Evaluating the Role of GDP Per Capita in Shaping Internal Migration Patterns in China: A Spatial Econometric and Regression Analysis Approach

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Abstract. This article demonstrates the links between immigration and the economy in China. It aims to uncover the complex interdependencies between GDPs per capita, education, and healthcare. Therefore, it is important to inform public discourse, develop evidence-based policies, and contribute to a more complete understanding of the impact of immigration on the economy. To complete this essay, Firstly, I surfed on some research programmes such as Jstor and Google Scholar; I found some essays about immigration trends in China in the dimension of provinces. In the main body of the research, I utilized some bar graphs and statistical strategies to demonstrate the relationship between the economic factors influencing the immigration trend, whether it is positive or negative. firstly, the graphs are used to illustrate the significant GDP difference between the top provinces and the ones that are poor in GDP per per capita. In the following graphs, I used the regression analysis to indicate the relationship between GDPs per capita and internal immigration (capital per inflow into provinces in a year).

Keywords: GDP, education, health care, internal immigration.

1. Introduction

1.1. Economic Inequality

Economic inequality has become a universal trend globally. The need to assess the impact of inequality on growth from a spatial perspective has been highlighted in the recent literature. Along this research line, Janikas and Rey proposed a spatial analysis that allows for simultaneous interactions between regional growth and inequality. De Dominicis has proposed a spatially augmented model that allows intra-regional disparities to be one of the determinants of regional economic growth [1]. Because of the growing inequality between different regions, it has become a severe problem, especially in the past thirty years in the world, as globalization has become increasingly vital. Some regions might benefit from the international trading trend and thus become richer and more developed than other areas. Before when, in the agricultural society, the distribution of population was quite even as the characteristic of agriculture is production. The difference between the productivity of different regions is not conspicuous. However, when considering trade, the situation is completely different. Human capital is only one of the main factors that influence the accumulation of wealth. Technology, natural resources, and policies are also momentum factors that will influence production nowadays. So, the areas with natural resources and the areas with policy support will have better opportunities to become enriched. Currently, the economic development of different provinces in China varies significantly.

1.2. Immigration

Recently, in the increasingly globalized world, the immigration issue has become a prominent problem that should be urgently discussed, immigration has become a trend with a big population. For example, immigration from Africa and Europe is conspicuous evidence of immigration. Immigration can change the landscape from area to area. Populations are productivity. In an area with an outflow with population, the human capital will fall, thus the productivity. This is a demerit for agriculture development and urbanization for the area with an outflow population. However, there

are some advantages to an outflowing population. The regional carrying capacity can increase as there is less population sharing the same number of resources and public services. In the areas that are more developed, human capital will become denser as the development because in these areas, they can earn a higher wage and have a higher standard of life. However, there is a dilemma about the increase in population. On one hand, the increasing of human capital can be beneficial to industrial production and labor markets, boosting productivity, fostering innovation and spurring growth. They argue that immigrants bring diverse skills, ideas and entrepreneurship, which creates jobs and fuels economic expansion. Moreover, immigrants often fill vacancies in sectors with labour shortages, thereby supporting industries that are critical to national prosperity. this article delves into the intricate links between immigration and the economy. By examining the literature on this topic and analyzing a range of perspectives, we seek to deepen our understanding of how migration affects economic outcomes at the macro and micro levels. Labour migration flows are closely linked to significant disparities in wages between the urban and rural sectors and between regions in China. As pointed out earlier, in the last 25 years, the majority of migrants were predominantly no hukou migrants from rural areas. The lack of sufficient gainful employment in the countryside in many agricultural provinces is the main reason why rural workers have left the countryside [2].

Through this research, we aim to uncover the complex interdependencies between GDPs per capita, education, and healthcare. Ultimately, understanding the relationship between immigration and the economy is critical to developing a holistic approach to addressing the opportunities and challenges that immigration presents. Through discovering this intricate topic, we hope to inform public discourse, develop evidence-based policies, and contribute to a more complete understanding of the impact of immigration on our economies.

2. Analysis

As the economy develops in one country, there will be a disequilibrium of the economy in the world. The equilibrium differs in different regions, especially in China. The trend of disequilibrium has become more significant than before. The top cities in China, like Beijing and Shanghai, have already reached a GDP of over 40 trillion RMB and a population of over 20 million. Because of the acceleration of the economy, capital will increase, and there will necessarily be. An Increase in labor demand. Human capital and economic growth have a strong correlation. Human capital affects economic growth and can help to develop an economy by expanding the knowledge and skills of its people [3]. When people come to these metropolises, the population staying in the rural areas will decrease, resulting in a disequilibrium. To make this clear, here are the data of the top 4 provinces in GDP in 2022 and the GDP of the last 4 provinces.

