Article

The Impact of Foreign Trade and Urbanization on Poverty Reduction: Empirical Evidence from China

Xingying Wang ^{1,2}, Hongli Yan ^{3,*}, Libin E ⁴, Xiaoyun Huang ², Haizhen Wen ¹ and Yan Chen ²

¹ Department of Civil Engineering, Zhejiang University, Hangzhou 310058, China; xying.wang@zju.edu.cn (X.W.); wenhaizhen@zju.edu.cn (H.W.)

² College of Economics, University of Guizhou, Guiyang 550025, China; xyhuang@gzu.edu.cn (X.H.); ychen8@newmail.gzu.edu.cn (Y.C.)

³ School of Marxism, Dongbei University of Finance & Economics, Dalian 116025, China

⁴ School of International Trade Dongbei, University of Finance & Economics, Dalian 116025, China; elibin@dufe.edu.cn

* Correspondence: yanhongli@dufe.edu.cn

Abstract: Poverty eradication is a worldwide development challenge, and China's poverty reduction experience, evident in its sustainable development strategy, is receiving increasing attention. China has achieved high economic growth and success in poverty reduction over the past 40 years, since its reform and opening up. China's experience can provide lessons for other countries, however, the situation of poverty in China is still severe, and the remaining people experiencing that condition have long been in a state where income poverty, capability poverty, and intergenerational transfer of poverty coexist. This requires systematic poverty reduction in multiple fields such as the following: population, production, consumption, capital, technology, finance and taxation, education, health care and environment. Foreign trade and urbanization are the best ways to implement poverty reduction. Despite the fruitful results of international studies, the impact of foreign trade, urbanization and their synergistic effects on poverty reduction have not been fully considered. Therefore, by selecting, as panel data, the urbanization rate, foreign trade dependence, and multiple dimensions of poverty indicators of different provinces in China from 2000 to 2017, this paper establishes regression models to study the poverty reduction effects of urban and rural areas. This is accomplished by focusing on three dimensions: poverty gap; income level and gap; and the numbers of under-insurance and guaranteed expenditure, in terms of both imports and exports, respectively. The paper not only considers the synergistic effects of foreign trade and urbanization on poverty reduction, but also investigates the heterogeneity of poverty reduction effects between urban and rural areas. The research results can be applied not only to poverty reduction policy formulation in China, but they can also provide empirical lessons for other developing countries with large urban-rural disparities. Therefore, the study has important implications for both poverty reduction theory development and poverty reduction policy formulation.

Keywords: foreign trade; urbanization; poverty reduction

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1. Introduction

Looking back at China's poverty reduction in the 21st century, two factors have been crucial: urbanization and trade liberalization, which began around the same time [1]. In October 2000, the Chinese government put forward in its proposal on the Tenth Five-Year Plan the following statement: "With the improvement of agricultural productivity and the acceleration of industrialization, the conditions for China to promote urbanization have become mature, and we should lose no opportunity to implement the urbanization strategy". China joined the World Trade Organization (WTO) on 11 December 2001, becoming the 143rd full member in the same period. Thanks to this opportunity, China's foreign trade process has been gradually accelerated. Trade liberalization has spawned

China's economic growth, and economic growth is an essential way for a country to solve poverty [2]. Therefore, this paper will be based on an empirical analysis of the relationship between urbanization, foreign trade and poverty reduction, as well as the synergy of urbanization and foreign trade in poverty reduction.

A policy of opening to the outside world and urbanization are currently the two major engines of China's economic development. The "One Belt, One Road" initiative and new urbanization have injected new vitality into China's economic development [3]. Since the 1990s, China has vigorously promoted the economic development of poverty-stricken areas through large-scale implementation of the policy of opening up and urbanization, and the effect of poverty reduction has been prominent. International experience shows that opening to the outside world and urbanization can play a synergistic role in poverty reduction [4]. China has not yet conducted enough research on this, but it must be emphasized in the next step of formulating relevant policies on foreign trade, foreign investment, and urban development. Therefore, it is important to study the poverty reduction effects of opening up and urbanization, and give play to the mutual synergy between the two in poverty reduction, and construct a "two-wheel drive" poverty reduction strategy led by opening up and urbanization, which will serve the Chinese government and others. The national government's poverty reduction work provides a reference path.

There have been many studies on the effects of foreign trade and urbanization on poverty reduction [5]. However, due to differences in statistical calibers and measurement methods, there is no unified conclusion on the role of urbanization and foreign trade in poverty reduction. Existing studies mainly focus on the relationship between foreign trade and urbanization, the relationship between urbanization and poverty reduction, and the relationship between foreign trade and poverty reduction. These three factors are rarely included in a comprehensive analysis under a unified framework. Therefore, this paper focuses on the impact of the synergy between foreign trade and urbanization on poverty reduction. We reviewed Panudulkitti on the relationship between urbanization and poverty reduction under a closed economy [6], and expanded it innovatively by establishing a cross-synergy model of foreign trade between trade urbanization and poverty reduction under the open economy, respectively, using regional data of 27 Chinese provinces for 18 years, etc. Based on the empirical results, and drawing on successful overseas experiences, we propose the rational development of urbanization, the improvement of trade openness and the coordinated development of foreign trade urbanization, and find the domestic empirical evidence on the relationship between urbanization and poverty reduction in an open economy. We expect to achieve better poverty reduction with the synergy of foreign trade and urbanization, and provide empirical evidence for the implementation of poverty reduction strategies in other countries internationally.

2. Literature Review

Poverty includes both absolute poverty, where it is difficult to maintain minimum subsistence needs, and relative poverty [7], where per capita welfare is below the average level [8]. With economic and social development, the connotation of poverty is also changing, not only referring to the income problem, but also involving education, health, public services, equity and justice, personal dignity and other complex social issues [9]. According to the causes of poverty, these issues can be subdivided into income poverty, capacity poverty, resource poverty, cultural poverty, institutional poverty, intergenerational transfer poverty, etc. [10].

The international community has always been very concerned about poverty reduction. In the early days, countries generally adopted the financial aid approach to poverty reduction [11], but this tends to make people in poverty become welfare-dependent, which is not conducive to long-term poverty reduction [12]. Therefore, attention has turned to economic development to reduce poverty [13,14], increasingly focusing on the education, health and public services for people in poverty [15], focusing also on issues such as capacity poverty, poverty vulnerability, equity and justice, subjective feelings and participation rights [16].

The economic theory of poverty reduction follows the logic of “poverty reduction—income growth—income disparity” [17]. On this basis, our paper will examine the poverty states of the study subjects in three dimensions: poverty disparity, income level and disparity, the numbers of under-insurance and protection expenditure, and measure the effect of poverty reduction.

2.1. The Impact of Urbanization on Poverty Reduction

Judging from the existing literature on the relationship between urbanization and poverty reduction, most studies point out that urbanization has a positive impact on poverty reduction. Awan and Shahbaz (2010) found that urbanization positively affects poverty reduction, which is particularly obvious in rural areas [18]. As the urbanization rate rises, the poverty rate will decrease. Cali and Menon (2012) studied the relevant data of India from 1983 to 1999 and found that urbanization can achieve poverty reduction in rural areas through economic linkages between urban and rural areas [19]. The literature review illuminates the following:

2.1.1. The Main Ways to Reduce Poverty through Urbanization

First, urbanization reduces poverty through economic growth [20,21]. Lewis (1954) [22] pointed out that economic growth can improve employment and income distribution brought about by urbanization, thereby reducing poverty. Industrial restructuring, industrial transfer, industrial agglomeration [23], and agricultural modernization brought about by urbanization have strongly promoted economic development [24]. Second, urbanization reduces poverty by affecting income levels [25]. Ahluwalia et al., (2008) showed that urbanization leads to a shift of rural labor to cities, which reduces the supply of rural labor while increasing labor productivity, leading to an increase in the income of rural residents and thus reducing poverty [26]. Third, urbanization achieves poverty reduction through its impact on employment. McKenzie and Sasin (2007) found that the demand for products brought about by urbanization will promote enterprise development, increase labor demand for enterprises, and create more employment opportunities for the poor [27]. Fourth, urbanization achieves poverty reduction through population mobility. Christiaensen and Todo (2014) pointed out through an empirical study of cross-country data in developing countries from 1980 to 2004 that when rural poor people migrate to middle-level cities and towns compared to large cities [28], the poverty reduction effect is more effective. Fifth, infrastructure development [29] and public service [30] improvements during urbanization contribute to poverty reduction. Jayasuriya (2002) and Gordon et al., (2003) empirically examined the effects of urbanization on education [31,32], health care, and services, and pointed out the indirect effects of urbanization on poverty reduction by improving education, health care, and services.

