3), and total import and export (M_4) are selected, which represent the role of the government, fixed asset investment, scientific and technological level and opening-up level, and study and analyze the inherent influence mechanism between each variable. Before doing specific research, I consulted the papers and literature of many other outstanding scholars, among which Cheng Yuhong and Cheng Chi's "The Influence Mechanism of industrial structure of urban and rural income gap" [1] has great reference value for this paper. According to the research results, under the background of high-quality development in the Yangtze River Delta region, the expansion of the income gap between urban and rural areas will inhibit the upgrading of the industrial structure, so it is necessary to focus on building a new type of urbanization, accelerating the construction of an urban innovation system, optimizing the rural employment structure to narrow the income gap between urban and rural areas, and providing impetus for the continuous upgrading of the industrial structure.

Keywords

Income Gap Between Urban and Rural Areas, Industrial Structure Upgrading,

High-Quality Development, Normalization of the Epidemic, Yangtze River Delta Region, Mediation Effect Model, SPSS

1. Introduction

At present, China has entered a stage of high-quality development, the so-called high-quality development is to take the quality and efficiency of development as the center, to better meet the people's needs for a better life. Therefore, building a new development pattern and optimizing the upgrading of the industrial structure are very critical to the current development. Since the impact of the new crown pneumonia epidemic in 2020, many industries and fields have been seriously impacted, and the industrial structure has also faced a severe test of optimization and upgrading. At present, under the normalization of the epidemic, the Chinese government has taken active and effective measures to achieve remarkable results in fighting the epidemic, and the current development pattern is basically stable. However, with the development of society, science and technology the demand of farmers has decreased, the primary sector is overpopulated and the agricultural population is moving to the secondary and tertiary sectors to contribute to the modernisation of agriculture. The secondary industry is large but needs to be strengthened, and many high-end technologies and key technologies in important areas have been imported from abroad. So there is an overcapacity on the one hand and a large demand for total imports on the other. Secondly, there are many labour-intensive enterprises and the proportion of the tertiary industry is too small, which should be fully supported and developed in a coordinated manner, mainly by training innovative talents. However, the structural upgrading of employment is still being tested as many people are facing unemployment and wage cuts due to the epidemic still existing. The foreign research context is specifically manifested in the fact that the developed Western countries, such as the United States, have a huge gap between the rich and the poor, and the decline in the growth rate of the manufacturing sector has not only led to a decline in US economic growth, but has also become one of the main reasons for the gradual increase in the US foreign trade deficit. From 1960 to 2018, the growth rate of the US manufacturing sector was gradually lower than the growth rate of GDP, and the growth of the US economy gradually entered the growth-driven mode of business and social services. As manufacturing growth slowed, the growth rate of the US economy gradually declined from 5% to around 3%. The contribution of US commodity production to GDP growth has also fallen sharply as a result of the declining share of manufacturing output. Over the past two decades, bubbles in the information, financial and real estate sectors have had a very bad impact on the performance of the US economy. In the years leading up to the global outbreak of the COVID-19 new crown epidemic, health and social care was the largest output of the US social services

sector, and the rapid growth in the value of production in the treatment services sector also led to a rapid rise in labour costs, which also limited the growth of manufacturing and basic services. Throughout the background of domestic and international research, economic production has been directly or indirectly affected globally as a result of the New Crown pneumonia outbreak, and what we can intuitively sense is that the tertiary sector is undoubtedly the one most affected by the outbreak.

Over the years, many experts and scholars have conducted studies on the income gap between urban and rural residents. Analysis has shown that the widening income gap that emerged since the reform and opening-up [2], the income gap that has emerged has widened to the current reversal; in general, with the proposal of the rural revitalization strategy, the income gap between urban and rural areas is gradually narrowing, the income growth rate of rural residents is fast [2], and the happiness index of rural residents is gradually improving. However, the excessive income gap between urban and rural residents in some areas still exists, so the rural revitalization strategy still needs to be promoted, and the development of poverty alleviation areas needs continuous attention.

Due to the current development needs of China, the optimisation and upgrading of industrial structure is very crucial. Therefore, there are an increasing number of analytical studies on industrial structure upgrading and income disparity. According to other scholars' studies, it is found that industrial structure optimization and upgrading can promote the development of urbanization, which is conducive to narrowing the income gap between urban and rural residents. [3] However, so far, not many experts and scholars have explored in depth whether the urban-rural income gap will have some kind of intrinsic influence mechanism on the upgrading and optimisation of industrial structure, so this paper conducts a specific study from that perspective.

The main issue that this paper aims to address is to analyse and explain the impact of the urban-rural income gap on the industrial structure of the Yangtze River Delta region from a macro perspective in the context of high-quality development. Through mediating variables, it will explore the intrinsic influencing mechanisms between the two, and thus offer policies and recommendations of practical significance on the issues of income distribution, employment, and technological innovation.

2. Theoretical Basis

2.1. Model Introduction

In our study, we studied the effect of the independent variable X on the dependent variable Y, obtained the actual or theoretical relationship between X and Y, and then tried to explore the internal mechanisms or principles of the relationship between them. Considering the effect of the independent variable X on the dependent variable Y, if X affects Y by influencing the variable M, M is called the mediating variable [4]. **Figure 1** is a schematic of the mediation effects model.