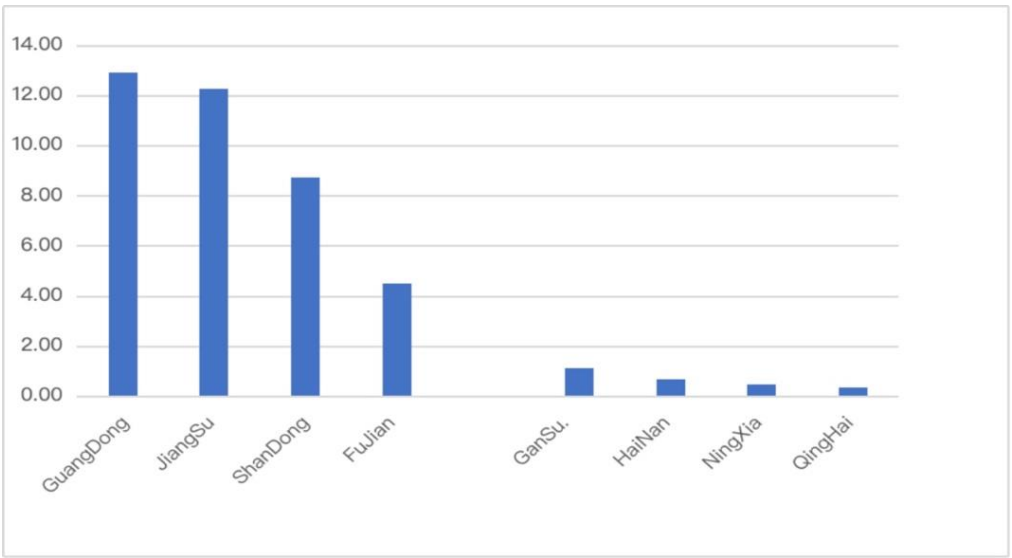


Fig. 1 GDP of the first four provinces and the last four provinces. (trillion) GDP trillion/RMB [5]

The graph above shows the difference between the places with the highest GDP and the places with the lowest GDP in China. However, in this graph, economic inequality among regions is considered, so population differences haven't been taken into consideration. In this graph, we pick four provinces with the highest GDP and four provinces with the lowest populations in China. the provinces with the highest population are Guangdong, Jiangsu, and Fujian, and the four provinces with the lowest population are Gansu, Hainan, Ningxia and Qinghai. Besides considering the authority of using data, it is fundamental for us to take into consideration every single province in the data collection; for provinces in China, there are various factors that can be counted or regarded as a variable. Therefore, it might not be a sufficient way of doing a static analysis only on the GDP output on a macro scale, not only because of the unequal of the population but also some other factors such as the unemployment rate as in some provinces, the unemployment rate might be lower due to the subsidy by the government, whether in the form as transfer payment or in the form. Of tax rate or even as a form of policy such as a lum-sum tax functioning as an incentive to the economy. Especially in China, because of the specialty of the government-holding firms, creating monopolies in some industries; thus, in these industries, job distribution might also be different. Prior to reform, job changes were either prohibited or controlled by appropriate government agencies. The fundamental shifts in the distribution of employment across sectors and ownership categories that have occurred under reform require an allocative mechanism far more flexible and sensitive than any nations have ever achieved with administrative controls. Because of these reasons, we assume that there are other factors that might influence the economy. As a result, I made this model to demonstrate that if we don't use GDP per capita as the variable rather than GDP total, the trend might not be consistent. For this reason, I decided to use GDP per capita as the variable on the Y-axis.

