INCOME GAP BETWEEN URBAN AND RURAL AREAS IN CHINA

by

Yunge Du

Bachelor of Economics, Shandong University of Finance and Economics, 2018

A Report Submitted in Partial Fulfilment of the Requirements for the Degree of

Master of Arts

in the Graduate Academic Unit of Economics

Supervisor:	Weiqiu Yu, Ph.D., Economics
Examining Board:	Yuri Yevdokimov, Ph.D., Economics, Chair
	Herb Emery, Ph.D., Economics
	Barry Watson, Ph.D., Economics

This report is accepted by the Dean of Graduate Studies

THE UNIVERSITY OF NEW BRUNSWICK

August 2021

Abstract

Since economic reform beginning in 1978, China's economy has grown rapidly resulting in higher standard of living for both urban and rural residents. However, the income gap between urban and rural residents continues to expand. Using time series data from 1978 to 2019 and cointegration technique, I find that (i) in the long run China's *Dual Economic Structure*, *Dependence on Foreign Trade* and *Difference Between Urban and Rural Consumption* expand the income gap while the *Urbanization* and *Proportion of Agriculture in GDP* reduce the income gap between urban and rural residents; and (ii) in the short run, only the *Dual Economic Structure* and *the Difference Between Urban and Rural Consumption* have a significant impact on the urban-rural income gap. Accordingly, I recommend the governments increase investments in agricultural technology and training programs, promote the export of agricultural products, and encourage the rural residents to consume more by increasing agricultural subsidies.

Acknowledgements

I would like to express my gratitude to all those who helped me during the writing of this report.

Firstly, I would like to pay my authentic thankfulness to Professor Weiqiu Yu who is the supervisor of my research during the long phase in writing this report. She patiently answered my questions and provided useful suggestions for me. Her thoughts led me to think more about the content of the report, which made my report completer and more convincing.

Secondly, I would like to thank all the teachers who have helped me to develop the fundamental and necessary academic skills. Based on these basic literacies, I completed the report on time.

Last but not least, I should express my gratitude to my beloved parents and friends for their encouragement and support to accompany me through the difficult writing period. Without their trust and help, I will not have such a strong motivation to complete this report.

Table of Contents

List of Tables

List of Figures

1. Introduction

Since 1978, China's economy has grown rapidly resulting in a higher standard of living for both urban and rural residents. According to the National Bureau of Statistics, per capita disposable income of urban residents and rural residents in 2019 were 42358.8 yuan and 16020.7 yuan (123.4 times and 119.9 times the per capita income of urban residents and rural residents in 1978), respectively. Cheng and Li (2007) argued that although the overall income level of urban and rural residents continues to improve, the income gap between urban and rural residents continues to expand with the rapid development of the national economy. In 2019, the absolute income gap[1] between urban and rural residents was 124.54 times higher than that in 1978; the relative income gap[2] between urban and rural residents was 2.7% higher than that in 1978.

The income gap between urban and rural areas affects economic development and social stability[3]. To narrow the gap between urban and rural areas in China, the Government put in place a Rural Revitalization program in 2018 aiming at equalizing the countryside with urban areas by 2035. With this program in place, how to improve the income of the farmers and how to narrow the income gap between urban and rural residents have become one of the top policy issues in China.

Past studies have identified several factors driving the income gap between

---

[1] Absolute income gap refers to the difference between urban residents' disposable income and rural residents' net income. The disposable income refers to the income after deducting the paid income tax and social security fee from the total income, and the net income refers to the total income of rural residents in the current year after deducting the expenses incurred in obtaining the income.

[2] Relative income gap refers to the ratio of urban residents' disposable income to rural residents' net income.

[3] See: Dai Feng (2005), "Trade liberalization and income inequality: An Empirical Study Based on China", World Economic Research (10), 39-46.

urban and rural areas in China using different data sets and different estimation methods. First, Most studies used only a few of the many independent variables affecting the income gap between urban and rural areas in China due to data limitation and different conceptual framework and thus were subject to omitted variable bias. Tang (2011) argued that the income gap between urban and rural residents was affected by controllable and uncontrollable factors such as politics, economy, nature and history, which could not be listed in full. Second, the data used in these studies are dated. This report follows this strand of literature and uses a more recent time series data set from 1978 to 2019 to explore the factors driving the urban-rural income gap in China.

Using a Chinese time series data set from 1978 to 2019 and cointegration technique, I find that (i) in the long run China's *Dual Economic Structure*[4], *Dependence on Foreign Trade* and *Difference Between Urban and Rural Consumption* expand the income gap while the *Urbanization* and *Proportion of Agriculture in GDP* reduce the income gap between urban and rural residents; and (ii) in the short run, only the *Dual Economic Structure* and *the Difference Between Urban and Rural Consumption* have a significant impact on the urban-rural income gap.

The rest of the report is organized as follows: Section 2 reviews the literature. Section 3 explains the variables and data. Section 4 presents the tests and estimations results. Finally, Section 5 concludes and provides some policy recommendations.

---

[4] Dual economic structure refers to the economic structure in which modern industry and traditional agriculture coexist in developing countries.

2. Literature Review

2.1 The Measurement of Urban-Rural Income Gap

For the measurement of the income gap between urban and rural residents, the Gini coefficient[5] and urban-rural income ratio are widely used. Sicular (2007) used survey data from the Chinese Academy of Social Sciences to estimate the income gap between urban and rural areas and found that the income ratio between urban and rural areas was 2.3:1. In this report, I use both the absolute urban-rural income gap and the relative urban-rural income gap for our analysis. Absolute urban-rural income gap refers to the difference between urban residents' disposable income and rural residents' net income, while relative urban-rural gap refers to the ratio of urban residents' disposable income to rural residents' net income.

2.2 Factors Associated with Urban-Rural Income Gap

There have been many empirical studies identifying the factors impacting the Chinese urban-rural income gap. Zhang (1994), using a time series data set from 1978 to 1993 and stepwise multiple regressions, found that *dual economic structure* alone explained 59.62% of the change in the urban-rural income gap.

Olson (1996) examined factors such as population migration, population density, capital flow and human capital in various countries, and argued that the differences in endowments, differential access to technology, population migration and differences in personal culture could not explain the differences in per capita income. The author further argued that the most important explanation of the differences in

---

[5] Gini coefficient: a popular metric that captures the degree of income inequality in a particular region.

3

income across countries was the difference in their economic policies and institutions. Krugman (1998) introduced the main elements of new economic geography, and summarized that the economy would spontaneously organize itself into high-wage industrial ''core'' and a low-wage agricultural "periphery," then to a later convergence of wages as the periphery industrializes by reviewing the research results of many scholars on new economic geography.

Among the empirical studies for China, Xiang and Li (1998) found that *the proportion of the output value of the primary industry in GDP, the growth rate of fiscal expenditure on agriculture and the growth rate of the number of employees of township enterprises* were negatively correlated with the income gap between urban and rural areas in China by using a time series data set from 1981 to 1996 and regression analysis. Lu and Chen (2004) analyzed a panel data of 29 Chinese provinces from 1987 to 2001 by estimating a fixed effect model and found that the economic openness measured by *foreign trade* significantly expanded the urban-rural income gap, while *urbanization* and *fiscal expenditure on agriculture* significantly reduced the urban-rural income gap in China. Zhang Hongyu (2004) analyzed the impact of industrial development on urban-rural income gap from a theoretical perspective and argued that the existence of an income gap between urban and rural residents was a known fact in the process of industrialization. Although the income gap generally decreases with economic development, the process may be very long. Therefore, the government needs to take effective measures to narrow the income gap between urban and rural areas.

Kanbur and Zhang (2005) ran logarithmic regressions using data for the periods: 1952-2000, 1952-1978 and 1979-2000 respectively and found that the impact of the *trade ratio* on the urban-rural income gap almost doubled from 1979 to 2000 due to the economic reform in 1978, a greater favoring of heavy industry increases rural–urban income gap in the pre-reform period, and greater decentralization widens rural–urban income gap in the reform period. Dai (2005) argued that technological progress brought about by international trade increased the demand for skilled labor and reduced the demand for unskilled labor, thus widening the income gap. Using a time series data set from 1980 to 2003 and cointegration techniques, the author found that there was a long-term stationary relationship between the income gap as measured by the Gini coefficient and *foreign trade*.