The establishment of the mediation model consists of three steps:

Model 1: Regression analysis of independent and dependent variables

$$Y = qX + e_1 \tag{1}$$

Model 2: Independent and mediating variables work together to return to the dependent variable

$$M = mX + e_2 \tag{2}$$

Model 3: Independent variables and intermediary variables return; if there are multiple intermediary variables, hierarchical regression is required

$$Y = q'X + nM + e_3 \tag{3}$$

The model description is as follows (**Figure 2**):

Where the coefficient q of Equation (1) is the total effect of the independent variable X on the dependent variable Y; The coefficient m of Equation (2) is the effect of the independent variable X on the intermediary variable M; The coefficient n of equation (3) is the effect of the mediating variable M on the dependent variable Y after controlling the influence of the independent variable X. [4] The coefficient q' is the direct effect of the independent variable X on the dependent variable Y after controlling the influence of the mediating variable M; e_1 to e_3 is the regression residual [4]. For such a simple mediation model, the mediation effect is equal to the indirect effect, that is, equal to the coefficient product mn, which has the following relationship with the total effect and the direct effect

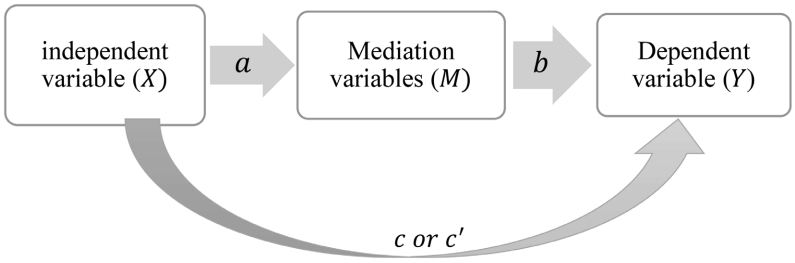

Figure 1. Schematic of the mediation effect.

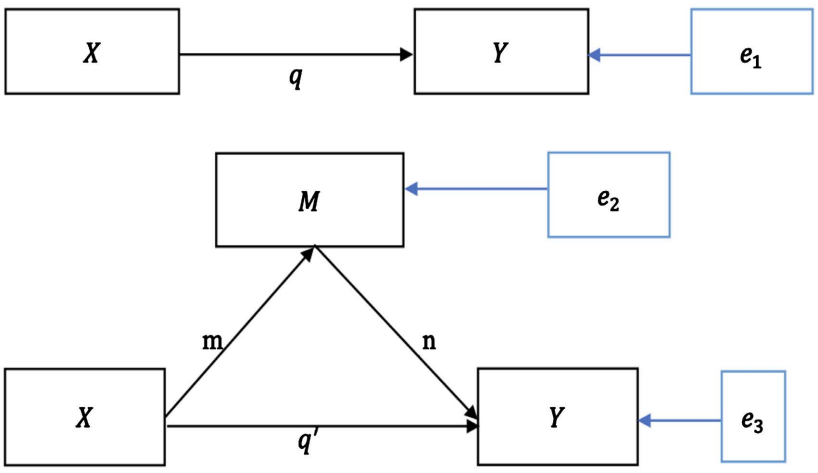

Figure 2. Model flowchart.

(MacKinnon, Warsi, & Dwyer, 1995): [4]

$$q = q' + mn \tag{4}$$

2.2. Statistical Tests

The mediation effect includes parallel mediation and chain mediation; if there is a mutual influence between the mediation variables, then the chain mediation model can be used for analysis.

2.2.1. Step by Step Test Regression Coefficients

1) The coefficient q of Equation (1) is called the total effect of the independent variable X on the dependent variable Y;

2) The coefficient m of Equation (2) represents the relationship between the independent variable X intermediary variable M;

3) After fixing the mediating variable M, the coefficients q' and the coefficient n in Equation (3);

The equation is judged to be significant based on:

First, the coefficient q is significant, that is, $H_0 : c = 0$ rejected.

Second, the coefficient m is significant, that is, the $H_0 : m = 0$, is rejected, and the coefficient n is substantial, that is, $H_0 : n = 0$, rejected.

If both conditions are met, the mediation effect is described as significant.

If both conditions are satisfied, the coefficient q' is not significant in Equation (3); then it is called a fully mediating effect.

2.2.2. Sobel Test

Sobel testing is also currently more commonly used than the test method, the test statistic is $z = m\hat{}n\hat{}/S_{mn}$, thereinto $m\hat{}$ and $n\hat{}$ is the standard error of the estimates $m\hat{}n\hat{}$ for m and n, respectively:

$$se(mn) = \sqrt{m\hat{}^2 se_n^2 + n\hat{}^2 se_m^2} \tag{5}$$

se_m and se_n is the standard error of $m\hat{}$ and $n\hat{}$, respectively.

Simulation studies have shown that the test force of the Sobel method is greater than the test force of the sequential regression coefficient method (MacKinnon *et al.*, 2002; Wen Zhonglin *et al.*, 2004) [4]. That is, Sobel can exhibit more mediating effects than the first method, but if the results of both methods are significant, the test results are more robust than those of the Sobel test (Wen Zhonglin *et al.*, 2004) [4].

The statistical derivation of the product of the test coefficients requires the assumption that $m\hat{}n\hat{}$ follows the normal distribution, which is difficult to guarantee, because even if $m\hat{}$ and $n\hat{}$ follow the normal distribution, the product of the two cannot be guaranteed to follow the normal distribution, so the Sobel test also has some limitations.