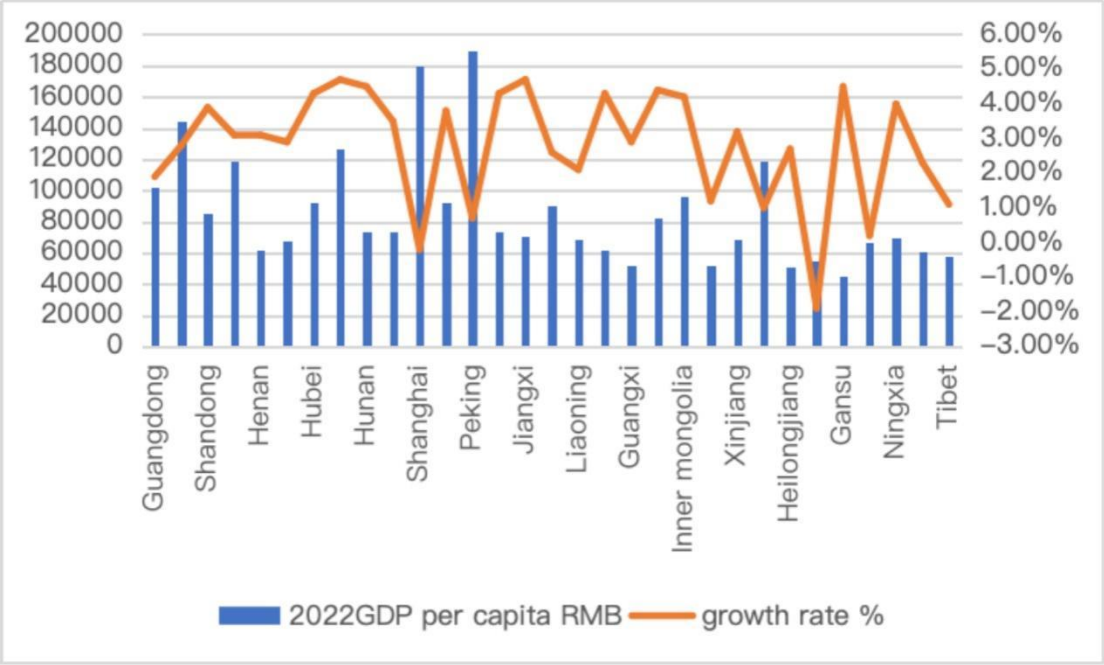


Fig. 2 GDP in the provinces in China, and the growth rate of GDP.

The graph above is used to make statistics on the GDP in the provinces in China and the growth rate of GDP. the X axis is for the provinces and the Y axis is for the GDP. On the X-axis, there aren't any names for every province. I only put on some provinces that have strong representativeness. In the Y axis is the province's GDP of production in 2022.

In the model, there are two kinds of statistic charts: the bar chart and the broken line statistics chart. there are several reasons that might cause the economic disparity among provinces. this also might be a historical issue which causing economic disparity in China. From the graph above, we can discover the GDP among different provinces has a considerable difference in GDP per year, The reasons why the data and tendency of the Broken line chart are not consistent with the Bar chart

various reasons, one of the main reasons might be COVID 19 still has an outstanding impact in China's economy. as the eastern areas of China are one of the most developed areas, so these areas might be affected by COVID-19 most conspicuous. The provinces in eastern China have gone through a rapid economic increase. The development started in the provinces in the eastern areas of China; China has experienced rapid urbanization in the past three decades, with its urbanization level increasing from about 19 per cent in 1979 to 46.6 per cent in 2008. Ural-to-urban migration is mainly concentrated in the eastern coastal areas, especially in the peri-urban areas of large metropolises [6]. They have the advantage of sitting near the ocean and becoming ports to operate overseas trade. Because of the support of the policy, some cities became free trade ports. For example, Shenzhen is a city constructed by companies and investors that have been attracted to this city. Other cities like Shanghai and Beijing have also attracted a large amount of human capital because they are cities with a large scale of capital and currency. They are able to charge higher incomes to employers. GDP per capita and immigration. From the data above, we are familiar with the distribution of capital in China. The Capital mostly concentrate on developed areas Like Shanghai, Beijing, Jiangsu and so on. We assume that the immigration trend has some linear relationship with GDP per capita. We have this assumption because we assume human capital is likely to migrate to developed regions for the regions as they can have a higher income and better opportunity to find a job. to show this relationship in an arithmetic method, I used a model to quantify the number of international immigrants; I surfed through China statistics for some data on internal immigration, and finally, I came up with the population inflow rate. As we know, immigration consists of population inflow and population outflow. However, when considering the economic influences, capital inflow might be a better indicator, as capital inflow is.