Using a time series data from 1985 to 2004 and stepwise regressions, Zhang (2005) found that *urbanization, labor structure, per capita GDP* and *dual economic structure* were positively correlated with the income gap between urban and rural residents, while *fiscal expenditure* on agriculture was negatively correlated with the income gap between urban and rural residents. Cheng and Li (2007) estimated a Vector Autocorrelation (VAR) model with time series data from 1978 to 2004 for China. Through a Granger causality test, impulse response function and variance decomposition, they concluded that both *urbanization* and *preferential treatment of urban residents* were positively correlated with the urban-rural income gap. Zhang and Wu (2007) ran time series regression for the Anhui Province of China from 1978 to 2004 and found that *the dual economic structure, urbanization*, and *proportion of*

fiscal expenditure on agriculture significantly reduced the urban-rural income gap, while *the industrial ratio* and *per capita GDP growth rate* significantly increased the urban-rural income gap.

Zhang and Fang (2007) examined the dynamic relationship between economic development as measured by per capita GDP and urban-rural income gap, using time series data for China from 1978 to 2003. They found that there was a significant relationship between the urban-rural income gap and economic development in both the long run through a cointegration test and the short run through the estimation of an error correction model. Xu and Wang (2008) estimated a dynamic simultaneous equation model using a panel data set of 30 provinces from 1997 to 2006 and found that there was a strong relationship among *urbanization, industrialization,* and the urban-rural income gap.

Wu and Chen (2010) estimated a logarithmic VAR model of the urban-rural income gap and agricultural growth using a time series from 1990 to 2007 and found that *agricultural growth* was conducive to narrowing the income gap between urban and rural residents through an impulse response function and variance decomposition.

Tang (2011), using a panel data set of 30 Chinese provinces from 1978 to 2008 and fixed effects estimation, found that both *dual economic structure* and *urbanization* significantly widened the income gap between urban and rural areas. Hui and Xiong (2011) found that increasing investment in *rural fixed assets* was negatively correlated with the urban-rural income gap in both the short run and long

run using a time series data set from 1980 to 2009 and cointegration techniques.

Zheng and Li (2012) used the Gini coefficient to measure the urban-rural income gap. Using a panel data of six provinces from 2000 to 2010 and a fixed effects model with six independent variables: *industrial structure*, *fixed asset investment, the proportion of fiscal expenditure on agriculture, the difference between urban and rural labor force participation rate, the level of marketization* and *foreign trade*, they found that the upgrading of *industrial structure* widened the income gap between urban and rural areas, while *fixed asset investment in agriculture* and *foreign trade* narrowed the income gap between urban and rural areas.

Zhu (2012) using a time series data from 1992 to 2009 and the VAR technique, found that there was a significant correlation between the income gap and *the consumption gap* between urban and rural residents, and the cumulative effect of the two would lead to the continuous expansion of the income gap and the consumption gap between urban and rural residents. Tang (2013) using a time series data from 1978 to 2011 and regression analysis, found that *the proportion of the output value of the primary industry in GDP*, *the urbanization rate* and *the total output value of agriculture, forestry, animal husbandry and fishery per capita* were negatively correlated with the urban-rural income gap.

Based on the panel data of 31 provinces from 2006 to 2013, Chen, Gao, Wang and Yang (2016) estimated a fixed effect model that included four independent variables: *industrialization, urbanization, economic development,* and *the degree of*

openness to the outside world into the model. They found that *the development of heavy industry* expanded the income gap between urban and rural areas in that period, while *urbanization* was negatively correlated with urban-rural income gap.

Li (2016) used Gini coefficient to measure urban-rural income gap, and studied the impact of urban-rural fixed asset investment gap on urban-rural income gap by selecting the following explanatory variables: *industry ratio*, *foreign trade*, *fiscal expenditure on agriculture,* and a measure of marketization into a fixed effects model. The author found that *the urban-rural fixed asset investment gap*, the upgrading of *industrial structure, fiscal expenditure* and *foreign trade* were positively correlated with the income gap between urban and rural residents.

Finally, Chen, Xu and Zhou (2017) used a time series data from 1993 to 2011 to investigate the relationship between *urbanization*, *economic growth* and the urban-rural income gap through the Johansen cointegration test, Granger causality test, impulse response and variance decomposition. Their results showed that *urbanization* and *economic growth* widened the income gap between urban and rural areas.

In summary, there have been many empirical studies on the income gap between urban and rural areas in China. These studies, using different data sets covering different time periods, and different estimation methods, have identified many factors affecting the urban-rural income gap. However, most studies used only a few of the many independent variables used in the literature due to data limitations and thus were subject to potential omitted variable bias. In addition, the data used in these

studies are dated. To alleviate the problem of omitted variable bias and to enrich the literature by providing a more updated analysis, I conduct analysis using a more recent data set and a richer set of independent variables in this report.

3. Variables and Data

3.1 Variables and transmission mechanisms

Based on the literature review and date availability, I selected nine independent variables that are hypothesized to be associated with the dependent variable, the *income gap between urban and rural residents* (*gap*). I introduce these variables below and explain the transmission mechanisms through which the dependent variable is thought to be affected.

1. *Dual economic structure (dual).* Dual economic structure is measured by the ratio of non-agricultural comparative labor productivity to agricultural comparative labor productivity. Specifically, non-agricultural comparative labor productivity is equal to the proportion of the output value of non-agricultural sector in the total output value divided by the proportion of the labor force of non-agricultural sector in the total labor force, Agricultural comparative labor productivity is equal to the proportion of the output value of the agricultural sector in the total output value divided by the proportion of the labor force of agricultural sector in the total labor force. Lewis (1954) proposed a dual sector model in which there are two different sectors in developing countries. One is the industrial sector with higher labor productivity and wages; the other is the agricultural sector with low labor

productivity and wages. The expansion of the industrial sector leads to the increase of the demand for labor, which promotes the transfer of rural surplus labor, with zero marginal productivity in agriculture, to the industrial sector. When the surplus labor in the traditional agricultural sector is transferred to the industrial sector, capital becomes a relatively abundant factor of production, and the return of capital will decrease, while the labor force will change from unlimited supply to a scarce factor of production, which makes the marginal productivity and wages of labor in the agricultural sector gradually increase. In other words, the transfer of surplus labor in the agricultural sector, and the improvement of agricultural labor productivity, gradually reduces the *dual economic structure* and narrows the income gap between urban and rural areas. Thus, it is expected that the smaller the value of this measure is, the smaller will be the gap between urban and rural areas, and *vice versa*.

2. *Urbanization (ur).* Urbanization, measured by the proportion of urban population in the total population, reflects the transformation process of people's production and lifestyle from rural to urban. The impact of this variable on the urban-rural income gap is mainly reflected in the following two aspects. First, according to Todaro (1970), the expected income gap between urban and rural areas leads to the transfer of labor from rural areas to urban areas. On the one hand, the supply of labor force in urban areas increases, resulting in the decline of urban residents' income; On the other

hand, the decrease of labor supply in rural areas leads to the improvement of rural labor productivity and the increase of farmers' income. Second, the "radiation effect" of *urbanization* expands the demand for agricultural products and promotes the development of rural areas, thus narrowing the income gap between urban and rural areas. Thus, it is hypothesized that urbanization is negatively associated with the income gap.