2.1.2. An Inverted U-Shaped Relationship between the Urbanization Rate and the Incidence of Poverty

Martinez-Vazquez et al., (2009) showed an inverted U-shaped relationship between the urbanization rate [33], and poverty incidence, i.e., urbanization has a positive effect on poverty reduction in the early stages of urbanization, whereas the effect of urbanization on poverty reduction decreases in the later stages [34]. This finding was empirically confirmed using cross-country data. It was also found that the positive effect of urbanization on poverty reduction occurs only in some countries [35].

2.2. The Impact of Foreign Trade on Urbanization

Moomaw and Shatter (1996) pointed out that foreign trade can directly or indirectly promote the development of urbanization through various channels, such as economic growth, industrial structure transformation, and capital accumulation [36]. Huff and Angeles (2011) pointed out that economic globalization and the strengthening of free trade have profoundly affected the urbanization patterns and processes in countries around the

world [37], especially in Southeast Asia, many large-scale urban centers have been formed in trade-facilitated areas such as borders and the globalization index has become an essential factor influencing the urbanization of various countries [38]. However, many scholars have put forward different views, pointing out that foreign trade also has a negative effect on urbanization. Taking Mexico as an example, under the conditions of an open economy, the production links of enterprises may be transferred overseas, which is not conducive to the agglomeration of labor and capital and the development of urbanization [39]. Pengfei Ni and others pointed out that an unreasonable export structure and a low value-added export-oriented strategy will lead to the simultaneous existence of trade surplus and lagging urbanization development [40].

2.3. The Impact of Foreign Trade and Urbanization on Poverty Reduction

There are few studies that examine foreign trade, urbanization, and poverty reduction together. Daniel (2004) pointed out that foreign trade and urbanization have a mutual influence on poverty reduction [41]. Chunxiang and Zhaolong (2014) used Granger causality test methods to find a long-term equilibrium relationship between foreign trade, urbanization, and the gap between rich and poor, but did not explain the mutual influence mechanism [42]. Yongqiang and Hemao (2012) used the dual economic model to analyze the mechanism of export structure, urbanization, and the gap between urban and rural rich and poor [43]. Qilin (2011) pointed out that the demand for high-skilled labor brought about by foreign trade will exacerbate the gap between urban and rural rich and poor, while the development of urbanization will promote the transfer of surplus rural labor to employment and reduce poverty [44].

To sum up, in the context of opening up, there is a lack of systematic research on the relationship between foreign trade, urbanization, and poverty reduction. In addition, few studies have further examined the interactive effects of foreign trade, urbanization and poverty reduction. This article contains our research from this aspect.

3. Research Methods

3.1. Model

Based on our literature review, theoretical basis, and theoretical analysis, we constructed the following regression model:

$$Poverty_{it} = \alpha_0 + \alpha_1 Urban_{it} + \alpha_2 Urban_{it}^2 + \alpha_3 Export_{it} + \alpha_i X_{it} + v_i + u_{it} \quad (1)$$

$$Poverty_{it} = \alpha_0 + \alpha_1 Urban_{it} + \alpha_2 Urban_{it}^2 + \alpha_3 Import_{it} + \alpha_i X_{it} + v_i + u_{it} \quad (2)$$

where $Poverty_{it}$ represents the poverty level, $Urban_{it}$ represents the level of urbanization, $Urban_{it}^2$ represents the square term of the level of urbanization, $Export_{it}$ represents the export level, $Import_{it}$ represents the import level, and X_{it} is a series of control variables. we conducted GDP per capita, total railways and road transport routes as the control variables. The three indicators of length and the proportion of the added value of the financial industry in GDP reflect the indicators of income growth, fiscal expenditure, and financial development, respectively, while national fixed effects indicate random interference items.

At the same time, in order to examine the interaction between foreign trade and urbanization, the corresponding cross-terms of foreign trade indicators and urbanization were added, based on the basic model:

$$Poverty_{it} = \alpha_0 + \alpha_1 Urban_{it} + \alpha_2 Urban_{it}^2 + \alpha_3 Export_{it} + \alpha_4 Export * Urban_{it} + \alpha_i X_{it} + v_i + u_{it} \quad (3)$$

$$Poverty_{it} = \alpha_0 + \alpha_1 Urban_{it} + \alpha_2 Urban_{it}^2 + \alpha_3 Import_{it} + \alpha_4 Import * Urban_{it} + \alpha_i X_{it} + v_i + u_{it} \quad (4)$$

In order to better reflect the effect of poverty reduction and consider the sustainability of the effect of poverty reduction in the time dimension, a dynamic GMM model was selected for further analysis when analyzing the effects of urbanization and foreign trade on the population of basic subsistence allowance and basic living allowance expenditure. The dynamic models are:

$$\Delta \ln Poverty_{it} = \alpha_0 + \beta Poverty_{it-1} + \alpha_1 Urban_{it} + \alpha_2 Urban^2_{it} + \alpha_3 Export_{it} + \alpha_i X_{it} + v_i + u_{it} \quad (5)$$

$$\Delta \ln Poverty_{it} = \alpha_0 + \beta Poverty_{it-1} + \alpha_1 Urban_{it} + \alpha_2 Urban^2_{it} + \alpha_3 Import_{it} + \alpha_i X_{it} + v_i + u_{it} \quad (6)$$

where $\Delta \ln Poverty_{it} = \ln Poverty_{it} - \ln Poverty_{it-1}$ represents the rate of change of the poverty indicator, and $Poverty_{it-1}$ represents the poverty indicator level of the previous period. The meanings of other variables are the same as before. At the same time, in order to measure the interaction between foreign trade and urbanization, the corresponding cross-terms of foreign trade indicators and urbanization were added based on the above-mentioned dynamic model, expressed as:

$$\Delta \ln Poverty_{it} = \alpha_0 + \beta Poverty_{it-1} + \alpha_1 Urban_{it} + \alpha_2 Urban^2_{it} + \alpha_3 Export_{it} + \alpha_4 Export * Urban_{it} + \alpha_i X_{it} + v_i + u_{it} \quad (7)$$

$$\Delta \ln Poverty_{it} = \alpha_0 + \beta Poverty_{it-1} + \alpha_1 Urban_{it} + \alpha_2 Urban^2_{it} + \alpha_3 Import_{it} + \alpha_4 Import * Urban_{it} + \alpha_i X_{it} + v_i + u_{it} \quad (8)$$

3.2. Variables

3.2.1. Dependent Variables

In order to fully reflect the effect of poverty reduction, the explanatory variables measured the effect of poverty reduction from both urban and rural subjects, as well as from different dimensions such as poverty gap, income level and gap, number of minimum subsistence allowance and minimum guarantee expenditure.