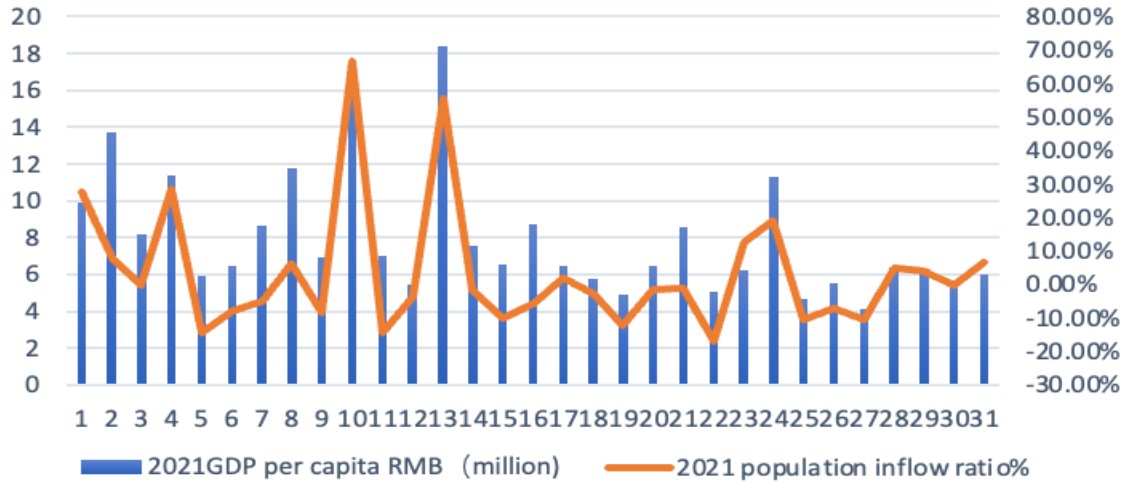


Fig. 3 GDP per capita and population inflow [4]

2.Guangdong 3. Jiangsu 4. Shandong 5. Zhejiang 6. Henan 7. Sichuan 8. Hubei 9. Fujian 10. Hunan 11. Shanghai 12. Anhui 13. Hebei 14. Peking 15. Shanxi 16. Jiangxi 17. Chongqing 18. Liaoning 19. Yunnan 20. Guangxi 21. Shanxi 22 Inner Mongolia 23 Guizhou 24. Xinjiang 25. Tianjin 26. Heilongjiang 27.Jilin 28.Gansu 29.Hainan 30.Ningxia 31.Qinghai 32.Tibet

In the graph above, the x-axis is for different provinces; there are two variables, which are the GDP per capita and the population inflow. the function of the two variables is used to demonstrate the consistency of immigration and economic level. In the vertical axis, we have labelled every 2 trillion as an interval. This graph also contains a bar graph and a broken-line statistic graph. To illustrate the relation between the GDP per capita and internal immigration, the scatter diagram has the advantage of making the relation between the GDP per capita and immigration. to make the relational database turn into a quantitative database, it will be necessary to utilize a recessionary analysis to quantify the relation between X fixed quantify (GDP per capita) and Y variable (GDP)

GDP per capita and population inflow ratio. I have listed the numbers of the provinces according to their position on the composed graph above. In this graph, there is a clear tendency that in places

such as Shandong and Xinjiang, the GDP per capita is quite high. For Shandong, which is a province located in the east of China, the eastern areas are the most developed. However, it is quite surprising that Xinjiang also has Such a high GDP per capita; Xinjiang is the largest administrative unit in China and is rich in mineral resources, especially oil and natural gas, that will make it a major player in generating rapid economic growth in the western part of China in the coming decades. Xinjiang is not only far ahead of other Western provinces, but it also has the advantage of flourishing international trade with eight neighbouring countries as well as with other CIS countries and West Asia.[7] Because of these reasons, Xinjiang has also become an attractive destination for those who want to pursue a better wage. To make the relational database turn into a quantitative database, it will be necessary to utilize a recessionary analysis to quantify the relation between X fixed quantify (GDP per capita) and Y variable (GDP)