3. *Dependence on foreign trade (trade).* Dependence concerns the ratio of total import and export to GDP, which reflects the scale of foreign trade of a country or region. The law of one price argues that international trade has the potential to equalize prices of the same product across countries and regions. In this process, changes in product prices will inevitably affect people's income. For example, the price of industrial products is high while the price of agricultural products is low, which leads to the income of urban residents being higher than that of rural residents and expands the income gap between urban and rural areas. In addition, economic globalization increases competition within markets. Due to the lack of mature technology, the quality of agricultural products is low in China, and agriculture, as a weak industry, is easily affected by technical barriers to trade, which hinder the export of agricultural products[6]. In contrast, industrial products gradually extend from low value-added products to high value-added products relying on innovation and technological progress, which greatly improve its

---

[6] See: China industry information network, 2020, Analysis on the development trend of China's agricultural product output and agricultural product import and export trade in 2019, https://www.chyxx.com/industry/202007/883979.html

international competitiveness. Therefore, urban residents benefit more than rural residents in the process of foreign trade, thus widening the income gap between urban and rural areas. Thus, I expect to see a positive correlation between trade dependence and urban-rural income gap.

4. *Ratio of industry (ratio).* Ratio of industry refers to the proportion of the total output value of the secondary and tertiary industries in the output value of the primary industry. It is used to measure the industrial structure of a country or region. Reasonable industrial structure can narrow the income gap between urban and rural areas. As early as the 17th century, Petty (1690) discussed the relationship between industry and income. He thought that the manufacturing industry received more income than agriculture, while commerce received more income than the manufacturing industry. He pointed out that the income gap between industries would promote the transfer of labor to higher income sectors. This report analyzes the influence mechanism from the following two aspects. From the perspective of industrial types, agriculture is the main industry in rural areas with low price of agricultural products and small demand elasticity, while secondary and tertiary industries are the main industry in cities with high price of products and large demand elasticity. The difference of main industries between urban and rural areas leads to the income gap between these areas. From the perspective of industrial association, the industries in rural areas are single, the industrial chain is short, and the competitiveness of products is small.

However, the urban industries are complete, the value chain of industries is long, the competitiveness of products is strong, so the profitability is far higher than that of agricultural products. Therefore, the income of urban residents is higher than that of rural residents. Accordingly, I expect that the industrial ratio is positively correlated with the income gap between urban and rural areas.

5. *Per capita GDP (pGDP).* Per capita GDP is measured by GDP divided by population. The Kuznets curve (1955) posited that with economic development, the inequality of income distribution expanded first and then narrowed. The reason is that in the early stage of industrialization, the rapid development of the industrial sector promotes economic growth and increases the income of urban residents, thus widening the income gap between urban and rural areas. However, as more labor transfer from the low-income agricultural sector to the industrial sector, the income gap between urban and rural residents narrows. Chen, Gao, Wang and Yang (2016) argued that industrialization has developed rapidly, but the transfer of rural labor is far behind industrialization in China at present. Therefore, it is expected that the per capita GDP is positively related to the urban-rural income gap.

6. *Proportion of agriculture in GDP (agri).* Proportion of agriculture in GDP is measured by the ratio of output value of primary industry to GDP. Agriculture development is of great significance to narrow the income gap

between urban and rural areas for the following reasons. First, the primary industry is a main source of income for many rural residents. The increase of agricultural output value means the increase of farmers' income and the narrowing of the income gap between urban and rural areas. Second, the development of industrialization attracts the transfer of rural surplus labor from the agricultural sector to the industrial sector, but the limited job opportunities provided by the industrial sector cannot meet the employment needs of all the transferred labor, resulting in their unemployment and slowing the development of urbanization. The increase of the proportion of agricultural output value and the development of agriculture can provide employment opportunities for these unemployed rural residents, which not only alleviate their unemployment problem, but also increases the income of rural residents, thus narrowing the income gap between urban and rural areas.

7. *Industrialization (indus).* Industrialization is generally measured by the proportion of industrial value added to GDP. First, since larger industrial enterprises are mostly located in cities, urban residents benefit more from the development of industrialization. Second, Chen and Lin (2013) argued that although the development of industrialization promotes the transfer of rural labor to the industrial sector, the limited job opportunities provided by the industrial sector lead to urbanization lagging behind industrialization. The slow development of urbanization means that it is difficult for rural

residents to transfer to cities, resulting in majority of the rural labor force having to stay in rural areas. According to the law of diminishing returns to scale, the average output of agriculture and the income level of farmers will inevitably decline, and the income gap between urban and rural areas will expand. In addition, in the process of industrialization, the technical ability and proficiency of urban residents are much higher than that of rural residents due to the accumulation of work experience and the improvement of technical requirements of industrial sectors, which makes them more able to find high-income jobs in the labor market, thus widening the income gap between urban and rural residents. Accordingly, I expect a positive relationship between *Industrialization* and the urban-rural income gap.

8. *Proportion of rural investment (rural).* The proportion of rural investment is measured by the ratio of fixed assets investment of rural residents to fixed assets investment of the whole society. Fixed assets investment is an important force to promote economic development, and its distribution between urban and rural areas will inevitably affect the urban-rural income gap. Both Zheng and Li(2012) and Li (2016) argued that *fixed asset investment* mainly affects the urban-rural income gap through the so-called "back-wash" effect and "Matthew" effect. The back-wash effect refers to the phenomenon that capital, talent, and technology flow from underdeveloped areas to developed areas under the attraction of the high return rate. The Matthew effect is a polarized social phenomenon, which reflects that the

rich are richer and the poor are poorer. In China, due to the low rate of return in rural areas and the high rate of return in urban areas, both per capita and total fixed asset investments in urban areas are much higher than those in rural areas. In addition, the expansion of industrial sector stimulates the demand for investment. As a result, the fixed asset investment flows into the city continuously, and the rural fixed asset investment declines. Finally, under the investment multiplier theory, the income of rural residents is decreasing, and the income gap between urban and rural areas is also expanding. Hence, it is expected that the larger the ratio of fixed assets investment of rural residents to fixed assets investment of the whole society, the more income farmers will get and the smaller the income gap will be.

9. *The difference between urban and rural consumption (durc).* The difference between urban and rural consumption is calculated by the ratio of per capita consumption expenditure of urban residents to per capita consumption expenditure of rural residents. The impact of this variable on the *urban-rural income gap* is mainly through the consumption multiplier theory. Suppose everyone's marginal propensity to consume is σ, then the consumption multiplier is $\frac{1}{1-\sigma}$, which means that the increase of national income is $\frac{1}{1-\sigma}$ times of consumption expenditure. The more consumption, the more increase in national income. However, the consumption level of urban residents is high, while the consumption level of rural residents is low, which leads to the increase of urban residents' income more than that of

rural residents, thus widening the income gap between urban and rural areas. Therefore, a positive correlation between this variable and the *urban-rural income gap* is expected.

For convenience, the definitions and measurements of the dependent and independent variables are summarized in Table 1 below.

Table 1: Variable definition and calculation

Variables	Definition	Calculation method
gap	relative income gap between urban and rural residents	ratio of per capita disposable income of urban residents to per capita net income of rural residents
dual	dual economic structure measure	the ratio of non-agricultural comparative labor productivity to agricultural comparative labor productivity
ur	urbanization	the proportion of urban population in the total population
trade	dependence on foreign trade	ratio of total import and export to GDP
ratio	ratio of industry	the proportion of the total output value of the secondary and tertiary industries in the output value of the primary industry
pGDP	per capita GDP	GDP divided by population
agri	proportion of agriculture in GDP	ratio of output value of primary industry to GDP
indus	the level of industrialization development	the proportion of industrial value added to GDP
rural	the proportion of rural investment	ratio of fixed assets investment of rural residents to fixed assets investment of the whole society
durc	the difference between urban and rural consumption	ratio of per capita consumption expenditure of urban residents to per capita consumption expenditure of rural residents

3.2 Data

A time series data set from 1978 to 2019 is used for our empirical analysis. Except for the missing data of fixed assets investment of rural residents in 1978 and 1979, which is filled by a linear interpolation method[7] in this report, all data are collected and calculated based on the relevant data in China Statistical Yearbook 2020 (http://www.stats.gov.cn/tjsj/ndsj/2020/indexch.htm). The China Statistical Yearbook 2020 is a public dataset compiled by the National Bureau of statistics. This is an informative Yearbook that comprehensively reflects China's economic and social development, which not only contains macroeconomic data such as population, industry, import and export and GDP, but also data on the consumption, investment and income of urban and rural residents defined according to their place of residence.

