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Yan He†

1 . Introduction

The literature on the relationship between inequality and growth is large and still growing. In classical economic theory, income inequality was thought to influence economic growth rates through savings and consumption. Economic growth was possible only when there were enough rich people in society since only rich people saved (Smith, 1811). Keynes (1936) argues that income inequality leads to slower economic growth. Demand is the basis of investments, while inequality lowers aggregate consumption, thus inequality of incomes will diminish economic growth. Kuznets (1955) suggests the inverted U-shaped relation between income inequality and economic growth. In poor countries, economic growth increased the income disparity between rich and poor people. In wealthier countries, economic growth narrowed the difference.

The following works contributed to this field by theoretical and empirical studies. Theoretical literature on income distribution and growth can be divided into four groups, including credit-market imperfections, political economy, unrest related to social policy and saving rates (Malinen, 2007). Empirical studies on the effect of income distribution on economic growth have been done, but the conclusions are quite controversial. Some studies predict a negative (such as Persson and Tabellini, 1994), and some a positive effect of inequality on growth (see as Forbes, 1998). While Deininger and Squire (1996) fail to find a statically significant negative relationship between income inequality and growth. Barro (1999) provides evidence for a negative relationship between growth and income inequality in poor countries and a positive relationship in rich countries. Other studies insist income inequality may also affect economic growth rates more

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indirectly. Murphy *et al.* (1993) demonstrate that property crimes, vandalism, theft and corruption in particular can harm economic growth by discouraging investments and lowering productivity by inflicting additional costs on companies. Income inequality can also increase corruption and illegal rent-seeking (Jong-Sun and Khagram 2005). Other factors, human capital, division of labor, and taxation have also been linked to economic growth through income inequality (Forbes 2000).

Most of the researches dealing with the inequality-growth relationship have either concentrated on the effect of income inequality on economic growth (Fallah and Partridge, 2007) or the impact of various socio-economic variables on inequality. However, studies assessing whether economic growth affects income inequality have been few. Chambers (2007) makes effort to study past growth impact inequality. Majumdar and Partridge (2009) tried to study the impact of economic growth on income inequality using the country-data from 48 countries, but there is still no accomplished version. Targeting Chinese case, there is no relative study focusing on this topic, especially rural income inequality.

Rural income inequality has been paid much attention in China since rural-to-urban migration and non-farm income play an increasingly important role in sustainable development and poverty reduction in rural areas (OECD, 2005). With high speed of economic growth,rural income inequality is rising considerably since 1978, over international warning line of 0.4 in several years. Does high economic growth worsen rural income inequality? In order to answer this question, this paper will employ time series for the period from 1978 to 2010 to empiricallyinvestigate the impact of economic performance on rural income inequality in China. To study the effect of rural-to-urban labor flow, time series of 1998 to 2010 are also considered for data unavailability. The rest of this paper is arranged as follows. Section 2 demonstrates data sources and empirical model this paper will use. Section 3 is a description between economic growth and rural income inequality. Section 4 displays empirical results and explanation. Section 5 is discussion and policy suggestion.

2 . Data Availability and Model Specification

2.1 Rural Income Inequality: An Explanation

In this paper, I would like to employ rural Gini coefficient as the measurement of rural income inequality to analyze the effect of economic growth on inequality from 1978 to 2010. About the data of rural Gini coefficient from 1998 to 2010, I already explained in my previous paper. For the data availability, I would like to give some illustration about this variable since I intend to combine my own data (1998-2010) with other researcher's (1978-1997) in order to intend my study period, since my data is not only discontinuous from 1980 to 1997 but also missing 1978 and 1979.

As for the data structure, income ranges of Chinese statistical data are grouped by family average income. It can be transformed into individual average incomeaccording to average family member of each class. Usually, earning, disposable income and net income are employed to calculate Gini ratio. There are great disparities among different income source. In my previous paper (He, 2012), I used net income as the basis of Gini coefficient calculation for the time period of 1997 to 2010.

Income inequality has been paid great attention by academics and the measurement of inequality has accumulated a large number of literatures in China. Early studies mainly concentrated on region inequality for the reason of uneven regional development of China. The stepwise researches contributed to urban inequality, rural inequality and decomposition by urban and rural sectors since China is strictly divided into rural and urban sectors, while urban sector is the engine of economic growth of China. As a result, both urban inequality and inequality of China have been attracted great concerns in the previous studies. Through literature review, there arefew studies directly concentrating on rural income inequality yet. The studies on decomposition by rural and urban sectors often report the Gini ratio of urban and rural areas separately and combine to Chinese Gini coefficient by weight such as population. To complement this blank, I calculated rural income inequality for the period of 1980 to 2010 by applying the methods of Iterative I of Dagum distribution.

With respect of inequality measurement, data resource and structure are important since different kind of data would cause disparity of measurement. Cheng (2007) also applied net income as the basis of rural parts calculationfor the time period of 1978 to 2005. Per capita income of each family is grouped by the percentage of household. The author transferred family grouped income data according numbers of family member to Per capita income of each person in each income group. The procedure is the same as what I did when I calculated rural Gini coefficient by Dagumdistribution. His results are quite similar to mine for the overlapped periods of 1998 to 2005. With this respect, I would like to extend my time period of rural income inequality by employing Cheng (2007) from 1978 to 1997.

2.2 Variables and Data Sources

The literature review suggests that the basic factors of income inequality are structural changes, high returns to education, shifts in labor market and immigration (Majumdar and Partridge, 2009). Taking the preference of this study into consideration, economic growth and fiscal policy are alsoincluded into the model. In order to study the impact of rural-to-urban labor force flow on rural income inequality, inter and intro province rural-to-urban flow are considered.

