Income Growth, Income Gaps, and Rural Poverty Reduction in China

Wang Zhonghua, and Yue Ximing*
School of Finance, Renmin University of China, Beijing, China

Abstract: *This paper analyzes the evolving trends in China's rural poverty from 1988 to 2018 and how income growth and income gaps contributed to poverty reduction using rural household data from the China Household Income Project (CHIP). We find that after China's reform and opening up policy introduced in 1978, China's rural poverty has been reduced substantially due primarily to income growth, although this poverty-reducing effect was partially offset by widening income gaps. During the progress of this poverty reduction, however, income distribution replaced income growth as the key driver. For the extremely poor in particular, their poverty status hinged upon income distribution. As revealed by our empirical analysis of income sources, wage income became the chief source of income for rural households, contributing a rising share to poverty reduction in the countryside. The contribution of net income from government transfer to poverty reduction has increased in recent years, and this contribution has been increased with the deepening level of poverty. Calculation of the pro-poor growth index suggests that the poor population primarily benefited from the trickle-down effect of economic growth, and the economic growth pattern has yet to lean towards pro-poor growth.*

Keywords: *Income growth, income gaps, poverty, pro-poor growth*
JEL Classification Code: I32, I38, R28
DOI: 10.19602/j.chinaeconomist.2023.01.07

1. Introduction

Poverty has been a persistent problem throughout the history of human society. For governments across the world, a common concern and policy priority is to mitigate and, wherever possible, eradicate poverty. Despite the absence of a commonly accepted definition of the connotation of poverty[1], as far as its results are concerned, the term poverty refers to a living condition in which an individual or household cannot take care of their basic needs or reach a certain level of living standards (Li, 1999; Ye, 2005). Reducing poverty is, therefore, vital for improving public wellbeing. This paper focuses on income poverty.

Since the start of economic reforms in 1978, China has made tremendous progress in reducing poverty thanks to its rapid social and economic development and a swathe of poverty reduction policies (Li et al., 2019). According to the World Bank, China lifted 728 million people out of poverty from 1981 to 2015, far eclipsing the total of 152 million people who escaped poverty elsewhere in the world during the same period. According to the *China Rural Poverty Monitoring Report*, 770.39 million people lived

* CONTACT: Yue Ximing, email: yue@ruc.edu.cn.

[1] Poverty can be defined from different perspectives. For instance, it can be defined from the perspective of deprivation, which may range from material to spiritual and cultural deprivation. From the perspective of social exclusion, poverty refers to those excluded from the minimum lifestyles acceptable in their home country (Ye, 2005). In addition, from the perspective of competence, poverty refers to the lack of abilities to acquire and enjoy a normal life (Li, 1999).

in poverty in rural China in 1978 using the current rural poverty line of 2,300 yuan per person/year (in constant 2010 prices), with a poverty incidence rate of 97.5%. By 2020, however, all rural population in China had been out of poverty, with the absolute poverty eradicated historically. Regionally, poverty primarily affects China's countryside (Li and Gustafsson, 1996; Wan and Zhang, 2006; Wang et al., 2020). Hence, this paper focuses on China's rural poverty and examines its evolving trends and determinants during the period from 1988 to 2018.

Economic growth has been shown by extensive research to be a key driver of poverty reduction (Roemer and Gugerty, 1997; Ravallion and Chen, 2009). Economic growth, usually represented by growth in real GDP, encompasses changes in both average income and income distribution. For a constant absolute poverty line, an increase in average income naturally brings down poverty incidence if income gap stay the same. In reality, however, an increase in average income can be accompanied by narrowing, constant, or widening income gap depending on different economic growth patterns. If income gaps widen, the poor will benefit less, economic growth may even have no effect on reducing poverty. However, if income gaps narrow, the low-income group may benefit more, and the poverty-reducing effect of economic growth becomes more evident.

Over the past four decades, China's urban and rural household incomes have been rising rapidly. According to the National Bureau of Statistics (NBS), rural disposable income for rural households rose from 133.6 yuan in 1978 to 16,020.7 yuan in 2019. However, China's household income gaps have remained high. According to the *China Household Survey Yearbook* (2020), the Gini coefficient of China's per capita disposable income stayed above 0.46 from 2003 to 2019, peaking at 0.491 in 2008 before decreasing but began to rise again after 2015, reaching 0.465 in 2019. According to relevant research, China's growing income inequality stemmed mainly from widening income gaps within both cities and the countryside, especially those within the countryside (Piketty et al., 2019). This study attempts to explain how China's rural income growth and income gaps since the economic reforms of 1978 have contributed to rural poverty reduction.

Studies closely related to this paper fall into the following categories, enumerated below.

(i) The effects of economic growth on poverty. Economic growth tops governmental agendas in many countries, but its effects on poverty in terms of actual function and extent are still controversial. According to the "trickle-down" viewpoint that was fashionable at the end of the 20th century, economic growth experience by affluent groups or regions "trickles down" to poor groups or region through consumption, employment, capital lending, and other avenues. That is, this view holds that economic growth automatically benefits all economic groups, including the poor (Fields, 1984; Aghion and Bolton, 1997; Bhalla, 2002). In reality, however, economic growth does not always reduce poverty (Ravallion, 2001; Bourguignon, 2004; Perry et al., 2006). Based on the experiences of many countries, rapid economic growth is often accompanied by widening wealth gaps, and progress in poverty reduction in many parts of the world has been disappointing over the past decades (World Bank, 2000). Some academics have called for more attention to how the poor benefit from economic growth, but despite their endorsement of pro-poor growth, they have yet to agree on the definition and measurement of pro-poor growth (Kakwani and Pernia, 2000; Ravallion and Chen, 2003; White and Anderson, 2000; Klasen, 2008).

(ii) The effects of income growth and income gaps on rural poverty. Many studies have empirically examined the effects of China's income growth and changing income gaps on rural poverty since 1978. Among them, one branch of the literature has employed aggregated or grouped data, including papers by Chen and Wang (2001), Lin (2003), Hu et al. (2007), Chen (2009), Shen (2012b), Wang and Huang (2005), among others. Though another branch of the literature is based on household budget survey data without preconfiguring the functional forms of the Lorenz curve or income distribution (Wei and Gustafsson, 1998; Xia et al., 2010; Shen, 2012a; Luo, 2012; Luo et al., 2020; Chen and Lu, 2014; Luo and Ping, 2020; Jiang and Liu, 2017). On the whole, most studies have reached consistent conclusions:

The plunge in China's rural poverty stemmed from rapid income growth, but the poverty-reducing effect of economic growth was partially offset by income gap effects.

Although numerous studies have examined how economic growth has influenced poverty in China, some questions remain unanswered. Despite the consensus of existing research that income growth served as a key driver of rural poverty reduction in China, whether or not economic growth will always propel poverty reduction in the long run remains an open question. Moreover, the Chinese government has played an active role in reducing China's rural poverty, but how rural poverty is influenced by net income from government transfers has yet to be discussed in depth in light of economic growth.

Compared to previous research, this paper makes the following marginal contributions. First, it employs rural household data from CHIP from 1988 to 2018, which has a longer period than previous studies, in order to conduct a systematic empirical analysis of both the evolving trends of rural poverty and the effects of economic growth on rural poverty. Second, it follows a more detailed breakdown of income sources in which the net income from government transfers is separated from net transfer income to investigate the rural poverty-reducing effects of net income from government transfers and estimate the efficiency of such transfers. Our empirical results suggest that income growth has sharply reduced China's rural poverty, but growth's contribution to poverty reduction has been waning. Increasing net income from government transfers has contributed a growing share to rural poverty reduction, and its poverty-reducing effect is stronger for the the ultra-poor.

2. Research Methodology

2.1 Poverty Index

To measure poverty, we employ the Foster-Greer-Thorbecke (FGT) index put forth by Foster et al. (1984), which is a general index for measuring poverty. The general form of the FGT index is:

$$P_{\alpha}=\frac{1}{n}\sum_{i=1}^{q}\left(\frac{z-y_i}{z}\right)^{\alpha} \quad (1)$$

where, y_i is the income level of individual i, z is the poverty line, n is total population, and q is the size of the population whose income level is below or at the poverty line. Parameter α can be seen as a measurement of aversion to poverty and is therefore referred to as the poverty aversion coefficient. A greater value of α suggests a higher level of aversion to poverty, that is, a greater weight is given to the ultra-poor, which means that the measurement of poverty is more concerned with inequality within the poor population.

Various values of α suggest that the FGT index represents a group of poverty measurement indicators, the commonest three of which are: (i) Poverty incidence when α is 0, which measures the share of the poor in the total population; (ii) poverty gap when α is 1, which denotes the average distance of the poor's income to a given poverty line; (iii) squared poverty gap when α is 2, which assigns a greater weight to the relatively low-income population than does the poverty gap. If individual income is not negative, the FGT's value will decrease with the increasing value of α, and if an individual with negative income[2] exists, the poverty gap and the squared poverty gap could be larger than normal.

2.2 Decomposition of the Growth Effect and Distribution Effect on Changes in Poverty

We specify P as above for our poverty measurement indicator and assume it is subject to three factors: Including the mean value of income distribution (average income), the income gap denoted by

[2] Notably, negative income is not abnormal. For instance, households with operating net incomes as their chief source of income may report negative incomes in case their businesses are loss-making.

the Lorenz curve, and the poverty line. Hence, poverty P_t during period t can be expressed as:

$$P_t = P(z, \mu_t, L_t) \tag{2}$$

where z is the poverty line, μ is the average income, and L is the Lorenz curve. For a given poverty line, the change in poverty $P_{t+n} - P_t$ between any two periods t to $t+n$ is assumed to be primarily influenced by the change in average income and the Lorenz curve, so P_t can be notated as $P(\mu_t, L_t)$. To distinguish the magnitude of the effects of average income and the income gap on changes in poverty, we define the "growth effect" as the effect of average income growth on changes in poverty when the income gap measured by the Lorenz curve is constant, and the "distribution effect" as the effect of the change in the Lorenz curve on poverty when income level is constant.

