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Investigating the Connection Between Income Inequality and Economic Expansion

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Abstract: Since the Kuznets curve theory was published, more and more researchers have explored the relationship between 2 elements (economic growth and income inequality), such as whether income inequality has a good or bad impact on a country's economic growth. Because each researcher uses different methods and data, so there are different conclusions for the statement. Some researchers show that economic growth will not be influence by a growth of income inequality in the short term, but when a country is in a long-term income inequality, this situation will make the gap between rich and poor wider and wider. Research scholars recommended that the government should pay attention to the country's income distribution. This paper uses the collected data to build a multi-linear regression model to explore which factor has the greatest impacts on income inequality, as well as to investigate the connection between the two factors (economic growth and income disparity). The main element, according to this paper's findings, is GDP, and there is an inverse relationship between the two. When the economy grows, the degree of income inequality rises, but when the economy grows to a certain value, the degree of income inequality will decrease with economic growth.

Keywords: income inequality, economic growth, Kuznets curve theory, Gini index, multi-linear regression

1. Introduction

For a long time, economic growth and per capital income distribution have been widely discussed topics, and these two topics are also very important research topics in the field of development economics. Because of its widespread discussion and its own importance, many researchers have written many papers related to it. The researchers also gave their results and opinions from it.

Among them, how to measure the economic development level of different countries, economists put forward a series of indicators to answer this question [1]. Per capital GDP and per capital income are the most used indicators. What is per capital GDP? From its definition, In development economics, It is commonly employed as an economic development indicator. This macroeconomic indicator is important. It is an effective tool for helping people comprehend how a nation's or region's macroeconomic system works. It uses a method of calculation that compares the country's resident population to the GDP realised over a national accounting period, which is typically one year. But this is not enough to convince other researchers, so in addition to the indicator of per capital GDP, the growth in income inequality and the increase in the number of poor people are also included in the

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indicators to measure a country's economic development. As many scholars pay attention to the topic of income inequality, they not only focus on the causes of income inequality, but also pay more attention to the results of income inequality. The reason why income distribution is important is that uneven income distribution will affect the poverty level of a country, which will also lead to a widening gap between rich and poor. No matter in terms of personal ability or access to resources, a high-income person often has more opportunities than a low-income group. Therefore, the income level of an individual determines the status and ability of the individual in society. At the same time, income inequality may affect the individual's happiness index. For example, when people see that other people's income is higher than their own, even if their own income is already very high, they will still feel envious. Because for the most people, the factor that affects happiness is not their own income level, it is other people's income. Conversely, when a high-income person sees someone with a lower income than themselves, they feel happy. But people often like to compare upwards rather than downwards. Because of this, most individuals do not feel satisfied when per capital income levels increase [1]. Additionally, income disparity has an impact on every element of social life, which has an impact on supply decisions and economic growth.

In recent years, scholars believe that income inequality contains 2 elements. The first element is fair and reasonable elements. The remains is unfair and unreasonable elements. Researchers believe that social system, family background, gender and other environmental factors may influence income inequality. Taking China as an example, for the influence factor of income inequality in China, education factors account for 56%. Chinese residents attribute this 56% to individual effort or luck, which is a reasonable component that can be accepted by the public. While the other 44% is attributed to environmental factors, which is an Unfair, unreasonable ingredients. How does aging of population affect income inequality? Specifically, for some jobs rely on proficiency and interpersonal relationships, such as design and handicrafts, the older you are, the higher your income. Because whether these jobs can be done well depends on the individual's working time and proficiency. But aging is not the single biggest factor affecting income inequality. According to the survey, the most important factor is education, and its impact on income inequality is higher than 50%. Specifically, People with college degrees typically make more money than people without college degrees, because the jobs they do are not available to everyone. People are required to be trained for a period if they want to obtain a high-income job. Since some jobs can only be completed after learning relevant knowledge [2].

This article mainly discusses the causes of income inequality and its impact, explores the relationship between economic growth and income inequality, and uses models to show the relationship between them.

2. Research Design

This article takes the United Kingdom as an example. The author collected data of the United Kingdom from 1967 to 2021. This set of data lasts for 54 years. The authors collected the Gini coefficient for each year from 1967 to 2021, the GDP for each year, the total UK population for each year, and the UK labor force population for each year.