The causal stepwise regression test is generally used in the Sobel test, as follows:

First, test the coefficient c; if the coefficient c is not significant, the indepen-

dent variable and the dependent variable do not conform to the mediating effect model, stop the mediation effect analysis; if the coefficient c is powerful, test the coefficient a and the coefficient b in turn:

If coefficients a and b are both significant, coefficients c' are tested, if coefficient c' is significant, the mediating effect is substantial, and if coefficient c' is not significant, it is called a completely mediating effect.

If at least one of the coefficients a and b is not significant, the Sobel test is executed, the mediation effect is significant if the test result is significant, and the mediation effect is not significant if the test result is important.

2.2.3. Bootstrap Test

Bootstrap also tests the theory about standard errors based on $H_0 : mn = 0$, treats samples with larger sample sizes as populations, and performs retraction sampling (if necessary, the sample size can be determined independently to obtain a more accurate standard error). For example, if you take a sample with a capacity of 5000 as the bootstrap population and then repeat the sample from there, you can get a bootstrap sample (the volume is still 5000). For these 5000 bootstrap samples, a product estimate of 5000 coefficients can be obtained, all recorded as mn, sorted from minimum to maximum, with the 2.5 percentile and 97.5 percentile forming a 95 percent confidence interval for mn; if this confidence interval does not include 0, the null hypothesis $H_0 : mn = 0$ is rebuffed, and the product of the coefficients is significant. [5]

The Bootstrap test is currently a more commonly used, and more effective test method, including causal stepwise regression test, product coefficient test, and causal stepwise regression improvement method three test methods; this paper will also use this method for model testing.

1) Bootstrap-product coefficient method

The principle of the product coefficient test is to test the significance of $a * b$; in the Bootstrap test, what is presented is the non-positive sampling distribution based on the intermediary effect, which is suitable for the mediating effect model of any size sample. The specific test method is whether the product $a * b$ of the regression coefficient a and the regression coefficient b contains the value 0 in the 95% confidence interval, and if the value 0 is not included in the 95% confidence interval, then this indicates that the model has a mediating effect; if it is in the 95% number interval, the value 0 is included, which means that the model does not have a mediating effect.

2) Bootstrap-causal stepwise regression improvement method

First, coefficient c is tested, and if coefficient c is significant, it conforms to the mediation effect model; if coefficient c is not significant, it is called the masking effect. Next, coefficient a and then the factor b is tested in turn:

a) If at least one of the coefficients a and b is not significant, the Bootstrap-product coefficient method is used, and if the test results are not significant, the introduction effect is not significant, and if the test result is significant, the indirect effect is significant.

b) If both the coefficients a and b are significant, the indirect effect is significant.

Indirect effects are significant, then continue to test the coefficient c':

a) If the test result of the coefficient c' is significant, then the direct effect is substantial; that is, there may be other mediating effects: if ab is the same as c' is called a partial mediation effect, it is explained according to the result of the mediation effect; if ab is not the same as c', it is called the masking effect, and the result of the uneasiness mediation effect is interpreted, and the report $|ab/c|$ analyzed according to this result.

b) If the test result of the coefficient c' is not significant, it means that the direct effect is not significant, and the model only contains the mediation effect.

3. Empirical Analysis

3.1. Data Sources and Standardized Processing

The Yangtze River Delta region is one of China's most dynamic, open, and innovative regions, an essential area for national modernization and wide opening-up, and its development has always been at the forefront of the whole country. In this article, 22 key cities in the Yangtze River Delta region are sampled, with data ranging from 2000 to 2020 and derived entirely from each city's statistics yearbook.

Taking 22 central cities in the Yangtze River Delta region as the research object [6], this paper collects indicators such as regional GDP (100 million yuan), urban and rural per capita disposable income (yuan), government financial expenditure (100 million yuan), fixed asset investment (100 million yuan), patent application volume (pieces), and total import and export volume (100 million U.S. dollars). Define these metrics as: The disparity in income among urban and rural areas-Disp, Fiscal expenditure-Fe, Investment in fixed assets- Ifa, Number of patent applications- Pat, Total import and export volume-Iae. The following is the first descriptive statistics of the collected data, mainly through the median, average, and standard deviation of the overall situation of the data, given the extensive data collected, covering 22 cities from 2000 to 2020, a total of 20 years of data. Therefore, only the date of 2000 and 2020 are selected for descriptive statistics. The collected data is sorted out in Excel, operated using SPSS software, and select in SPSS-Analyze-Descriptive Statistics-Frequency, the specific statistical results are as follows (**Table 1**).

Due to the significant differences in the nature, dimension, order of magnitude, and other characteristics of the collected research indicators, according to the descriptive statistical results, the extreme value gap between the selected hands is far, and the standard deviation is significant, that is, the number set fluctuates wildly and exceeds the controllable range. Then, if the hand is directly analyzed, it will have a great impact on the analysis results, so it is necessary to standardize the data, narrow the gap between several sets, and then generate variables. Here's how:

3.2. Variable Selection

All variables are redefined first. For the construction of the index of the upgrading level of the Y industrial structure, drawing on an article published by two scholars, Yuhong Cheng and Chi Cheng, in the journal "Exploration of Economic Issues", [1] the difference between the per capita disposable income of urban and rural areas and the number of patent applications in M_3 taken logarithmically, and the remaining three indicators of fiscal expenditure, fixed asset investment and total import and export are respectively taken from their respective proportions of the GDP of the region in that year (Table 2).

Table 1. Descriptive statistical results (1).

