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Name of Author	Sonariddh Mao and Tingru Wei
Name of University	Monash University
Country of Study	Australia
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The Impact of Total Factor Productivity and Gross Domestic Product on Income Disparity and Consumption Pattern: The Case Study in China

SONARIDDH MAO (21786399)
TINGRU WEI (22314717)

Abstract

The aim of this paper is to quantitatively answer the relationship of economic growth and income disparity in China. The issue of this macroeconomic factor can be traced back to the history of economic thought origin, therefore, the underlying understanding of the interaction of these two macroeconomic factors can enhance the crucial framework process in the development of developing countries and developed countries. The primary finding of this paper is the identification of the sing of the relationship between the rate of economic growth and the rate of income disparity using time-series model utilizing national and provincial data. The secondary finding of the paper is the identification of the relationship between the rate of consumption disparity between two Chinese provinces, comparing drastic economic performances and characteristics quantitatively. This paper identifies a general positive connection between growth of economic growth, proxy by Gross Domestic Product, and the rate of income disparity, proxy by the rate of national Gini Coefficient. The finding concludes inverse relationship between Total Factor Productivity and income disparity due to the characteristic of rapid urbanization component of the TFP. Secondary finding also identifies positive connection between rate of consumption of rural and urban cohorts, and the rate of provincial GDP and the rate of national average year of schooling. The inverted relation of developed and developing provinces can be used to answer the paradoxical relationship of urban and rural cohort during and after the development process, hence this understanding gives a depiction of the law of marginal decreasing return .The overall findings are supported by the past literature review even though this paper uses a model that utilizes the most contemporary time data.

1. Introduction

The general consensus on the positive effect of economic growth and the consequential impact of growth on income disparity and consumption pattern are thoroughly defined and explored in academia. The aim of this paper is to explore the level of economic differences in term of the impact

of economic growth on income disparity in application emphasizing developing countries. The initial point of the paper is to construct a two-stage process: firstly, calculating the total factor productivity (TFP) at the national level in China, and secondly, to integrate the TFP into a time-series model and relates it to the disparity in income and consumption pattern at provincial level. The focus of this paper is directly related to the exponential growth in China and to explore the diverse positive effects that China had achieved with such immense growth, reflected by the calculation of the national Total Factor Productivity (TFP) and utilizing the rate of GDP. The paper will further utilize the calculated TFP or Gross Domestic Product growth rate to realize the income disparity reflected by the changes in Gini coefficients as a relevant measurement of change in income and growth. The Chinese provinces that are used in this paper are Qinghai and Guangdong. The characteristics of the provinces differ greatly in the level of economic growth and consumption pattern across the rural and urban cohorts as well as across time.

2. Literature Review

China, in the last thirty years, has redefined a new term of real economic growth with average annual gain rate of 9% in real GDP (Khin, 2010). The poverty level has greatly reduced from 250 million people in 1978 to 37 million people in 1999. Furthermore, life expectancy at birth roses to 70.3 years and the adult illiteracy rate significantly drops to only 15.9% in 2000 from 34.5% in 1980 (Biggeri, 2003). This major growth is influenced by many restructurings and reforms in the market system and financial institutions commenced by Deng Xiao Ping's economic reform since 1978, which leads to significant improvements across all sectors in the Chinese economy (Khin, 2010; Sachs & Wing Thye, 2000). To be more precise, before 1978, China had a centrally planned economy and market, thus the China assumes the characteristics of extremely low productivity, widespread poverty, and more importantly, very low inequality at that time.

However, China has seen drastic changes in the last three decades, accompanied by remarkable rate of economic growth and reform in welfare and wellbeing of the population. It is important to bear in mind that China, at the same time, witnesses a dramatic increase in economics inequality as well. The uneven economic growth characterized by the emergence of severe income disparity across regional cohorts should also be emphasized. There is a vast literature on the relationships between economic development and economic inequality. Economists usually use Gini coefficient as an indicator to show the equity level of the distribution of wealth. The measurement is standardized to range between 0 and 1, where 0 means complete equitable distribution of income and 1 means complete inequitable distribution of income (Hindriks & Myles, 2006).