3.3 Descriptive Statistics

There are 42 observations in total. Table 2 reports the mean, standard deviation, minimum and maximum values of the dependent variable and nine independent variables.

Table 2: Descriptive statistics

Variable	Obs	Mean	Std.Dev	Min	Max
gap	42	2.66	0.44	1.82	3.33
dual	42	5.05	0.77	3.87	6.85
ur	42	0.37	0.13	0.18	0.61
trade	42	0.35	0.14	0.10	0.64
ratio	42	6.13	3.52	2.05	13.20
pGDP	42	1.67	2.06	0.04	7.08
agri	42	0.18	0.09	0.07	0.33
indus	42	0.39	0.03	0.32	0.44
rural	42	0.10	0.07	0.01	0.21

---

[7] Linear interpolation is a method to determine the value of a missing data between these two known data through a straight line.

durc	42	2.88	0.48	2.13	3.53

Since the economic reform from 1978 in China, the income gap between urban and rural areas in China has experienced a process of fluctuating rise. I first present the relevant statistical data of the income gap between urban and rural residents in China. Using a histogram and line chart of these data, I found that the income gap between urban and rural residents has widened since 1978. In terms of absolute gap, the income gap between urban and rural residents has increased by 125 times from 1978 to 2019; in terms of relative gap, in the past 42 years, the largest income gap between urban and rural residents was 1.8 times of the smallest one.

Figure 1 shows that the growth trend of per capita disposable income of urban residents in China from 1978 to 2019 is remarkable, with a fast growth rate; while the growth trend of per capita net income of rural residents during the same period is relatively smaller, with a slow growth rate. In addition, the income gap between urban and rural residents is generally expanding.
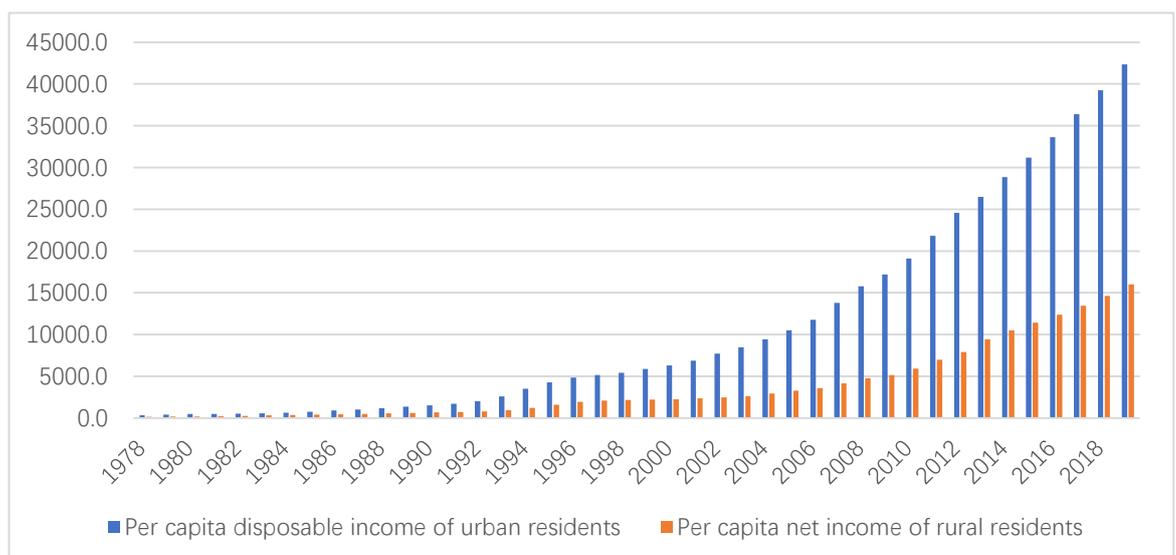

Fig.1. Absolute Income of Urban and Rural Residents in China, 1978-2019

Figure 2 shows the historical evolution of the relative income gap between

urban and rural residents in China from 1978 to 2019 which can be divided into six
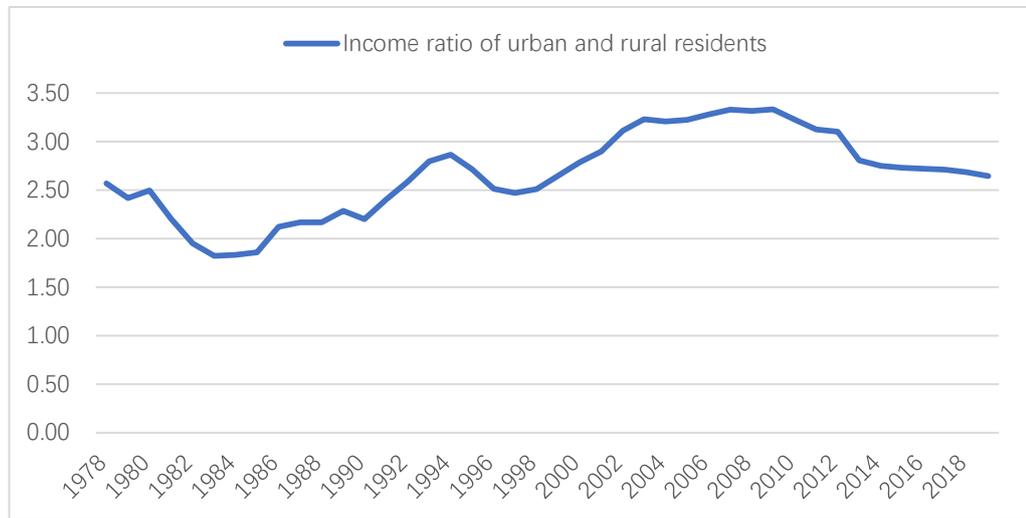
stages according to its trend.

Fig.2. Relative income gap between urban and rural residents in China, 1978-2019

In the first stage (1978-1984), the per capita relative income gap between urban

and rural residents decreased from 2.57:1 to 1.83:1, and the absolute income gap

expanded from 209.8 yuan to 295.9 yuan. In 1984, the per capita net income of rural

residents reached 355.3 yuan, 2.7 times that of 1978. Both Xiang and Li (1998) and

Zhang and Wu (2007) argued that the narrowing of the relative income gap between

urban and rural residents was mainly due to the promotion of the rural economic

system reform and the implementation of the Household Contract Responsibility

System, which greatly improved the production efficiency of farmers and improved

the dual economic structure, thus narrowing the income gap between urban and rural

areas.

It can be seen from Figure 3 that the dual economic structure decreased from

6.25 in 1978 to 3.87 in 1984, which could explain the decrease of the relative income

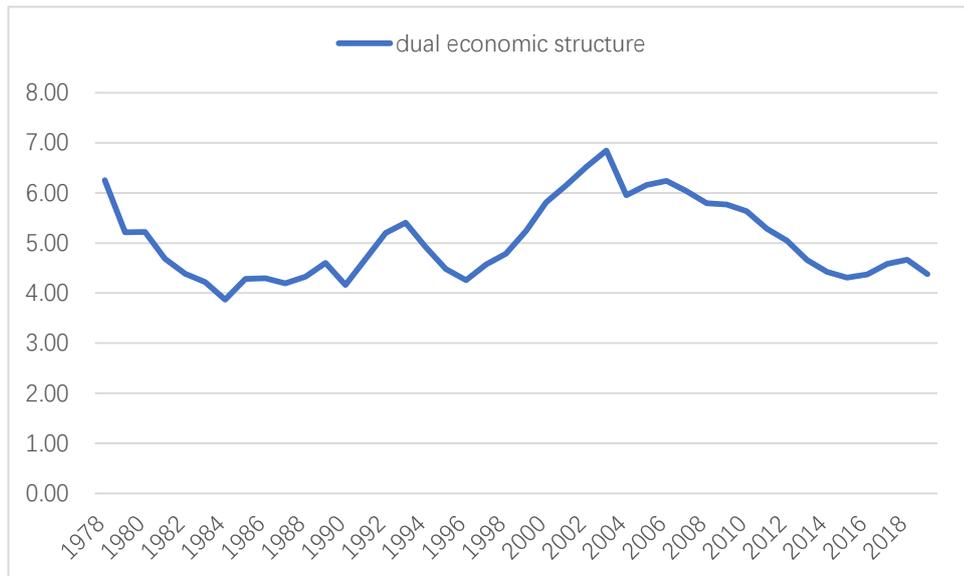gap between urban and rural residents in this period.