Index	Maximum (Max)	Minimum (Min)	Median	Mean	Standard deviation (Sta.)
The year 2000					
Disp	7753.00	3049.00	4349.00	4409.53	1099.23
Fe	622.84	6.11	26.82	57.88	119.83
Ifa	1869.67	25.14	177.51	280.36	390.03
Pat	11,318.00	18.00	404.00	1116.41	2322.91
Iae	69,308.00	2.05	23.82	3529.15	15,091.18
The year 2020					
Disp	41,513.00	16,733.00	28,165.00	27,825.58	5780.06
Fe	8102.11	182.49	863.89	1215.63	1519.85
Ifa	8837.48	516.87	4545.90	4280.30	2232.57
Pat	381,000.00	2947.00	42,973.00	69,311.27	82,473.97
Iae	1,633,419.00	1,633,419.00	770.99	83,189.61	355,653.59

Table 2. Variable names and functions.

Symbol	Variable name	Definition	Function
Y	Industrial structure upgrading grade index	The ratio of the first, second, and third industries to the GDP of the year is multiplied by 1, 2, and 3, respectively, and then summed.	
X	The disparity between urban and rural per capita discretionary income	The difference in income between urban and rural residents is logarithmic	
M_1	Fiscal expenditure	Fiscal expenditure as a percentage of GDP for the current year	Government functions
M_2	Investment in fixed assets	Fixed asset investment as a percentage of GDP for the current year	capital
M_3	Number of patent applications	The number of patent applications is logarithmic	Technological level
M_4	Total import and export volume	Total imports and exports as a percentage of GDP for the year	The level of opening-up to the outside world

On the determination of industrial structure upgrading indicators, the industrial structure upgrade coefficient can comprehensively determine the status of the three industries, allowing the industrial structure upgrade to be measured; scholars at domestically and overseas have various measurement methodologies [7]; this study draws on the research of Deyun Xu (2008), Min Xu (2015), the calculation method is as follows:

$$Y = \sum_{i=1}^{3} iq_i = 1 \times q_1 + 2 \times q_2 + 3 \times q_3 \tag{6}$$

Among them, Y represents the industrial structure upgrading indicators, q_1, q_2, and q_3 represent the indicator of the value addition of the primary, secondary and postsecondary industries to the regional GDP, respectively, and the increased the index, the greater the level of industrial structure upgrading.

After determining the variables, still, the processed data for statistical description, from the statistical results can be seen, in addition to the total import and export standard deviation is large, that is, the total import and export volume of each region is significantly different, but within the controllable range, the rest of the indicators are no outliers, in general, the next step of statistical analysis can be carried out, the following table is the result of the statistical description (due to the large span of 2000-2020 years, this paper only selects 2000, 2005, 2010, 2015 and 2020, Descriptive statistics were made for a total of 5 years) (**Table 3**).

3.3. Mediation Effect Modeling

The industrial structure upgrading grade index is Y, and the disparity between urban and rural per capita discretionary income is X

A total of four mediation variables are selected, as follows:

M_1- Fiscal expenditure (100 million yuan);

M_2- Investment in fixed assets (100 million yuan);

M_3- Number of patent applications (pieces);

M_4- Total imports and exports (Billions of dollars).

This paper mainly studies the impact of urban and rural income gaps on industrial structure upgrading [8]. In this process [9], there are many factors that will have a particular impact on industrial structure upgrading, so the mediation effect model is used to comprehensively select four intermediary variables to analyze whether it will play a "bridge" role.

This study uses SPSS software for econometric analysis, the construction of an intermediary model, because of the selection of an independent variable and four mediating variables, so according to the principle of mediation effect, this paper involves a total of six models, software analysis results, as shown in following **Table 4**.

After stepwise regression of each variable according to SPSS software, the regression coefficient and residual of each regression equation are obtained, as shown in **Table 4**, so the specific equations of the 6 regression models are as follows:

Table 3. Descriptive statistical results (2).

Variable	Maximum (Max)	Minimum (Min)	Median	Mean	Standard deviation (Sta.)
The year 2000					
X	3.889	3.233	3.622	3.619	0.138
M_1	0.252	0.036	0.054	0.069	0.045
M_2	1.703	0.050	0.303	0.360	0.309
M_3	0.146	0.003	0.026	0.036	0.033
M_4	0.130	0.004	0.049	9.735	44.379
The year 2005					
X	4.113	3.667	3.908	3.897	0.114
M_1	0.391	0.055	0.077	0.095	0.070
M_2	2.353	0.086	0.445	0.521	0.416
M_3	0.439	0.011	0.154	0.174	0.130
M_4	0.337	0.009	0.067	16.141	73.550
The year 2010					
X	4.257	3.913	4.134	4.120	0.092
M_1	0.526	0.079	0.106	0.137	0.092
M_2	1.921	0.145	0.604	0.632	0.367
M_3	1.788	0.232	0.775	0.816	0.355
M_4	0.328	0.011	0.081	22.829	104.132
The year 2015					
X	4.474	4.088	4.320	4.282	0.105
M_1	0.705	0.092	0.122	0.162	0.125
M_2	2.788	0.096	0.680	0.807	0.522
M_3	2.608	1.111	1.718	1.766	0.340
M_4	0.745	0.010	0.063	21.969	95.621
The year 2020					
X	4.618	4.212	4.448	4.415	0.108
M_1	0.770	0.093	0.130	0.166	0.135
M_2	2.892	0.087	0.647	0.731	0.577
M_3	4.916	1.333	2.935	2.889	0.754
M_4	1.347	0.013	0.074	23.437	106.225

Table 4. Mediation effect model tests.