Academics have come up with various ways to identify how growth and distribution contribute to the overall change in poverty, respectively. The basic approach is as follows: With the base period t or end period $t+n$ as the reference period, the Lorenz curve for the reference period (or average income) is held constant to calculate the growth effect (or distribution effect) of change in poverty. Kakwani and Subbarao (1990) and Jain and Tendulkar (1990) attempt to make such a decomposition. Equation (3) is the equation of decomposition put forth by Datt and Ravallion (1992), which is more complete than previous equations of decomposition. In this equation, r is the reference period, and R is the residual term. It was derived that R equals the difference of growth effect with the base period t and end period $t+n$ as the reference period, or the difference of distribution effect with the base period t and end period $t+n$ as the reference period, respectively.

$$P_{t+n} - P_t = [P(\mu_{t+n}, L_r) - P(\mu_t, L_r)] + [P(\mu_r, L_{t+n}) - P(\mu_r, L_t)] + R \tag{3}$$

Nevertheless, the above method of decomposition is path dependent, i.e. the growth effect and the distribution effect obtained from decomposition vary with the reference period selected. Based on the Shapley value in the cooperative game theory (Shapley, 1953), Shorrocks (2013) derives the method of decomposition shown in equation (4). The first term to the right of equation (4) is the growth effect on change in poverty, and the second term is the distribution effect. This equation is straightforward, i.e. the arithmetic average of the growth effect or distribution effect with the base period and end period as the reference period, respectively. As such, the Shapley decomposition is both complete without residual term and "path independent," avoiding the randomness of selection between the base period and end period as the reference period.

$$\begin{aligned} P_{t+n} - P_t = & \frac{1}{2}\left\{[P(\mu_{t+n}, L_t) - P(\mu_t, L_t)] + [P(\mu_{t+n}, L_{t+n}) - P(\mu_t, L_{t+n})]\right\} \\ & + \frac{1}{2}\left\{[P(\mu_t, L_{t+n}) - P(\mu_t, L_t)] + [P(\mu_{t+n}, L_{t+n}) - P(\mu_{t+n}, L_t)]\right\} \end{aligned} \tag{4}$$

Most research literature has followed the Datt-Ravallion decomposition (referred to as D-R) or the Shapley decomposition. The empirical section of this paper will report the results of both the D-R decomposition and the Shapley decomposition.

2.3 Semi-Elasticities of Poverty with Respect to Growth and Distribution

To examine the relationship among income growth, distribution and poverty, we may also simulate the change in poverty based on income distribution characteristics at a certain time point using the concept of elasticity to investigate the marginal effects of income growth and distribution on poverty amid economic growth (Araar, 2012). Here, we may define the elasticity of poverty with respect to growth as the percentage of change in the poverty index for each percentage point of change in average income with income inequality held constant, and the elasticity of poverty with respect to inequality or distributional change as the percentage of change in the poverty index for each percentage point of change in the inequality index while the average income is constant.

Elasticity calculation with respect to the poverty problem has its limitations: First, elasticity

measures change in the poverty index by percentage points, which bears no explicit and direct policy implications; second, absolute change in the poverty index is standardized in percentage points according to the initial level of poverty, which will largely influence the value of elasticity. As the initial level of poverty lowers amid poverty mitigation, the elasticities of poverty with respect to income growth and distribution could be overstated and misleading (Stephen and Mark, 2008; Arndt et al., 2017).

Hence, this paper employs the semi-elasticity of poverty with respect to income growth and the semi-elasticity of poverty with respect to inequality or distributional change to calculate the degree of absolute change in the poverty index due to changes in growth and distribution to estimate their marginal effects on poverty. Referencing Araar (2012), individual i's income is marked as y_i in the initial income distribution at the time point, and at this moment, the average income is $\mu(y_i)$, the Lorenz curve for measuring the level of inequality is $L(y_i,p)$, and the poverty index is $P(\mu(y_i), L(y_i,p))$. Assuming that the incomes of all individuals increase by 1%, i.e. y_i changes to $y_i^g=y_i\times(1+1\%)$, without any change in the inequality of income distribution, and at this moment, the semi-elasticity of poverty with respect to income growth is:

$$SE_g=P(\mu(y_i^g), L(y_i,p))-P(\mu(y_i), L(y_i,p)) \tag{5}$$

Assuming average income to be constant, we increase the level of inequality by one percentage point through bi-polarization, i.e. individual i's income is changed into $y_i^d=y_i+1\%\times(y_i-\mu(y_i))$. Then, there are more individuals whose incomes are higher than the average income in the initial income distribution and still fewer individuals whose incomes are below average, so the Gini coefficient rises by 1%. Meanwhile, it is not hard to prove that this change does not alter the average income, i.e. $\mu(y_i^d)=\mu(y_i)$. The semi-elasticity of poverty with respect to distributional change is expressed as:

$$SE_d=P(\mu(y_i), L(y_i^d,p))-P(\mu(y_i), L(y_i,p)) \tag{6}$$

Notably, when the poverty line is constant, the semi-elasticity of poverty with respect to income growth must not be positive since poverty must decrease, or at least the poverty index remains constant when everyone sees their income increase (without any change in the inequality of distribution). However, the sign of the semi-elasticity of poverty with respect to distributional change will be influenced by average income and the relative poverty line. If the poverty line is below average income, the sign of the semi-elasticity of poverty with respect to distributional change is positive or 0, i.e. an increase in the Gini coefficient will cause more poverty; but when the poverty line is above average income, the sign of the semi-elasticity of poverty with respect to distributional change could be negative, i.e. poverty will improve as a result of increasing incomes of people whose incomes are below the poverty line but above average income, allowing them to escape or alleviate poverty.

2.4 Contribution of Itemized Incomes to Poverty Alleviation

To examine the effects of income from different sources on poverty, Duclos and Araar (2006) decompose the poverty index by income sources according to the Shapley decomposition principle. This paper follows the same approach for decomposition. Please refer to the following section for a detailed explanation.

2.5 Pro-Poor Effects of Economic Growth Patterns

The above decomposition of the change in poverty by the growth effect and the distribution effect, together with the calculations of the semi-elasticities of poverty with respect to income growth and distribution, all measure the poverty effects of income growth and distribution. However, we cannot measure the poverty effects of aggregate economic growth or the economic growth model. Based on relevant research literature, therefore, this paper will calculate the three types of pro-poor growth index to measure the extent to which the current economic growth pattern helps reduce poverty.

Kakwani and Pernia (2000) provide the calculation of change in poverty by percentage points from period t to period $t+n$, as shown in equation (7), which is further written in the form of equation (8). Equation (8) can be regarded as a decomposition of equation (7) by the growth effect and distribution effect. On this basis, the definition of the pro-poor growth index is given, as shown in equation (9).

$$\varphi = \ln P(\mu_{t+n}, L_{t+n}) - \ln P(\mu_t, L_t) \tag{7}$$

$$\begin{aligned}\varphi = &\frac{1}{2}\left\{\left[\ln P\left(\mu_{t+n}, L_t\right) - \ln P\left(\mu_t, L_t\right)\right] + \left[\ln P\left(\mu_{t+n}, L_{t+n}\right) - \ln P\left(\mu_t, L_{t+n}\right)\right]\right\} \\ &+ \frac{1}{2}\left\{\left[\ln P\left(\mu_t, L_{t+n}\right) - \ln P\left(\mu_t, L_t\right)\right] + \left[\ln P\left(\mu_{t+n}, L_{t+n}\right) - \ln P\left(\mu_{t+n}, L_t\right)\right]\right\}\end{aligned} \tag{8}$$

$$\phi = \frac{\ln P\left(\mu_{t+n}, L_{t+n}\right) - \ln P\left(\mu_t, L_t\right)}{\frac{1}{2}\left\{\left[\ln P\left(\mu_{t+n}, L_t\right) - \ln P\left(\mu_t, L_t\right)\right] + \left[\ln P\left(\mu_{t+n}, L_{t+n}\right) - \ln P\left(\mu_t, L_{t+n}\right)\right]\right\}} \tag{9}$$

When the economic growth rate is positive, if $\phi > 1$, economic growth is strictly favorable to the poor; if $0 < \phi < 1$, a smaller proportion of the poor will benefit from economic growth than does the non-poor population, but economic growth remains generally pro-poor; if $\phi < 0$, economic growth will increase poverty instead of reducing it.

Ravallion and Chen (2003) adopt the Watts index as the standard for measuring poverty to derive the average income growth for the poor with equation $\int_0^{Ht} g_t(p)\mathrm{d}p/H_t$, where p is the percentile of the population ranked by the ascending order in period t with the value range of 0-1, $g_t(p)$ is the income growth for the percentile p of the population in period t, and H_t is the share of the poor population. Assuming the growth of average social income to be γ, if the average growth of the poor's income is greater than γ, economic growth will be pro-poor. In comparison, the Kakwani & Pernia index is more focused on income distribution among various social groups, and the Ravallion & Chen index is concerned with the relative magnitude of income growth for the poor.