Regarding to economic growth impact on inequality, there is no statistically significant association between inequality and income according to empirical study of Deininger and Squire

(1998). Thedata of China confirms a linearly increasing trend between economic growth and inequality. In subsection 3.1, the detailed descriptive analysis will displayed. The following work is to check the effect of economic growth on rural income inequality.

Structural change affects income inequality, at least in the short run (Levernier*et al.*, 1998). Chinese economic has also undergone dramatic and continuing structural change since 1978. The share of agriculture in GDP has declined from 28.2% in 1978 to 10.1% in 2010 as the manufacturing and services sectors have grown much faster. The gap between agricultural and industrial labor productivity is considerable large. In 2001, the labor productivity ratio of urban industry, urban services and rural-non-farm to agriculture in China is an astonishing 4-10 times larger than in other countries. These extremely high ratios as well as their rising trend are symptomatic of the major distortions in the labor markets, especially in its partial against the agricultural sector. The development of agricultural sector will affect rural income directly, since agriculture is the main source of income and employment for rural residents.

Income inequality is often attributed to higher returns of education. For rural-to-urban labor flow with relative high income, the educational level of rural migrant employees is higher than rear personnel. Taking Sichuan Province for example, according to the second countrywide agriculture general investigation in 2006, the illiteracy rate of rural migrant employees is 0.8%, slower than that of 12.9% of agricultural employee. A household survey undertaken by Kipnis (2010) shows thatin 2005 and 2006 revealed that all of the families surveyed wanted their child to attend university in China. Only through education, rural residents are able to change their status under Chinese *hukou* system. University represents high income and a door to urban status. However, educational resources are concentrated on urban sectors. The drawback of rural education and low income of rural family make higher education difficult for rural students because of expensive tuition. Thus, education is a very important factor to influence family income in rural China.

Rural to urban labor force flow has been proved to increase in rural income by Zhu and Luo (2010). According to the second Agricultural Census China had 130 million rural labor who workedfor more than one month outside of their township of residence in 2006. The correspondingdata is 74 million in 1997. Labor movement is still restricted by thehousehold registration system (*hukou*) and associated regulations and policies. Rural labor migrationin China is restricted largely to a “floating population”. However, Rural to urban labor flow include inter-province and intro-province shifts. Both of them impact on the growth of farmer’s income significantly.

Migration, rural-urban migration in particular, as a culturally patterned movement of people, generally interacting with modern urbanization when economic developments expand labor requirements, has for long been an important area of research in development economics. At the

end of 2009, urbanization has risen from 17.92% in 1978 to 46.59% in 2009, and urban population rose by 449.41 million. Zhu andLuo (2010)shows thatmigration tends to have egalitarian effects on rural income for three reasons: (1) migration is rational self-selection-farmers with higher expected return in agricultural activities and/or in local nonfarm activities choose to remain in the countryside while those with higher expected return in urban nonfarm sectors migrate; (2) households facing binding constraints of land supply are more likely to migrate; (3) poorer households benefit disproportionately from migration.

Fiscal expenditures will reduce income inequality (Muinelo-Gallo and Roca-Sagales, 2011). Fiscal issues have becomemore prominent in China in several respects in recent years. The rebalancing of theeconomy and striving to a harmonious society that the government aims for reliesconsiderably on fiscal policy measures (Kuijs and Xu, 2008). As the fiscal revenue situation improved since the mid-1990s, and particularly since 2000, government spending increased as a share of GDP. Public expenditure has traditionally been a component of fiscal policy which is an instrument of the state to influence economic growth.

According to empirical study by Zhu and Luo (2010), rural-to-urban migration leads to an increase in rural income. That is, the increasing share of nonfarm income in total income widens inequality. Undoubtedly, rural-to-urban migration caused by high speed of economic growth increased the nonfarm income of rural families. Therefore, the effect of rural-to-urban labor flow will be investigated. Besides, intro and inter province rural-to-urban labor flow is distinguished. For detailed illustration, I will explain in Subsection 3.2.

The definition and explanation of each variable are reported in table 1. The data of inter-province and intro-province labor flows are collected from <Compiled statistics of registered temporary residents in China>; rural income inequality is collected from Cheng (2007) for the sample size of 1978-1997 and calculated by He (2012) for the sample period of 1998-2010. Other data comes from the website of National Bureau of Statistics of China.

2.3 Model Specification

It can be seen from my previous work that economic growth and rural income inequality are bidirectional relationship, that is, both are endogenous variables. In order to avoid nonlinear problem, all the variables take logarithm value. To deal with endogenous problem, this paper will apply GMM model to estimate the impact of economic growth on rural income inequality. On the basic hypotheses of linear estimation, I build following empirical model:

$$\log GINI_i = c(0) + c(1)*\log perGDP_i + c(k)*\log X_{kj} + \varepsilon_i \quad (1)$$

where i is time period from 1998 to 2010; log$GINI$ is dependent variable; log$perGDP$ is independent variable; $logX_k$ are control variables including logEdu, logExp, log$Inter_p$, log$Intro_p$ and logStr; $c(0)$, $c(1)$,..., $c(k)$ are estimation coefficients; ε_i is the error term.