Mediation Effects Model Test - Simplified Format						
	M_1	M_2	M_3	M_4	Y	Y
Constant	−0.371** (−5.541)	0.514** (2.764)	−7.200** (−20.387)	−265.307** (−2.997)	1.701 (0.427)	7.057 (1.215)
X	0.122** (7.462)	−0.098* (−2.114)	2.718** (30.824)	98.793** (3.521)	0.228 (0.234)	−1.754 (−0.949)
M_1		4.033** (32.104)	0.879* (2.059)	−108.062 (−1.390)		1.335 (0.264)
M_2			−0.331** (−3.765)	6.950 (0.429)		0.006 (0.006)
M_3				−28.888** (−3.405)		0.675 (1.208)
M_4						−0.000 (−0.034)
Sample size	461	461	461	461	461	461
R^2	0.108	0.708	0.702	0.033	0	0.004
Adjusted R^2	0.106	0.707	0.7	0.025	−0.002	−0.007
F value	$F(1, 459)$ = 55.679, p = 0.000	$F(2, 458)$ = 555.337, p = 0.000	$F(3, 457)$ = 358.461, p = 0.000	$F(4, 456)$ = 3.894, p = 0.004	$F(1, 459)$ = 0.055, p = 0.815	$F(5, 455)$ = 0.351, p = 0.882

*$p < 0.05$; **$p < 0.01$ The t value is contained within the parenthesis.

$M_1 \sim X$:

$$M_1 = -0.371 + 0.122X \tag{7}$$

$M_2 \sim X + M_1$:

$$M_2 = -0.514 - 0.098X + 4.033M_1 \tag{8}$$

$M_3 \sim X + M_1 + M_2$:

$$M_3 = -7.2 + 2.718X + 0.879M_1 - 0.331M_2 \tag{9}$$

$M_4 \sim X + M_1 + M_2 + M_3$:

$$M_4 = -265.307 + 98.793X - 108.062M_1 + 6.95M_2 - 28.888M_3 \tag{10}$$

$Y \sim X$:

$$Y = -1.701 + 0.228X \tag{11}$$

$Y \sim X + M_1 + M_2 + M_3 + M_4$:

$$Y = 7.057 - 1.754X + 1.335M_1 + 0.006M_2 + 0.675M_3 - 0.00 * M_4 \tag{12}$$

When the regression variable X and the mediation variable M are analyzed for regression, the regression model is obtained by hierarchical regression because there are multiple mediation variables. From the above six regression equations,

when the role of intermediary variables is not considered, the impact of urban and rural income gap X on industrial structure upgrading Y is positive, indicating that it means that the widening of urban and the rural income gap has a promoting effect on industrial structure upgrading [10].

After the addition of the intermediary variable, the impact of the urban-rural income disparity on the upgrading of the industrial structure becomes negative [2], which means that the widening of the income gap between urban and rural areas will have a restraining effect on the upgrading of the industrial structure [8]. Therefore, at present, it is impossible to determine the impact of the urban-rural income gap on the industrial structure [11], but it can be determined that the urban-rural income gap will have some impact on it during the upgrading process, and the mediation role model will be tested below to further to analyze its impact mechanism further.

3.4. Intermediate Effect Test Procedure

3.4.1. Effects Analysis

First, the stepwise regression coefficient is used to test; from the above table, the total effect is −1.681 - 2.137 within the bootstrap 95% confidence interval, and the test results include the value 0, indicating that the total impact is not significant. The direct effect is −5.376 - 1.868 within the 95% confidence interval, and the test result also includes a value of 0, indicating that the direct effect is not significant. However, in fact, at present, the two situations cannot be determined to be completely unable to analyze the role of intermediaries. This result only shows that the existing preconditions for analysis are relatively harsh, that is, the relationship between the impact of the wealth disparity between urban and rural areas on the upgrading of the industrial structure is relatively weak [11]. It is also worth noting that the stepwise regression coefficient test procedure is relatively simple and will have a certain degree of deviation from the results, and the indirect effects will be analyzed below (**Table 5**).

3.4.2. Indirect Effects Analysis

The mediating effect analysis using the Bootstrap sample test was 5000 times, and the results showed that only $X \Rightarrow M_2 \Rightarrow M_4 \Rightarrow Y$ and $X \Rightarrow M_1 \Rightarrow M_2 \Rightarrow M_4 \Rightarrow Y$ included the value 0 in the 95% confidence interval

Table 5. Effects analysis process summary.

Summary of the effects analysis process							
Effect indicators	**item**	**Effect**	**SE**	**t**	**p**	**LLCI**	**ULCI**
Direct effects	$X \Rightarrow Y$	−1.754	1.848	−0.949	0.343	−5.376	1.868
Total effect	$X \Rightarrow Y$	0.228	0.974	0.234	0.815	−1.681	2.137

Note: LLCI resembles the lower threshold of the estimated 95% interval, while ULCI captures the peak value of the estimated 95% interval.