Based on the different definitions of pro-poor growth, Kakwani and Son (2008) put forth an improved pro-poor growth index, which is referred to as the "Poverty Equivalent Growth Rate (PEGR)". The equation for calculating the PEGR index is $\gamma^* = \phi\gamma$, i.e. the product between the Kakwani & Pernia index and the growth rate of average social income. Hence, in measuring whether economic growth is favorable to the poor population, the PEGR index also considers the distribution of income growth and benefits from growth between the poor and the non-poor. Economic growth can be considered pro-poor only when $\gamma^* > \gamma$. The PEGR index is also a good indicator for measuring poverty: $\gamma^* > 0$ means poverty is reducing, and $\gamma^* < 0$ means poverty is increasing, and this index satisfies the requirement of monotonicity. A greater value of it means a greater extent of poverty reduction.

3. Data Explanation and Descriptive Statistics

3.1 Data Explanation

This paper employs the rural household survey data of CHIP of 1988, 1995, 2002, 2007, 2013, and 2018. Rural survey samples of various years are all based on the sample households under the regular household survey by NBS and were randomly selected with a certain sampling method. This paper primarily employs relevant data on rural household income from various surveys, and the definition of income is consistent with the household income definition of the NBS. Rural household disposable income data are from the NBS household disposable income indicators.[3] For an in-depth analysis of the rural poverty effects of incomes from various sources, we divide rural household disposable income into

[3] Part of the CHIP data are copied from the household income data of the NBS. Such data are obtained from the NBS regular household survey in the form of daily bookkeeping and should theoretically be more reliable compared to data obtained from household recollections (Li et al., 2017).

wage income, net operating income, net property income, and net transfer income. Net transfer income is further divided into net income from government transfers and nongovernment transfer income. To ensure consistency of income classification in the sample years, the itemized incomes of various years are finally adjusted according to the NBS *Survey Program for Household Income and Living Standards*.[4] All calculations in this paper are based on per capita household incomes and assume household incomes were evenly distributed among members of each household.

In addition, the data were subjected to the following three treatments. (i) To ensure comparability of data for various sample years, we made price adjustments to incomes according to the fixed-base rural household consumer prices released by the *China Price Statistical Yearbook* to ensure that incomes in all sample years are measured by the price level of 1988 to exclude the impact of inflation. (ii) This paper makes a weighted adjustment to the samples by regions according to the proportions of the rural population in each region (eastern, central, and western regions) across the country in order to make samples nationally representative. (iii) Data from 2007, 2013, and 2018 contain 55, 57, and 115 households with disposable incomes smaller than 0, respectively, and most of these data points are due to negative net operating incomes. By comparing the balances of year-end household financial assets (including renminbi-denominated financial assets and the renminbi-converted value of foreign-denominated financial assets), consumer spending, and nonincome gains, among other indicators, however, we found that compared to the poor population whose disposable incomes are greater than zero but below the poverty line, households with negative disposable incomes had significantly higher average values of these indicators, even above the average of overall samples. Hence, such households are generally not in the scope of the poor population to be discussed in this paper and are excluded from the empirical section.

This paper simultaneously adopts the four poverty lines i.e., China's three official poverty lines used since reform and opening up in 1978 and the World Bank's international poverty line of 1.9 US dollars per person/day. The three official poverty lines are those of 1978, 2008, and 2010. Among them, the poverty line of 1978 is a subsistence line of 100 yuan per person/year at the price of 1978; the poverty line of 2008, i.e. 865 yuan per person/year at the price of 2000 for basic food and clothing, came into effect since 2000, and became China's official poverty relief standard since 2008; the poverty line of 2010 is the current rural poverty line, i.e. 2,300 yuan per person/year at the price of 2010, which is formulated based on the criteria for "two no worries, three guarantees," i.e. no worries about food and clothing and guarantees of compulsory education, basic medical treatment, and safe housing.

According to "China's rural poverty line and poverty monitoring method" in the *China Rural Poverty Monitoring Report (2016)*, the NBS adjusts the three poverty lines each year according to the calculated "consumer price index for the rural poor" to ensure comparable living standards at the same poverty line in different years. Consistent with the above-mentioned treatment of income, this paper also converts the poverty line into the price level of 1988 to obtain the poverty lines of 1978, 2008, and 2010, which are equivalent to 236 yuan, 365 yuan, and 755 yuan at the price level of 1988, respectively. The international poverty line of 1.9 US dollars per person/day is 654 dollars per person/year. In the following section, the four poverty lines are those of 1978, 2008, 2010, and 1.9 US dollars per person/day.

[4] The specific process of adjustment is available upon request. Moreover, since a few itemized household incomes based on the questionnaires of itemized household incomes in 1988, 1995, and 2002 are not classified as wage income, net operating income, net property income, or net transfer income, those incomes are listed as "other incomes" in household disposable income classification for those three years. In comparison, the itemized household incomes of 2007, 2013, and 2018 are free from this problem since they are copied from the bookkeeping data of NBS regular household survey. In the itemized income data of 2007 copied therefrom, there is no differentiation in the net transfer income into government and nongovernment net transfers of funds.

3.2 Descriptive Statistics

Table 1 provides the mean values of rural household disposable incomes and itemized incomes for various sample years. As the table shows, China's rural residents saw their per capita disposable income and various itemized incomes rise steadily in 1988-2018. Specifically, wage income shot up from 78.66 yuan in 1988 to 1,830.65 yuan in 2018. Net operating income rose from 434.54 yuan to 1,448.65 yuan from 1988 to 2018, and net government transfer income was negative in 1988, 1995, and 2002, but turned positive after 2007. In 2013-2018, per capita government net transfer income for rural households went up from 140.76 yuan to 341.82 yuan, an increase of 1.43 times.

Figure 1 further reflects the composition and change in rural household disposable income by income source. Wage income as a share of disposable income increased quickly in 1988-2013, up from a mere 14.62% in 1988, and almost half of all disposable income in 2013 came from wage income. Before the implementation of the integrated urban and rural household survey system on December 1, 2012, the NBS surveyed household living conditions separately for urban and rural areas. The statistical scope of income indicators was also different before and after this reform. Before the reform, incomes remitted by migrants who worked and lived outside their hometowns for over six months were considered as wage income. After the reform, such incomes became recognized as transferred income. This could be the reason that the share of wage income barely budged from 2013 to 2018.

Net operating income was initially the primary source of income for rural households, accounting for 80.80% of their disposable income in 1988, but this share gradually decreased in subsequent years, down below 40%, in 2013 as the second-largest income source for rural households after wage income. Net property income had made up a modest share of rural household disposable income, but its share expanded swiftly from 4.94% to 7.92% in 2013-2018.

To study disposable and itemized income in various years we also employ the concentration index (Kakwani, 1984). The ranking variable for calculating the concentration index is disposable income, and the concentration index of an itemized income indicates whether the distribution of such itemized income is concentrated among the low-income or high-income group; the concentration index of disposable income here is its Gini coefficient (Kakwani,1984).

According to the estimated results of rural household income in various sample years of 1988-2018 (as shown in Figure 2), there was a significant downward trend in the concentration index of wage income, indicating faster wage income growth for lower-income people than for higher-income people. The concentration index of net operating income increased at a modest pace, suggesting that the high-income

Table 1: Mean Values of Rural Household Disposable and Itemized Incomes in 1988-2018 (yuan)

Mean	1988	1995	2002	2007	2013	2018
Disposable income	537.8090	705.0398	1101.4358	1571.3871	2847.9336	4318.6182
Wage income	78.6624	140.1850	377.2712	664.8008	1289.0325	1830.6509
Net operating income	434.5368	544.1943	680.5996	778.2627	984.9864	1448.6516
Net property income	1.0173	2.9469	7.2770	50.2436	167.6968	124.6507
Net government transfer income	-6.5649	-11.5539	-27.9861		140.7573	341.8183
Non-government transfer income	14.6672	20.1233	32.8000		265.4607	572.8468
Net transfer income				78.0799		
Other incomes	15.4901	9.1441	31.4741			

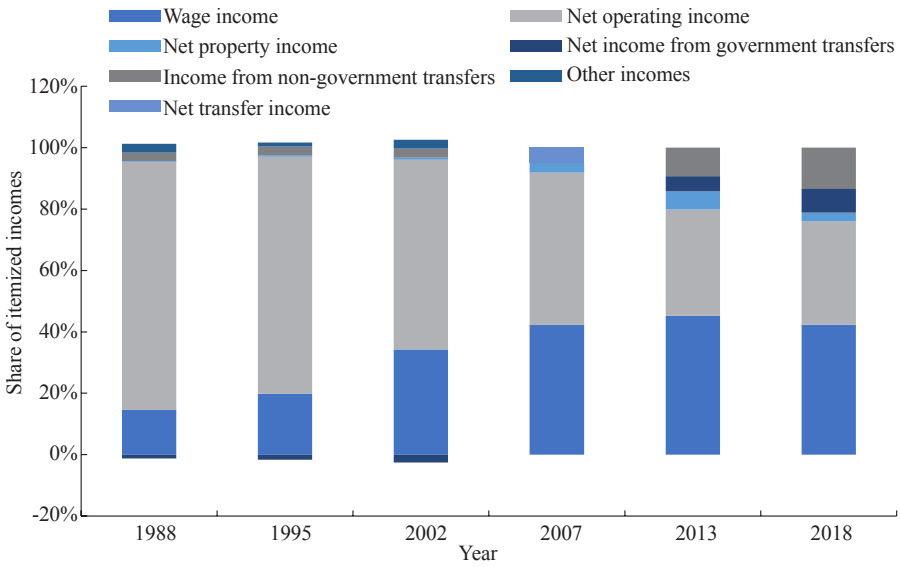

Figure 1: Composition of Rural Household Disposable Income

group was the primary recipient of property income, and the concentration index of net income from government transfers in 1988-2018 remained smaller than the Gini coefficient in the same years, though it did stay high. This indicates that net income from government transfers was relatively concentrated among the low-income group.