1. Poverty gap

The poverty gap was measured by three indicators: poverty incidence, “Headcount”; poverty depth, “Poverty gap”; and poverty intensity, “Fgt2”. The incidence of poverty reflects the size of the population in poverty—that is, the proportion of the number of people whose income is below the poverty line. The depth of poverty is the average gap between the per capita income of the poor and the poverty line, and the intensity of poverty indicates the equilibrium degree of income distribution within the poor; these two indicators reflect the average poverty level and income distribution of the poor.

To measure the poverty gap between cities and rural areas in each province in China, we had to first determine the poverty line. For the rural income data of 17 provinces from 2000 to 2017, we used the per capita net income of farmers of 2300 yuan (2010 constant price), announced by the Central Poverty Alleviation and Development Work Conference in 2011, as the national rural poverty line, and we used the rural consumer price index to establish the rural poverty line of China from 2000 to 2017. Regarding the income data of urban residents in 19 provinces from 2000 to 2017, considering that the rural poverty line announced by the Central Poverty Alleviation and Development Work Conference in 2011 is too low for urban residents, it will seriously underestimate the urban poverty situation. The average subsistence allowance for cities in the central, western, and northeastern regions is the base, and the urban poverty line from 2000 to 2017 is obtained by using the consumer price index of China. We used the POVCAL software provided by the World Bank website to estimate the incidence, depth, and intensity of poverty in urban and rural areas of each province.

2. Per capita disposable income level and urban-rural gap

To measure income level, three indicators were used: urban per capita disposable income, rural per capita disposable income, and multiples of the urban rural income gap, which are recorded as Reveurban, Rural and Timeurra, respectively. Increasing income levels is one of the most important ways to reduce poverty. The core measure of poverty reduction is still to increase the per capita disposable income of urban and rural areas. We selected data from 27 provinces from 2000 to 2017 for analysis. In order to reduce the impact of heteroscedasticity, we took the natural logarithm of the two variables of urban

per capita disposable income and rural per capita disposable income. In addition to raising income levels, reducing income inequality is also an essential part of poverty reduction. To narrow the income gap is mainly to narrow the income gap between urban and rural areas. The selected data were analyzed by calculating the multiple personal disposable income gap between urban and rural areas.

3. Population of basic subsistence allowance and basic living allowance expenditures

Two indicators were used to measure the proportion of urban residents with basic living allowance to the total population and the proportion of rural residents with basic living allowance to the total population, recorded as “Headurban” and “Headrural”, respectively. The Department of Finance of the Ministry of Civil Affairs has announced the number of urban and rural subsistence allowances and the number of rural subsistence allowance in each province since 2007. Urban and rural subsistence allowance households are typical representatives of urban poverty and rural poverty. Therefore, the number of urban and rural subsistence allowances can represent the corresponding urban and rural poverty conditions. We used the number of urban and rural residents to represent urban poverty and rural poverty, respectively. Given the data collection situation, 27 provinces from 2007 to 2016 were selected for analysis.

In addition, two indicators, the proportion of urban minimum living security expenditure to GDP and the proportion of rural minimum living security expenditure to GDP, were used to measure the living security expenditure, and the poverty level was measured from the perspective of the amount of benefits provided to the low-income earners, denoted as “Exraurban” and “Exrarural”, respectively. The Department of Finance of the Ministry of Civil Affairs of China has announced the expenditures for urban minimum living security and rural minimum living security in various provinces since 2007. The minimum living security expenditures reflect the relief and support provided by the Chinese government to the poor, and therefore also reflect the poverty situation of the corresponding urban and rural areas from fiscal expenditure. Given the data collection situation, the 2007–2016 data of 27 provinces in China were selected for analysis.

In addition to the data released by the Department of Finance of the Ministry of Civil Affairs of China, other data come from the “China Statistical Yearbook”, provincial statistical yearbooks, and the National Bureau of Statistics website.

3.2.2. Independent Variables

1. Urbanization level

The ratio of urban population to total population was used to measure the level of urbanization. We calculated the ratio of the permanent urban population to the total population at the end of the year and recorded it as “Urbanratio” in the model.

2. Level of foreign trade

Two indicators, the proportion of exports to GDP and the proportion of imports to GDP, were used to measure the level of foreign trade, and denoted as “Expraio” and “Impratio”, respectively.

3. Other control variables

Three indicators, namely per capita GDP, total length of railway and road transport routes, and the proportion of financial industry added value in GDP, reflect the level of regional economic development, local infrastructure, and financial development, respectively, as control variables. Among them, per capita GDP is expressed as “Pgdp”; the total length of railway and road transportation lines is expressed as Line; and the financial scale is expressed as the proportion of the added value of the financial industry in GDP, recorded as “Finaratio”. To reduce the effect of heteroskedasticity, the natural logarithm was taken for the two control variables of GDP per capita and total length of rail and road transport routes. To avoid endogeneity problems, the values of the explanatory variables were taken with a one-period lag, by prefixing L1 to the variable names.

3.3. Descriptive Statistics

The descriptive statistics of each variable are shown in Table 1. Among them are the following: “Headcount” represents the incidence of poverty; “Povertygap” represents the depth of poverty, taking the logarithmic value; “Fgt2” represents the poverty intensity; we added -U to indicate the urban indicator and -R to indicate the rural indicator; and “Urbanratio” indicates the proportion of the urban population to the total population. “Lnpgdp” is the logarithm of GDP per capita. “Line” is the logarithm of the total mileage of railways and highways. “Finaratio” is the proportion of the added value of the financial industry in GDP. “Expratio” is the proportion of exports to GDP. “Impratio” is the proportion of imports to GDP. “Reveurban” is the urban per capita disposable income. “Reverural” is the rural per capita disposable income. “Timeurra” is the multiple of urban-rural income gap.

Table 1. Descriptive statistical results of variables.

Variable	Samples	Mean	Sd.	Min.	Max
Headcount-U	342	4.934	6.748	0.000	39.196
Povertygap-U	342	1.233	1.822	0.000	11.193
Fgt2-U	342	0.525	0.823	0.000	4.894
Headcount-R	306	18.761	17.875	0.000	78.838
Povertygap-R	306	6.491	7.018	0.000	35.420
Fgt2-R	306	3.338	3.900	0.000	21.344
Urbanratio	486	45.389	11.212	19.600	69.850
Lnpgdp	486	9.898	0.798	7.887	11.582
Line	486	0.997	0.305	0.037	1.525
Finaratio	486	0.022	0.018	0.000	0.105
Expratio	486	0.129	0.161	0.011	0.989
Impratio	486	0.090	0.117	0.004	0.854
Reveurban	486	4.146	0.252	3.674	4.710
Reverural	486	3.681	0.289	3.124	4.397
Timeurra	486	2.971	0.590	1.892	5.103

Note: -U indicates cities and towns; -R indicates rural areas.

4. Results

4.1. Model Regression Results Based on Poverty Gap

In this section, we regress the incidence of rural poverty “headcount”, depth of poverty “povertygap”, and poverty intensity “fgt2” in each province. Limited by the availability of data, this section includes the income data of rural residents in 17 provinces from 2000 to 2017.

4.1.1. Regression Results of Exports, Urbanization on Poverty Gap

First, we get the basic estimation results. In order to further examine the interaction between exports and urbanization on the poverty gap, we introduce the cross term of import and export and the level of urbanization. In order to avoid endogenous problems, we choose the one-period lagging value of the explanatory variable as the instrumental variable of this variable for analysis. The results show in Table 2.

Table 2 shows the poverty gap; for the urban poverty gap, the coefficients of urbanization on the three poverty gap indicators in towns and cities are negative, regardless of whether the cross-sectional terms are considered. The coefficients on poverty incidence and poverty depth are significant at the 1% significant level, indicating that urbanization significantly reduces the level of poverty in towns and cities. The coefficients of the square of urbanization are all positive, and in most cases they are significant at least at the 10% significance level. This has further verified the inverted U-shaped feature of the poverty reduction effect of the level of urbanization. The two control variables of per capita GDP and the total length of railway and road transport routes also played a role in reducing the urban poverty gap. The export coefficient performance is not stable enough, and the significance level is not high. The coefficients of the cross-terms of exports and urbanization are all negative, which is consistent with the conclusion of the theoretical model, but the level of

significance is not high. This suggests that there is much room for improvement in China's ability to leverage the interaction between exports and urbanization to reduce poverty.