These data are basically obtained from Statista and OECD Data, and more than 80% of the data are obtained from Statista. Statista is a German online data gathering and visualisation platform that provides statistics and reports, Market Insights, Consumer Insights, and Company Insights. According to its own data, the website offers over 1,000,000 statistics from over 150 nations. More than 2 million individuals utilise it. Statistics and survey results are available on the platform. The platform may employ charts and tables to display data to visitors, which is useful for them. The majority of visitors are commercial clients, lecturers, and researchers. The OECD's mission is to assist member governments in achieving sustainable economic growth and employment, improving

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member nations' living standards while maintaining financial stability, and thereby contributing to the global economy's development. The OECD has been one of the biggest and most trustworthy sources of information about the international economy in recent years. The databases of the OECD contain data that transcends geographical boundaries. In this paper, the regression model is established to measure and analyze the factors that affect the changes of the Gini coefficient. The result variable is typically modelled in terms of how regression models are described: The result of linear regression is continuous. A statistical model comprising two or more dependent or outcome variables is referred to as multivariate analysis in statistics. A statistical model of this kind can be used to evaluate the connection between multiple variables. Simple linear regression models have continuous outcomes and one predictor variable, while multiple or multivariate linear regression models have continuous outcomes and multiple predictor variables. The form of a simple linear regression model is: $y = \alpha + x\beta + \varepsilon$, and the form of a multivariate or multilinear regression model is: $y = \alpha + x_1\beta_1 + x_2\beta_2 + \ldots + x_k\beta_k + \varepsilon$ [3].

In this paper, a multivariate regression model will be used. Where α is used as a constant, and x_1,x_2 and x_k are variables. These variables are GDP per year, GDP square, total UK population per year, and UK labor force per year. Observing the change of R square by changing the variable, this can observe which factor affects the Gini coefficient. At the end of this article, a graph will be drawn to show how the influencing factors affect income inequality.

3. Result and Analysis

According to the formula: $\frac{Annual\ labor\ force\ population}{Annual\ UK\ population}$. The author can obtain the UK annual labor force percentage.

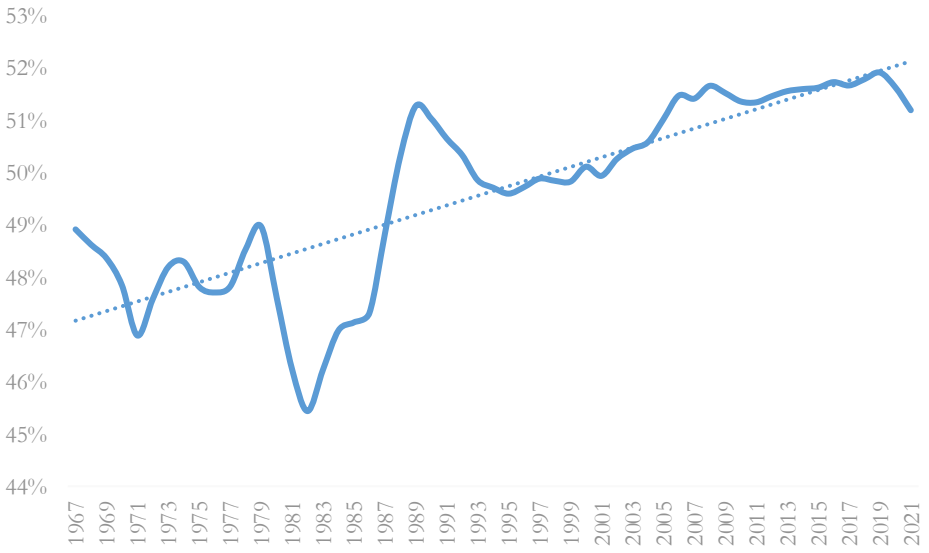

Figure 1: Labor force, %.

Data source: Statistic, OECD Data

Photo credit: Original

After obtaining the figures of UK, the annual labor force percentage and year are drawn into a linear graph (Figure 1). In this way, the trend of labor force can be observed intuitively through the linear graph. Briefly introduce this picture, the vertical axis is the proportion of the British labour force in the population, while the horizontal axis represents the years 1967 through 2021. It can be seen from the figure that there was a large increase in the proportion of the British labor force before

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1983. But there was a substantial increase in the percentage of British labor forces between 1983 and 1991. In 2019, the number of British labor force reached the highest value, with 52% of the labor force. In this graph, the UK reached the lowest percentage of the UK labor force in 1983 at 45%. Combining the linear graph, although the percentage of the labor force has declined in some years, overall, In the UK, the percentage of the labour force has been steadily increasing.