4. Empirical Result and Analysis

4.1 Rural Income Level and Distribution

As discussed above, the process of economic growth can be regarded as inclusive of changes in income growth as well as the income gap. As such, we measure the status of economic growth by income growth and income gap. Table 2 depicts rural economic growth from 1988 to 2018. It measures income growth by per capita actual disposable income and its annual growth rate, and income gap by the Gini coefficient, the coefficient of variation, the Theil index, and mean logarithmic deviation.

As shown in Table 2, China's rural per capita actual disposable income increased sharply from 1988 to 2018, up from 537.81 yuan in 1988 to 4,318.62 yuan in 2018. The annual actual growth rate of disposable income increased at first, peaking at 10.42% in 2007-2013, and then slowed to 8.68% in 2013-2018. For the rural income gap between 1988 and 2018, the four inequality indexes shared a consistent trend. In 1988-2013, the rural household income gap kept widening (the inequality index of 1995 was higher than normal due to data quality issues, but in 2013-2018, the inequality index dipped. Specifically, the Gini coefficient of rural household disposable income was 0.333 in 1988 and increased to 0.395 in 2013 before decreasing to 0.383 in 2018.

4.2 Rural Poverty Status

To measure rural poverty and its change, we used the FGT index as an indicator for measuring poverty. As discussed before, the FGT index normally includes poverty incidence, poverty gap, and squared poverty gap. Calculation results of various rural poverty indicators for 1988-2018 are shown in Table 3. Here we see that China's rural poverty significantly decreased between 1988 and 2018 and decreased at all four poverty lines. By the lowest poverty line of 1978, China's rural poverty incidence fell from 12.74% in 1988 to 0.54% in 2018. By the highest poverty line of 2010, China's poverty

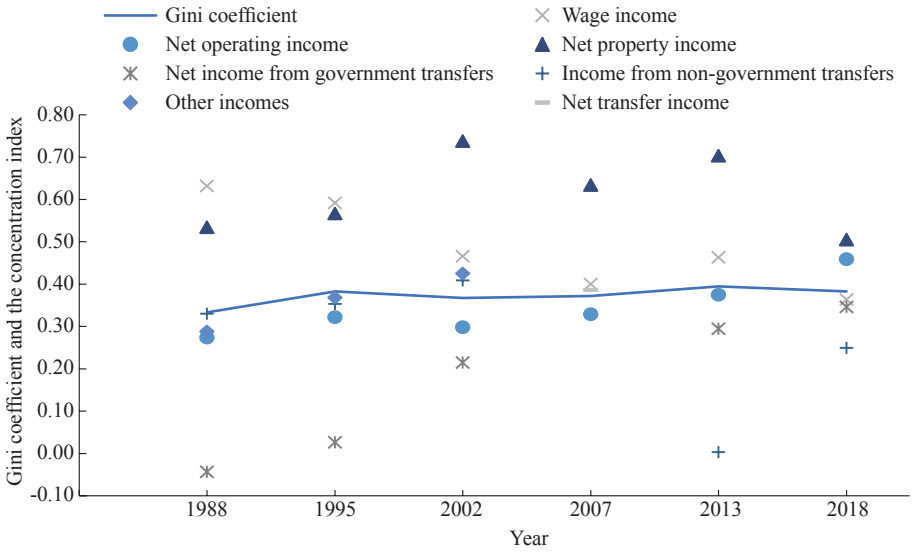

Figure 2: The Gini Coefficient of Rural Household Disposable Income and the Concentration of Various Itemized Incomes

Table 2: China's Rural Economic Growth from 1988 to 2018

	1988	1995	2002	2007	2013	2018
Per capita actual disposable income (yuan)	537.8090	705.0398	1101.4358	1571.3871	2847.9336	4318.6182
Average annual actual growth rate (%)		3.9436	6.5805	7.3655	10.4183	8.6833
Gini coefficient	0.3327	0.3833	0.3675	0.3716	0.3953	0.3828
Coefficient of variation	0.7393	0.8550	0.8354	0.8425	0.8856	0.8814
Theil index	0.1804	0.2592	0.2428	0.2459	0.2755	0.2642
Mean logarithmic deviation	0.1716	0.2563	0.2331	0.2391	0.2774	0.2692

Note: Both per capita actual disposable income and annual actual growth rate follow the 1988 prices.

incidence decreased the most, down almost 80 percentage points from 82.51% in 1988 to a mere 3.01% in 2018.

A significant downward trend may still be discerned if we look at the two indicators of the poverty gap and the squared poverty gap as well. By the poverty line of 2010, for instance, China's rural poverty gap narrowed from 37.68% to 1.18% in 1988-2018, and the squared poverty gap fell from 21.52% to 0.71%, and the same trend also occurred with the poverty line of 1.90 US dollars per person per day. This indicates significant poverty alleviation for the deeply poor rural population. When measured by the relatively low poverty lines of 1978 and 2008, the squared poverty gap slightly increased from 2013 to 2018, and by the poverty line of 1978 the poverty gap during this period also increased a bit. This may imply an insignificant poverty reduction for the lowest-income population during this period.

The results in Table 3 also suggest that poverty reduction was the most striking in the countryside in 1995-2002 using various poverty criteria. This may be due in part to the implementation of the *Initiative to Lift 80 Million People Out of Poverty in Seven Years* enacted by the State Council in 1994, which identified 592 poor counties across China. To implement this initiative, the Chinese government set up

a special pro-poor fiscal fund, invested heavily to create jobs for the poor, issued loans at discounted interest rates, and adopted a bevy of support and preferential policies. In addition, the principle of development-oriented poverty reduction continued to be followed to make use of local resources, address subsistence problems, reduce poverty, and even help some to achieve affluence. Through the implementation of the *Initiative to Lift 80 Million People Out of Poverty in Seven Years,* poor population was sharply reduced in the state-designated poor counties, easing poverty in the countryside remarkably (Li et al., 2019). Another conclusion that can be drawn from Table 3 is that poverty reduction has begun to slow.

Compared to poverty incidence, the two indicators of the poverty gap and squared poverty gap take into account the internal distribution of the poor population and better reflect the depth or severity of poverty. This paper still adopts four different poverty lines that help describe the conditions of different depths of poverty. The following section reports empirical results with poverty incidence as the sole criterion of poverty. Our calculations suggest that conclusions with poverty gap and squared poverty gap as poverty indicators are generally consistent with other conclusions of this paper.

4.3 The Effects of Income Growth and Income Gap on Rural Poverty

To differentiate how income growth and income gap influenced changes in poverty in the process of rural economic growth, we decomposed changes in the rural poverty index in various stages over the period from 1988 to 2018 with the results shown in Table 4. The two methods of decomposition, Datt-Ravallion (D-R) decomposition and Shapley decomposition, were employed in this table with results shown under each poverty criterion.

The D-R decomposition uses the starting year as the reference period. For instance, the decomposition of the change in poverty in 1988-1995 takes 1988 as the reference period, and the decomposition of the change in poverty in 1995-2002 takes 1995 as the reference period. Taking the result of the decomposition of the change in poverty in 1988-1995 with the poverty line of 1978, for instance, the numbers in the table have the following meanings. According to the results of the D-R decomposition, assuming income gap to be constant, average income growth reduced rural poverty incidence by 5.81 percentage points over this period, and assuming average income to be constant, a

Table 3: Rural Poverty Status from 1988 to 2018 (%)

		1988	1995	2002	2007	2013	2018
Poverty line of 1978 (236 yuan for 1988)	Poverty incidence	12.7387	10.8593	2.6467	1.2295	0.5792	0.5352
	Poverty gap	5.0665	3.8471	0.7797	0.3458	0.2401	0.3008
	Squared poverty gap	3.5322	2.0411	0.4036	0.1548	0.1506	0.2145
Poverty line of 2008 (365 yuan for 1988)	Poverty incidence	33.1530	25.8003	9.0547	4.1997	1.5294	0.9254
	Poverty gap	11.3012	8.7935	2.4044	1.0829	0.5092	0.4631
	Squared poverty gap	6.2018	4.5313	1.0624	0.4689	0.2774	0.3134
Poverty line of 2010 (755 yuan for 1988)	Poverty incidence	82.5072	68.3443	40.7804	22.1051	8.0369	3.0111
	Poverty gap	37.6806	29.8349	13.6818	6.9129	2.4848	1.1826
	Squared poverty gap	21.5248	16.7524	6.4779	3.1472	1.1747	0.7067
Poverty line of 1.9 US dollars per day (654 yuan for 1988)	Poverty incidence	75.1505	60.4955	32.0619	16.6194	6.0363	2.3644
	Poverty gap	31.2853	24.4957	10.1677	4.9938	1.7929	0.9541
	Squared poverty gap	17.1665	13.2565	4.6592	2.2122	0.8531	0.5862

widening income gap caused rural poverty incidence to rise by 5.82 percentage points, while the residual error of the decomposition caused poverty incidence to decrease by 1.89 percentage points;Then, there was an actual decrease in rural poverty incidence by 1.88 percentage points between 1988 and 1995 (from Table 3, rural poverty incidence decreased from 12.74% to 10.86% over this period). Similarly, according to our Shapley's decomposition results, with average income growth alone, rural poverty incidence over this period decreased by 6.76 percentage points, but widening income gaps led to an increase in poverty incidence by 4.88 percentage points. Hence, rural poverty decreased by 1.88 percentage points in actual terms over this period.