Table 1. variables and definition

Variable	Definition	Explanation
GINI	rural income inequality	The sample size from 1978 to 1997 is collected from-Cheng (2007); the sample size from 1998 to 2010 is calculated by He (2012)
perGDP	economic growth	The annual growth rate of real income per capita
Str	structural change	The proportion of the production of primary industry to GDP
Edu	educational input	The sample size from 1978 to 1997 is the proportion of college graduate to total proportion; the sample size from 1998 to 2010 is the proportion of fiscal expenditure on education to GDP
Inter_p	inter-province mobile population	The proportion of inter-province mobile population to total population
Intro_p	intro-province mobile population	The proportion of intro-province mobile population to total population
Mig	migration	The proportion of rural population to total population
Exp	fiscal expenditures	The proportion of fiscal expenditures to GDP

3 . Description between Inequality and Economic Growth

3.1 Rural Income Inequality and Economic Growth

China has experienced particularly high rates of economic growth due to a series of reforms which started in the late 1970s. Since 1978, reforms began in the agricultural, industrial, fiscal, financial, banking, price setting, and labor systems. "The Household Responsibility System" which releases rural labor force,"urban-bias" policy which enlarges rural-urban income gap, and "The Open-Door Policy" which causes regional disparity, have played a striking role in economic growth of China.

Before "open-door"policy, collective farming under the Commune system was implemented. Under this kind of agricultural policy, farmers worked as a team consisting of some forty persons. A farmer could not get extra reward by working harder because all members of the team would share the additional output due to his additional labor. Gradually, the drawback became obvious since some farmers realized that if they farmed separately the team could produce more in total and still delivered the same amount of output required by the procurement system for government distribution of agricultural products in the economy. Therefore, in 1978, a new policy was adopted as the national policy called the "household responsibility system", instead of collective farming. The "household responsibility system" served as the foundation of reform in other-

sectors not only by increasing the supply of food but also by liberating the farmers from the land and offering surplus labor force for coastal areas where practiced "open-door " policy and urban areas whereimplemented "urban-bias" policy.

China is strictly divided into two parts: rural and urban areas. In the history of Chinese economic growth, cities were always endowed prior to develop by Chinese government. Urban bias has long been China's dominant economic policy. The path of China's development became "industry promotion by agriculture", i.e. all agricultural resources, including grains, labor force, capital, policy biases and so on, supply from rural to urban, to support the development of industry. The persistent urban bias not only leadsto a severe rural-urban income gap, but also deepens rural-urban division. From 1991 to 2003, the average growth rate of GDP per capita in China is 8.2%. The growth rate of per capita net income of rural residents is only 4.3%, while urban residents are 7.7% which is close to the average growth rate of GDP per capita. The widest rural-urban income gap recorded in 2009. According to National Bureau of Statistics, the urban per capita net income stood at 17,175 Yuan ($2,525) in 2009, in contrast to 5,153 Yuan in the countryside, with the urban-to-rural income ratio being 3.33:1.

The most important dominant is the open-door policy in 1978, which creates high speed of economic growth about 30 years. China's economy was essentially a closed economy before the economic reform. In 1978, the total volume of its foreign trade, or the sum of the values of its exports and imports, amounted to only 7% of national income. The open-door policy encouraged the development of foreign trade and foreign investment.

Foreign trade The view of exports as an engine of growth has been recognized for long time in both academic and policy circles. The open-door policy encouraged the opening of China to foreign imports and the promotion of exports. In order to earn foreign exchange through export, special treatment, such as export subsidies and export drawback, was given to exporting companies and enterprises to encourage them to export. These exporting companies and enterprises were allowed to retain part of the foreign exchange they earn and to obtain special loans in RMB or in foreign exchange for short-term financing or long-term capital expansion. Additionally, Export Processing Zones have been one of the most important components of export-promotion strategy in developing countries since the 1960s. In China, Export Processing Zones are established in several coastal provinces such as Guangdong and Fujian. There was no import duties levied on materials processed for exports. Foreign investors were encouraged to set up factories with Chinese enterprises independently or jointly to process imported or locally produced materials for export in export-processing zones. The use of export-processing zones to promote exports had been practiced to be successful. By 1998, the volume of foreign trade increased to 37% of gross domestic product. China's foreign trade has grown faster than its GDP for the past 25 years. However, its over-reliance on exports for growth was starkly exposed by

the global economic crisis of 2008. Also, joint ventures with foreign investors outside the export-processing zones were established. These developments were relevant not only to China's foreign trade but also to foreign investment in China.

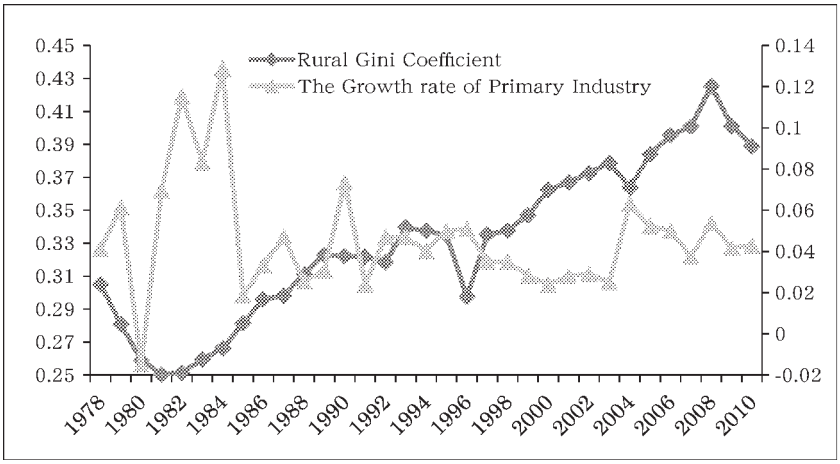
Foreign investment In an effort to attract international capital to spur economic development in China, a decision was made in 1978 to permit foreign direct investment in several small "special economic zones" along the coast. Low labor costs emerged as its main comparative advantage to attractFDI (Foreign Direct Investment) because many observers believed that China was characterized by surplus and underemployed rural labor in the 1980s and 1990s (Bowlusand-Sicular, 2003). FDI can take three forms, jointly financed enterprises, cooperative ventures and entirely foreign-owned enterprises. 14 coastal cities and three coastal regions are "open areas" for foreign investment. "Open areas" provide favored tax treatment and other advantages for foreign investment. Laws on contracts, patents, and other matters of concern to foreign businesses were also passed. As a result, from an almost isolated economy, China has become the largest FDI recipient in the developing world and globally the second largest (next to US) since 1992, which caused to rapid development of coastal areas.