Guo (2009) points out that, the rural areas display a moderate inequitable distribution of income in 1952, with the Gini coefficient of 0.23. The trend of rural inequity has drastically increased since. The Gini coefficient reaches 0.37 in 2007 compared to 0.23 in 1952, thus this change indicates that the disparity in income has greatly deviated in the rural cohorts. In contrast, the urban Gini coefficient is vastly smaller than that of the rural in 1950s, however, its rising trend has exceeded the rural cohort in 2007, whereas urban Gini coefficient is technically at 0.4. So Guo (2009) states that there is income disparity in both regional cohorts, however, real income for urban is larger than that of rural cohorts, hence there the rising trend is lower. The overall measurement of China, as a whole, is at 0.496, which implies that the disparity of distribution in wealth is extremely high, while forecasters expect it to be on a rising trend in the future. Ravallion and Chen (2007) use Rural Household Surveys (RHS) and the Urban Household Surveys (UHS) from China's National Bureau of Statistics (NBS) to construct the Gini index (Ravallion & Chen, 2007). Both rural and urban Gini coefficient has had increased gradually, with the rural figures exhibit significantly higher disparity than that of urban figures in 1980. Equivalently, inequity in rural cohort is not significantly larger than urban cohort in the recent date (Guo, 2009; Ravallion & Chen, 2007). Nationwide inequity, as expected, is much larger than the figure in either rural or urban areas.

Ravallion and Chen (2007) use the Rural Household Surveys (RHS) and the Urban Household Surveys (UHS) from China's National Bureau of Statistics (NBS) to conduct their work. The outcome concluded in their works proves that, over those years, all the Gini coefficients increased by 4-percentage point in the urban cohort, while 2-percentage points in the rural cohort, and 3-percentage points in the national case; their estimate of the national Gini in 2001 was 45% or 0.45. They use income difference between rural and urban areas to demonstrate the income disparity within all selected cohorts. They provide an intuitive concept by illustrating the disparity chart using income difference between rural and urban cohorts in relative and absolute term. Relative inequality (the ratio of urban mean income to rural mean income) increases from 1980 to 2000 thus there is a clear overall increasing trend in the ratio even after the adjustments are created for the cost-of-living difference (Ravallion & Chen, 2007).

How can uneven growth and disparity be explained? First of all, during China's transition from a fully planned collective economy to a market-oriented economy, structural and institutional reforms engage important roles in the pace of the economic development. There are a vast number of policies favour the Special Economic Zones (SEZs) and coastal regions, in addition to geographical advantage like coastal regions, those areas enjoys special government subsidies and policies that welcome foreign direct investment (FDI). It is important to underline that FDI not only enables direct gains including inflow of foreign capital assets, access to advanced technologies, remarkable progress in R&D capabilities, but also indirectly provides positive simulative such as introduction of efficient management, labour specializations, and improved international distribution networks (Gang & Ruifang, 2007; Ping, et al., 2010; Wei & Xiaohui, 2009). Another probable source that may create deep impacts on the income disparity can be partly explained by the rural taxation system and the procurement system. The tax system directly taxes agricultural output after procurement, which create heavy burden on the rural cohort thus reduce the amount of consumption, labour, and ultimately, the growth of rural agriculturalists (Tao, 2002). Also, the policy of "price scissors" kept

down the price of food in relation to manufactures. Conclusively, the peasants paid indirectly for the urban industrialization. Part of the investable surplus was diverted to enable urban workers to enjoy a higher standard of living than their rural counterparts (Knight et al., 2006).

3. Methodology

The method that will be utilized in this paper is a two-stage process that firstly utilizes the construction of Total Factor Productivity (TFP) and secondly integrates the calculated TFP into a time-series model to regress against Gini coefficient as a proxy of income disparity. The robustness of the model allows a further emphasis on the exploration of changes in consumption pattern by the changes in the growth of provincial Gross Domestic Product, as TFP is not a suitable indicator of consumption pattern, hence the disparity between provinces are not only captured by the income disparity but the changes in consumption of food pattern as well. The technical aim of this model is to capture the magnitude and correlation between economic growth and income disparity at both national and provincial state as well as the correlation of changes in controlled provincial GDP with provincial consumption pattern. The provincial cohorts that will be conducted are two drastically different provinces in term of urbanization and decentralization: Qinghai and Guangdong. The method aims to capture the differences in magnitude whether a province had experienced decentralization and rapid urbanization.