(BootCI), so it means that these two mediation effect paths do not exist, and the remaining paths exist. Then, it shows that the use of intermediary effect analysis of this case is of particular value; from the test results, the total import and export on the urban and rural income gap has little impact, fixed asset investment, government financial expenditure, and scientific and technological level on the urban and rural income gap and industrial structure upgrading has a certain degree of impact, these three intermediary variables on the industrial structure upgrade are showing a positive correlation effect, of which the government financial expenditure and the number of patent applications and the gap between urban and rural income also show a positive correlation effect, that is, the more government financial expenditure, The higher the level of science and technology, the more significant the wealth disparity between urban and rural areas, which will promote the upgrading of the industrial structure [10], and the model will be improved below (**Table 6**).

3.5. Model Optimization

From the above analysis, it can be seen that the urban-rural income gap and industrial structure upgrading have specific differences in the effect of regression

Table 6. Introduction to effects analysis.

item	Effect	Boot SE	BootLLCI	BootULCI	*z*	*p*
$X \Rightarrow M_1 \Rightarrow Y$	0.163	0.001	0.008	0.011	229.415	0
$X \Rightarrow M_2 \Rightarrow Y$	−0.001	0	0.00*	0.00*	−5.366	0
$X \Rightarrow M_3 \Rightarrow Y$	1.833	0.002	0.089	0.095	1145.898	0
$X \Rightarrow M_4 \Rightarrow Y$	−0.01	0	−0.002	−0.001	−37.56	0
$X \Rightarrow M_1 \Rightarrow M_2 \Rightarrow Y$	0.003	0	−0.001	−0.001	31.891	0
$X \Rightarrow M_1 \Rightarrow M_3 \Rightarrow Y$	0.072	0.002	0.001	0.007	45.261	0
$X \Rightarrow M_1 \Rightarrow M_4 \Rightarrow Y$	0.001	0	0.00*	0.00*	31.552	0
$X \Rightarrow M_2 \Rightarrow M_3 \Rightarrow Y$	0.022	0.001	0.00*	0.002	38.783	0
$X \Rightarrow M_2 \Rightarrow M_4 \Rightarrow Y$	0	0	−0.00*	0.00*	8.091	0
$X \Rightarrow M_3 \Rightarrow M_4 \Rightarrow Y$	0.008	0	0.001	0.001	40.779	0
$X \Rightarrow M_1 \Rightarrow M_2 \Rightarrow M_3 \Rightarrow Y$	−0.11	0.002	−0.009	−0.003	−68.167	0
$X \Rightarrow M_1 \Rightarrow M_2 \Rightarrow M_4 \Rightarrow Y$	0	0	−0.00*	0.00**	−10.442	0
$X \Rightarrow M_1 \Rightarrow M_3 \Rightarrow M_4 \Rightarrow Y$	0	0	0.00*	0.00*	17.809	0
$X \Rightarrow M_2 \Rightarrow M_3 \Rightarrow M_4 \Rightarrow Y$	0	0	0.00*	0.00*	15.1	0
$X \Rightarrow M_1 \Rightarrow M_2 \Rightarrow M_3 \Rightarrow M_4 \Rightarrow Y$	0	0	0.00*	0.00*	−24.891	0

Note: BootLLCI denotes the lower bound of the 95 percent range of boot sample size, while BootULCI denotes the upper limit of the 95 percent range of boot sampling. The gray shading is chained mediation, and the rest are parallel mediation.

analysis and the addition of intermediary variables, and after testing the model, it is found that there is a particular influence between the two, but the influence relationship is relatively vague, so this section will optimize the model, achieve model optimization, and explore the impact of urban and rural income on industrial structure upgrading in more depth.

The core independent variable urban-rural income gap is replaced by the Thiel coefficient of urban-rural income gap (drawing on the research of Cheng Yuhong and Cheng Chi), and its calculation formula is as follows [1]:

$$X' = \frac{P_{1t}}{P_t}\ln\left(\frac{P_{1t}}{P_t}\Big/\frac{Z_{1t}}{Z_t}\right)+\frac{P_{2t}}{P_t}\ln\left(\frac{P_{2t}}{P_t}\Big/\frac{Z_{2t}}{Z_t}\right) \tag{13}$$

where $j = 1$ represents rural areas, $j = 2$ represents urban areas, and t represents different years, then

P_t-t years of the total income of residents in the region;

P_{1t}-total income of rural residents, P_{2t} - total income of urban residents;

Z_t-total population of the region in t-year;

Z_{1t}-total population in rural areas, Z_{2t}- Total population of the town.

From the above analysis, it is learned that after the use of chain mediation analysis, the two analysis paths related to the mediation variable M_4 the total import and export amount, do not exist, so for the convenience of research, this variable is excluded in this section, and the following use of parallel mediation model for research and analysis, the regression equations obtained are:

1) $Y = 2.345 - 6.262X'$;

2) $Y = 1.054 - 0.835X' + 2.648M_1 - 0.31M_2 + 0.087M_3$

The results of the inspection according to SPSS are summarized as follows (Table 7).

In this paper, the parallel mediation model is selected, and the product coefficient is used for testing; according to the test results presented in the above table, it can be seen that $X \Rightarrow M_1 \Rightarrow Y$, $X \Rightarrow M_2 \Rightarrow Y$ contains 0 values in the interval where the $a * b$ the test value is located within the 95% confidence interval, so the mediation effect is not significant, but $X \Rightarrow M_3 \Rightarrow Y$ this path is significantly mediated, and according to the following table - the 95% confidence interval for the effect values can be seen in this path $X \Rightarrow M_3 \Rightarrow Y$ the effect

Table 7. Mediation Test Results Summarized 1.

