



ISSN: 0975-833X

## RESEARCH ARTICLE

### A STUDY ON THE CORRELATION BETWEEN FLOATING POPULATION, ECONOMIC GROWTH AND HAZE IN BEIJING

\*He Xiao and Zhe Yin

Department of Mathematics, Yanbian University, YanJi, China

#### ARTICLE INFO

##### Article History:

Received 12<sup>th</sup> November, 2017  
Received in revised form  
25<sup>th</sup> December, 2017  
Accepted 20<sup>th</sup> January, 2018  
Published online 18<sup>th</sup> February, 2018

##### Key words:

Floating population;  
GDP; Haze.

Copyright © 2018, He Xiao and Zhe Yin. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: He Xiao and Zhe Yin. 2018. "A study on the correlation between floating population, economic growth and haze in Beijing", *International Journal of Current Research*, 10, (02), 64936-64938.

#### ABSTRACT

In this paper, based on feedback effects between the floating population, economic growth and the fog haze in Beijing, by constructing dynamic equation around the lagging items and the system GMM, to analyze the long-term equilibrium relationship and dynamic effect mechanism between the floating population, economic growth and haze. Based on the obtained data, the system GMM method is used for the empirical test. Therefore, this paper studies the correlation between the floating population, economic growth and haze in Beijing.

## INTRODUCTION

China's plateau belt is divided between Yunnan and the Daxing'an mountains. Beijing is a city close to the high area, so it has a greater impact on haze than other major cities. Considering the economic, floating population and haze problems, Beijing is chosen as the research object, and Beijing's GDP per capita as an indicator of economic growth. With economic growth, attracting a large number of floating population, the population flow as the population of a particular phenomenon, has certain influence to economy, environment, this article will leave the census register seat, live for a long time in the rest of the population is called the floating population. In 2011, according to the total scale of the floating population of 7.422 million people in Beijing, which accounts for about 36.8% of the total population of Beijing, Beijing accounted for 37.9% of the floating population in 2015, thus, the rise of the floating population. Economic growth, meanwhile, the situation of the ecological environment is increasingly severe, the smog is becoming more and more serious. It is affected by a variety of factors, such as air density, PM2.5, dust, etc. Against this background, the haze has received more and more attention. The floating population, the problem of haze and the development of per capita GDP has strong inertia, over the past few years to influence the current development, want to consider this lag effect, floating population and GDP, and the

relationship between the haze is complex. As shown in figure 1, the direct effects between A, B and C should not only be considered, and negative feedback effects such as D, E and F should also be considered. Based on the above considerations, this article surveys the index data of 2000-2016 in Beijing, and constructs a dynamic simultaneous equation model with lag term, considering the dynamic evolution characteristics of floating population, economic growth and haze and their interaction, in order to enhance the accuracy of the model.

#### Model design

##### Empirical model design

In order to study the correlation between floating population, economic growth and haze, the labor capital of production function should be decomposed into local population and floating population, and the following assumptions should be made:

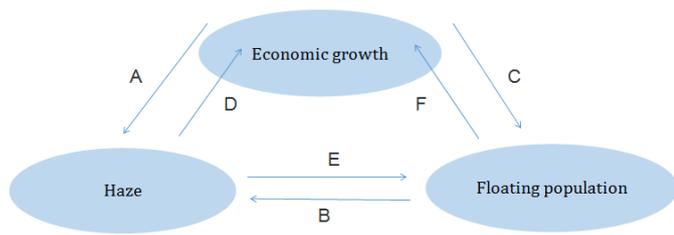
- (1) The inflow of migrants into Beijing can be employed;
- (2) Defined the total labor force Beijing L consists of two parts, part of the local workforce, the other part for foreign labor, and between one and local labor and migrant labor force is mutual independence;
- (3) The technology remains the same, that is, the technology is external (Xuezhen Xu, 2013).
- (4) In the process of production, only labor and capital production factors and production functions can meet