For the rural poverty gap index, the coefficients of urbanization on the two poverty gap indicators, namely the incidence of poverty and the intensity of poverty, are all negative. Moreover, the coefficients of the square of urbanization are all positive, and the coefficient of the incidence of poverty is significant at 1%. The poverty intensity coefficient is significant at the 5% significance level, indicating that urbanization has significantly reduced the rural poverty level, and further verified the inverted U-shaped characteristics of the poverty reduction effect of the urbanization level. Per capita GDP has not played a positive role in reducing the poverty gap in rural areas, while the total length of railway and road transport routes has played a significant role in reducing poverty, which fully validates the common assumption that better road infrastructure leads to better income in rural areas. The export coefficient is positive, but not significant. This shows that the direct impact of China's foreign exports on rural poverty reduction is limited, and there is still much room for improvement. The coefficients of urbanization and urbanization squared are consistent with the previous basic situation without considering the cross-term, showing an inverted U-shaped characteristic. Due to the addition of the cross-term, the coefficients of exports themselves become significant. The export coefficients are negative, indicating that after considering the interaction between exports and urbanization, the exports themselves have played a significant role in reducing poverty. However, the cross-term coefficients of exports and urbanization are negative; some are not significant, indicating that exports and urbanization have not yet fully played an interactive role in rural poverty reduction, and that there is substantial room for improvement.

4.1.2. Regression Results of Imports, Urbanization on Poverty Gap

Similar to the previous export analysis, we first obtained the basic estimation results. In order to further examine the interaction between imports and urbanization on the poverty gap, the cross-term of imports and urbanization levels is introduced. The specific results are shown in Table 3.

For the urban poverty gap, it can be seen from Table 3 that the inverted U-shaped characteristics of the poverty reduction effect of urbanization are consistent with the previous analysis. The two control variables of GDP per capita and the total length of railway and road transportation routes also had a positive effect on reducing the urban poverty gap. Before the cross-term was added, the coefficient of imports was negative. After the cross-term was added, the coefficient of the imports became positive, the performance was not stable enough, and the significance level was generally not high. The coefficients of the cross-terms of imports and urbanization are all negative, which is consistent with the conclusion of the theoretical model, but the level of significance is also not high. This shows that China also has a lot of room for improvement in the utilization of the interaction of imports and urbanization in poverty reduction.

Table 2. Regression results of exports and, urbanization on the poverty gap.

	Urban Poverty Gap						Rural Poverty Gap					
	Headcount		Poverty Gap		Fgt2		Headcount		Poverty Gap		Fgt2	
L1.Urbanrati	−0.7991 ***	−0.8370 ***	−0.1658 ***	−0.1850 **	−0.0397	−0.0480	−2.9430 ***	−2.6370 ***	110.6780	1005.4260	−0.3590 **	−0.2720
	0.1956	0.2453	0.0603	0.0759	0.0326	0.0409	0.4280	0.4870	925.7450	1319.7020	0.1600	0.1890
L1.Urb ²	0.0070 *	0.0074 **	0.00158 **	0.0018 *	0.0004	0.0005	0.0300 ***	0.0250 ***	−4.1270	−17.4110	0.0020	0.0010
	0.0027	0.0034	0.0008	0.0011	0.0004	0.0006	0.0060	0.0070	11.2400	17.8280	0.0020	0.0030
L1.Pgdp	−0.00007 ***	−0.0001	−0.00003 *	−0.00003 *	−0.00001 **	−0.00001 **	0.0001 ***	0.0001 **	0.0100	0.1470	0.0001 *	0.0001 **
	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0010	0.0000	0.1810	0.2130	0.0000	0.0000
L1.Line	−10.1034	−10.0249 ***	−2.4429	−2.3892	−0.8693 ***	−0.8447 ***	−36.1430 ***	−37.8530 ***	6269.0320	611.4480	−7.232 ***	−7.5040 ***
	1.5886	1.6623	0.4845	0.5090	0.2648	0.2772	3.9490	3.8990	7914.5720	9535.9460	1.4820	1.5130
L1.Finaratio	24.7049	26.2688	8.3450	8.8388	6.2770 *	6.4849 *	7.4170	34.9440	120,437.6000	107,451.6000	17.0180	18.8470
	21.3956	21.4947	6.6385	6.6767	3.5689	3.5882	41.1150	40.5190	104,822.0000	105,408.1000	15.6360	15.9220
L1.Expratio	2.2194	6.8797	−0.0503	1.9013	−0.2484	0.5402	0.6980	−185.0330 ***	7796.4770	124,700.7000	1.5420	−12.9590
	2.8189	16.5396	0.8577	5.1303	0.4699	2.7607	11.3480	49.0040	23,412.1900	143,920.6000	4.2570	19.4390
L1.Expurban		−0.0826		−0.0353		−0.0145		3.5310 ***		−2148.5570		0.2570
		0.2968		0.0920		0.0495		0.8890		2543.4290		0.3520
_Cons	36.3559	36.9210	8.0018	8.2513	2.3875	2.4906	128.7420	126.6030	−7469.5450	−15,719.8600	19.6290	18.4870
	3.6664	4.0674	1.1399	1.2656	0.6116	0.6791	7.0100	7.4270	17,860.7400	20,425.8600	2.6340	2.8750
Samples	323	323	323	323	323	323	289	289	289	289	289	289
R ²	0.4650	0.4640	0.3510	0.3520	0.1890	0.1900	0.6420	0.1700	0.0140	0.0220	0.1820	0.1700

Note: L1 represents the value of the variable lagging by one period; L2 indicates the value of the variable in the second lag period; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 3. Regression results of imports, urbanization on poverty gap.

	Urban Poverty Gap						Rural Poverty Gap					
	Headcount		Poverty Gap		Fgt2		Headcount		Poverty Gap		Fgt2	
L1.Urbanratio	−0.8463 ***	−1.0331 ***	−0.1732 ***	−0.2391 ***	−0.0413	−0.0649	−2.7610 ***	−2.5375 ***	111.5321	1016.5728	−0.3197 **	−0.3215
	0.1899	0.2439	0.0583	0.0750	0.0316	0.0403	0.3562	0.4687	932.6657	1113.6003	0.1312	0.1635
L1.Urb ²	0.0084 ***	0.0110 ***	0.00193 **	0.0029 ***	0.0006	0.0009	0.0220 ***	0.0239 ***	−4.8112	−15.7451	0.0029	0.0010
	0.0025	0.0034	0.0008	0.0010	0.0004	0.0006	0.0055	0.0067	11.3629	19.6853	0.0021	0.0023
L1.Pgdp	−0.0001 **	−0.0001 ***	−0.00004 ***	−0.00004 ***	−0.00002 ***	−0.00002 ***	0.0001 ***	0.0001 **	0.0092	0.1157	0.0001 *	0.0001 **
	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0009	0.0006	0.1898	0.2319	0.0000	0.0000
L1.Line	−9.8094 ***	−9.2006 ***	−2.3962 ***	−2.1678 ***	−0.8550 ***	−0.7760 ***	−36.5532 ***	−37.8253 ***	6354.0012	609.9228	−7.2295 ***	−7.4332 ***
	1.5514	1.6499	0.4718	0.5011	0.2586	0.2706	3.6621	3.2169	75,618.3532	9031.1926	1.3672	1.7090
L1.Finaratio	21.5133	25.8672	7.1106	8.4262	5.5918	5.9276	7.2139	34.5211	123,436.6110	103,452.1106	15.3218	16.8121
	21.4080	21.6062	6.6119	6.6662	3.5517	3.5735	42.5992	41.1326	103,821.2132	101,108.1109	13.5342	14.1931
L1.Impratio	−2.4037	25.8045	−1.7458	8.0327	−1.2197 **	2.4462	2.4480	233.3780 ***	−9806.1236	−275391.4000	−0.5030	2.1580
	3.5669	23.2801	1.0862	7.1762	0.5943	3.8484	15.2740	70.2560	31893.1830	196735.7000	5.7560	27.7600
L1.Impurban		−0.5196		−0.1792		−0.0665		−4.406 ***		4783.9770		−0.0310
		0.4213		0.1296		0.0696		1.3150		3535.2330		0.5170
_Cons	36.7165	38.9085	8.0182	8.7699	2.3662	2.6314	120.6622	125.3605	−7312.3569	−15,215.1867	18.5521	19.1409
	3.6279	4.0140	1.1227	1.2423	0.6016	0.6649	7.3599	7.8436	17,786.5747	205,321.8578	2.1625	2.6821
Samples	323	323	323	323	323	323	289	289	289	289	289	289
R ²	0.4670	0.4670	0.3470	0.3500	0.1780	0.1830	0.6321	0.1721	0.0141	0.0229	0.1812	0.1716