3.1 Data

1978-2010 National macroeconomics data of China are obtained from Word Development Indicator (WDI) from the World Bank database and the 2005 urban and rural household survey from Chinese Bureau of Statistics database. 1978-2010 Provincial data of Qinghai and Guangdong are obtained from the Chinese Bureau of Statistic database and the Chinese Marketing Association. 1984-2010 Provincial GDP and consumption level are obtained from the National Bureau of Statistics. The 1978-2006 national Gini coefficients are obtained from the University of Manchester as computed by

Chen et al (2010). 1978-2010 data for average years of schooling are obtained from the Barro-Lee dataset from Harvard University database. The paper utilizes two sets of data: national data set and provincial data set. Two sets of data are included in order to avoid confusion due to close resemblance of each macroeconomic variable such as national or provincial GDP. Furthermore, this time-series model used the most contemporary time-data that could be obtained momentarily thus allowing for more updated effect that previous literatures were not able to access before.

Table.1 Descriptive Statistic

Macroeconomic Variables	Mean	Standard Deviation	Maximum	Minimum
Gross Domestic Product (billion)	1246.344	1491.059	5878.63	148.18
GDP Growth (%)	0.099	0.028	0.152	0.038
Labour Force (million)	780	121	958	554
National Gini Coefficient (0-1)	0.386	0.067	0.496	0.283
National Average Years of Schooling (years)	5.144	0.894	6.315	3.53
Provincial GDP[1] (million)	12128.699	13263.967	45472.83	458.74
Provincial GDP[2] (million)	331.357	357.919	1350.43	26.42
Rural Consumption[1] (Yuan)	1134.865	665.282	2425.6	205.5
Urban Consumption[1](Yuan)	2728.012	1659.726	6225.2	473.3
Rural Consumption[2] (Yuan)	584.988	323.019	1220	141.2
Urban Consumption[2] (Yuan)	1488.55	903.849	3548.9	299.1

*1 Quangdong *2 Qinghai

3.2 Model

(1) $LnY_t = \beta_0 + \sum\beta_1 LnTFP_t + \varepsilon$

Y is the natural logarithm of Gini coefficient at period t (Gini coefficient is a proxy income disparity), which indicates the growth of disparity in income across time. LnTFP is the natural logarithm of Total Factor Productivity at period t, which indicates the growth rate in the performance of the

economy in term of provincial and national capital and human resource investment and accumulation across time. β_i is the fixed effect of each predictor variables.

3.3 Total Factor Productivity (TFP)

The paper will follow the perpetual inventory method in order to compute the TFP of china. Data that are needed include constant GDP, GDP growth rate, total population, labour force proportion to population, average year of schooling, human capital, Gross fixed capital formation, and the export as percentage of GDP, etc (Bosworth & Collin, 2003). TFP is a measurement of labour and human capital and it is computed by subtracting the growth rate of physical capital labour per worker from the growth rate of gross domestic product per worker (Miller, 2011).

$$TFP_t = \frac{y_t - y_{t-1}}{y_{t-1}} - 0.35 \cdot \frac{k_t - k_{t-1}}{k_{t-1}} - 0.65 \cdot \frac{h_t - h_{t-1}}{h_{t-1}} = \Delta y_t - 0.35 \cdot \Delta k_t - 0.65 \cdot \Delta h_t$$