As shown in Table 4, the growth effect was negative in all periods, which means that the continuous increase in rural average income propelled poverty reduction over during 1988-2018. The distribution effect was positive most of the time, indicating that the change in income distribution was unfavorable to poverty reduction. The distribution effect turned negative over the periods of 1995-2002 and 2013-2018 due to the falling Gini coefficient. That is, narrowing income gap also helped reduce poverty. Judging by the absolute values of the growth effect and the distribution effect, the decomposed absolute value of the growth effect outweighed that of the distribution effect most of the time. After the positive growth effect (with a larger numerical value) was offset by the negative distribution effect (with a smaller numerical value), the poverty index still declined. As such, the sharp decrease in rural poverty between 1988 and 2018 primarily stemmed from income growth, and widening income gap for most of the time partially offset the poverty-reducing effect of growth and impeded further poverty reduction, which accords with the findings of Luo (2012), Chen and Lu (2014). As we can see from the table, the absolute value of the growth effect fell between 1988 and 2018, but this does not mean that income growth contributed to a diminishing share of poverty reduction. The reason for the fall may be that that amid the progress of poverty reduction, it became increasingly difficult to reduce poverty, and a smaller decrease in poverty naturally means a smaller growth effect.

Table 4: The Growth Effect and Distribution Effect on Changes in Rural Poverty during 1988-2018

		Poverty line of 1978 (236 yuan for 1988)		Poverty line of 2008 (365 yuan for 1988)		Poverty line of 2010 (755 yuan for 1988)		Poverty line of 1.9 US dollars per person/day (654 yuan for 1988)	
		D-R	Shapley	D-R	Shapley	D-R	Shapley	D-R	Shapley
1988-1995	Growth effect	-5.8120	-6.7560	-13.8338	-14.6027	-15.6990	-14.2862	-18.9787	-16.8939
	Distribution effect	5.8206	4.8766	8.0188	7.2499	-1.2895	0.1233	0.1541	2.2389
	Residual error	-1.8880		-1.5377		2.8256		4.1696	
1995-2002	Growth effect	-5.9442	-6.3174	-15.1827	-15.4975	-26.4906	-27.0545	-27.4580	-27.7085
	Distribution effect	-1.5220	-1.8952	-0.9333	-1.2480	0.0545	-0.5094	-0.4746	-0.7251
	Residual error	-0.7464		-0.6295		-1.1278		-0.5010	
2002-2007	Growth effect	-1.6448	-1.8086	-5.8259	-5.9716	-19.4695	-19.0503	-16.5428	-16.2269
	Distribution effect	0.5553	0.3915	1.2623	1.1166	-0.0443	0.3750	0.4684	0.7844
	Residual error	-0.3276		-0.2914		0.8385		0.6319	
2007-2013	Growth effect	-0.9790	-1.2548	-3.3566	-3.9817	-16.1903	-16.7579	-12.6413	-13.0862
	Distribution effect	0.8802	0.6044	1.9365	1.3114	3.2574	2.6898	2.9480	2.5031
	Residual error	-0.5516		-1.2502		-1.1353		-0.8897	
2013-2018	Growth effect	-0.3021	-0.3461	-0.9316	-0.8775	-4.9956	-4.6206	-3.9266	-3.4469
	Distribution effect	0.3462	0.3022	0.2194	0.2735	-0.7803	-0.4053	-0.7048	-0.2251
	Residual error	-0.0880		0.1082		0.7500		0.9594	

The semi-elasticities of rural poverty with respect to income growth and distribution are shown in Table 5 for various years from 1988 to 2018 to present the contributions of income growth and distribution factors to rural poverty reduction and their characteristic trends. Unlike the decomposition of the change in the poverty index based on actual changes in poverty in the adjacent sample years, the semi-elasticities of rural poverty with respect to income growth and distribution shown in Table 5 are calculated based on the characteristics of actual income distribution and changes in poverty simulated according to poverty conditions in a certain sample year. The results in the table suggest that by the poverty line of 1978, the semi-elasticity of rural poverty with respect to income growth was -0.31 for 1988. That is, assuming the rural household income gap in the year to be constant, an increase in average income of 1% further drove down poverty incidence by 0.31 percentage points. The semi-elasticity of rural poverty with respect to distribution was 0.44. Assuming the rural average household income to be constant, an increase in the Gini coefficient by 1% pushed up poverty incidence in the year by 0.44 percentage points.

The following conclusions can be drawn from Table 5. First, the semi-elasticity of rural poverty with respect to income growth was always negative since income growth for all eased poverty regardless of the poverty line. However, the sign of semi-elasticity of rural poverty with respect to distribution is subject to the poverty line and the relative average income. If the poverty line is below average income, poverty increases after the Gini coefficient increases by 1% under the simulation of rising incomes for those above average income and decreasing incomes for those below the average income. That is, the semi-elasticity of growth with respect to distribution is positive. That is why most estimated results of semi-elasticity of rural poverty with respect to distribution in Table 5 were positive.

When the poverty line is above average income, however, the polarized simulation (as directly above) also leads to an increase in the incomes of the poor whose incomes are above the average income but below the poverty line, so that poverty decreases. The semi-elasticity of rural poverty with respect to distribution is thus negative. Using the poverty line of 2020, the semi-elasticity of rural poverty with respect to distribution was negative for 1988 and 1995 for the very reason that this poverty line was above the average rural household incomes in those years (537.81 yuan and 705.04 yuan, respectively, see Table 1)

Second, during 1988-2018, the semi-elasticity of rural poverty with respect to income growth generally declined. Using the poverty line of 2008, for instance, the absolute value of the semi-elasticity of rural poverty with respect to income growth fell from 0.63 in 1988 to 0.00 in 2018. However, with the poverty line of 1.90 US dollars per person per day, the absolute value of the semi-elasticity of rural poverty with respect to income growth also fell from 0.60 to 0.03. By 2018, none of the semi-elasticity values of rural poverty with respect to income growth at various poverty lines exceeded 0.06. During the progress of rural poverty reduction, income growth contributed a diminishing share to poverty reduction, making it harder to reduce poverty through average income growth.

The reason for this is that in the latter stage of poverty reduction, the remaining poor population tends to consist of those who lack the ability to work or who live in regions with an extremely harsh natural environment where it is difficult to escape poverty (Jia et al., 2017; Chen et al., 2019). In the early stage of poverty reduction, development-oriented poverty reduction allowed the poor to escape poverty by working hard to earn income. For those unable to work, the effect of development-oriented poverty reduction may have been negligible (Shen, 2017).

Third, despite the absence of a noticeable temporal trend in the semi-elasticity of rural poverty with respect to distribution, Table 5 shows that using the poverty lines of 2008, 2010, and 1.90 US dollars per person per day, the absolute value of the semi-elasticity of rural poverty with respect to distribution was initially smaller than the absolute value of the semi-elasticity with respect to growth but started to exceed the semi-elasticity with respect to growth as of 2007 (at the relatively low poverty line of 2008, the semi-elasticity with respect to distribution started to exceed the semi-elasticity with respect to growth

Table 5: Semi-Elasticities of Rural Poverty with Respect to Income Growth and Distribution during 1988-2018

	Poverty line of 1978 (236 yuan for 1988)		Poverty line of 2008 (365 yuan for 1988)		Poverty line of 2010 (755 yuan for 1988)		Poverty line of 1.9 US dollars per person/day (654 yuan for 1988)	
	Growth	Distribution	Growth	Distribution	Growth	Distribution	Growth	Distribution
1988	-0.3078	0.4356	-0.6279	0.3340	-0.5338	-0.1017	-0.5970	-0.1061
1995	-0.2417	0.5005	-0.5871	0.2724	-0.4716	-0.0582	-0.5242	0.0951
2002	-0.0990	0.1442	-0.2433	0.5212	-0.6295	0.3196	-0.5370	0.3415
2007	0.0000	0.2265	-0.2142	0.3985	-0.4410	0.4936	-0.3449	0.4115
2013	-0.0186	0.1070	-0.0279	0.1437	-0.1940	0.4084	-0.1172	0.4831
2018	-0.0069	0.1566	0.0000	0.1318	-0.0577	0.2688	-0.0309	0.1997

beginning in 2002). That is, amid the progress of poverty reduction, the distribution factor had a more significant impact on rural poverty reduction. By 2018, the sign of semi-elasticity of growth with respect to distribution suggests that an improvement in income distribution still helped to reduce poverty.

Finally, using the lowest poverty line of 1978, the semi-elasticity of rural poverty with respect to income distribution stayed above the absolute value of the semi-elasticity of rural poverty with respect to income growth. Hence, for the extremely poor, distribution was a more important factor than growth in mitigating poverty, which is consistent with the conclusions of Yao et al. (2004).