Table 1: Regression results.

VARIABLES	(1) OLS Gini	(2) OLS Gini	(3) OLS Gini	(4) OLS Gini
GDP	4.4953***	40.4206***	37.9457***	36.9082***
	(0.6549)	(3.2357)	(3.8053)	(3.5512)
GDP-sq		-12.1889***	-10.7088***	-10.7346***
		(1.0743)	(1.6619)	(1.5400)
Population, million			-0.2520	-0.4937*
			(0.2411)	(0.2593)
Labor force, million				0.5118*
				(0.2706)
Constant	26.1777***	2.2352	17.3620	18.1494
	(0.9935)	(2.2535)	(14.5178)	(13.8656)
Observations	55	55	55	55
R-squared	0.4196	0.8174	0.8210	0.8278

The Table 1 is the regression result. This paper uses a multivariate model:

$$y = \alpha + x_1\beta_1 + x_2\beta_2 + \ldots + x_k\beta_k + \varepsilon \quad (1)$$

To be specific, the process of the calculations: First, the first variable (GDP) is added into the model. The first model equation is:

$$Gini\ index\ = 26.1777 + 4.4953 \times GDP$$
$$R\ squred\ = 0.4196 \quad (2)$$

According to the Table 1, GDP is proportional to Gini index, because $\beta_1 = 4.4953 > 0$. Then the second variable (GDP squared) is posted into the model. After that, the second model equation is:

$$Gini\ index = 2.2352 + 40.4206 \times GDP - 12.1889 \times GDP\ squared$$
$$R\ squared = 0.8174 \quad (3)$$

It can be seen from equation 3 that GDP squared is inversely proportional to Gini index, because $\beta_2 = -12.1889 < 0$. Then the third variable (Population) is added into the model. The third model equation is:

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$$Gini\ index = 17.3620 + 37.9457 \times GDP - 10.7088 \times GDP\ squared - 0.2520 \times Population$$
$$R\ squared = 0.8210 \quad (4)$$

After adding the third variable, the Table 1 shows that Population is inversely proportional to the Gini index, because $\beta_3 = -12.1889 < 0$. Finally, the fourth variable (Labor Force) is posted into the model. The third model equation is:

$$Gini\ index = 18.1494 + 36.9082 \times GDP - 10.7346 \times GDP\ squared - 0.4937 \times Population + 0.5118 \times Labor\ Force$$
$$R\ squared = 0.8278 \quad (5)$$

It can be seen equation 5 that Labor Force is proportional to Gini index, because $\beta_4 = 0.5118 > 0$. Combining the four R squared, the factor that most affects the Gini index is GDP, because when the second variable is added into the model, R squared changes greatly. This situation does not appear in the results of first, third and fourth. Specifically, after adding the second variable into the model, the second R squared is too different from the first R square value, while the R squared values of the third and fourth factors are basically the same as the second R square value There is no difference between. In summary, the biggest factor affecting the Gini index is GDP. According to the second equation, it can be concluded that the relationship between GDP and Gini index is inversely proportional.