Fig.3. Dual economic structure, 1978-2019

In the second stage (1985-1994), the per capita relative income gap between urban and rural residents expanded from 1.86:1 to 2.86:1, and the absolute income gap expanded from 341.5 yuan to 2275.2 yuan. The data show that in 1994, the disposable income of urban residents in China reached 3496.2 yuan, which was 470% of that in 1985. In contrast, the average annual growth rate of per capita net income of rural residents was much lower than that of urban residents, with a difference of more than 5 percentage points. The expansion of the relative income gap between urban and rural residents in this period is probably due to the increase of dependence on foreign trade. Figure 4 shows that the dependence on foreign trade has an upward trend in this period, which indicates that dependence on foreign trade could be an important factor influencing the urban-rural income gaps in China. Urban people are more likely to benefit from trade liberalization, which would also increase the income of urban residents and widen the income gap.
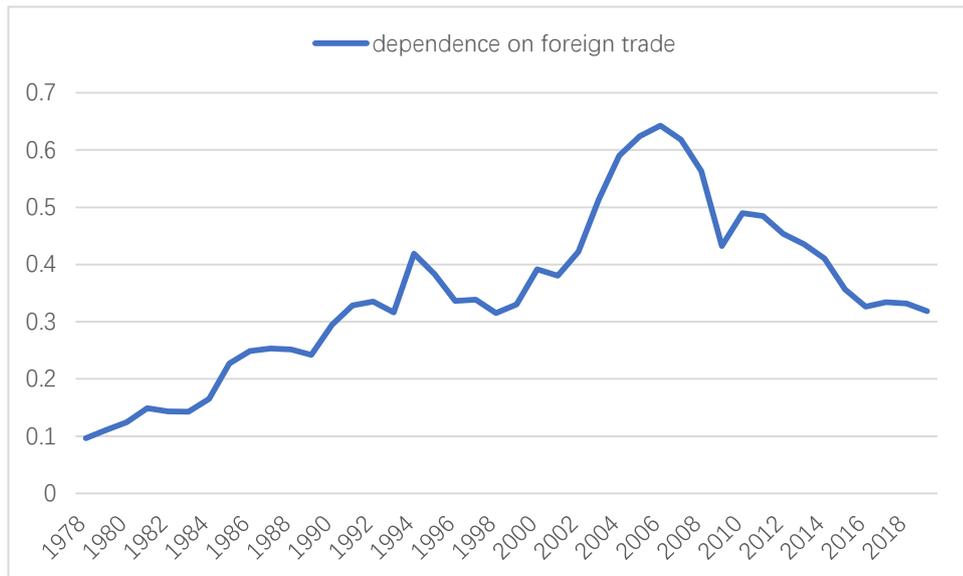
Fig.4. Dependence on foreign trade, 1978-2019

In the third stage (1995-1998), the relative income gap between urban and rural residents decreased steadily from 2.71:1 to 2.51:1, and the absolute income gap expanded from 2705.3 yuan to 3263.1 yuan. The narrowing of the relative income gap between urban and rural residents during this period may also be explained by the dependence on foreign trade. Figure 4 shows that the dependence on foreign trade gradually decreased from 0.38 in 1995 to 0.32 in 1998, which may mean that urban residents benefit less from foreign trade than before, thus narrowing the urban-rural income gap.

In the fourth stage (1999-2004), the relative income gap between urban and rural residents increased from 2.65:1 to 3.21:1, and the absolute income gap expanded from 3643.7 yuan to 6485.2 yuan. From 1999 to 2004, the average growth rate of the income of rural residents was lower than that of urban residents, with a difference of more than 4 percentage points. Figure 5 shows that the proportion of rural investment decreased rapidly, and the slope of the decline trajectory during the period from 1999 to 2004 seems consistent. Through the investment multiplier, it

may indirectly reduce farmers' income and expand the income gap between urban and rural areas in this period.
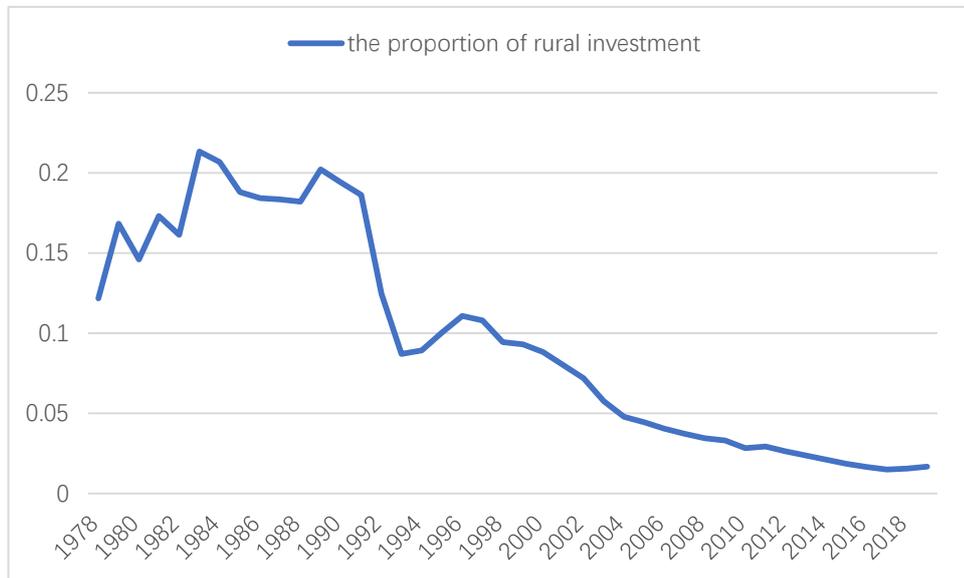

Fig.5. Proportion of rural investment, 1978-2019

In the fifth stage (2005-2008), the per capita relative income gap between urban and rural residents increased slightly from 3.22:1 to 3.31:1, and the absolute income gap expanded from 7239 yuan to 11020.2 yuan. The absolute income gap exceeded 10000 yuan for the first time in 2008, and the relative income gap reached a historical maximum of 3.33:1 in 2007. As shown in Figure 6, the trajectory of difference between urban and rural consumption level is almost a horizontal line during this period, that is, it is stable at the level of about 3.09. The slight expansion of urban-rural residents' income gap is likely to be related to urban-rural consumption difference. In addition, it may also be the joint influence of many factors, that is, some factors lead to the expansion of urban-rural income gap, which offsets the narrowing of the urban-rural income gap caused by other factors.

In the sixth stage (2009-2019), the per capita relative income gap between urban and rural residents decreased substantially from 3.33:1 to 2.64:1. By 2019, it fell

23

back to the lowest point in two decades. During this period, the absolute income gap widened from 12021.5 yuan to 26338.1 yuan. One reason for the narrowing of the urban-rural income gap in this period may be related to the narrowing of difference between urban and rural consumption level. In recent years, the development of rural e-commerce has facilitated the consumption of rural residents, changed the traditional consumption mode of rural residents, enriched the consumption categories of rural residents, and narrowed the difference between urban and rural consumption level.