4.4 The Effects of Different Income Sources on Rural Poverty

(1) The contribution of different income sources to poverty reduction.We decomposed rural poverty incidence in various sample years during 1988-2018 by income sources according to the Shapley decomposition principle to examine their effects, and the results are shown in Table 6. Using the poverty line of 1978 and with the decomposition results of rural poverty contribution by income sources in 1988, for instance, the numbers in Table 6 mean that assuming initial income for all to be zero, poverty incidence would be 100%, and an increase in wage income at this moment would have driven down poverty incidence by 7.63 percentage points. If net operating income is also taken into account, poverty incidence would have further decreased by 76.47 percentage points. If all itemized incomes are included, the aggregate reduction of poverty incidence equals the sum of the absolute contributions of the various itemized incomes. Subtraction of this aggregate value by 100% gives us the actual poverty incidence in 1988, of 12.74% (see Table 3).

Of course, the contributions of various itemized incomes are the results of taking average values of various possible paths according to the Shapley principle. In addition, the absolute contribution of an itemized income divided by the aggregate contribution of all itemized incomes gives us the share of the contribution of the itemized income to poverty reduction in the sample year. Notably, the contribution of an income source to poverty is subject to both its amount and distribution. Specifically, the greater share of an itemized income in total income (larger itemized income) and in the incomes of low-income people (the more such an income is concentrated among low-income people), the more it contributes to poverty reduction.

Table 6 shows that during 1988-2018, the contribution of wage income to rural poverty reduction increased sharply. With the poverty line of 2010, for instance, the absolute contribution of wage income to poverty incidence stood at -4.16% in 1988 with a relative share contribution of 23.80%. By 2018, however wage income alone caused rural poverty incidence to fall by 41.18 percentage points, contributing 42.46% to rural poverty reduction. The increasing contribution of wage income to rural

poverty reduction can be examined in terms of scale and distribution. While wage income increased rapidly, the level of concentration showed a clear tendency to decrease.

Brisk growth in rural household wage income stemmed from government initiatives to develop township enterprises and help rural residents find work in cities, as reflected in the *Initiative to Lift 80 Million People Out of Poverty in Seven Years* and the two *Outlines for China's Rural Poverty Reduction and Development*[5]. This finding is consistent with the conclusions of Yue and Luo (2010) and Luo et al. (2021) that wage income has a significant poverty-reducing effect. During 1988-2007, net operating income served as the largest source of income for reducing rural poverty. Table 6 shows that when measured by the lower among the poverty lines, net operating income contributed an increasing share to reducing rural poverty.

For instance, net operating income contributed 70.39%, 74.50%, 84.55%, and 87.64% to poverty reduction in 1988 by the descending order of the poverty lines, respectively, and the same pattern also occurred in 1995, 2002, and 2007, indicating that net operating income was more important for reducing poverty for those with even lower incomes during this period. The reason is that in the early years, the net operating incomes of rural residents were primarily operating incomes from agricultural production, which was the main source of income for low-income farming households. Chronologically, net operating income contributed a decreasing share to poverty reduction because it made up a diminishing share of the disposable income of rural households. In 1988-2002, the mean net income from government transfers was negative, resulting in a generally positive contribution of net income from government transfers to poverty. That is, net income from government transfers did not help reduce rural poverty during this period. Since the government part of net transfer income cannot be separated due to data availability issues for 2007, we cannot measure the contribution of net income from government transfers in this year. During 2013-2018, however, the mean net income from government transfers turned positive and increased sharply. Table 6 shows that net income from government transfers also contributed positively to poverty reduction over this period.

However, Figure 2 shows that the concentration of net income from government transfers increased from 0.29 to 0.35 in 2013-2018; net income from government transfers contributed more to rural poverty reduction because it increased more and not because more of it went to the low-income population. Furthermore, China enacted a string of policies to improve the livelihoods in the countryside after 2002. The rescission of agricultural tax in 2006 reduced the tax burden on farmers[6], and there was an improvement in the rural social protection system. China also established its new rural cooperative medical system in 2002 and began to roll it out in 2009. In the same year, the pilot program for the New Rural Pension Scheme was launched as well, and full coverage was achieved by the end of 2015(Li et al., 2019). Additionally, the Rural Subsistence Protection System, or *Dibao*, developed rapidly after being established nationwide in 2007, and the number of rural residents receiving *Dibao* payouts peaked in 2013 (Li et al., 2019).

The implementation of those policies has significantly raised net income from government transfers for rural households, but the low-income population was not given more priority in terms of net income from government transfers. Research also finds that the *Dibao* system did poorly at targeting eligible recipients, leaving many of them uncovered and mistakenly including those ineligible (Zhu and Li, 2017). Local governance gaps in the countryside often led to the "elite capture" of policy resources, and deviation has always existed in diverting poverty relief resources to the poor (Shen, 2017). Yet Table 6 shows that as far as 2013 and 2018 are concerned, i.e. years with positive net average incomes from government transfers, when an even lower poverty line is specified, both the contribution of net income

[5] Source: http://www.gov.cn/jrzg/2011-12/01/content_2008462.htm.
[6] Source: http://www.gov.cn/govweb/ztzl/gclszfgzbg/content_554913.htm.

Table 6: Contributions of Itemized Incomes on Rural Poverty Alleviation during 1988-2018 (%)

		Poverty line of 1978 (236 yuan for 1988)		Poverty line of 2008 (365 yuan for 1988)		Poverty line of 2010 (755 yuan for 1988)		Poverty line of 1.9 US dollars per person/day (654 yuan for 1988)	
		Absolute contribution	Relative share	Absolute contribution	Relative share	Absolute contribution	Relative share	Absolute contribution	Relative share
1988	Wage income	-7.6316	8.7466	-7.5862	11.3485	-4.1630	23.7982	-5.1995	20.9239
	Net operating income	-76.4684	87.6409	-56.5214	84.5534	-12.3139	70.3940	-18.5139	74.5039
	Net property income	-0.0669	0.0767	-0.0351	0.0525	-0.0728	0.4161	-0.0811	0.3265
	Net income from government transfers	-0.1818	0.2083	0.2068	-0.3093	0.2808	-1.6054	0.3639	-1.4646
	Income from non-government transfers	-1.3340	1.5289	-1.4298	2.1389	-0.6391	3.6534	-0.6593	2.6531
	Other incomes	-1.5692	1.7985	-1.4813	2.2159	-0.5849	3.3437	-0.7597	3.0572
1995	Wage income	-11.3375	12.7186	-10.7297	14.4606	-7.2026	22.7528	-8.3002	21.0107
	Net operating income	-75.4158	84.6031	-61.5614	82.9671	-23.3506	73.7645	-30.1085	76.2152
	Net property income	-0.1730	0.1941	-0.1309	0.1764	-0.1434	0.4530	-0.1272	0.3220
	Net income from government transfers	0.0693	-0.0777	0.5057	-0.6815	0.4550	-1.4372	0.6164	-1.5603
	Income from non-government transfers	-1.7000	1.9071	-1.6816	2.2664	-0.9952	3.1438	-1.1621	2.9418
	Other incomes	-0.5837	0.6548	-0.6018	0.8111	-0.4189	1.3232	-0.4229	1.0705
2002	Wage income	-26.9846	27.7182	-25.9123	28.4922	-20.4387	34.5135	-22.5459	33.1860
	Net operating income	-66.3198	68.1228	-61.5165	67.6412	-36.4211	61.5018	-42.8540	63.0780
	Net property income	-0.3931	0.4038	-0.2841	0.3123	-0.2453	0.4142	-0.2640	0.3885
	Net income from government transfers	0.2870	-0.2948	0.3948	-0.4341	0.6494	-1.0967	0.7357	-1.0828
	Income from non-government transfers	-2.0994	2.1564	-1.8883	2.0763	-1.4092	2.3796	-1.5889	2.3388
	Other incomes	-1.8434	1.8935	-1.7389	1.9120	-1.3547	2.2876	-1.4210	2.0916
2007	Wage income	-38.8072	39.2903	-38.5723	40.2632	-34.1403	43.8286	-36.1688	43.3779
	Net operating income	-53.6041	54.2714	-51.5569	53.8171	-39.3893	50.5672	-42.5095	50.9825
	Net property income	-2.2373	2.2652	-1.8949	1.9780	-1.4030	1.8012	-1.5251	1.8291
	Net transfer income	-4.1218	4.1731	-3.7762	3.9417	-2.9623	3.8030	-3.1772	3.8105
2013	Wage income	-35.4177	35.6240	-37.1225	37.6990	-38.9388	42.3418	-38.8428	41.3381
	Net operating income	-35.6395	35.8471	-35.4122	35.9622	-32.2538	35.0726	-33.1223	35.2501
	Net property income	-5.1882	5.2184	-4.2715	4.3379	-3.0895	3.3595	-3.1955	3.4008
	Net income from government transfers	-6.9565	6.9971	-5.9965	6.0896	-4.9490	5.3815	-5.1654	5.4973
	Income from non-government transfers	-16.2189	16.3134	-15.6680	15.9113	-12.7319	13.8446	-13.6376	14.5136
2018	Wage income	-37.0359	37.2352	-38.7296	39.0913	-41.1823	42.4609	-40.7534	41.7402
	Net operating income	-30.7420	30.9075	-30.7615	31.0488	-29.1028	30.0063	-29.5828	30.2992
	Net property income	-4.4716	4.4957	-3.5455	3.5786	-2.2478	2.3176	-2.4879	2.5481
	Net income from government transfers	-11.5741	11.6364	-10.3046	10.4008	-8.7497	9.0213	-8.9830	9.2006
	Income from non-government transfers	-15.6411	15.7253	-15.7335	15.8804	-15.7064	16.1940	-15.8285	16.2119

from government transfers and its share have increased, meaning that net income from government transfers did more in reducing poverty amid the rising depth of poverty.