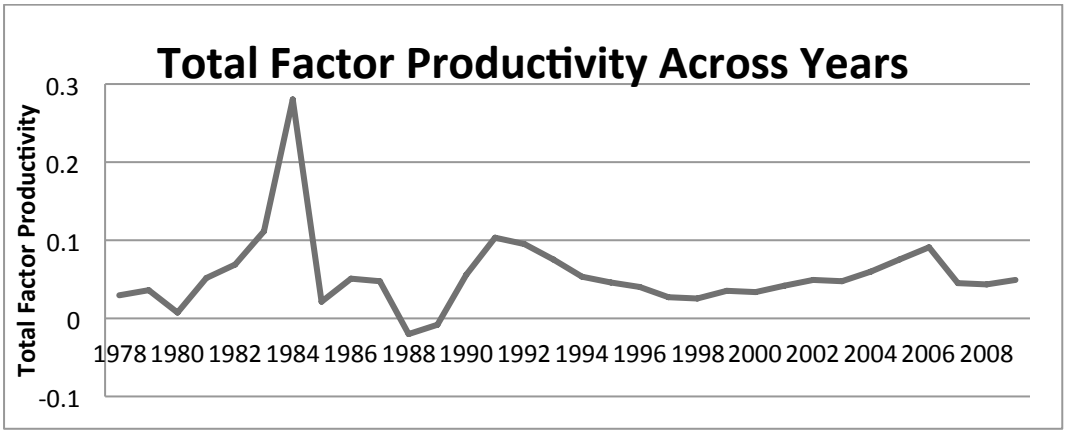
Y = GDP growth rate. *h* = Human Capital per Worker growth rate. *k* = Physical Capital per Worker Growth rate

Table.2 Descriptive Statistic and TFP (the construction of TFP is included in the data file)

Variables	Mean	Maximum	Minimum
Exports of goods and services (constant LCU)	2.71279E+12	1.17785E+13	3.10303E+11
Exports of goods and services (% of GDP)	20.2710658	39.13381303	6.603506083
GDP (constant LCU)	1.01271E+12	3.24307E+12	1.57718E+11
Population ages 15-64 (% of total)	73.8969697	76	69.1
Population, total	1172299682	1338299512	956165000
Labour force Population 15-64	780868748.7	958222450.2	554445199.3
GDP per worker	1177.002276	3384.46312	284.4615861
GDP per worker growth rate	0.046228349	0.13021659	0.020013748
Average years of schooling	5.144393939	6.315	3.53
Human capital	1208108480	1469010493	894017839.4

Human capital per worker	1.569	2.074	1.324
human capital per worker growth rate	1.569135689	0.014721579	-0.30794327
GDP Growth	0.099437352	0.152	0.038
Gross fixed capital formation (constant LCU)	3.03723E+12	1.09974E+13	3.93946E+11
capital stock	1.64684E+13	5.75424E+13	2.32502E+12
capital stock per worker	19016.913	60051.195	4193.422
capital stock per worker growth rate	0.087	0.131	0.045
TFP	0.033	0.280	-0.020

Figure.1



There is a steady average growth of 3% through out mid-1990s to early 2000s. The TFP peaked around early 1980 due to the open and reform policies taking effect in addition to massive foreign direct investment (Li, 2009).The TFP is constructed because it is a variable that captures most of the output with no attributions to the input as well as unobserved inputs (Bosworth & Collins, 2003).

3.4 Income disparity

(2) $LnY_t=\beta_0+\alpha_t + \beta_1 LnTFP_{it} + \beta_2 LnAYS_t + \varepsilon_t$

(3) $LnY_t=\beta_0+ \beta_1 LnGDP_t + \beta_2 LnAYS_t + \beta_2 LnLBS_{it} + \varepsilon_t$

Y represents the rate of Gini coefficient in which is a proxy for the national income disparity at cohort i and time t. α represents the fixed effect of yearly binary variables that are used to correct time-series autocorrelation problem at time t and cohort i.LnTFP represents growth rate of the measurement of human and physical capital at time t (proxy for economic growth) and cohort i. LnGDP is the growth rate of GDP in which represents the performance of the national economy in China at time t and cohort i. LnAYS represents the rate of average years of national schooling thus representing the level of basic human development at time t and cohort i. I = urban or rural cohort

3.5 Consumption pattern

(4) $LnY_t=\beta_0 + \beta_1 LnGDP_t + \beta_2 AYS_t + \varepsilon_t$

LnY represents the provincial consumption rate of food at time t and cohort i. LnGDP represent the growth rate of provincial gross domestic product at time t. LnAYS represents the rate of average years of national schooling at cohort i and time t.