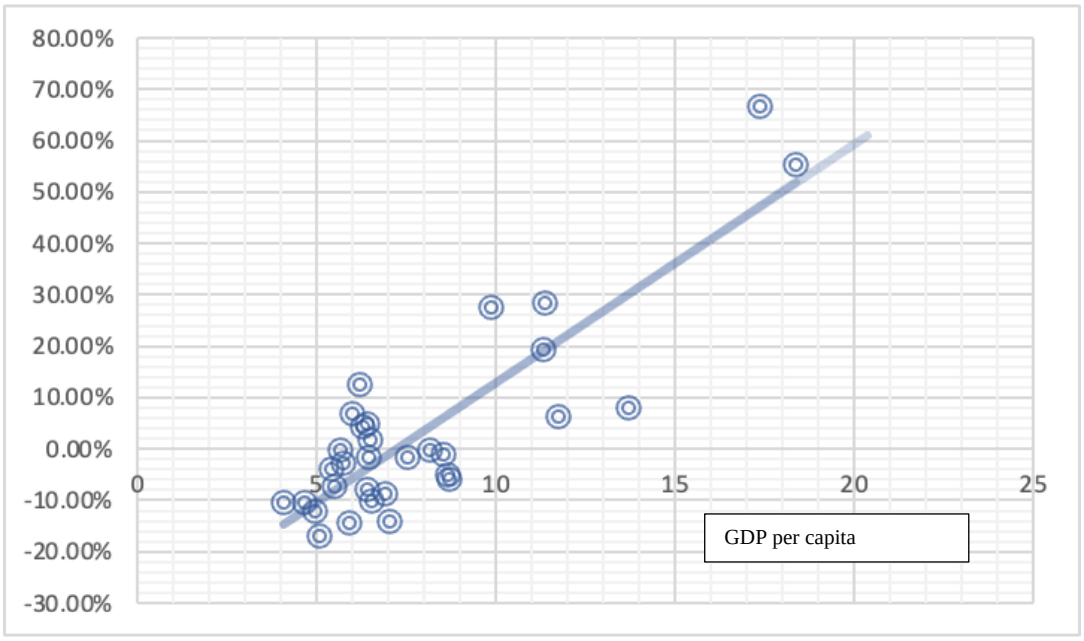


Fig. 4 Regression chart of GDP per capita and population inflow. [5]

As in this chart above, the Database comes from China statistics, and the Data is about 2021GDP per capita and 2021 population inflow ratio. To do this regression graph, I used Excel to generate the graphs. in the graph, we can discover that the regression line goes through the scattered points, which are the data of education and internal immigration in the level of provinces; these points are distributed along the line with a relatively short distance. Most of the data is scattered around 50 thousand GDP, so the assumption is true as there is a positive relationship between GDPs per capita and immigration trends. The first graph uses a columnar statistic chart and a Discounted statistical chart. We can discover the positive relationship according to the consistency of the two values. In the second chart we used a scatter diagram to analyze the data. X axis is for GDP per capita, and the Y axis is the population inflow rate. From this diagram, we discovered the relationship between the two factors approaching a line.

Table 1. Regression analysis of GDP per capita and population inflow

Regressive statistic	
Multiple R	0.85258371
R Square	0.72689898
Adjusted R Square	0.71748171
standard error	0.10118955
observation data	31

Regression analysis

	df	SS	MS	F	Significance F
regression analysis	1	0.79035117	0.79035117	77.1878136	1.1424E-09
Residual error	29	0.29694045	0.01023933		
total	30	1.08729161			

	Coefficients	Standard error	t Stat	P-value	Lower 95%	Upper 95%	minimum 95.0%	maximum 95.0%
Intercept	-0.3360576	0.04590933	-7.320069	4.6079E-08	-0.429952	-0.2421624	-0.4299527	-0.2421624
X Variable 1	0.04644145	0.00528605	8.78565954	1.1424E-09	0.03563026	0.05725264	0.03563026	0.05725264

We can draw a line of the tendency of the relationship of GDP per capita and internal immigration rate as y=0.04644145x-0.3360576. From this line we can demonstrate that there is a linear relation between these two factors. From the chart below, we used a regression to analyze whether the relation between the two factors is effective. According to the analysis of variance table provided, the P-value of regression analysis is 1.1424E-09, which is an extremely small value. In statistics, results with a P-value less than 0.05 (or less than the significance level) are usually considered statistically significant. In addition, you can also see that the Intercept (intercept) and X Variable 1 (independent variable 1) have p-values of 4.6079E-08 and 1.1424E-09, respectively, and these p-values are used to test whether the correlation coefficient is significantly different from zero. Drawing to the conclusion. The relationship between GDP per capita and internal immigration is effective. Because the P value is extremely small, which is p-values of 4.6079E-08 and 1.1424E-09, so we can affirm that we could deny the null hypothesis in this situation because when there is a null hypothesis, the data will have no expected effect, no difference, and no correlation. Besides, the R square is 0.72, indicating all the influencing factors that influence the growth of immigration. GDP per capita is a major factor that attracts the Population to immigrate. From this point of view, we adjust that the GDP per capita has a straightforward influence on the migration tendency, and thus, the topic of how GDP per capita influences internal immigration in China is credible. The reasons that cause the positive influence of GDP per capita on immigration. As we demonstrated the positive relationship of GDP per capita has a positive relationship with internal immigration and the validity of the influence of GDP on internal migration, so there might be some reasons that cause the connections of GDP per capita and internal immigration. First, we should focus on the income level. Income level could be a vital factor that has a direct impact on the GDP per capita. The growth rate of the population of a developing economy can be used as a proxy for the downward pressure of population growth in