After "opening up" in 1978, development strategy of China has led to internal and external economic imbalances. The proportion of primary industry to GDP is decreasing rapidly. High cost and low input of agricultural production promote rural residents flow out of primary sectors. Due to expanding labor requirements and relative high income attraction in coastal areas and urban sectors, large scale of labor force in rural areas has been attracted to flow into southern-eastern coastal cities and urban areas and absorbed in manufacturing and service sectors mainly, especially since its labor market reform of the mid-1990s. Massive population flows from rural to urban areas and from western to eastern areas. Rural-to-urban migration and remittances play an important role in transforming the structure of rural household income. Figure 1 shows the relationship between deduction of the growth rate of primary industry and relatively rising rural income inequality.

Meantime, the rural urban income gap is also rising, which reached its widest in more than three decades in 2009. As of year 2010, income ratio was recorded at 3.23:1 and per capita disposable income of urban households stood at 19109 (Yuan) while rural households' were at 5919 (Yuan) according to data from National Bureau of Statistics of China. It can be seen from figure 2, per capita total income of rural areas taken account to GDP per capita is decreasing rapidly, especially from 1994. Rural income inequality also rises sharply since 1982.

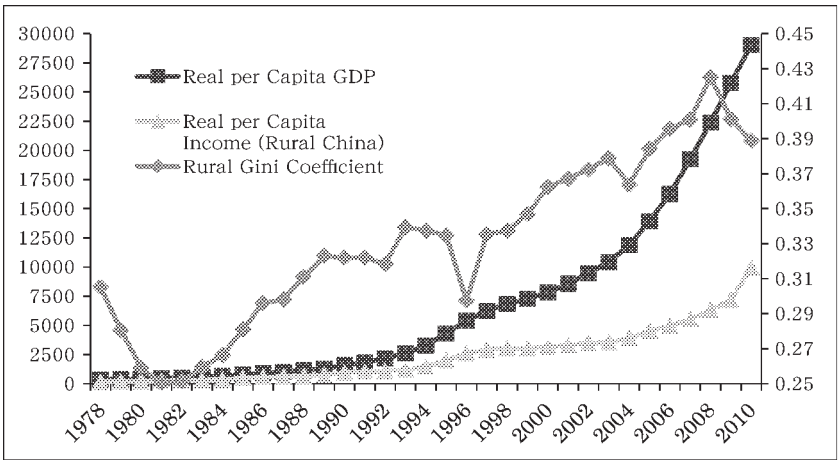
With striking characteristics of economic growth in China, rural income inequality also increases rapidly. Average rural income inequality is 0.33 from 1978 to 2010 with max value of 0.43 in 2008 and min value of 0.25 in 1981. Meanwhile, economic growth increases 9.07% on average. Figure 2 showsthe increasing trend of rural income inequality and economic growth.

Fig. 1 The growth rate of primary industry and rural income inequality



Data source: Rural Gini coefficients of 1978-1997 are collected from Cheng (2007) which used the same data structure and data source as He (2012) with the sample size of 1998-2010. The growth rate of primary industryis from National Bureau of Statistics of China.

Fig. 2 Rural Gini coefficient, real per capita total income (rural China) and real per capita GDP

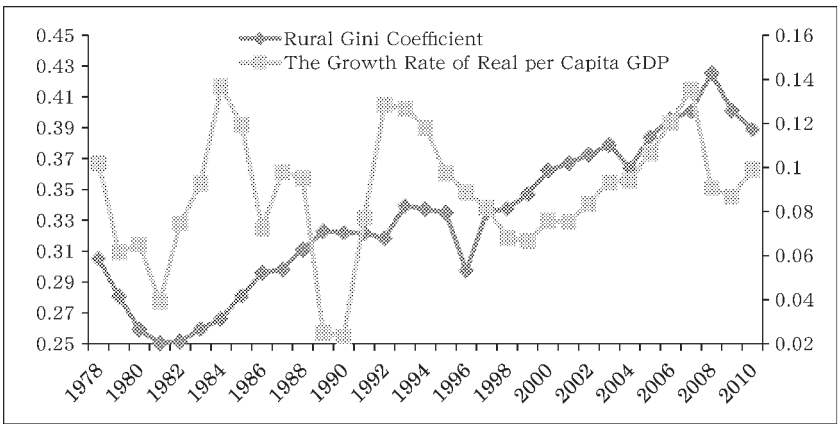


Data source: Rural Gini coefficients of 1978-1997 are collected from Cheng (2007) which used the same data structure and data source as He (2012) with the sample size of 1998-2010.GDP per capita (Yuan) and per capita total income of rural China (Yuan) are from National Bureau of Statistics of China. To eliminate the effect of price fluctuation, Real GDP per capita(Unit:Yuan) is calculated by dividing CPI (Overall Consumer Price Index of Residents). For CPI missing values of 1979 and 1981-84, Overall Retail Price Index is instead.