(2) Poverty-reducing efficiency of net income from government transfers. As an itemized income, net income from government transfers contributed a growing share to poverty reduction probably due to its increasing amount since rural households received an increasing average net income from government transfers during the same period. In addition to the poverty-reducing effect of net income from government transfers, we should also consider the poverty-reducing efficiency of government transfer funds. For the same amount of funds, the poverty-reducing effect becomes more potent when poverty reduction is more efficient. It is important, therefore, to boost the efficiency of net income from government transfers, which are part of fiscal funds.

Referencing Lustig et al. (2013) and Xie (2018), the "poverty gap efficiency index" defines poverty reduction efficiency as "net income from government transfers as a share of contribution to poverty reduction divided by net income from government transfers as a share of disposable income" to exclude the impact of change in the amount of income from government transfers. Since the average net income from government transfers during 1988-2002 is negative and the part of net transfer income from the government cannot be separated for 2007, we only calculate poverty reduction efficiency for 2013 and 2018, as shown in Figure 3. The horizontal axis in the chart is the four poverty lines, and the vertical axis is the poverty reduction efficiency of net income from government transfers. At various poverty lines, net income from government transfers became more efficient at reducing poverty incidence in 2018 compared with 2013. Nevertheless, such definition and calculation of poverty reduction efficiency are relatively general and require further testing in future research.

4.5 Pro-Poor Growth Index of Economic Growth

After investigating the rural poverty effects of income growth and the income gap, this paper employs the pro-poor growth index to examine whether China's rural economic growth between 1988 and 2018 is more favorable to the poor. Table 7 shows the calculation results of the three pro-poor growth indexes for various periods. It can be learned that most of the time, the Kakwani & Pernia index is in the range between 0 and 1, i.e. the poor benefited from economic growth but to a smaller proportion compared with the non-poor population. The Ravallion & Chen index is smaller than the society-wide average income growth rate, indicating relatively slow income growth of the poor. The PEGR index also needs to be compared with the society-wide average income growth rate, and the conclusion is roughly consistent, i.e. in 1988-2018, rural economic growth was not strictly favorable to the poor population, who primarily benefited from the trickle-down effect of economic growth. With the poverty line decreasing, the PEGR index also declines. This pattern holds for the three periods of 1988-1995, 2007-

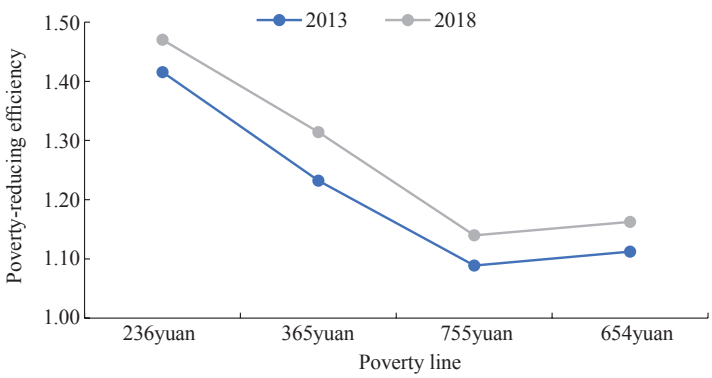

Figure 3: Poverty-Reducing Efficiency of Net Income from Government Transfers

Table 7: Pro-Poor Growth Index of Rural Economic Growth in 1988-2018

Period	Pro-poor growth index	Poverty line of 1978 (236 yuan for 1988)	Poverty line of 2008 (365 yuan for 1988)	Poverty line of 2010 (755 yuan for 1988)	Poverty line of 1.9 US dollars per Day (654 yuan for 1988)
1988-1995	Kakwani & Pernia index	0.3234	0.5315	0.9022	0.7722
	Ravallion & Chen index	-0.1360	-0.0038	0.1012	0.0839
	PEGR index	0.1006	0.1653	0.2805	0.2401
	Society-wide average income growth rate	0.3109			
1995-2002	Kakwani & Pernia index	1.3816	1.1029	1.0405	1.0355
	Ravallion & Chen index	0.3765	0.3581	0.3939	0.3790
	PEGR index	0.7768	0.6201	0.5850	0.5822
	Society-wide average income growth rate	0.5622			
2002-2007	Kakwani & Pernia index	0.8616	0.8333	0.9592	0.9335
	Ravallion & Chen index	0.2820	0.2176	0.2445	0.2346
	PEGR index	0.3676	0.3556	0.4093	0.3983
	Society-wide average income growth rate	0.4267			
2007-2013	Kakwani & Pernia index	0.6643	0.7955	0.8689	0.8372
	Ravallion & Chen index	0.0489	0.1566	0.2719	0.2551
	PEGR index	0.5397	0.6463	0.7059	0.6801
	Society-wide average income growth rate	0.8124			
2013-2018	Kakwani & Pernia index	0.1454	0.6484	1.0061	0.9352
	Ravallion & Chen index	-0.4435	-0.1058	0.1782	0.1355
	PEGR index	0.0751	0.3348	0.5195	0.4829
	Society-wide average income growth rate	0.5164			

2013, and 2013-2018. Take the period of 2013-2018, for instance, the PRGR index is 0.52, 0.48, 0.33, and 0.08 at the poverty lines of 2010, 1.9 US dollars per person/day, 2008, and 1978, respectively. The monotonicity of the PEGR index suggests that economic growth is becoming less pro-poor for the more deeply poor.

5. Conclusions

This paper employed CHIP data to investigate the evolving poverty conditions in rural China during the period from 1988 to 2018, as well as the effects on rural poverty from income growth and changes in the income gap amid economic growth. Our conclusions can be summarized as follows.

(i) During 1988-2018, rural poverty was greatly reduced in China, and it primarily stemmed from income growth. In most periods, the widening income gap offset some of the poverty-reducing effect of income growth. Overall, the mode of China's economic growth was not pro-poor, and the poor benefited proportionally less from economic growth than the nonpoor population.

(ii) Amid the progress of rural poverty reduction, economic growth's contribution to poverty reduction waned near the end of the period in question, and efforts in relying on the growth of average income to drive poverty reduction became less and less effective. Income distribution, however, exerted

an increasing effect on rural poverty reduction.

(iii) By examining different income sources, wage income contributed a significantly greater share to rural poverty reduction, becoming the principal source of income for rural poverty reduction. Net operating income was also a major source of income for rural poverty reduction except that its overall contribution to poverty reduction stayed on the decline. Thanks to the implementation of pro-farmer policies, there was a noticeable rise in the contribution of net income from government transfers over recent years, as well as in its efficiency in reducing poverty incidence.

(iv) The ultra-poor benefited relatively less from current economic growth, and net income from government transfers had the most significant poverty-reducing effect for them. Considering such potential factors as the imprecise targeting of poverty relief resources, the lowest-income people of China have yet to be given a greater preference in receiving the distribution of net income from government transfers (Shen, 2017). For the deeply poor, distribution has an even more important effect on easing poverty.

We recommend the following policy implications based on our above conclusions. First, we believe that the Chinese government should continue to transfer money directly to rural households while paying more attention to improving income distribution and narrowing income gaps. Rapid household income growth has been a key driver of rural poverty reduction for most of the years since 1978 and the single most important aspect of China's rural poverty reduction in the past several decades. Noticeably, however, China's economic growth exerted a diminishing effect on poverty reduction. Economic growth of the previous sort became less-and-less potent in curbing poverty. We believe that what matters now is to narrow household income gaps and nudge the pattern of China's economic growth in a pro-poor direction.

Similarly, we believe that the Chinese government should pay more attention to direct relief for poverty reduction. China has focused on development-oriented poverty reduction, on creating conditions more conducive for the poor to earn incomes through development-oriented poverty reduction. With the progress of poverty reduction over the past decades and increasing depth of poverty for the remaining poor, however, the causes of poverty have become more diverse and intractable. The poor who find it hard to escape poverty due to the lack of labor skills should be assisted primarily through poverty relief, but the level of attention and fiscal allocations to address this issue remain small (Zhu, 2021). We therefore believe that the Chinese government should offer direct subsidies to the neediest to alleviate their poverty status directly. In addition, we believe that a long-term mechanism should be put into place to prevent relapse into poverty, and promote sustainable development for the poor.

References:

[1] Aghion, Philippe, and Patrick Bolton. 1997. "A Theory of Trickle-Down Growth and Development." *Review of Economic Studies*, 64(2): 151-172.

[2] Araar, Abdelkrim. 2012. "Expected Poverty Changes with Economic Growth and Redistribution." *CIRPÉE Working Paper*.

[3] Arndt, Channing, Kristi Mahrt, and Caroline Schimanski. 2017. "On the Poverty-growth Elasticity." *WIDER Working Paper*.

[4] Bhalla, Surjit S. 2002. *Imagine There's No Country: Poverty, Inequality, and Growth in the Era of Globalization.* Washington D.C.: Peterson Institute.

[5] Bourguignon, François. 2004. "The Poverty-growth-inequality Triangle." *Indian Council for Research on International Economic Relations (ICRIER) Working Paper*.

[6] Chen, Fei, and Jianci Lu. 2014. "Research on Rural Poverty Reduction Effect of Income Growth and Distribution Structure Distortion." *Economic Research Journal*, (2): 101-114.

[7] Chen, Kevin, Jieying Bi, Guobao Wu, Xiaojun He, and Zimeiyi Wang. 2019. "Post-2020 Rural Urban Integrative Poverty Reduction Strategy: Development Status, Evolution, New Vision and Key Areas." *Chinese Rural Economy*, (1): 2-16.