Note: L1 represents the value of the variable lagging by one period; L2 indicates the value of the variable in the second lag period; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

For the rural poverty gap: the coefficients of urbanization on poverty incidence and poverty intensity are both negative; the coefficients of urbanization squared are both positive; the coefficients of poverty incidence are significant at the 1% significant level; and poverty intensity is at the 5% significant level. The latter indicates that urbanization significantly reduces the rural poverty level, further verifying the inverse U-shaped effect of urbanization level on poverty reduction, that is, the inverse U-shaped characteristic of the poverty reduction effect of urbanization level. GDP per capita does not contribute positively to the reduction of rural poverty gap, while the total length of rail and road transport routes plays a significant role in poverty reduction, which fully verifies the saying that “to get rich, we must first build roads” in rural areas. The coefficients of imports are positive and negative, and insignificant. This indicates that the direct impact of China’s foreign trade on rural poverty reduction is limited, and there is still much room for improvement. The coefficients of urbanization and urbanization squared are in line with the previous one without the crossover term, showing an inverted U-shaped characteristic. The coefficient of imports per se becomes significant due to the inclusion of the cross term, and the coefficient of imports is positive, indicating that after considering the interaction of foreign trade and urbanization, exports per se and imports per se do not play a more significant role in poverty reduction. The coefficients of the cross term between imports and urbanization are positive and negative, some significant and some insignificant, indicating that the interaction between imports and urbanization in rural poverty reduction has not been fully exploited, and there is much room for improvement.

4.2. Model Regression Results Based on Income Levels and Urban-Rural Income Gap

In order to examine the impact of foreign trade and urbanization on urban per capita income, rural per capita income, and the urban-rural income gap, the first two indicators reflect the absolute income level, and the latter reflects relative income changes. The improvement of the absolute income level of urban and rural areas and the improvement of the dual economic structure of urban and rural areas are important aspects of poverty alleviation in China.

4.2.1. Regression Results of Exports, Urbanization on Income Level and Urban-Rural Income Gap

First, we obtained the basic estimation results. To further examine the interaction effect of exports and urbanization on the poverty gap, a cross term of exports and urbanization level was introduced. Considering that the interaction plays out with a lagged effect, one-period lagged values were added. The specific results are shown in Table 4.

It can be seen from Table 4 that the coefficients of urbanization on urban per capita disposable income and rural per capita disposable income are 0.030 and 0.044, respectively, and they are significant at the 1% significance level, indicating that urbanization has simultaneously increased urban and rural per capita income levels, and the effect on rural areas is more potent than that in urban areas. The squares of urbanization coefficients are -0.0003 and -0.0005 , respectively, which are significant at or close to 1%. This also verifies the inverted U-shaped characteristics of the poverty reduction effect of the urbanization level, that is, with the increase in the urbanization level in the initial stage, the poverty reduction effect continues to appear. However, if the level of urbanization exceeds a specific limit, further urbanization will bring new urban and rural poverty problems. The coefficients of exports are 0.146 and 0.148, both of which are significant at the 1% significance level, indicating that exports have also played a role in increasing urban and rural incomes, and the coefficients are higher than those of urbanization. Per capita GDP, the total length of railway and road transport routes, and the added value of the financial industry accounted for the weight of GDP. These three control variables also played a positive role in increasing urban and rural incomes, and they were significant at the 1% level. They respectively reflect the vital role of regional economic growth, fiscal expenditure, and financial development to increase the income of urban and rural residents.

Table 4. Regression results of exports and urbanization on per capita disposable income and urban-rural income gap.

	Urban Per Capita Disposable Income		Rural Per Capita Disposable Income		Income Gap	
L1.Urbanratio	0.0300 ***	0.0260 ***	0.0440 ***	0.0421 ***	−0.1131 ***	−0.1370 ***
	0.0030	0.0030	0.0030	0.0040	0.0110	0.0140
L1.Urb ²	0.0010 ***	0.0010 ***	−0.0010 ***	0.0010 ***	0.0020 ***	0.0020 ***
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
L1.Expratio	0.1460 ***	1.2560 ***	0.1480 **	2.3971 ***	−0.1630	−9.9240 ***
	0.0510	0.4300	0.0580	0.4820	0.2060	1.7300
L1.Pgdp	0.0001 ***	0.0001 ***	0.0001 ***	0.0001 ***	0.0001 ***	0.0001 ***
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
L1.Line	0.3240 ***	0.2821 ***	0.2730 ***	0.2250 ***	0.3341 ***	0.4120 ***
	0.0250	0.0240	0.0280	0.0270	0.1010	0.0980
L1.Finaratio	1.4710 ***	1.7081 **	2.8730 ***	2.9370 ***	−10.5341 ***	−9.400 ***
	0.2490	0.2400	0.2830	0.2700	1.0050	0.9670
L1. Expurban		−0.0420 **		−0.0831 ***		0.3680 ***
		0.0190		0.0210		0.0770
L2. Expurban		0.0200 ***		0.0231 ***		−0.0300
		0.0060		0.0070		0.0250
L1.Expurb2		0.0001 *		−0.0830 ***		−0.0030
		0.0000		0.0210		0.0010
L2.Expurb2		0.0001 ***		0.0230 ***		0.0010
		0.0000		0.0070		0.0000
_Cons	2.8580	2.9110	2.1250	2.0920	5.1280	5.9310
	0.0460	0.0620	0.0520	0.0700	0.1840	0.2490
Samples	459	432	459	432	459	432
R ²	0.8270	0.8330	0.8670	0.8750	0.0030	0.0110

Note: L1 represents the value of the variable lagging by one period; L2 indicates the value of the variable in the second lag period; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

When the cross-term between exports and urbanization level was introduced, the coefficients of urbanization and urbanization squared changed little compared to the basic regression results, which again verifies the inverted U-shaped characteristics of the poverty reduction effect of urbanization level. The export coefficients are 1.256 and 2.397, respectively which are significantly higher than 0.146 and 0.148 when the cross-term is not considered and are significant at the 1% significance level. The coefficients of the lagging one-period value of the cross-term of exports and urbanization are 0.020 and 0.023, respectively, and are significant at the 1% significance level, indicating that exports and urbanization have played a synergistic effect, and urbanization with a sufficient export level is the foundation for poverty reduction. The income-increasing effect is more obvious, which is consistent with the conclusion of theoretical analysis.