Although there are fluctuations of rural Gini ratio, the increasing trend also extends. Doesthis mean that high speed of economic growth raised rural income inequality? To search for the answers, this paper employs time series covering period from 1978 to 2010 to investigate the effect of economic growth on rural income inequality in China. Most of the literatures suggest employ

the growth rate of real per capita GDP as economic growth indicator to investigate inequality-growth relationship. Figure 3 illustrates the changing trend of rural income inequality and the growth rate of real per capita GDP.

Fig. 3 Rural Gini coefficient and the growth rate of real per capita GDP



Data source: Rural Gini coefficients of 1978-1997 are collected from Cheng (2007) which used the same data structure and data source as He (2012) with the sample size of 1998-2010. The growth rate of real per capita GDP is from National Bureau of Statistics of China.

3.2 Rural-to-urban Labor Force Flow and Rural Inequality

Rural-to-urban labor flow is an inevitable factor impact on rural income inequality. As a special group, rural residents share urban resources with urban residents such as education, job opportunity, housing purchasing and so on. But whatever how many years they service in the cities, their statuses are still rural "*hukou*". Therefore, it is necessary to consider the effect of rural-to-urban labor flow.

Migration in China contains two kinds of perceptions: the "formal" migration and the "informal" migration. Formal migration means those mobile populations who officially changed their *hukou* status, data of which is from <Statistic of National sub-county municipal population>. The "informal" migration, i.e. rural-to-urban workforce flow, includes those mobile populations who move to live a new place without changing their *hukou* status, is from <Compiled statistics of registered temporary residents in China> since 1997. The latter is the conception of rural-to-urban labor flow and main concern of this paper.Inter-province and intro-province mobile population isdistinguished. According to National Census of Population and Empirical Investigation of Sub-regions, there is significant disparity in occupation, income and social security between inter and intro-province mobile population (Li, 2006). Table 2 shows the structure of Guangdong Province in China.

Table 2. The structure of mobile population in Guangdong Province

Data sources	Variable	Total mobile population	Intro-province mobility	Inter-province mobility
1990	Population (million)	3.929	1.258	2.671
(The fourth national census)	The proportion to total mobile population (%)	100.00	32.01	67.99
1995	Population (million)	8.042	3.145	4.897
1% sample survey of population	The proportion to total mobile population (%)	100.00	39.11	60.89
2000	Population (million)	25.304	15.065	10.239
The fifth national census	The proportion to total mobile population (%)	100.00	59.53	0.47

Sources: The data is calculated according to national censuses.

Comparing with the families with no mobility, the whole income of families with mobile population is higher about 16%-43% (Taylor*et al.*, 2003). According to the 2005 sample survey on 1% of China's population, monthly net income per capita is up to 1038, which is higher than rural the mean net income of rural residents in the same period (Duan and Yang, 2008). If one of the family members transfers from rural labor force to urban labor force, the family income of which will increase 3509 Yuan (Zhao, 1999). 90% of mobile population in the urban areas increases their annual income considerably, 8783 Yuan on average (Li, 2003). Based on above statistic data comparison, rural-to-urban labor force flow raised income inequality of rural China. The following work will prove this opinion by empirical evidence.

4 . Empirical Analysis

4.1 EconomicGrowth andInequality: 1978-2010

In this subsection, I would like to discuss the impact of economic growth on rural income inequality without taking the effect of rural-to-urban workforce flow into consideration due to data unavailability. Table 3 presents summary statistics of the above variables. This table provides the list of all the variables, means, standard deviations, minimum and maximum values. Economic growth increases 9.07% on average with maximum value of 13.67% and minimum value of 2.23%. Average rural income inequalityis 0.33 with max value of 0.43 and min value of 0.25. Taking both of the increasing trends into consideration, the following work will investigate whether economic growth impacts on rural income inequality or not. Besides, the decreasing trend of structure change and migration is also noticeable.

Concerning of estimation coefficient of equation (1) by GMM,I add control variable into the model gradually. After that, the goodness of fit becomes better, which demonstrate the variables

Table 3. Descriptive Statistics

Variable	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
perGDP	0.088444	0.090744	0.136742	0.023261	0.028111	33
Str	0.209923	0.197612	0.333888	0.10103	0.077531	33
Mig	0.685331	0.7149	0.8208	0.5005	0.094871	33
GINI	0.330727	0.3349	0.42535	0.2504	0.048107	33
Exp	0.187673	0.183268	0.315511	0.111519	0.051953	33
Edu	0.001188	0.000537	0.004706	8.71E-05	0.001365	33

used in the model are effective. AR (1) and AR (2) test can reject the null hypothesis of autocorrelation. The goodness of fit is up to 90.9%. Sargan test also accept the validity of instrumental variables. All of above tests show that the model is robust and the estimation coefficients are reliable. However, theresults are unreliable for unstable empirical model setting. The sign of economic growth changed from minus to plus when square term of economic growth includes in the model.