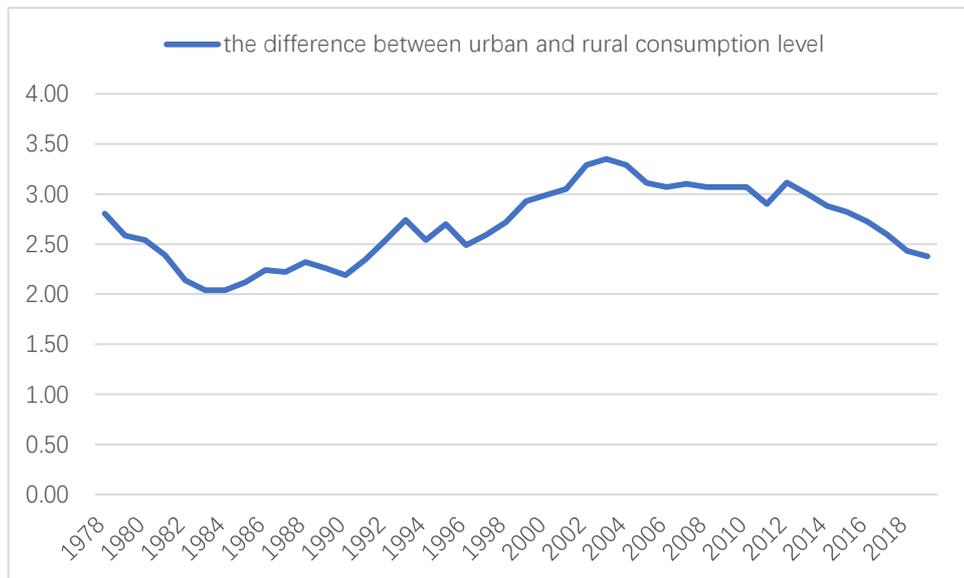Fig.6. The difference between urban and rural consumption level, 1978-2019

As shown in Figure 6, the difference between urban and rural consumption levels has been declining steadily from 2009 to 2019, which may explain the narrowing of the urban-rural income gap.

4. Tests and Estimations

4.1 Model Specification

Most studies concerning the urban-rural income gap use a multiple linear

regression model. Based on a preliminary analysis of the data, we choose the logarithm form (below) in this study because two variables are not first-order stationary.

$$\ln(gap) = C + \beta_1\ln(dual) + \beta_2\ln(ur) + \beta_3\ln(trade) + \beta_4\ln(ratio) +$$

$$\beta_5\ln(pGDP) + \beta_6\ln(agri) + \beta_7\ln(indus) + \beta_8\ln(rural) + \beta_9ln(durc) + \varepsilon \quad (1)$$

where C is the constant term and ε is the error term.

4.2 Tests for Stationarity

Before running regressions, Augmented Dickey-Fuller tests (ADF tests) were performed to test whether each time series variable was stationary. As for the type of ADF test, C means including drift term, T means including trend term, 0 means no drift term or trend term, and L means the order of time series lag, and the order of lag term is selected according to the general-to-specific sequential t rule, D means taking the first order difference for the original data. Table 3 shows that all ten time-series variables have unit root, which is not stationary. After performing first-order difference on the original data, the results show that they are stationary at the 5% level of significance.

Table 3: ADF test result

Variable	Test Statistic	Type	5% Critical Value	Result
ln(gap)	-1.623	(C,0,1)	-2.958	Non-stationary
Dln(gap)	-4.032	(C,0,0)	-2.958	Stationary
ln(dual)	-1.832	(C,0,0)	-2.955	Non-stationary
Dln(dual)	-5.400	(C,0,0)	-2.958	Stationary
ln(ur)	-2.587	(C,T,2)	-3.544	Non-stationary
Dln(ur)	-4.411	(C,0,0)	-2.958	Stationary
ln(trade)	-2.542	(C,0,1)	-2.958	Non-stationary

Dln(trade)	-4.935	(C,0,0)	-2.958	Stationary
ln(ratio)	0.474	(C,0,0)	-2.955	Non-stationary
Dln(ratio)	-6.042	(C,0,0)	-2.958	Stationary
ln(pGDP)	-2.234	(C,T,1)	-3.540	Non-stationary
Dln(pGDP)	-3.672	(C,0,3)	-2.966	Stationary
ln(agri)	0.735	(C,0,0)	-2.955	Non-stationary
Dln(agri)	-5.945	(C,0,0)	-2.958	Stationary
ln(indus)	-0.647	(C,0,1)	-2.958	Non-stationary
Dln(indus)	-4.085	(C,0,0)	-2.958	Stationary
ln(rural)	-3.248	(C,T,3)	-3.548	Non-stationary
Dln(rural)	-4.457	(C,0,2)	-2.964	Stationary
ln(durc)	-1.506	(C,0,1)	-2.958	Non-stationary
Dln(durc)	-4.023	(C,0,0)	-2.958	Stationary

4.3 Cointegration Test and Long-run Estimations

To verify if there is a long-term equilibrium relationship between the dependent variable and the independent variables, I conducted the Engel and Granger (1987) two-step test (i.e., EG test) cointegration test as follows:

In the first step, I ran OLS regression of *ln(gap)* on *ln(dual), ln(ur), ln(trade), ln(ratio), ln(pGDP), ln(agri), ln(indus), ln(rural),* and *ln(durc)*. The regression results are shown in Table 4.

Table 4: OLS Regression of the original variables: 1978-2019

Variables	Coefficients	Std. Err.	t-stat	p-value
C	-0.71	1.01	-0.70	0.491
ln(dual)	0.39	0.18	2.21	0.034
ln(ur)	-0.59	0.28	-2.07	0.047
ln(trade)	0.14	0.05	2.88	0.007
ln(ratio)	0.08	0.91	0.09	0.928
ln(pGDP)	0.05	0.09	0.58	0.567
ln(agri)	-0.14	1.22	-0.11	0.910
ln(indus)	0.12	0.22	0.55	0.586
ln(rural)	-0.08	0.06	-1.26	0.217
ln(durc)	0.11	0.18	0.58	0.563
F-statistic			81.61	
Prob > F			0.0000	

Adj R^2	0.9465

Before proceeding to the cointegration test, I conducted a series of diagnostic tests regarding multicollinearity, endogeneity, autocorrelation, and heteroscedasticity.

It can be seen from Table 4 that the adjusted R^2 is 0.9465; and the F-statistic is 81.61, suggesting that the model fits well as a whole, but the six variables are statistically insignificant at conventional levels, which indicates that the model may suffer from the multicollinearity problem. Indeed, the variance inflation factor (VIF) test for multicollinearity shown in Table A1 of Appendix A confirms that there is multicollinearity in my data.

To deal with the multicollinearity problem, I use backward stepwise regression and show that *ln(ratio), ln(pGDP), ln(indus)* and *ln(rural)* are removed successively. The final long-run regression results are reported in Table 5.

Table 5: Long-run Estimations of the final model: 1978-2019

Variables	Coefficients	Std. Err.	t-stat	p-value
C	-1.29	0.32	-3.97	0.000
ln(dual)	0.27	0.07	3.69	0.001
ln(ur)	-0.65	0.19	-3.44	0.001
ln(trade)	0.13	0.03	3.87	0.000
ln(agri)	-0.57	0.13	-4.49	0.000
ln(durc)	0.21	0.07	3.05	0.004
F-statistic	150.01			
Prob > F	0.0000			
Adj R^2	0.9478			

However, it may face the problem of endogeneity in the model. Lu and Chen (2004) argued that urbanization might be an endogenous variable, and took birth rate as an instrument variable of urbanization, because the birth rate had a significant impact on urbanization and had no direct impact on urban-rural income gap. This

report attempts to use the birth rate as the instrument variable of urbanization for two-stage least squares regression. The results of Durbin-Wu-Hausman endogeneity test (Table A2 in Appendix A) show that there is no endogeneity in the model, so OLS regression results are used for reporting.

Next, I perform heteroscedasticity and autocorrelation tests. Results show there is no heteroscedasticity (Table A3 in Appendix A). but there is autocorrelation (Table A4 in Appendix A). Accordingly, we rerun the long-run estimation using "Newey West"[8] standard errors. The regression results are shown in Table 6.

Table 6: Long-run Estimations with Newey West standard errors

Variables	Coefficients	Newey-West Std. Err.	t-stat	p-value
C	-1.29	0.33	-3.95	0.000
ln(dual)	0.27	0.05	5.64	0.000
ln(ur)	-0.65	0.19	-3.43	0.002
ln(trade)	0.13	0.04	3.53	0.001
ln(agri)	-0.57	0.13	-4.33	0.000
ln(durc)	0.21	0.10	2.16	0.037
F-statistic	148.67			
Prob > F	0.0000			

Next, I follow the second step of the EG test, which is to test the stationarity of residuals. The purpose is to see whether there is still a cointegration relationship between the dependent variable and selected independent variables. As is shown in Table 7, the null hypothesis of unit root is rejected, suggesting the residual is a stationary at the 5% significance level - hence, there is a long-term cointegration relationship between the dependent and independent variables.