4. Results and Findings

4.1 TFP

Table.3

Variables	(1)LnGIni	LnGINI	(2)LnGINI
Constant	-0.416(0.0732)***	-1.119(0.0564)***	-1.271(0.148)***
LnTFP	-0.002(0.055)	-0.033(0.019)*	0.040(0.027)
LnAYS		0.933(0.06)***	0.747(0.196)***
D82			-0.077(0.045)**
D85			-0.120(0.026)**
D91			-0.068(0.015)**
D95			-0.009(0.0145)*
D00			-0.015(0.014)

D05			-0.0626(0.0151)*
+			
	R^2=0%	R^2=89%	R^2=96%
	*Significant at 10% level	**Significant at 5% level	***significant at 1% level

[+]There are more yearly fixed variables (provided in statistical summary)

From table.3, the variables regressed against LnGini indicate a mixed of magnitude toward rate of national income disparity. In column 1, (Ceteris Paribus) if there an additional percentage increase in TFP there will be a decrease if 0.002% in the Gini coefficient, however, this is inconclusive due to that fact that it is not statistically significant but it may be economically significant. To add more robustness into the model, more variables are added in column 2 with controlled variable of rate of national average year of schooling. For one percentage increase in the rate of national total factor there will be a decrease of 0.033% in the rate of income disparity. The magnitude of the TFP variable becomes economically and statistically significant at 10% level of significance while controlled for average year of schooling. LnAYS indicates that one percentage increase in average year of national schooling lead to an increase of 0.933% in the rate of national income disparity. It is significant to note that if a person obtained higher addition year of education then that person tend to earn higher income thus increasing the poverty gap. Furthermore, even if an addition year of schooling does not contribute significantly to productivity, but it is still regarded as a competitive advantage when taking two potentially identical employees that only allowed for changes in year of education (Jacob, 1985).This factor can be proven by that fact that the variable is statistically significant at 1% level of significance. The nature of computation of TFP as a measurement of human and physical capital could include variables that might have inverse relationship with income disparity such as gross fixed capital formation (Total capital investment) and labour force population which can be seem to be proxy of urbanization, thus in accordance to Ahluwalia (1976), rapid urbanization may decrease

income disparity. We can see that rate of TFP become statistically significant at 10% level of significance but the most crucial variable is the average year of schooling in which capture more than 80% of variation in Gini coefficient. In column 3, we include fixed yearly binary variables to account for fixed effect of rate of Gini coefficients especially across the year after controlled for LnTFP and LnAYS. Ceteris Paribus, we can see that Gini coefficients continue to fluctuate even without controlled for TFG and AYS, thus there is some unobservable variable that needed to be controlled.

4.2 Income Disparity

Table.4

ariables	Log(Gini)	(3)Log(Gini)	(4)Log(Consumption) (Rural)[1]	(4)Log(Consumption) (urban)[1]	(4)Log(Consumption) (Rural)[2]	(4)Log(Consumptio (urban)[2]
onstant	-2.211(0.134)***	16.796(5.366)***	0.094(0.694)***	0.743(0.138)***	1.648(0.738)**	1.505(0.587)***
nGDP	0.194(0.021)***	0.173(0.038)***				
nAYS		1.808(-0.159)***	2.187(0.696)***	2.200(0.653)***	1.330(0.629)**	1.955(0.500)***
nLBS		-0.928(0.280)***				
nGDP[1]			0.353(0.013)***	0.375(0.057)***		
nGDP[2]					0.446(0.026)***	0.444(0.055)***
	R^2=79%	R^2=91%	R^2=97%	$R^{2=}$97%	R^2=96%	R^2=97%

*Significant at 10% level **Significant at 5% level ***significant at 1% level [1] Guangdong [2] Qinghai

The rate of TFP does not capture the magnitude of income disparity as effective as the paper would want to capture thus the rate of national Gross Domestic Product level will be used as a proxy of economic growth instead, while retaining for average year of schooling. In column 1, the coefficient