rural areas on agricultural wages and thus encouraging migration to urban areas.[8] besides when there is a higher production level, which is shown as GDP per capita. As a result, the human capital and income will increase. For education, higher GDP per per capita might also be consistent with higher education because the unemployment rate is related to education level. To demonstrate this guess; it is important to demonstrate whether there is a positive connection between education and economic growth. In other words, is education a factor of the economy. To approach this guess, the bar graph will be a persuasive model to make this connection clear and easier to understand.

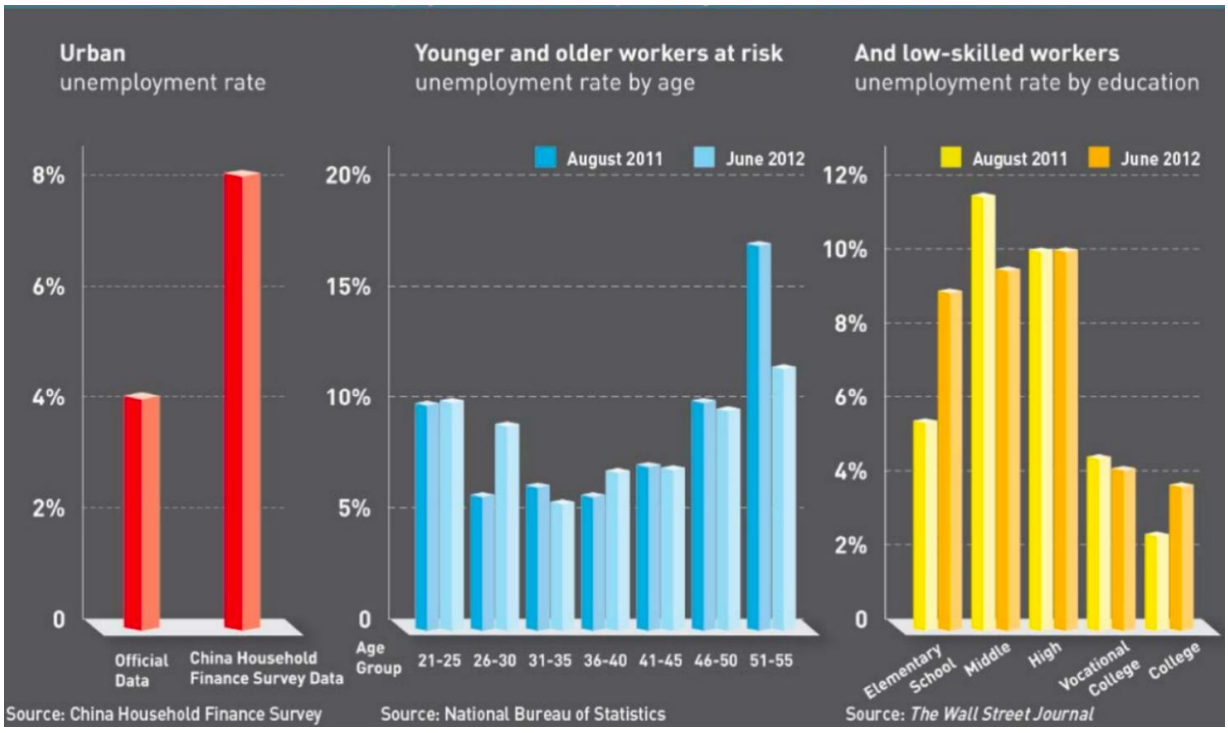


Fig. 5 China's unemployment rate computed by various entities. [10]