Table 7: Cointegration Test

Variable	Test Statistic	Significant level	Critical Value

---

[8] It uses OLS coefficient estimates, but re-calculates the variance of the coefficient in a way that does not assume no autocorrelation.

		1%	-3.641
ε	-4.231	5%	-2.955
		10%	-2.611

To sum up, the model meets all assumptions, so even in the case of small samples, the regression results are still efficient and unbiased (Wooldridge, 2019, p.350). With the confirmed cointegration, I now report the regression results of my long-run estimations in Table 6. First, the *Dual Economic Structure* has a significant impact on the urban-rural income gap in the long run, and the regression coefficient is 0.27, which indicates that the income gap between urban and rural residents is expected to increase by 0.27% with a 1% increase in the dual economic structure variable. Second, the regression coefficient of *urbanization* is -0.65, which means that when the urbanization level increases by 1%, the urban-rural income gap is predicted to narrow by 0.65%. Third, the regression coefficient of *dependence on foreign trade* is 0.13, which indicates that the income gap between urban and rural residents is expected to increase by 0.13% given a 1% increase in the dependence on foreign trade.

Fourth, the regression coefficient *proportion of agriculture in GDP* is -0.57, which shows that the proportion of agriculture in GDP increases by 1%, and the income gap between urban and rural areas narrows by 0.57%. Finally, *the difference between urban and rural consumption level* has a significant impact on the urban-rural income gap, with an impact coefficient of 0.21, which suggests that a 1% increase in the difference between urban and rural consumption level is predicted to increase the urban-rural income gap by 0.21%.

For robustness check, I use the Gini coefficient between urban and rural areas as the dependent variable by following Chen (2010) and Zheng and Li (2012). Table 8 shows that the sign and significance of the estimated coefficients remain unchanged.

Table 8: Robustness Test

Variables	Coefficients	Std. Err.	t-stat	p-value
C	-3.62	0.48	-7.49	0.000
ln(dual)	0.19	0.11	1.75	0.089
ln(ur)	-0.59	0.28	-2.11	0.042
ln(trade)	0.26	0.05	4.98	0.000
ln(agri)	-0.47	0.19	-2.44	0.020
ln(durc)	0.54	0.10	5.18	0.000
F-statistic	131.52			
Prob > F	0.0000			
R^2	0.9481			
Adj R^2	0.9409			

4.4 Error Correction Model (ECM)

To explain if the short-term fluctuation of the dependent variable can be explained by the short-term fluctuations of the independent variables, I estimated the corresponding ECM as follows.

$$Dln(gap) = C + \beta_1 Dln(dual) + \beta_2 Dln(ur) + \beta_3 Dln(trade) + \beta_4 Dln(agri) +$$

$$\beta_5 Dln(durc) + \gamma ecm(-1) + u \qquad (2)$$

Where *Dln(gap)* is the first order difference of the dependent variable, *Dln(dual),* and *Dln(ur), Dln(trade), Dln(agri), Dln(durc)* represent the first-order difference of the independent variables, and ecm (-1) represents the data with one year lag in the residual term of cointegration regression. The results are shown in Table 9.

Table 9: Short-run estimations

Variable	Coefficient	t-value	p-value
Dln(dual)	0.26	2.10	0.043
Dln(ur)	-0.73	-1.73	0.092
Dln(trade)	0.05	1.43	0.162
Dln(agri)	-0.09	-0.47	0.639
Dln(durc)	0.41	4.32	0.000
ecm(-1)	-0.68	-5.38	0.000
C	0.02	1.53	0.135
F-statistic		21.63	
Prob > F		0.0000	
R^2		0.7924	

It shows that the coefficient of the error correction term is -0.68, indicating that when the short-term fluctuations deviate from the long-term equilibrium, they will return to the long-term equilibrium with an adjustment strength of -0.68. Specifically, if the urban-rural income gap in the previous period exceeds the long-term equilibrium level, the error correction term will make a negative change in the urban-rural income gap to return to the equilibrium level. On the contrary, if the urban-rural income gap in the previous period falls below the long-term equilibrium level, the error correction term will make a positive change in the urban-rural income gap to return to the equilibrium level.

The results in Table 9 shows that in the short term, only two variables: *dual economic structure* and *the difference of urban and rural consumption level are statistically significant*. Specifically, the income gap between urban and rural residents grows by 0.26% with a 1% increase in the growth of *dual economic structure,* and by 0.41% with a 1% increase in the growth of *the difference of urban and rural consumption*.

5. Conclusion and Policy Recommendations

5.1 Summary of Findings

This report explores the factors influencing the urban-rural income gap in both the long term and short run. Through the cointegration test, I find that the *dual economic structure*, *dependence on foreign trade* and *the difference between urban and rural consumption* significantly increase the urban-rural income gap, while *urbanization* and *the proportion of agriculture in GDP* significantly narrow the urban-rural income gap in the long run. Through the error correction model, I find that *dual economic structure* and *the difference between urban and rural consumption* are positively correlated with the urban-rural income gap in the short term.

5.2 Policy Recommendations

Based on these results, my policy recommendations to narrow the urban-rural income gap in China are as follows:

1. Improving the dual economic structure by promoting agricultural technology and investing in training programs to help farmers increase labor productivity.

2. Increasing the urbanization rate by raising the welfare level and working conditions of migrant workers so to attract rural surplus labor.

3. Promoting the export of agricultural products through the export rebate system[9] of agricultural products and preferential tax policies.

---

[9] The export tax rebate system is a tax system in which a country refunds the consumption tax and value-added tax paid during domestic production, circulation and export. Its purpose is to make the export goods enter the international market at the price excluding tax, enhance the competitiveness in the international market and promote the export of products.

4. Protecting the interests of farmers by increasing agricultural subsidies, improving the policy of price floor on grain, so as to increase farmers' income.

5. Narrowing the consumption gap between urban and rural areas by incentivizing rural residents to increase their consumption through the promotion of rural e-commerce. The improvement of rural consumption not only stimulates the growth of the rural economy, but also indirectly increases their income and achieves the objective of narrowing the income gap between urban and rural areas.

5.3 Limitations and Future Work

Like most empirical studies, this report has limitations. First, this report does not consider the impact of prices in measuring GDP and consumption. Future research may wish to use GDP deflator and a consumer price index to deflate the income and consumption data so to eliminate the impact of price fluctuations. Second, this report adopts the EG test when examining cointegration. Its disadvantage is that it cannot deal with the situation that there are multiple cointegration relationships. Moreover, because the EG test is divided into two steps, the estimated error in the first step is applied in the second step, so it is not the most effective method. In the future, we could use the Johansen test on the basis of a VAR model to further verify the cointegration relationship between urban-rural income gap and these influencing factors. Finally, this report uses time series data, and we can use richer panel data to further verify the influence of these factors on the

urban-rural income gap. Specifically, the provinces in China can be divided into eastern region, central region and western region according to their geographical location, and then do regression analysis on these three regions respectively to see which factors will have a significant impact on the urban-rural income gap, so as to put forward more targeted policy recommendations for reducing the urban-rural income gap in different regions.

References

Chen B. & Lin Y. (2013). Development strategy, urbanization and China's urban-rural income gap. *Social Sciences in Chin*a (04), 81-102 + 206. Doi: CNKI: Sun: zshk. 0.2013-04-005.

Chen Y., Xu B. & Zhou W. (2017). Urbanization, property income, economic growth and rural internal income gap: An Empirical Analysis Based on VAR model. *Journal of Yunnan University of Finance and Economics* (01), 74-83. Doi: 10.16537/j.cnki.jynufe.000175.

Chen Z., Gao Q., Wang S. & Yang J. (2016). An empirical analysis of China's heavy industry and urban-rural income gap. *Economic geography* (07), 99-106. Doi: 10.15957/j.cnki.jjdl.2016.07.013.