indicates that a one percentage increase in the rate of national GDP will lead to an increase of 0.194% in the rate of Gini coefficient. This factor directly specifies the direct relationship between the growths of GDP on the growth of income disparity as it is significant at 1% level of significant. So if the Chinese economy continues to grow at any given rate, model would predict that the gap in poverty will continue to widen at the national level (Du, Park, & Wang, 2005). In column 2, the table contains a model with more robustness with controlled for variables such rate of average years of national schooling, and the rate of labour force proportionate the population. For one percentage increase in the rate of national GDP there will be an increase of 0.173% in income disparity, while an additional percentage increase in the rate of average year of school will lead to an increase of 1.808% in income disparity. However, for an additional percentage increase in the rate of labour force will lead a decrease of 0.928% in income disparity. These variables are all statistically significant at 1% level of significance. Therefore, with increase of GDP rate and education rate at any given year would likely lead to a direct proportional impact on the income disparity because the urban cohorts could capture more benefit (Park & Wang, 2001), while an increase in labour force leads to a decrease in income disparity because of increasing jobs that lead to uniform wage thus decrease the marginal increase of income disparity. Ahluwalia (1976) states that rapid urbanization may lead to a decrease in income disparity because of increasing opportun4ities for the less fortunate, hence the rate of labour force proportion to total population increase over time could be counted as a proxy of urbanization then this factor is reasonable to explain the negative coefficient and the inverse relation of labour force and income disparity.

4.3 Provincial Consumption Disparity

In order to capture the provincial disparity, as well as the urban rural disparity within a province, we examine time data from two provinces: Guangdong[1] and Qinghai[2]. The reasons for choosing these

[1] Quangdong: http://www.china.org.cn/english/features/ProvinceView/167727.htm

two provinces are based on the massive difference in economic characteristics and performances between the two. Guangdong is one of the most vibrant provinces whose economic performance is excellent and can be treated as wealthy area. With the geographical advantage of being a coastal region, Guangdong, as one of special economic zones, experienced numerous advantageous policies that encourage foreign trade and foreign direct investment in order to accelerate the growth of the provincial economy as well as the national economy. Institution reforms such as decentralization, where reduction of central planning and exponential growth in privatization, under which entrepreneurs and employers has full responsibilities for their profits and losses. The entrepreneurship and effective privatization play an important role in Guangdong's economic transformation into the advanced market orientated economy. On the contrary, Qinghai is a typical poor and egalitarian province, located in the inner part of Chinese continent. Qinghai is lacking is economic activities and performances unlike Guangdong in all economic aspects such as industrialization and promotion of market economy.

From the column 3-6, the model concludes that economic growth has mostly likely positive impact on the consumption pattern thus indicates that amount of food consumption pattern has increased following the general pattern of economic growth. From the fixed effect of column 3, we can see that for one percentage increase in provincial GDP there is a correlated increase of 0.353% in the rate of consumption in the rural cohort of Guangdong, ceteris paribus. While an increase of one percentage in rate of provincial GDP will likely lead to an increase of 0.375% in the urban cohort of Guangdong, ceteris paribus. In Guangdong, as a province with high economic activity and high provincial and national revenue, we can see that an increase in GDP indicates higher welfare for rural area because intuitively, urban cohorts tend to have higher standard of living so an increase of a dollar value tend to have less impact on the rich in term of consumption.

[2] Qinghai : http://www.china.org.cn/e-xibu/2JI/3JI/qinghai/qing-ban.htm

As can be seen from Table 1, the average GDP in Guangdong is more than 36 times as much as that in Qinghai. Fig.2. and Fig.3 plot out the urban and rural household's consumption figure. It is notable that Guangdong's data (both urban and rural) is more than two folds as much as Qinghai's. Therefore, vast economic disparity exists between these two provinces thus incur different level of consumption rate. The divergence of trend between provincial rural and urban household consumption tends to become larger and larger in absolute value as the time goes by.