In this graph above, we discovered that from the data collected from officials and the data from the financial surveys in 2011 and 2012, we find out that generally, education has a benefit for someone to acquire a job because, on the graph, the X axis is the education level which divided people into 7 groups they are the elementary school graduated, the middle school graduated, high school graduated, vocational college, and college. for elementary students, the unemployment rate is around 9%. For middle school, the number is 9.5%, and for high school, the unemployment rate is at about 10%. It seems like there is not a significant difference in the unemployment rate between the graduation of elementary school, middle school, and high school. However, when we look at the college level, things are different. Even if one has a vocational college degree, one will actually obtain a considerable advantage in the labour market. the unemployment rate for vocational college students is only 4%, and for the ones who have a college degree, this number will even drop to about 3.8%, which is under 4%. The highly aggregative analyses of Denison (1962), Bowman and Anderson (1963), and Schultz (1963) have estimated the contribution of education expenditures to national income, while disaggregated analyses of Becker (1965), Hanoch (1967), and Schultz (1968) have estimated effects of education on individual incomes.[9] A higher graduation degree represents a lower unemployment rate, and a lower education shows a lower unemployment rate. From this graph, we can discover from 1992 to 2016, the higher educated people always had a lower unemployment rate, indicating that it is persuasive that education can help one to acquire a job or even acquire an even better job than the ones that have less education. to make a clear vision of whether there is a positive relationship between the internal immigration and the education level it would be necessary to do a regression analyse. In this simple regression, the ratio, which is the rate of people that have a bachelor's degree or more, is representative of the education level. because, as we know, universities in China have discriminated when recruiting students. the schools have a policy of protecting the

local residents, which they acquire more students from the city they are located in, therefore this is the reason why Beijing and Shanghai are the cities with the best education resources. and the variable is the population inflow to the province which is a representative of internal immigration which has been mentioned presently in the passage.

Table 2. Population with higher education level.

recessionary analyze	
Multiple R	0.60081099
R Square	0.36097384
Adjusted R Square	0.33893846
standard error	0.15478659
Observation data	31

Analysis of variance

	df	SS	MS	F	Significance F
regression analyze	1	0.39248383	0.39248383	16.3815539	0.00035168
residual error	29	0.69480778	0.02395889		
total	30	1.08729161			

	Coefficients	standard error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	-0.6770383	0.17794518	-3.804758	0.00067795	-1.0409771	-0.3130996
X Variable 1	0.93289008	0.23049044	4.04741323	0.00035168	0.46148419	1.40429597

The P value is 0.0067 for interception, which is very low, and it is lower than 0.05, indicating that the education level has an effective impact on internal immigration in this situation; there might be a consistent relation between the two variables. Nevertheless, this relationship isn't as credible as the one between GDPs per capita and internal immigration. Because the R square is only 0.36. as we know, the R square is between 0-1, and the closer the data approaches 1, the more plausible the data is, in other words, in this regression analysis, education level can only explain 36% of the reasons of internal immigration. on the other hand, the immigration might come up with eternal impact to the education system, turning the interact into a cycle. Wage-sensitive college demand by natives as well as elastic college supply, particularly at the decadal frequency of the data. This hypothesis is supported empirically. The crowd-in effect is driven by natives ages 18–24, who are likely to have college demand that is more sensitive to returns than older natives.[9]

There might be other economic factors that might affect internal immigration. When considering the capacity of a city to carry such an amount of immigration, healthcare ability is a vital factor that cannot be ignored. Because of the increasing demand for medical services, there will be an increasing supply. In the graph below, we utilize the number of nurses per thousand people to represent the healthcare level of a region, choosing this method has dispersed the medical service more fairly, even though there are some hospitals that are more advanced in the production of medicine or more proficient in doing operations. However, that can't be beneficial for all citizens or people in the province.