[8] Chen, Lizhong. 2009. "The Impact of Income Growth and Income Distribution on Poverty Reduction in China's Rural Areas." *China Economic Quarterly*, (2): 711-726.

[9] Chen, Shaohua, and Yan Wang. 2001. "China's Growth and Poverty Reduction: Trends between 1990 and 1999." *World Bank Policy Research Working Paper*.

[10] Datt, Gaurav, and Martin Ravallion. 1992. "Growth and Redistribution Components of Changes in Poverty Measures: A Decomposition with Applications to Brazil and India in the 1980s." *Journal of Development Economics*, 38(2): 275-295.

[11] Duclos, Jean-Yves, and Abdelkrim Araar. 2006. *Poverty and Equity: Measurement, Policy and Estimation with DAD*. Ottawa: International Development Research Centre.

[12] Fields, Gary S. 1984. "Employment, Income Distribution and Economic Growth in Seven Small Open Economies." *Economic Journal*, 94(373): 74-83.

[13] Foster, James, Joel Greer, and Erik Thorbecke. 1984. "A Class of Decomposable Poverty Measures." *Econometrica: Journal of the Econometric Society*, 52(3): 761-766.

[14] Hu, Bing, Jingsheng Lai, and Baodi Hu. 2007. "Economic Growth, Income Distribution and Poverty Alleviation—Evidence from Rural China:1985-2003." *The Journal of Quantitative & Technical Economics,* (5): 33-42.

[15] Jain, Lila Ram, and Suresh D. Tendulkar. 1990. "Role of Growth and Distribution in the Observed Change in Headcount Ratio Measure of Poverty: A Decomposition Exercise for India." *Indian Economic Review*, 25(2): 165-205.

[16] Jia, Junxue, Cong Qin, and Yongzheng Liu. 2017. "Policy Design for the Integration of 'Top Down'and 'Bottom Up': An Empirical Analysis Based on Poverty Alleviation Rural Development Projects." *Social Sciences in China*, (9): 68-89.

[17] Jiang, Kezhong, and Shenglong Liu. 2017. "Income Structure, Income Inequality and Rural Family Poverty." *Chinese Rural Economy*, (8): 75-90.

[18] Kakwani, Nanak C. 1984. "On the Measurement of Tax Progressivity and Redistributive Effect of Taxes with Applications to Horizontal and Vertical Equity." *Advances in Econometrics*, 3: 149-168.

[19] Kakwani, Nanak, and Hyun H. Son. 2008. "Poverty Equivalent Growth Rate." *Review of Income and Wealth*, 54(4): 643-655.

[20] Kakwani, Nanak, and Kalanidhi Subbarao. 1990. "Rural Poverty and its Alleviation in India." *Economic and Political Weekly*, 25(13): A2-A16.

[21] Kakwani, Nanak., and Ernesto M. Pernia. 2000. "What Is Pro-Poor Growth." *Asian Development Review*, 18(1): 1-16.

[22] Klasen, Stephan, and Mark Misselhorn. 2008. "Determinants of the Growth Semi-Elasticity of Poverty Reduction." *Ibero America Institute for Economic Research Discussion Paper*.

[23] Klasen, Stephan. 2008. "Economic Growth and Poverty Reduction: Measurement Issues Using Income and Non-Income Indicators." *World Development*, 36(3): 420-445.

[24] Li, Xiaoyun, Lerong Yu, and Lixia Tang. 2019. "The Process and Mechanism of China's Poverty Reduction in the Past Seventy Years." *Chinese Rural Economy*, (10):2-18.

[25] Li, Shi, and Bjorn Gustafsson. 1996. "Estimates of the Scale and Extent of Poverty in China in the Late 1980s." *Social Sciences in China*, (6): 29-44.

[26] Li, Shi, and Ximing Yue, Terry Sicular, Sato Hiroshi. 2017. *New Changes in Pattern of Income Distribution in China.* Beijing: China Financial & Economic Publishing House.

[27] Li, Shi, Ximing Yue, Terry Sicular, Sato Hiroshi. 2019. "New Changes in Pattern of Income Distribution in China." *Studies in Labor Economics*, (1): 9-31.

[28] Li, Shi. 1999. "Amartya Sen and His Major Economic Contributions." *Reform*, (1): 101-109.

[29] Lin, Boqiang. 2003. "Economic Growth, Income Inequity, and Poverty Reduction in the China." *Economic Research Journal*, (12): 15-25.

[30] Luo, Chuliang, Shi Li, and Terry Sicular. 2020. "The Long-term Evolution of National Income Inequality and Rural Poverty in China." *China Economic Review*, 62: 101465.

[31] Luo, Chuliang, Shi Li, and Ximing Yue. 2021. "An Analysis of Changes in the Extent of Income Disparity in China (2013-2018)." *Social Sciences in China*, (1): 33-54.

[32] Luo, Chuliang. 2012. "Economic Growth, Inequality and Poverty in Rural China." *Economic Research Journal*, (2): 15-27.

[33] Luo, Liangqing, and Weiying Ping. 2020. "Decomposition of Poverty Dynamic Changes in China: 1991-2015." *Journal of Management World*, (2): 27-40.

[34] Lustig, Nora, Carola Pessino, and John Scott. 2013. "The Impact of Taxes and Social Spending on Inequality and Poverty in Argentina, Bolivia, Brazil, Mexico, Peru and Uruguay: An Overview." *CEQ Working Paper*.

[35] Perry, Guillermo. 2006. *Poverty Reduction and Growth: Virtuous and Vicious Circles.* Washington D.C.: World Bank Publications.

[36] Piketty, Thomas, Li Yang, and Gabriel Zucman. 2019. “Capital Accumulation, Private Property, and Rising Inequality in China, 1978-2015.” *American Economic Review*, 109 (7): 2469-2496.

[37] Ravallion, Martin, and Shaohua Chen. 2003. “Measuring Pro-Poor Growth.” *Economics Letters*, 78(1): 93-99.

[38] Ravallion, Martin. 2001. “Growth, Inequality and Poverty: Looking beyond Averages.” *World Development*, 29(11): 1803-1815.

[39] Roemer, Michael, and Mary Kay Gugerty. 1997. *Does Economic Growth Reduce Poverty*. Cambridge, MA: Harvard Institute for International Development.

[40] Shapley, Lloyd S. 1953. “A Value for N-Person Games.” *Contributions to the Theory of Games*, 2(28): 307-317.

[41] Shen, Qiu. 2017. “Reflections on the Historical Evolvement of Poverty Alleviation Policy in Rural China and the Practice of Poverty Alleviation.” *Journal of Jiangxi University of Finance and Economics*, (1): 91-100.

[42] Shen, Yangyang. 2012. “The Impact of Economic Growth and Inequality on Rural Poverty in China.” *The Journal of Quantitative & Technical Economics*, (8): 19-34.

[43] Shen, Yangyang. 2012. “The Impact of Growth and Inequality on Rural Poverty in China—Based on Different Economic Activity Type Farmers.” *Nankai Economic Studies*, (2): 131-150.

[44] Shorrocks, Anthony F. 2013. “Decomposition Procedures for Distributional Analysis: A Unified Framework based on the Shapley Value.” *Journal of Economic Inequality*, 11(1): 99-126.

[45] Shujie, Yao, Zongyi Zhang, and Lucia Hanmer. 2004. “Growing Inequality and Poverty in China.” *China Economic Review*, 15(2): 145-163.

[46] Wan, Guanghua, and Yin Zhang. 2006. “The Impacts of Growth and Inequality on Poverty Dynamics in China.” *Economic Research Journal*, (6): 112-123.

[47] Wang, Chen, Guanghua Wan, and Wan-Zong Wu. 2020. “Transformation of China’s Poverty-reduction Strategy and Related Challenges.” *China Industrial Economics*, (1): 5-23.

[48] Wang, Yulin, and Zuhui Huang. 2005. “Decomposing the Factors of Rural Poverty in Transitional China.” *Chinese Journal of Population Science*, (1): 52-59.

[49] Wei, Zhong, and Bjorn Gustafsson. 1998. “Analysis of Poverty Changes in China’s Transition Period.” *Economic Research Journal*, (11): 65-69.

[50] White, Howard, and Edward Anderson. 2001. “Growth versus Distribution: Does the Pattern of Growth Matter.” *Development Policy Review*, 19(3): 267-289.

[51] World Bank. 2000. *World Development Report 2000-2001: Attacking Poverty*. Washington D.C.: World Bank.

[52] Xia, Qingjie, Lina Song, and Simon Appleton. 2010. “Economic Growth and Poverty Reduction in Rural China.” *China Economic Quarterly*, (3): 851-870.

[53] Xie, E. 2018. “Effects of Taxes and Public Transfers on Income Redistribution.” *Economic Research Journal*, (8): 116-131.

[54] Ye, Puwan. 2005. “Research on the Economics of Poverty: A Literature Review.” *The Journal of World Economy*, (9): 70-79.

[55] Yue, Ximing, and Chuliang Luo. 2010. “Rural Labor Force Going Out to Work and Alleviating Poverty.” *The Journal of World Economy*, (11): 84-98.

[56] Zhu, Mengbing, and Shi Li. 2017. “The Key to Precise Poverty Alleviation Rests in the Precise Identification of Impoverished Populations: An Analysis of the Targeting Effect of the Rural Subsistence Allowance Policy.” *Social Sciences in China*, (9): 90-112.

[57] Zhu, Qing. 2021. “On the Reform of Fiscal and Tax System in the ‘New Development Pattern’.” *Finance & Trade Economics*, (5): 1-12.