Instead, in order to get robust model, I add the square term of all the independent variable into equation (1). Estimatecoefficient presents in Table 4. After rejecting the insignificant variables gradually (model (1) to (4) in Table 4), I get a stable empirical model by adding two control variables ($\log Edu^2$ and$\log Exp^2$) into equation (1). Model (4) in Table 5 displays estimation results of stable model. In model (4), residual diagnose shows that Jarque-Bera value is 0.42 with probability of 0.81, which accept the null hypothesis of normal distribution of error term. AR (2) test of disturbancealso rejects autocorrelation of order (2). Significance test of regression equation also rejects null hypothesis at the significant level of 1% ($F=104.66>F_{0.1}(8, 24)=3.36$). Above tests demonstrate empirical model is stable and the results in model (4) are robust. It can be concludedthat economic growth, structural change, fiscal expenditure are significant negative impact on rural income inequality, while other variables including migration, and educational input show a significant positive relationship with rural income inequality.

The negative coefficient of economic growth illustrates that economic growth will decrease rural income inequality. In the long run, economic growth in China mainly relies on state-owned enterprises and urban development, which enlarged the disparity between rural and urban sector. Meantime, the eastern part of Chinathat owns a comparative advantage in producing consumers and industrial goods is prior to develop, which also raised the regional unbalance. In recent years, economic growth begins to slow down and bubble economy exists in real estate industry. In order to solve above problems, central government began to find a new way to keep high growth of China. New policies are trying to givepriority to small cities and towns in accelerating urbanizationin order to increase the income of rural residents and decrease the disparity

Table 4. Estimation coefficients

Dependent variable: log*GINI* Method: GMM Estimation				
Variable	Model (1)	Model (2)	Model (3)	Model (4)
logperGDP	-0.065 (-1.488)	-0.049 (-1.418)	-0.070* (-1.881)	-0.051*** (-6.885)
logperGDP^2	-0.002 (-0.323)	0.001 (0.092)	-0.003 (-0.511)	
logStr	-0.617 (-1.504)	-0.643*** (-10.442)	-0.611*** (-8.553)	-0.456*** (-11.681)
logStr^2	0.013 (0.102)			
logMig	1.717*** (4.261)	1.626** (2.855)	1.117*** (4.703)	0.835*** (4.357)
logMig^2	0.543 (1.216)	0.537 (0.833)		
logEdu	0.615*** (3.273)	0.627** (2.492)	0.761*** (9.609)	0.083*** (8.928)
logEdu^2	0.042*** (3.255)	0.043** (2.458)	0.052*** (8.974)	0.051*** (7.975)
logExp	-2.128*** (-7.276)	-2.137*** (-7.263)	-2.133*** (-6.462)	-2.164*** (-6.690)
logExp^2	-0.576*** (-7.822)	-0.578*** (-7.599)	-0.576*** (-6.812)	-0.584*** (-6.700)
constant	-1.436** (-2.885)	-1.441** (-2.202)	-1.044*** (-4.383)	-1.130*** (-3.686)
Adj-R^2	0.951	0.954	0.956	0.958
Sargan test	7.248	7.241	6.465	6.396
AR(1) test (p-value)	0.019**	0.018**	0.030**	0.026**
AR(2) test (p-value)	0.983	0.997	0.764	0.844

Note: "*, **, ***" denote the level of significance at 10%, 5%, 1%, respectively.t statisticsare in parentheses. The instrument specification of GMM in each model is the lag values of one period of each variable except log*perGDP* lag (1, 5).

between urban and rural sectors. Political and economic resources also tend to central and western areas to balance uneven regional development. In the same time, farmers' burdens are reduced such as exempting from the agricultural taxation and subsidy to farmland. Policy makers also hope that new policies can change the situation of weak consumption because of high saving rate of rural residents. As it turned out, economic growth on the basis of small towns and

rural development has an effective impact on rural income distribution, which is good for decrease rural income inequality. However, this kind of conclusion maybe a short term phenomenonsince China does fit the Kuznets's Hypothesis in current stage. Chinese situation is quite different from many other countries such as huge population, gradual economic system approach and a dual pricesystem. For these reasons, the economic development path may be quite different from others. Up to thismoment, it still cannot be assured whether the "Kuznets Curve" will go down or continue togo up in the near future (Chan and Kulkarni, 2006). However, if rural income inequality keeps on getting more and more serious, it is bad to thesocial stability as well as the development of economic growth.

The share of production of primary industry to GDP is decreasing to 10.10% in 2010 from 33.39% in 1978, while rural population takes the proportion of 50.05% to total population in 2010. There are two main reason caused rural income inequality. One is location disparity. Rural residents in flat farming landslocation such as north of China have promoted agricultural-productivity relying on mechanize farming. Otherframers, more than half, live in mountain areas have to engage in agricultural production by traditionalway. Income of farmers in flat areas is relative higher than mountain areas. The other reason is inequality of the per capita land. For the family who own more lands, their poverty is from the land they own, since they are bound by land and income source is only from agriculture. For the people with low per capita land, labor forces are released. They can spend several months to work outside and go back in the busy sowing and harvestseason, or even rent land to other person and make money to live in the cities. Hence, the development of agriculture will improve the income of farmers to reduce rural income inequality.

Migration is a central topic at current stagedue to high speed urbanization process. Urbanization as a new growth engines connects industry with rural development in order to balance economic growth of rural and urban sectors. Rural population decreases from 82.08% in 1978 to 50.05% in 2010. Undoubtedly, the status changing from rural to urban will benefit from social security, medical care, and educational resources and so on. For rural residents, if possible, it is a prior choice to take part in urban sectors. Reducing rural populationdue to urbanization releases a large amount of farming land and causes shortage of rural labor force. As my knowledge of my hometown, the wage of rural labor force increase from 40 Yuan per day in 2003 to 150 Yuan per day in 2011. With high cost of agricultural production, the raising price of agricultural products will increase the income of rural residents who mainly rely on agricultur-alactivity. That is, rural residents benefit from urbanization policy. Migration increases the income of the poor of rural residents. Therefore, this is a significant relationship between rural income inequality and migration.