Figure.2. Guangdong Urban/Rural households per capital annual food consumption

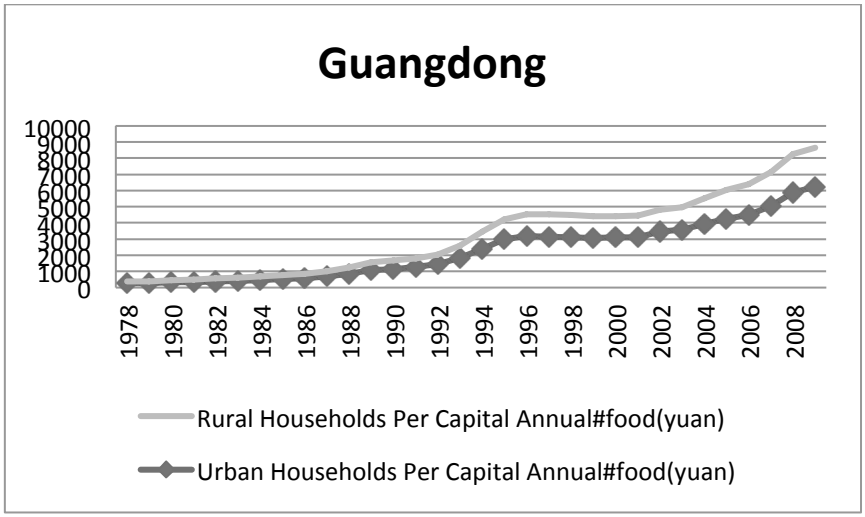
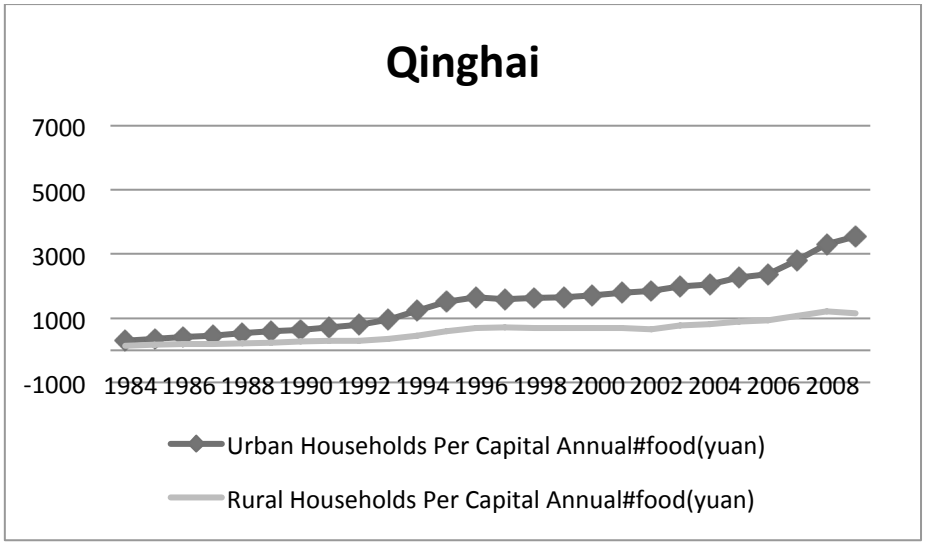


Figure.3. Qinghai Urban/Rural households per capital annual food consumption



Turn to the urban/rural data within one province. From column 3-6 of table 4, the model concludes that economic growth mostly likely positively impact on the consumption pattern, thus indicates that amount of food consumption pattern has increased following the general pattern of economic growth. To be more specific, from the fixed effect of column 3, we can see that for an additional percentage increase in Guangdong's provincial GDP there is a correlated increase of 0.353% in the consumption growth of rural cohort, ceteris paribus. While an increase of one percentage point in GDP will likely lead to an increase of 0.375% in the urban cohort of Guangdong, ceteris paribus. Similarly, significantly positive relation can be observed in Guangdong's data, that is rural and urban cohort consumption is positively related to the provincial GDP growth. However, Guangdong's GDP growth has a larger effect on its rural and urban consumption pattern. For an additional percentage increase in provincial GDP leads to 0.446% increase in food consumption for rural cohort and 0.444% for urban cohort respectively.

Furthermore, in Qinghai, the effect of provincial GDP growth on rural consumption (0.353%) is less than that on urban consumption (0.375%). But in Guangdong, it is an opposite situation, where rural area exhibits a higher influence by provincial GDP growth than urban area. One possible explanation

can be the marginal effect: as the consumption level gradually goes up and peaked at a given level of growth, the increase of additional consumption growth will grow at a decreasing rate. We can look at Kuznet's curve hypothesis, where the consumption growth rate of cohort peaks thus contributing a growth at marginal decreasing returns (Kuznet, 1955). Intuitively, an additional increase dollar (RMB) value tend to have less impact on the rich in terms of consumption, because the urban cohorts already possess high consumption level in term of living standard as the consumption peaked at a given point (Kuznet, 1955). In Guangdong, as a province with high economic activity and high provincial and national revenue, urban cohorts tend to have higher standard of living and their level of consumption is high enough to content. That is why we can see that one percentage point growth in GDP indicates less increase for urban cohort.