Item	c Total effect	$a * b$ The mediation effect value	$a * b$ (Boot SE)	$a * b$ (z value)	$a * b$	$a * b$ (95% BootCI)	c' Direct effects
$X \Rightarrow M_1 \Rightarrow Y$	−6.262*	−6.79	0.073	−93.438	0	−1.184 - 0.104	−0.835
$X \Rightarrow M_2 \Rightarrow Y$	−6.262*	3.61	0.063	57.592	0	−0.320 - 0.803	−0.835
$X \Rightarrow M_3 \Rightarrow Y$	−6.262*	−2.245	0.025	−88.507	0	−0.430 - −0.038	−0.835

*p < 0.05; **p < 0.01.

value of a and b does not contain 0 values in the confidence interval, that is, a and b are significant, but the c' direct effect contains 0 values, that is, it is not significant, so it is fully mediated, and the effect accounts for 100%, indicating that the change in scientific and technological level will indirectly affect the urban and rural income gap and thus affect the upgrading of industrial structure [2] (**Table 8**).

4. Conclusions and Recommendations

4.1. Conclusions

Through empirical analysis, it is known that the regression equations of the model alone and the regression after adding the mediation variable are:

$$Y = 2.345 - 6.262X' \tag{14}$$

$$Y = 1.054 - 0.835X' + 2.48M_1 - 0.31M_2 + 0.087M_3 \tag{15}$$

According to the regression results, it can be learned that no matter from which angle of study, there is a significant negative correlation between the industrial structure upgrade grade index Y and the Thiel coefficient X' of the urban and rural income gaps, [2] indicating that the widening of the urban and rural income gap will inhibit the upgrading of the industrial structure, and the impact of the urban and rural income gap on the upgrading of the industrial structure will also change through the influence of other factors [8]. The fact that the test results of other intermediary variables are not significant does not entirely mean that they have no impact on the income gap between urban and rural areas. Still, the influence is too subtle, or there are other influencing mechanisms between them, and this paper does not do more in-depth research.

Of course, there are many cities in the Yangtze River Delta region, and the economic level and social development of each town also have some differences; and from 2000 to 2020, after 20 years, social changes are also massive, and the development stages of national policies, population structure, employment structure, and other aspects have their own characteristics, and the impact of urban and rural income gap on industrial structure upgrading in different periods is also a dynamic process.

This paper only conducts a rough study and estimation of the impact mechanism

Table 8. Mediation test results are summarized 2.

	95% confidence interval for the effect value				
Item	***c* Total effect**	***a***	***b***	***a* * *b* Mediating effects**	***c'* Direct effects**
$X \Rightarrow M_1 \Rightarrow Y$	−10.139 - −2.385	−5.465 - 0.337	1.113 - 4.183	−1.184 - 0.104	−3.231 - 1.561
$X \Rightarrow M_2 \Rightarrow Y$	−10.139 - −2.385	−22.655 - −0.636	−0.721 - 0.101	−0.320 - 0.803	−3.231 - 1.561
$X \Rightarrow M_3 \Rightarrow Y$	−10.139 - −2.385	−47.669 - −3.668	0.049 - 0.126	−0.430 - 0.038	−3.231 - 1.561

Note: $a * b$ is 95% bootstrapCI.

of urban and rural income gap on industrial structure upgrading in the Yangtze River Delta region from a macro perspective [2], combined with the overall economic development [1]. It does not consider the imbalance of economic growth in various regions and development periods in sub-regions and stages, and studies and analyzes the internal impact mechanism of urban and rural income gap on industrial structure upgrading in the Yangtze River Delta region.

4.2. Suggestions

The report of the Eighteenth National Congress of the Communist Party of China requires that the strategic adjustment of the economic structure be the main direction for accelerating the transformation of economic development, focusing on improving the demand structure, optimizing the industrial structure, promoting coordinated regional development, and promoting urbanization. Efforts should be made to solve the main structural problems restricting the sustained and healthy growth of the economy. This vital speech emphasized the importance of strategic adjustment of the economic structure; the industrial structure is an important part of the economic structure; therefore, actively promoting the adaptation of the industrial structure is the only way to promote sustainable economic development.

Since the outbreak epidemic in 2020, all industries and fields have been affected to a certain extent. At present, the prevention and control of the new crown pneumonia epidemic in China is developing in a positive direction; due to the small-scale outbreak in the local area, China has adopted the epidemic prevention policy of "dynamic clearance." Under the background of the normalization of the epidemic, the basic situation of China's long-term economic improvement has not changed. However, the upgrading and optimization of the industrial structure are still facing a certain degree of the test, in some ways, due to the impact of the epidemic, it will accelerate the pace of industrial structure transformation. And in recent years, China's strategic emerging industries have shown a trend of accelerated development; in general, the optimization and upgrading of industrial structure is an important task for the current development of China's economy. On this basis, this paper combines empirical analysis and the research of other scholars to propose the following policy recommendations:

1) Continue to promote the rural revitalization strategy from a practical point of view, and the programs and measures must be consistent with the specific conditions of each region and highlight the characteristics. At the same time, throughout revitalizing the countryside, it is necessary to increase public participation and strengthen the role of peasant autonomy and non-governmental organizations. Consolidate the success of the development of poverty-alleviated areas and establish effective links with rural revitalization plans. Improve the rural employment structure, mobilize farmers' enthusiasm for production, promote the sustainability of agriculture and rural development, raise the income level of farmers, and ensure the quality of life of the rural population [12]. Im-

plementing the rural revitalization strategy is a complex and long-term task, which must be based on the current situation. Still, it must also have long-term planning and development from a high place. It is important to tackle the issue of unequal metropolitan and rustic turn of events and deficient horticultural turn of events, animate the endogenous main thrust of country renewal, advance the solid improvement of farming and provincial regions, and eventually acknowledge agrarian and rustic modernization [13].