In terms of urban income gap, the coefficient of urbanization on the urban-rural income gap is around −0.113 and significant at the 1% level, indicating that although urbanization raises both urban and rural per capita income levels, the effect on rural areas is stronger than that on urban areas, thus contributing to the reduction of the urban-rural income gap. The square of urbanization coefficient is 0.002, which is also significant at the 1% significance level, indicating that the impact of urbanization level on reducing the urban-rural income gap also has an inverted U-shaped characteristic.

When the cross term of exports and urbanization level is introduced, the coefficient of exports itself is as high as −9.924, and significant at the 1% level. The intersection of exports and urbanization does not show a significant positive impact on reducing the urban-rural income gap. On the whole, after separating the interaction between exports and urbanization, exports themselves have played an obvious positive role in reducing the urban-rural income gap. The key issue we face in the future is how to exploit the interactive role of exports and urbanization in reducing the urban-rural income gap.

4.2.2. Regression Results of Imports, Urbanization on Income Level and Urban-Rural Income Gap

The regressions of imports and urbanization on urban disposable income per capita as well as rural disposable income and income disparity yield the basic estimation results in Table 5.

Table 5. Regression results of imports and urbanization on per capita disposable income and urban-rural income gap.

	Urban PCDI		Rural PCDI		Income Gap	
L1Urbanratio	0.0280 ***	0.0260 ***	0.0420 ***	0.0381 ***	−0.1150 ***	−0.1081 ***
	0.0030	0.0040	0.0030	0.0040	0.0110	0.0140
L1Urb ²	0.0001 ***	0.0001 ***	−0.0010 ***	0.0001 ***	0.0021 ***	0.0020 ***
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
L1Impratio	0.3050 ***	−1.7580 ***	0.2700 ***	−2.1250	0.2430	4.9910
	0.0640	1.1580	0.0730	1.3400	0.2630	4.7520
L1Pgdp	0.0001 ***	0.0001 ***	0.0001 ***	0.0001 ***	0.0001 ***	0.0001 ***
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
L1Line	0.3260 ***	0.3001 ***	0.2780 ***	0.2520 ***	0.3001 ***	0.3180 ***
	0.0240	0.0240	0.0280	0.0280	0.0980	0.1000
L1Finratio	1.5220 ***	1.8670 ***	2.9211 ***	3.1210 ***	−10.5420 ***	−9.4730 ***
	0.2450	0.2490	0.2800	0.2880	1.0040	1.0220
L1Impurban		0.0580		0.0790		−0.2130
		0.0460		0.0530		0.1870
L2Impurban		0.0250 **		0.0251 *		−0.0040
		0.0110		0.0130		0.0470
L1Impurb2		0.0001		−0.0010		0.0020
		0.0000		0.0010		0.0020
L2Impurb2		0.0001 **		0.0001 **		0.0001
		0.0000		0.0000		0.0010
_Cons	2.8930	2.9810	2.1560	2.2570	5.1560	5.1370
	0.0450	0.0640	0.0520	0.0750	0.1860	0.2650
Samples	459	432	459	432	459	432
R ²	0.8190	0.8410	0.8690	0.8630	0.0090	0.0003

Note. L1 represents the value of the variable lagging by one period; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

As can be seen in Table 5, the coefficients of urbanization on urban and rural per capita disposable income are 0.028 and 0.042, respectively, and are significant at the 1% significant level, which is basically consistent with the previous regression results for exports, indicating that urbanization raises both urban and rural per capita income levels, and has a stronger effect on rural than urban. The coefficients of urbanization squared are −0.0003 and −0.0005, which are also consistent with the regression results of exports, and are also significant at or near the 1% level of significance. This verifies the inverted U-shaped characteristic of the poverty reduction effect of urbanization level. The coefficients of imports are 0.305 and 0.270, respectively, both significant at the 1% level of significance, indicating that imports play an equal role in raising urban and rural incomes, and the coefficients are higher than those of urbanization. The three control variables of GDP per capita, total length of rail and road transport routes, and value added of the financial sector as a share of GDP also all play a positive role in contributing to the increase of urban and rural incomes.

In order to further examine the interaction between imports and urbanization to increase the per capita disposable income of urban and rural areas, the intersection of imports and urbanization levels was introduced. Considering that there is a lag effect in the interaction, the one-period lag value of the cross-term was added to the regression. The coefficients of urbanization and urbanization squared change very little relative to the basic regression results after the introduction of the cross-sectional term between imports and urbanization level, which again confirms the inverted U-shape of the poverty reduction

effect of urbanization level. The coefficients of imports are -1.758 and -2.125 , respectively. The signs and expectations have changed. They are also different from 0.305 and 0.270 in the basic case without considering the cross-term, and they have also become insignificant. The lagging second-phase coefficients of the cross-term of imports and urbanization are 0.025 and 0.025 , respectively, and are significant at a significance level of 5% or close to 5%, indicating that imports and urbanization have a strong interaction. The poverty reduction effect is more significant, which is consistent with the conclusion of the theoretical model. After comprehensively considering the introduction of the cross-term, the impact of imports itself becomes insignificant, while the impact of the cross-term is significant, indicating that the impact of imports on the per capita disposable income of urban and rural residents is mainly realized through the interaction with urbanization.

From the perspective of urban-rural income gap, the coefficient of urbanization's impact on the urban-rural income gap is around -0.113 , and is significant at a significance level of 1%, indicating that although urbanization has increased both urban and rural per capita income levels, the effect on rural areas is stronger than that on cities and towns, so it is conducive to reducing the urban-rural income gap. The coefficient of urbanization squared is 0.002 , which is also significant at the 1% significance level, indicating that the impact of urbanization level on reducing the urban-rural income gap also has an inverted U-shaped characteristic. The two variables of GDP per capita and the total length of railway and road transportation routes do not reflect the characteristics of reducing the income gap between urban and rural areas, indicating that pure local economic growth and national infrastructure construction do not reflect the effect of changing the dual economic structure of urban and rural areas. The proportion of industry added value to GDP has a strong effect on reducing the urban-rural income gap, and it is significant at a significance level of 1%.

From the perspective of foreign trade, the effect of imports on narrowing the urban-rural income gap is in the opposite direction and insignificant. The insignificant impact of imports on reducing the gap between urban and rural areas also shows from another side that the government should pay attention to how to guide foreign trade to better increase rural per capita income when formulating foreign trade policies, thereby reducing the income gap between urban and rural areas and achieving common prosperity.

Relative to the basic regression results, the coefficients of urbanization and urbanization squared have little change, which again verifies the inverted U-shaped characteristics of the poverty reduction effect of urbanization. The two variables of per capita GDP and the total length of railway and road transportation lines also did not reflect the characteristics of reducing the income gap between urban and rural areas, and the proportion of the added value of the financial industry in GDP still showed a strong effect on reducing the income gap between urban and rural areas.

In terms of imports, with or without the addition of the cross-sectional term and with or without considering the interaction between imports and urbanization, the effect of imports per se and the interaction between imports and urbanization on narrowing the urban-rural income gap is not significant.

Overall, when formulating foreign trade policies, the government should pay attention to how to guide foreign trade to better interact with urbanization and thus narrow the urban-rural income gap.

4.3. Analysis Based on the Population of Basic Subsistence Allowance and the Basic Living Allowance Expenditures

In order to fully reflect the effect of poverty reduction in urban and rural areas, the population of basic subsistence allowances in urban and rural areas as well as the basic living allowance expenditures from 2007 to 2016 in 27 provinces were selected as the explained variables for analysis. Considering the continuity of foreign trade, this section further introduces the previous period value of the explanatory variable as one of the explanatory variables for dynamic panel analysis.

4.3.1. Regression Results of Exports and Urbanization on the Population of Basic Subsistence Allowance and the Basic Living Allowance Expenditures

Here we used the systematic GMM estimation method for empirical analysis. The explanatory variable contains the first-order lag of the explained variable, and at most, three lags of the explanatory variable were used as instrumental variables. The regression results are shown in Table 6.