Educational input is supposed to be negative link with rural income inequality. However, this

study shows a significant positive relationship. By explaining this disparity, special *"hukou"* system of China should be taken into consideration. When rural students go to college, most of their status also changed to urban status. After graduation, they usually will work in the city and their incomes belong to urban income class. Besides, the proportion of college students with rural status takes a small account in the whole graduation. In this aspect, educational input enlarges rural income inequality since excellent people who exhaust rural resources flow out to rural areas with nothing contribution to rural department. In the other hand, uneven educational resource distribution make educational input is not enough to have an effect on rural income inequality. Rural students are more difficult to go to college with respect to backwardness of teaching resource, soft and hard ware of educational condition and low income of the families. Most of the students have to leave school after junior high school, even better senior high school. If more educational resources input to rural areas, education will decrease rural income inequality by higher educational return.

Fiscal expenditure is always the main engine of economic growth. Increase in government expenditure on socio-economic and physical infrastructures encourages economic growth. For example,fiscal expenditure on health and education raises the productivity of labor and increase the growth of nationaloutput. Similarly, expenditure on infrastructure such aspower, communications,roads, and so on, reduces production costs,increases private sector investment and profitability of firms, thus fostering economic growth. Further, economic growth reduces rural income inequality. If fiscal expendituregives more prior to rural development, it will be an effective instrument to narrow rural income gap.

Overall speaking, economic growth and structural change will decrease rural income inequality, while other factors will have a contrary impact on income gap of rural areas. Chinese government should implementappropriate policy to induce economic growth and balance development in order to reduce rural income inequality.

4.2 Rural-to-urban Labor Flow and Inequality: 1998-2010

The following work will study the impact of economic growth on rural income inequality including the effect of rural-to-urban workforce flow. Table5 presents summary statistics of the above variables. This table provides the list of all the variables, means, standard deviations, minimum and maximum values. Economic growth increases 12.7% on average with maximum value of 22.23% and minimum value of 5.34%. Average rural income inequalityis 0.39 with max value of 0.43 and min value of 0.36. The scale of intro-province mobile population is larger than inter-province caused by uneven regional development of China.

Table 6 and 7 report the estimate coefficients of economic growth impact on rural income inequality with inter and intro province mobile population. In Table 6, I estimated the whole

Table 5. Descriptive Statistics

Variable	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
GINI	0.386561	0.38377	0.42535	0.3599	0.017914	13
perGDP	0.092038	0.090744	0.135677	0.06692	0.020082	13
Edu	0.030288	0.030651	0.03433	0.025525	0.002902	13
Exp	0.181169	0.183268	0.224012	0.127937	0.026754	13
Inter_p	0.017356	0.017016	0.027919	0.010772	0.005478	13
Intro_p	0.035233	0.034523	0.062318	0.014262	0.01547	13
Str	0.129683	0.127974	0.17556	0.10103	0.024097	13
Mig	0.583159	0.5824	0.6665	0.5005	0.053111	13

sample and found structural change is insignificant in model (1). In order to get more reliable results, Iestimated again without educational input and fiscal expenditure in model (2). Economic growth and structural change show a significant positive link with rural income inequality, while the coefficients of migration and intro-province mobile population are contrary. In table 7, empirical model excludes structural change since the coefficient of which is insignificant. The results in model (2) show that all the variables are of benefit to decrease rural income inequality except intro-province mobile population and structural Change.

Table 6. Estimation coefficients with inter-province mobile population

	Model (1)		Model (2)	
Variable	Estimate	t-ratio	Estimate	t-ratio
logperGDP	-0.446*	-9.218	-0.254*	-2.574
logInter_p	7.112*	8.865	6.860**	4.829
logMig	27.976*	8.865	27.686**	4.734
logStr	-3.006*	-8.690	-3.003**	-4.700
logEdu	-0.162	-4.617		
logExp	-0.509	-5.071		
constant	36.208*	8.346	36.221**	4.641
$Adj\text{-}R^2$	0.914		0.509	
Sargan test	1.400		2.795	

Note: "*, **, ***" denote the level of significance at 10%, 5%, 1%, respectively. t statistics are in parentheses. The instrument specification of GMM is the lag values of log*Str* (-1), log*Mig* (-1), log*Edu* (-1), log*Inter_p*(-1), log*Exp*(-1), log*perGDP* lag (1, 3), log*GINI* lag (1, 3), and constant.

Empirical evidence shows that economic growth will decrease rural income inequality in China. Both inter and intro province mobile population increase income gap of rural China. Compara-

tively, the effect of inter-province mobile population on rural income inequality is bigger (6.860) than that of intro-province mobile population (1.053). Two aspects can be interpreted as the main reason of the results. One is that intro-province mobility definitely improves the income of a large scale of population from poor provinces such as Sichuan, Yunnan and so on, which decreases the number of population in low income class. The top income class also becomes richer. The other reason is that flow distance has great impact on rural-to-urban mobile cost and integration into the city society. Long distance moving undoubtedly increases flow and life cost in a strange society, which causes relative high income but low net income. Henceforth, intro-province mobile population impact on rural income inequality is lower.