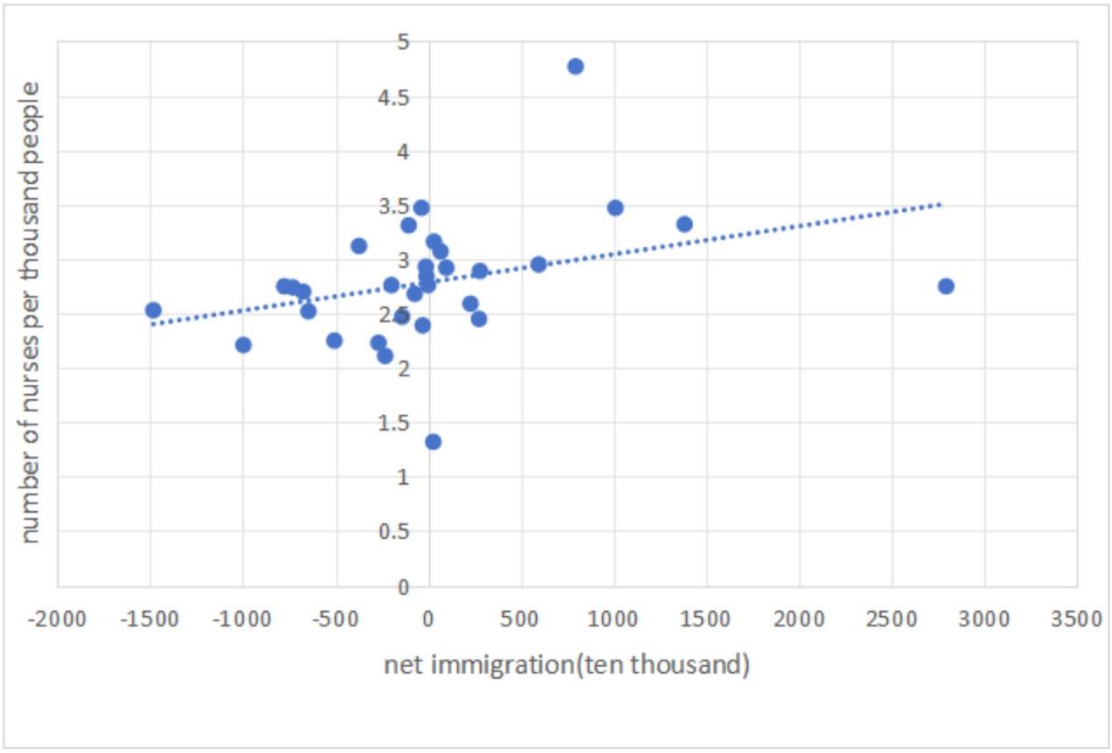


Fig. 6 The relationship between net immigration and the number of nurses per thousand people.

From the graph above, we can discover that the positions of these data generally distribute close to the regression line, indicating the efficacy of the education level based on internal immigration. we can demonstrate the relationship among the two values of nurses per thousand people, which is the indication of the healthcare level per capita and the net immigration. A better healthcare level is the foundation of a city's capacity to receive population inflow and the urgent increase of the population. There might be some reasons leading to this relationship. Control and prevention of diseases: efficiency to be realized in health care will encompass the capacity to have interventions in place that can help protect and control diseases, including vaccination, sanitation, and public health education, amongst many others. Controlling the spread of the disease, the health sector will have prevented the outbreak of diseases that could have otherwise led to illness or death, which diminishes the carrying capacity of the population. Improved Maternal and Child Health. Improving maternal and child health condition attainment includes improved access to health care, antenatal care, and child vaccination, coupled with a reduction in the infant mortality rate and an increase in life expectancy. Allowing more children to survive through to adulthood will thus result in an increased population at carrying capacity, added to the labour force and to the overall output. Re-productive health care access. Accessing the services of reproductive health that help in family planning and contraceptive methods goes a long way in helping people make informed choices about large family size and spacing. This stabilizes or reduces the population in a certain environment if overpopulation is the problem and thus ensures people live in these places within the limit of the available environment. Health care and Economic Development: Better health facilities can also lead to economic development, which influences changes in population growth rates. In the process of socio-economic development, birth rates usually decline, which is termed the demographic transition. Thus, this change ensures that the level of population growth is within the environment-carrying capacity.

3. Conclusion

In conclusion, the study concentrates on the relationship between GDP per capita and internal immigration. Among these main factors, education and healthcare are closely affected by the GDP per capita. Basing the argument of the study, this means that high GDP per capita is associated with high internal immigration, thereby providing evidence that regions that are in an economic boom

attract large inflows of the population. Regression analysis supports the relationship between GDP per capita and the population inflow with the relation of statistical importance. This will also focus on the effects that education has on internal migration trends. Compared to the one that exists between GDP per capita and immigration, although there is likely to be a positive correlation between education levels and internal migration, it is found that this correlation is not very strong. This basically shows that the economic factors are much of a critical guide for internal migration flows. In addition to this, the study takes into consideration the impact of health care on internal migration. The greater the level of health care, measured by nurses per thousand people, the greater the ability of a region to retain a stream of population growth. Improved health infrastructure and services will encourage population growth by reducing the spread of diseases through better health of the residents and improved maternal and child health, supporting economic development. Finally, the study confirms the relationship between economic, educational, and health factors and how they impact each other in regard to the internal migration dynamics in China. Generally, this research helps to explain some of the phenomena in population inflow and population outflow in some areas. Like China northeast. This research demonstrated some immigration trends and influencing factors. I hope this will help future research and help the government make policies to revive the deprived areas.

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