Table 6. The regression results of exports and urbanization on the population of basic subsistence allowance and basic living allowance expenditures.

	U-Population of Basic Subsistence Allowance		R-Population of Basic Subsistence Allowance		U-Basic Living Allowance Expenditures		R-Basic Living Allowance Expenditures	
L1.	0.8959 ***	0.8952 ***	0.8296 ***	0.8172 ***	0.5517 ***	0.56215 ***	0.6618 ***	0.6891 ***
	0.0117	0.0172	0.0102	0.0118	0.0194	0.0284	0.0062	0.0132
Urbanratio	−0.0006 ***	−0.0004 ***	−0.0016 ***	−0.0012 ***	0.00001 ***	−0.00007 ***	0.0000	−0.00005 ***
	0.0001	0.0001	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000
Urb2	0.0001 ***	0.0001 ***	0.0001 *	0.00001 ***	0.00001 ***	0.00001 ***	0.0000	0.00001 **
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Expratio	−0.0011	−0.0009	0.0052 **	0.0127 ***	−0.0023 ***	−0.0020 ***	−0.0041 ***	−0.0047 ***
	0.0008	0.0011	0.0024	0.0036	0.0002	0.0002	0.0002	0.0002
Pgdp	0.0001 ***	0.0001 ***	0.00001 ***	0.00001 *	0.00001 ***	0.00001 ***	0.00001 ***	0.00001 ***
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Line	0.0002	0.0002	0.0059 ***	0.0023	−0.0002 ***	−0.0001	0.0002 ***	0.0002 ***
	0.0007	0.0009	0.0012	0.0025	0.0002	0.0001	0.0000	0.0000
Finaratio	−0.0532 ***	−0.0465 ***	−0.1181 ***	−0.0752 ***	0.0024 *	0.0004	0.0131 ***	0.0114 ***
	0.0033	0.0069	0.0120	0.0132	0.0014	0.0018	0.0008	0.0008
L1.Expurban		−0.0004 ***		−0.0012 ***		0.0001 ***		0.0002 ***
		0.0001		0.0001		0.0000		0.0000
L1.Expurb2		−0.0004 ***		0.00002 ***		0.00001 ***		0.00001 ***
		0.0001		0.0000		0.0000		0.0000
_Cons	0.0191	0.0166	0.0519	0.0496	0.0023	0.0027	0.0016	0.0021
	0.0017	0.0020	0.0033	0.0016	0.0002	0.0003	0.0002	0.0003
sample	243	243	243	243	243	243	243	243
Wald chi2	73,507.4200	26,033.8500	125,913.9900	332,232.8300	2602.5800	3711.3500	27,503.1200	11,220.6700
Prob > chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Note: L1 represents the value of the variable lagging by one period; U- presents Urban area; R-presents Rural area; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

It can be seen from Table 6 that urbanization has a promoting effect on the decrease in the proportion of the urban population with the basic living subsistence allowance and the proportion of the rural population with the basic subsistence allowance, both of which are significant at the level of 1%. The coefficient of the square term of the urbanization level is positive, indicating that the effect of urbanization on poverty reduction has an inverted U-shaped characteristic, which is the same as the previous statistical analysis conclusion. The export coefficient is negative in most cases, indicating that exports have shown a strong role in reducing urban and rural subsistence allowances and basic living allowance expenditures. After adding the interactive item of export and urbanization level, it can be seen from Table 6 that urbanization has reduced the proportion of the urban and rural subsistence allowances and the basic allowance expenditures, both of which are significant at the level of 1%. The coefficient of the square term of the urbanization level is positive, indicating that the effect of urbanization on reducing urban and rural poverty has an inverted U-shaped characteristic, which is the same as the previous statistical analysis conclusion. In most cases, the export coefficient is negative, indicating that exports have shown a strong effect on reducing the urban and rural subsistence allowances and basic allowance expenditures. The lagging value of the cross-term between exports and urbanization has a significant impact on the reduction of urban and rural basic subsistence allowances, but the impact on the basic living allowance expenditure is not obvious.

4.3.2. Regression Results of Imports and Urbanization on the Population of Basic Subsistence Allowance and Basic Living Allowance Expenditures

The regression results are shown in Table 7.

Table 7. The regression results of Imports and Urbanization on the population of basic subsistence allowance and basic living allowance expenditures.

	U-Population of Basic Subsistence Allowance		R-Population of Basic Subsistence Allowance		U-Basic Living Allowance Expenditures		R-Basic Living Allowance Expenditures	
L1.	0.9099 ***	0.9066 ***	0.8252 ***	0.8218 ***	0.5888 ***	0.5766 ***	0.6522 ***	0.6375 ***
Urbanratio	0.0134	0.0137	0.0087	0.0106	0.0210	0.0342	0.0073	0.0094
	−0.0006 ***	−0.0003 ***	−0.0018 ***	−0.0014 ***	0.0000	0.0000	0.00003 **	0.00007 ***
Urb2	0.0001	0.0001	0.0001	0.0002	0.0000	0.0000	0.0000	0.0000
	0.00001 ***	0.00001 ***	0.00002 ***	0.00001 ***	0.00001 ***	0.0000	0.00001 ***	0.00001 ***
Impratio	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0012	0.0040 **	0.0001	0.0122 ***	−0.0035 ***	−0.0014 **	−0.0052 ***	−0.0052 ***
	0.0018	0.0016	0.0047	0.0047	0.0004	0.0006	0.0012	0.0008
Pgdp	0.00001 ***	0.00001 ***	0.00001 ***	0.00001 **	0.00001 ***	0.00001 ***	0.00001 ***	0.00001 ***
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Line	0.0003	−0.0002	0.0054 **	0.0025	−0.00024 ***	−0.0003 *	0.0001	0.0002
	0.0006	0.0006	0.0011	0.0023	0.0002	0.0002	0.0001	0.0001
Finaratio	−0.0510 ***	−0.0460 ***	−0.1245 ***	−0.0939 ***	0.0006	0.0000	0.0106 ***	0.0096 ***
	0.0045	0.0053	0.0111	0.0144	0.0011	0.0013	0.0011	0.0010
L1.Impurban		−0.0009 ***		−0.0013 ***		−0.00013 *		−0.0001 *
		0.0002		0.0003		0.0001		0.0001
L1.Impurb2		0.00001 ***		0.00002 ***		0.00001 ***		0.00001 ***
		0.0000		0.0000		0.0000		0.0000
_Cons	0.0183	0.0140	0.0583	0.0528	0.0015	0.0012	0.0007 **	0.0000
	0.0019	0.0021	0.0022	0.0030	0.0003	0.0005	0.0003	0.0003
Samples	243	243	243	243	243	243	243	243
Wald chi2	67,125.1900	15,841.9300	151,591.9500	421,275.4900	9682.2100	14,228.7100	98,012.7700	60,998.0800
Prob > chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Note: L1 represents the value of the variable lagging by one period, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

As can be seen from Table 7, the inverted U-shaped characteristics of poverty reduction in urbanization are consistent with the previous analysis. The coefficient of imports has a negative impact on the expenditures for urban and rural basic living allowances, and is significant at the level of 1%, indicating that imports show a strong effect of reducing the urban and rural minimum basic living allowance expenditures. After adding the interaction item between import and urbanization level, the inverted U-shaped characteristics of poverty reduction in urbanization are consistent with the previous analysis. Imports have a positive coefficient for the urban and rural basic subsistence allowances, and a negative coefficient for the basic living allowance expenditure, which is significant at the 5% level, indicating that imports show a strong effect on reducing the expenditures for urban and rural minimum basic living allowances. The lag value of the cross-term of imports and urbanization has a significant impact on the reduction of the urban population of subsistence and the basic living allowance expenditure.