Table 7. Estimation coefficients with intro-province mobile population

	Model (1)		Model (2)	
Variable	Estimate	t-ratio	Estimate	t-ratio
logperGDP	-0.258**	-16.444	-0.270***	-19.202
logEdu	-0.256**	-14.207	-0.251***	-12.263
logExp	-0.506*	-9.132	-0.569**	-6.669
logMig	3.385**	18.356	3.202***	21.283
logIntro_p	1.058**	22.671	1.053***	60.389
logStr	-0.044	-1.262		
constant	2.910*	12.954		
Adj-R^2	0.976		0.982	
Sargan test	1.324		1.829	

Note: "*, **, ***" denote the level of significance at 10%, 5%, 1%, respectively. t statistics are in parentheses. The instrument specification of GMM is the lag values of log*Str* (-1), log*Mig* (-1), log*Edu* (-1), log*Intro_p*(-1), log*Exp*(-1), log*perGDP* lag (1, 3), log*GINI* lag (1, 3), and constant.

4.3 Comparison

The results of two sample period display some differences when rural-to-urban labor force flow is taking into consideration (see Table 8). The sign of economic growth and migration is consistent. It can be conclude that economic growth will decrease rural income inequality, while migration will raise rural income inequality.

In Table 6, the effect of educational input and fiscal expenditure on rural income inequality becomes insignificant. Structural change is significant negative link with inequality, which demonstrates agriculturaldevelopment will reduce rural income gap. Most famers deny to do farm work due to "price scissors" of industry and agriculture sector, i.e. high cost of farming and low income of grains. Bad infrastructure of rural areas is also a problem to compel rural residents choosing far from farming. According to my investigation in Yunnan, most of the rural

resident would like to go back to hometown and engage in farming production. According to sampling survey of Zheng (1999) in Guangdong Province, only 23.0% of intro-province respondents want to stay in Guangdong, while 52.8% would like to go back to their hometown.

Table 8. The sign of variables comparison

	Table4	Table6	Table7
Variable	Whole Sample	Including *logInter_p*	Including *logIntro_p*
logperGDP	−	−	−
logEdu	+		−
logExp	−		−
logStr	−	−	
logMig	+	+	+
logInter_p		+	
logIntro_p			+

In Table 7, the coefficient of structural change is insignificant. Educational input shows anegative relationship with inequality including the effect of intro-province mobility, which is contrary as Table 4. This kind of difference should be attributed to the specialty of intro-provincemobile population, that is, the appearance of migration groups with families. According to sampling survey of 2010 by National Population and Family Planning Commission, core family migrations together with their spouses have been taken the proportion of 56.2% to mobile population.

Families' mobility changed the distribution of educational resources of urban sectors. In the educational input aspect, children of mobile families are able to share better urban educational resources to improve educational level in order to get better job opportunity in the future. Most of the rural migrant labors called the second-class citizen are low educational level. Thus, the rural migrant labors have strong desire to change their children'future through education, even though tuition in urban sector is much higher than rural sector. In this respect, a large part of rural residents can benefit from educational input in urban sector, further to reduce rural income inequality. However, the drop-off rate of mobile children reached at 0.82% of intro-province mobility and 0.83%of inter-province mobilityaccording to the second countrywide agriculture general investigation in 2006, since these children who are non-native *hukou* students have to pay for a big amount of extra-fees such as school selection fee, transient students' fee, a clothing allowance and so on.

Fiscal expenditure plays a significant role in economic growth in China, especially, the development of urban sectors. A large number of rural residents who move to work in the urban sectors

more or less enjoy the benefit from economic growth promoted by fiscal expenditure. Therefore, when rural-to-urban labor force flow as a control variable is included into the model, fiscal expenditure show a negative relationship with rural income inequality. That is, increasing fiscal expenditure will reduce rural income inequality.

5 . Conclusion and Policy Implications

The topic of how economic growth empirically affects rural income inequality has been largely unexplored despite obvious equity and policy implications. Especially, the situation becomes more complicated in Chinese case. In order to address this issue, this paper employs employ time series for the period from 1978 to 2010 to empirically investigate the impact of economic performance on rural income inequality in China. It can be conclude that economic growth, structural change, fiscal expenditure are significant negative impact on rural income inequality, which other variables including migration, and educational input show a significant positive relationship with rural income inequality.

With distinguishing intro and inter province labor flow,the effect of rural-to-urban labor flow on rural income gap is also taken into consideration, since there is significant disparity in occupation, income and social security between inter and intro-province mobile population. Empirical study shows that both inter and intro province mobile population increase income gap of rural China. Comparatively, the effect of inter-province mobile population on rural income inequality is bigger (6.860) than that of intro-province mobile population (1.053).

The policy implications of this study direct two dimensions. First of all,transforming economic developing mode is inevitable. Government decision should give more prior to rural development. After economic reform in 1978, the development of theurban areas has been quite satisfactory, while the rural areas have just been verylimitedly developed. If the central government can put more resources to develop these areas, such as fiscal expenditure budget, educational resources, agricultural policies, and so on, income inequality will certainly begreatly alleviated,since about 70% of Chinese population are living in theseinterior parts. Besides, the process of urbanization, which turned to be negatively link with rural income inequality, should be accelerated prudently. In the other hand, it is necessary to deepen the reform of Country Census Register System (*hukou* system). "*hukou*" system differentiates the agricultural and the non-agricultural registered permanent residence strictly, resulting in the forming of intersected structure of town and country and large scale of "floating people". "*hukou*" system reform would break urban-rural division and promote balanced economic growth between rural and urban sectors.

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