Chen Z., Wu J. (1990). Income distribution difference and dual economic development. *Economist* (03), 95-106. Doi: CNKI: Sun: jjxj. 0.1990-03-010.

Cheng K. & Li J. (2007). Mechanism and dynamic analysis of urban bias, urbanization and urban-rural income gap. *Research on quantitative economy, technology and economy* (07), 116-125. Doi: CNKI: Sun: sljy. 0.2007-07-014.

Dai F. (2005). Trade liberalization and income inequality: An Empirical Study Based on China. World Economic Research (10), 39-46. Doi: CNKI: Sun: Jing. 0.2005-10-008.

Harris, J. R., & Todaro, M. P. (1970). Migration, unemployment & development: a two-sector analysis. *American Economic Review*, 60(1), 126-142.

Hui N. & Xiong Z. (2011). Fixed assets investment and income gap between urban and rural areas -- Based on the time series data from 1980 to 2009. *Journal Of Northwest University (Philosophy and Social Sciences Edition)* (04), 45-52. Doi: 10.16152/j.cnki.xdxbsk.2011.04.030

Jorgenson, D. W. (1967). Surplus agricultural labour and the development of a dual economy. *Oxford Economic Papers*, 19(3), 288-312.

Lewis, W. A. (1954). Economic development with unlimited supplies of labour. *Manchester School of Economic and Social Studies*, 22, 139–191.

Li X. (2016). The impact of urban-rural fixed asset investment gap on urban-rural income gap -- Based on Provincial Panel Data of central China from 2000 to 2013. *Journal of Zhengzhou Institute of Aeronautical Industry Management* (04), 1-6. Doi: 10.19327/j.cnki.zuaxb.1007-9734.2016.04.001

Li X. & Cao F. (2013). Research on error correction model of consumption gap and income gap between urban and rural residents in China. Statistics and *Information Forum* (08), 64-68. Doi: CNKI: Sun: tjlt. 0.2013-08-012

Lu M., Chen Z. (2004). Economic policy of urbanization, urban tendency and urban-rural income gap. *Economic Research* (06), 50-58. Doi: CNKI: Sun: jjyj. 0.2004-06-005

Mancur O. (1996). Distinguished Lecture on Economics in Government: Big Bills

Left on the Sidewalk: Why Some Nations are Rich, and Others Poor. *Journal of Economic Perspectives* (2), doi:10.1257/jep.10.2.3.

Mo Y. & Zhang Z. (2011). Urbanization process, public financial expenditure and social income distribution: Based on the analysis of urban-rural dual structure model and panel data measurement. *Research on quantitative economy and technical economy* (03), 79-89. Doi: 10.13653/j.cnki.jqte.2011.03.008

Paul K. (1998). Space: The Final Frontier. *Journal of Economic Perspectives* (2), doi:10.1257/jep.12.2.161.

Petty. (1978). *Political Arithmetic*. Commercial Press

Ranis, G., & Fei, J. C. (1961). A theory of economic development. *American Economic Review*, 51(4), 533-565.

Ravallion, M. (2004). *Pro-Poor Growth: A Primer*. https://doi-org.proxy.hil.unb.ca/http://econ.worldbank.org/files/34168_wps3242.pdf

Ravi K., Zhang X., Which Regional Inequality? The Evolution of Rural–Urban and Inland–Coastal Inequality in China from 1983 to 1995, *Journal of Comparative Economics*, 27(4), 686-701.

Research group, agricultural survey corps, National Bureau of statistics. (1994). Research on income gap between urban and rural residents. *Economic Research* (12), 34-45. Doi: CNKI: Sun: jjyj. 0.1994-12-006.

Sicular, T., Ximing, Y., Gustafsson, B., & Shi, L. (2007). The Urban-Rural Income Gap and Inequality in China. *Review of Income and Wealth*, *53*(1), 93–126.

Simon K. (1955). Economic Growth and Income Inequality. *The American Economic Review* 45(1), 1-28.

Tang J. (2013). The income gap between urban and rural areas from the perspective of agricultural development. *Financial circles* (24), 13-14 + 16. Doi: CNKI: Sun: cjjx. 0.2013-16-008.

Tang S. (2011). An Empirical Study on the income gap between urban and rural residents in China. *Statistics and decision making* (16), 75-77.

Wooldridge, J. M. (2019) *Introductory Economics*: *A Modern Approach,* South Western College Publishing.

Wu D. & Huo X. (2010). An Empirical Study on the interaction between urban and rural residents' consumption gap and income gap -- verification from VEC model. *Agricultural technology and economy* (08), 101-106. Doi: 10.13246/j.cnki.jae.2010.08.003.

Wu J. & Chen X. (2010). An Empirical Study on the relationship between income gap between urban and rural residents and agricultural economic growth. *Agricultural technology economy* (12), 25-30. Doi: 10.13246/j.cnki.jae.2010.12.004.

Xiang S, Li L. (1998). Dynamic research on income gap between urban and rural residents in China. *Journal of Hebei University of economics and trade (*06), DOI: CNKI: Sun: hbjm. 0.1998-06-006.

Xu X. & Wang Z. (2008). An Empirical Study on the interaction between urbanization, industrialization and urban-rural income gap. *Agricultural*

economic issues (12), 65-71 + 111-112. Doi: CNKI: Sun: njwt. 0.2008-12-016.

Zhang H. (2004). The mechanism of reducing the income gap between urban and rural residents: economic growth and government behavior choice in the middle stage of industrialization. *Management world* (04), 9-21 + 60. Doi: 10.19744/j.cnki.11-1235/f.2004.04.002.

Zhang K. (2005). Analysis of the influencing factors of income gap between urban and rural residents in China. *Population and economy* (06), DOI: CNKI: Sun: rkjj. 0.2005-06-010.

Zhang L. & Fang T. (2007). Analysis of Cointegration and causality between the change of urban-rural income gap and economic growth in China. *Agricultural technology economy* (03), 38-43. Doi: CNKI: Sun: nyjs. 0.2007-03-006.

Zhang S. & Wu L. (2007). Empirical analysis on the income gap between urban and rural residents in Anhui Province. *Agricultural technology economy* (02), 72-78. Doi: CNKI: Sun: nyjs. 0.2007-02-012.

Zheng X. & Li X. (2012). Industrial structure, fixed asset investment and urban rural income gap: An Empirical Analysis Based on Provincial Panel Data in Central China. *Economy and management* (07), 71-79. Doi: CNKI: Sun: jjgl. 0. 2012-07-016.

Zhu C. (2012). The dynamic correlation between urban and rural residents' income and consumption gap -- Based on the empirical data from 1992 to 2009. *Financial Science* (08), 39-48. Doi: CNKI: Sun: cjkx. 0. 2012-08-007.

Appendix A: Diagnostic Tests of the Full Model

Table A1: VIF Test for Multicollinearity

Variable	VIF	1/VIF
ln(agri)	9948.40	0.0001
ln(ratio)	7932.05	0.0001
ln(pGDP)	561.24	0.0018
ln(ur)	287.98	0.0035
ln(rural)	83.66	0.0120
ln(durc)	27.27	0.0367
ln(dual)	18.06	0.0554
ln(trade)	13.66	0.0732
ln(indus)	7.70	0.1298

Table A2: Test of endogeneity

Ho: variables are exogenous
Durbin (score) chi2(1) = .619074 (p = 0.4314)
Wu-Hausman F(1,35) = .523613 (p = 0.4741)

Table A3: Test of Heteroskedasticity

White's test for Ho: homoskedasticity against Ha: unrestricted heteroskedasticity
chi2(20) = 14.94
Prob > chi2 = 0.7800

Table A4: Test of Autocorrelation

Breusch-Godfrey LM test for autocorrelation H0: no serial correlation
lags(p) = 1
chi2 = 6.018
Prob > chi2 = 0.0142

Curriculum Vitae

Candidate's full name: Yunge Du

University attended: Bachelor of Economics, Shandong University of Finance and Economics,

2018

Publications: N/A

Conference Presentations: N/A