4.4. Regression Results Considering Regional Heterogeneity

The “Headcount” variable of the incidence of rural poverty was selected as the poverty indicator, and the analysis was divided into three groups: eastern, central and western. In order to save space, export and import were put into a model for analysis. At the same time, in order to more fully demonstrate the role of opening to the outside world, while considering exports and imports, the use of foreign capital was also added.

4.4.1. Basic Regression Results of Foreign Trade and Urbanization on Rural Poverty Gaps in Various Regions

The basic results are shown in Table 8. It can be seen from Table 8 that the urbanization of rural areas in eastern, central, and western China has obvious U-shaped characteristics of poverty reduction. In addition, the per capita income level in the western region has shown a strong effect on reducing poverty in rural areas, while the total length of railway and road transport lines in the eastern, central and western regions has played a significant role in reducing poverty in rural areas. The phrase “build roads

first” applies to all regions of the country. Exports from the eastern and western regions have shown a strong effect on reducing poverty in rural areas, and imports in the central region have also shown a strong effect on reducing poverty.

Table 8. Effect of foreign trade and urbanization on rural poverty gap in different regions.

	Eastern China		Central China		Western China	
	Coef.	p Value	Coef.	p Value	Coef.	p Value
L1.Urbanratio	−0.707 0.272	0.009	−2.140 0.774	0.006	−4.399 1.257	0.000
L1.Urb ²	0.007 0.003	0.012	0.024 0.010	0.018	0.052 0.018	0.004
L1.Pgdp	0.000 0.000	0.001	0.000 0.000	0.001	−0.001 0.000	0.002
L1.Line	−9.671 2.909	0.001	−22.873 4.943	0.000	−44.633 7.178	0.000
L1.Finaratio	−49.740 39.504	0.208	77.030 43.160	0.074	363.512 99.563	0.000
L1.Expratio	−9.608 5.671	0.090	7.867 24.502	0.748	−272.349 64.114	0.000
L1.Impratio	7.491 7.675	0.329	−67.970 47.644	0.154	109.540 56.668	0.053
L1.Fdiratio	25.089 23.631	0.288	−139.250 50.714	0.006	526.330 187.029	0.005
_Cons	42.673 6.859	0.000	99.609 13.034	0.000	164.538 18.883	0.000
Simple size	102		85		102	
R ²	0.714		0.898		0.843	

Note: L1 represents the value of the variable lagging by one period.

4.4.2. Regression Results of the Effects of Interaction of Foreign Trade and Urbanization in Different Regions on Rural Poverty Reduction

After adding the cross-term of export and urbanization level, the cross-term of imports and urbanization level, and the cross-term of foreign capital utilization and urbanization level into the model, we arrived at the regression results shown in Table 9. It can be seen from Table 9 that poverty reduction through urbanization still has a strong inverted U-shaped characteristic. The per capita income level and the total length of railway and road transport routes have all played a significant role in reducing poverty. Exports from the eastern, central and western regions all show strong poverty reduction effects. Imports and urbanization have shown a strong interaction in poverty reduction, while the interaction between exports and urbanization in poverty reduction has not yet been fully realized.

4.4.3. Summary

On the whole, the U-shaped characteristics of urbanization and poverty reduction in rural areas in China are obvious. The per capita income level and the total length of railway and road transport routes have all played a significant role in reducing poverty. Exports from the eastern, central, and western regions all show a strong effect on reducing poverty in rural areas. Imports and urbanization show a strong interaction in rural poverty reduction, while exports and urbanization have insignificant interactions in rural poverty reduction.

Table 9. Interactive effects of foreign trade on rural poverty reduction in different regions of China.

	Eastern China		Central China		Western China	
	Coef.	p Value	Coef.	Coef.	p Value	Coef.
L1.Urbanratio	−0.887 0.348	0.011	−1.610 0.780	0.039	−6.207 1.314	0.000
L1.Urb ²	0.010 0.004	0.021	0.017 0.010	0.105	0.091 0.019	0.000
L1.Pgdp	0.000 0.000	0.000	−0.001 0.000	0.000	−0.001 0.000	0.000
L1.Line	−7.996 3.431	0.020	−23.155 4.816	0.000	−46.100 6.717	0.000
L1.Finaratio	−62.007 39.643	0.118	92.689 43.366	0.033	405.324 123.976	0.001
L1.Expratio	−114.335 41.891	0.006	−168.640 219.245	0.442	−897.416 366.212	0.014
L1.Impratio	167.784 64.875	0.010	403.367 297.111	0.175	1452.525 293.181	0.000
L1.Fdiratio	32.863 131.882	0.803	−881.715 348.188	0.011	1016.258 728.725	0.163
L1.Expurban	1.837 0.721	0.011	2.936 4.894	0.549	17.555 9.430	0.063
L1.Impurban	−2.816 1.121	0.012	−11.014 6.926	0.112	−35.837 7.865	0.000
L1.Fdiurban	−0.536 2.284	0.814	18.411 8.849	0.037	−10.855 17.304	0.530
_Cons	45.650 7.208	0.000	92.258 13.590	0.000	180.294 24.798	0.000
Simple size	102		85		102	
R ²	0.738		0.908		0.874	

Note: L1 represents the value of the variable lagging by one period.

5. Conclusions

The empirical analysis results based on China's interprovincial panel data show that urbanization has increased both urban and rural per capita income levels, and its effect on rural areas has been stronger than that on urban areas, thus reducing the urban-rural income gap. Moreover, the analysis results show that urbanization has significantly reduced urban and rural poverty and the proportion of urban and rural subsistence allowances. The poverty reduction effect of urbanization has an inverted U-shaped characteristic. Per capita GDP has not played a positive role in reducing the poverty gap in rural areas, while the total length of railway and road transport routes has played a significant role in reducing poverty; this fully validates the common saying that better road infrastructure leads to better income in rural areas.

Foreign trade has promoted the increase in per capita income in urban and rural areas, and its impact on rural areas is more obvious than on urban areas. Therefore, it is conducive to reducing the income gap between urban and rural areas. The impact of foreign trade on urban poverty reduction is unstable, and some of its impacts are even in the negative direction. Exports have significantly reduced rural poverty, and foreign trade has shown a strong positive effect on reducing the proportion of the urban and rural subsistence allowances and the minimum social security expenditures.

Foreign trade and urbanization have produced a strong synergistic effect in boosting income growth. Moreover, exports and urbanization have a significant interaction effect on the reduction of urban and rural subsistence allowances, and imports and urbanization have a significant effect on the reduction of urban and rural subsistence allowances. The reduction in social security expenditures has significant interactions with indicators, but exports, imports, and urbanization do not reflect significant synergy in reducing the urban-rural income gap or urban and rural poverty. These indicators also show that China

is playing a role in foreign trade and that there is still much room for improvement in terms of the interaction between foreign trade and urbanization to jointly promote poverty reduction.

Overall, China's provincial data show that the inverted U-shaped characteristics of the poverty reduction effect of urbanization indicate that moderate urbanization is still the main poverty reduction path for some poor areas in China. However, some developed areas should also control excessive expansion of the scale of cities and towns, and consider rural revitalization. Moreover, foreign trade itself has a certain effect on poverty reduction. An interaction between foreign trade and urbanization on poverty reduction has emerged, but it has not yet been fully utilized. This reminds us how to better exercise the interactive role of foreign trade and urbanization in poverty reduction. This also reminds us from one side, how to better play the interactive role of foreign trade and urbanization in poverty reduction and promote the transformation of foreign trade from labor-intensive to knowledge-intensive or technology-intensive, thereby improving the quality of foreign trade. While other countries can learn from China on narrowing the income gap between urban and rural areas and helping to fight poverty, these are still issues that the Chinese government should focus on when formulating relevant policies in the future.

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