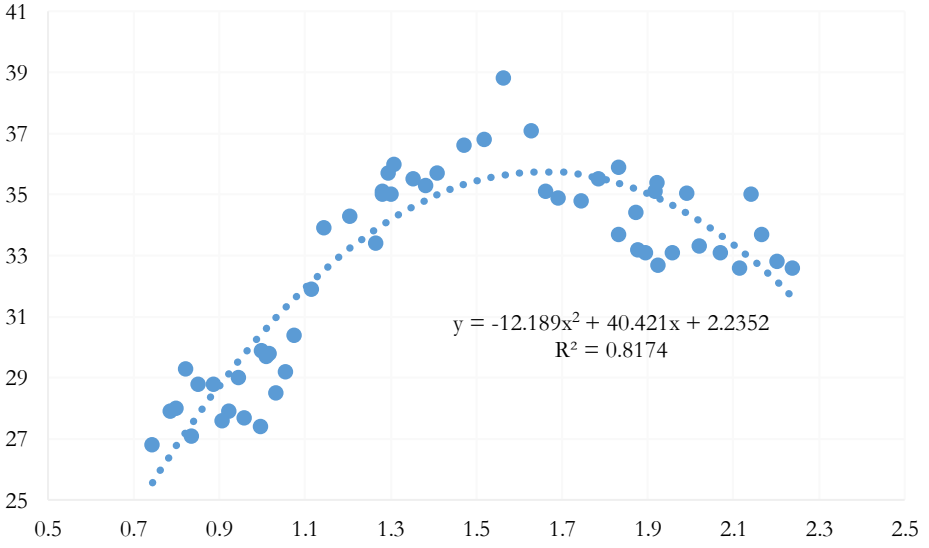

Figure 2: Inverse-U-shape between GDP (in Trillion) and Gini.

Photo credit: Original

The Figure 2 is a linear graph drawn according to the relationship between the two variables of GDP and Gini index. This allows relationship between GDP and Gini index can be observed and analyzed straight forward. The GDP is on the horizontal axis, and the figure on the vertical axis represents the Gini index. It can be seen from the table that this is an obvious inverted U shape. This shape shows that when the economy grows, the income inequality increases, but when the economy grows to a certain value, the income inequality will decrease with the economic growth. Kuznets

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wrote an article in 1995 that when an agricultural civilization transitions into an industrial civilization, economic growth initially increases, then levels off, and finally begins to shrink. This is the famous According to the Kuznets curve theory, there is an inverted U-shaped link between income disparity and economic progress [4]. This article caused widespread heated discussions in economics. This model was extensively utilised by academics to demonstrate the relationship between income disparity and economic development. Most academics consider whether income inequality and economic rise have a cyclical relationship. Particularly, economic expansion reduces inequality, which in turn leads to a faster economic growth [5]. In the past ten years, many scholars have done many experiments to explore whether inequality is good or bad for economic growth [6]. For example, Alesina and Rodrik did research in this area, and they concluded that income inequality had a negative effect on economic growth [7]. On the contrary, Castell found that the impact of inequality on economic growth is not negative, but positive [8]. Other studies have found that there is no evidence that inequality has any impact on economic growth [9]. So far, on the question of whether income disparity has a beneficial or negative effect on economic growth, academics have not yet come to a firm conclusion. According to a notion put out by Galor and Moay, the link between income distribution and economic growth exhibits an unstable pattern over time and is dependent on the nation's level of economic development [10]. The reasons for the different conclusions about the impact of income inequality on economic growth are the differences in the econometric methods used by the researchers and the countries analyzed [11]. According to some academics, the influence of income disparity on economic development is indirect. People may take timely action to enhance income distribution when they understand the connection between the two clearly [12]. After research, the specialists found that the impact of income inequality on economic growth was positive within seven years, and then it was negative. This shows that income inequality is beneficial to economic growth in the seven-year period, but unfavorable to economic growth in the long run. Therefore, it can be suggested to the government that considers long-term economic growth when they make decisions, so a country should not be post in a situation of income inequality for a long time [13].

4. Conclusion

In conclusion, according to the whole research, the author believes that the main factor affecting income inequality is education. Because education makes some occupations professional and rare. So that people need be trained in special knowledge and access test of professional occupation. Such as doctors, lawyers, accountants, and other professions. Professional knowledge makes people earn higher salaries than the average person. The results of income inequality are as follows: first, in a nation, the wealth gap between rich and poor is expanding; second, people cannot feel happiness from wages in an era of rising per capital income. Regarding what factors have a greater impact on income inequality, it can be seen from the multivariate regression model. The main factor affecting income inequality is GDP. And there is a negative correlation exists between these two factors. The regression findings demonstrated that the relationship between income inequality and economic development is structured like an inverted U. When the economy grows, the degree of income inequality rises, but when the economy grows to a certain value, the degree of income inequality will decrease with economic growth. Although so many researchers have tried to find out whether wealth disparity has a positive or negative effect on economic growth over time, there is still no definite conclusion. The author believes that a country should improve its income distribution policy, because the short-term effects of income disparity on economic growth will be minimal. However, it will damage economic growth in the long term. Policies to improve income distribution are important for every country. This article only uses data to prove the theory of Kuznets curve and conducts a simple analysis of examples. But it is hoped that more researchers will find out whether the impact of income inequality on economic growth is good or bad in the future.

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