Rate of national average years of schooling variables were included to emphasize the importance of education and income disparity at provincial level as well as individual level. In column 3-6, all the coefficient of rate of national average year are highly significant at 1% and 5% level of significant. In Guangdong, an addition percentage increase in rate of national year of schooling leads an increase of 2.187% and 2.2% in the consumption rate of the rural and urban cohort, respectively. While an addition percentage increase in rate of national average year of schooling lead to an increase of 1.33% and 1.955% in the rate of consumption of the rural and urban cohorts, respectively. Intuitively, the model predict that an individual with higher education tends to earn more thus widening the poverty gap. However, the increase rate of national average year in schooling in Qinghai seem to contain less increment consumption per both urban and rural, however, the constants of both models suggest a much higher magnitude than Guangdong. This may refers to a higher increase in the marginal rate of consumption due to current low level of consumption rate as Guangdong might have peaked and reached a decreasing marginal return (Kuznet, 1955). Guangdong tends to have better rate of consumption turnover that may be due to the ability to be able to adsorb more skilled workers than Qinghai as more employment opportunities are available (Lindert & Williamson, 1985)

4.4 Constraints

The time-series model is a generalized model that use aggregated national data thus it is not capable to capture the effect of each particular variable in detail. So the model will generalize the effect, therefore allow us to capture the aggregated effect, however, it unable to show the individual effect. The aggregate effect will display the general pattern in which specify the overview of the aggregate effect of growth in economy on income disparity and consumption pattern. Another factor that displays weaknesses in this model is the inability to effectively segregate the migration of rural to urban cohorts thus selection bias might be becoming a problematic factor. The model is most likely susceptible to multicollinearity due to close interactions between each economic variable and thus the fluctuation of the whole economy tends to have uniform effect to all the economic predictor variables as well the construction of the data that were taken as they are. Income disparity level of growth rate testing with time-series modelling with panel data at individual level or additional countries should be explored in consequent and future paper.

The time-series model with time-data that utilized in this paper at provincial level are susceptible to generalized effect as well, thus the output should be interpreted with the highest attention and care. Time constraint and limited quantitative skills are major hindrances in the construction of this term paper. Many technical problems that were encountered were simply included due to lack of econometric knowledge to effectively weighted and correct for the errors. The problems were emphasized due to short-term time frame for both researching and the construction of the model on top of other additional academic responsibilities.

5. Conclusion

The time-series model with rate of GDP that was utilized in the paper supports the general consensus that economic growth (GDP) has direct proportional impact on the rate of income disparity at both national level as well as provincial level. From the computation of TFP and the time-series

regression toward Gini coefficient, we can see that the gap between the development of physical and gross domestic product per worker may have marginal inverse relationship between income disparities, however, the growth of GDP has a much more significant effect on the income disparity as the national and provincial GDP has more influences on the consumption pattern and the Gini coefficient. In conclusion for any percentage increase in GDP will likely lead to a increase of income disparity. By comparing Guangdong and Qinghai's statistics, the two provinces with greatly significantly different economic and institutional characteristics, we find that the mean GDP level difference is as high as 36 times, and this difference is diverging year by year. Therefore, there is disparity between these two provinces. Moreover, within one province, it is clear that disparity still exist between the rural cohorts and urban cohorts, with urban annual food consumption is more than 2 time than rural consumption in Guangdong and Qinghai. Looking deep into the provincial data, again, the within province disparity of rural and urban regions is in an increasing trend as years go by. Provincial GDP growth seems to have more impact on rural consumption data than urban consumption data in Qinghai. However, it is an opposite case in Guangdong. The rural consumption pattern is more related with the Guangdong GDP growth than urban consumption. This different situation can be explained by the marginal effect and Kuznet's inverted U curve hypothesis and the law of marginal decreasing return.

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