2) Optimize the structure of rural employment, promote the transfer of the employed population in rural areas to the secondary and tertiary industries, improve the professional level of rural employed personnel, attach importance to the education and training of rural industrial employment personnel, improve the vocational skills and professional qualities of rural industrial personnel, attach importance to the equality of employment in rural areas and urban areas, and increase the wage level of rural employed personnel. It is also possible to enhance the cohesion of rural industrial development through industrial integration, develop characteristic agricultural industries, explore new characteristics and values, develop multi-type and multi-format industries connecting urban and rural areas, opening-up and create green and modern industrial chains, and increase the added value of traditional rural industrial chains, thereby shortening the income gap between urban and rural residents.

3) At present, in the world, the new crown epidemic is already in a state of basic control, and the number of confirmed new cases of the new crown epidemic in many European countries is vast, and, likely, that human beings will inevitably coexist with the new crown virus. Unlike other countries, we are already in a state of basically letting the epidemic go unchecked, and China is still implementing a stringent dynamic zeroing policy. The new crown vaccination has also achieved remarkable results. The dynamic zeroing policy makes China's epidemic situation always controlled in a sporadic state, and there is no large-scale spread, but the epidemic prevention and control cannot be relaxed, and the epidemic prevention will consume a lot of workforce and material resources, which will cause a certain degree of test for China's economic development and industrial structure upgrading, which can be described as opportunities and challenges coexisting [14]. In the face of such a complex domestic and foreign environment, the upgrading of our industrial structure is more important, and we should combine the actual development of different regions in the Yangtze River Delta and promote practical and feasible development strategies according to local conditions. Focus on the development of the tertiary industry, promote the proportion of the tertiary industry, pay attention to talent training, and encourage innovation and entrepreneurship in the whole society. While steadily developing the secondary industry, it is necessary to pay more attention to the development of science and technology and realize the transformation and upgrading of the economy from traditional growth to high-quality development to meet the people's exploration and pursuit of a better life [15].

4) Focus on promoting the construction of a new type of urbanization; the current socialist contradictions in our country have changed; the main contradiction in our country at present is the contradiction between the people's growing good life and unbalanced and insufficient development, simply put, the Chinese people's food and clothing challenges can be addressed, and the next step is to achieve common prosperity [16]. To achieve common prosperity and promote high-quality development further, the most critical thing is to solve the quality of life of rural residents. As a result, constructing a new style of urbanization with the purpose of creating common prosperity and encouraging the optimization and upgrading of industrial structure is critical [17]. At present, Shanghai, as one of the most economically developed areas in China, has begun to build a new type of urbanization, so in the Yangtze River Delta region, Shanghai, as a "forerunner," can provide experience and help to other urban agglomerations in the Yangtze River Delta region, thus driving the optimization and upgrading of the industrial structure of the entire Yangtze River Delta region. To promote new urbanization, the next step is to improve the level of high-intensity and urban support capacity, and to achieve a more efficient and greener development model from various angles such as engineering technology, infrastructure construction, and urban planning. The new type of urbanization is also of great significance to constructing a new development pattern with the domestic cycle as the main body and the domestic and international dual cycles promoting each other [18]. [19] The specific performance is as follows.

a) The urbanization of the agricultural transfer population, thereby releasing the strong potential of domestic demand [20]

Due to a large number of agricultural migrants, the primary basis for constructing a new development model is a huge internal market and a high potential for domestic demand [21]. To improve the new urbanization strategy, it is necessary to comprehensively promote the urbanization of the agricultural transfer population, increase the intensity of work based on further relaxing and relaxing the restrictions on urban settlements, and make progress in promoting the balance of basic public services. It is necessary to relax the restrictions on urban settlements in an orderly manner around the existing agricultural transfer population, improve the "people-land-wealth" mechanism, promote the coverage of unstable permanent residents in basic urban public services, and promote the better integration of agricultural residents into the city [22]. At the same time, it is also necessary to form a joint force of the government, economy, society, and residents to share the cost of new public services.

b) Accelerate the construction of an urban innovation system to provide a strong guarantee for industrial transformation and upgrading [23]

At present, China's development is still facing major challenges, the situation in which key technologies are constrained by human beings has not been fundamentally improved, and there is still a "stuck neck" problem in the development process [24] [25]. Cities in the Yangtze River Delta region have rich appli-

cation scenarios, active innovation resources, and high-end industrial systems; in a sense, urban economic growth can stimulate more employment, better stimulate the development of urbanization, innovative results can only be transformed into real productivity, promote high-quality development of urbanization, only urban economic modernization, can make urban development modern [26]. It is necessary to maintain the improvement of quality and efficiency and the priority of employment, follow the direction of digitalization and greening, and build the development of different cities at all levels on a solid industrial foundation [27]. Vigorously promote the development of innovative cities, transform urban innovation success and innovation resources into tangible productive forces, promote industrialization and large-scale application of new technologies, and finally complete the optimization and modernization of industrial structure, achieve high-quality development, and show China's strength to the world.

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Conflicts of Interest

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

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