\*Corresponding author: He Xiao and Zhe Yin,  
Department of Mathematics, Yanbian University, YanJi, China

the scale compensation. Using the growth accounting equation of the Cobb-Douglas form (c-d) of Hicks (Fei Nie, 2015) the economic growth, floating population and haze are included as endogenous variables in the model, be specific to:

$$Y = e^\varepsilon AK^\alpha H_l^\beta H_f^\gamma E^\lambda \dots\dots\dots(1)$$

Among them, with  $Y$  said GDP per capita, said  $A$  technical level, the  $K$  said capital investment, including  $H_l$  local human capital stock, for the period of  $H_f$  to human capital stock of the floating population,  $E$  said annual haze days,  $e^\varepsilon$  as exogenous shocks.  $\alpha$ ,  $\beta$ ,  $\gamma$  and  $\lambda$  represent capital, local human capital stock, human capital stock of floating population, and elastic coefficient of haze days, and because of hypothesis (4),  $\alpha + \beta + \gamma + \lambda = 1$  is established.



**Figure 1. Interactive effect diagram of economic growth, floating population and haze**

The logarithm of both sides of (1) can be reduced to linear form :

$$\ln Y = \ln A + \alpha \ln K + \beta \ln H_l + \gamma \ln H_f + \lambda \ln E + \varepsilon \dots\dots(2)$$

In addition, considering the lagged effect of floating population, economic growth and haze days, in equation (2), the lagged term of explained variable is introduced, and the dynamic simultaneous equation model is constructed, the decision equation of economic growth of floating population and haze respectively is obtained:

$$\ln Y_t = a_0 + a_1 \ln K_t + a_2 \ln(H_l)_t + a_3 \ln(H_f)_t + a_4 \ln E_t + a_5 Ind_t + \nu_t + \varepsilon_t \dots\dots(3)$$

(t=1,2,3,.....,T)

The decision equation of haze and economic growth on floating population is:

$$\ln(H_f)_t = b_0 + b_1 \ln K_t + b_2 \ln(H_l)_t + b_3 \ln Y_t + b_4 \ln E_t + b_5 Edu_t + \nu_t + \varepsilon_t \dots\dots(4)$$

(t=1,2,3,.....,T)

The decision equation of economic growth and floating population on haze is:

$$\ln E_t = c_0 + c_1 \ln K_t + c_2 \ln(H_l)_t + c_3 \ln(H_f)_t + c_4 \ln Y_t + c_5 (PM_{2.5})_t + \nu_t + \varepsilon_t \quad (5)$$

(t=1,2,3,.....,T)

Among them,  $a_0 = b_0 = c_0 = \ln A$ , which on behalf of the constant,  $Y_t$ ,  $K_t$ ,  $(H_l)_t$ ,  $(H_f)_t$ ,  $E_t$  respectively represent Beijing's  $t$ th annual GDP per capita, capital deposit, local human capital stock, floating population human capital stock, and haze days.  $\nu_t$  represents time effect,  $\varepsilon_t$  represents independent identically distributed random disturbance term. In addition, due to the level of industrialization will not only promote economic growth, also will attract more external population, but also played a promoting role in the formation of haze, therefore, adding the factor to (3),  $Ind_t$  represents level of industrialization; education is an important factor to attract the foreign population, so it is included in equation (4), using  $Edu_t$  for education; the size of PM2.5 increases with the increase of population and economy, and according to the statistics of PM2.5, it can greatly promote the formation of haze, so this factor is included in equation (5).

**Data**

Beijing's GDP per capita can generally reflect the Beijing people's living standard and changes in the economy, according to the 2016 Beijing statistical yearbook, eliminate unnecessary influence to GDP divided by 2000 to 2000 in each of the CPI, get constant GDP, will represent the real GDP per capita in 2000 constant as indicators of economic growth; The length of haze days can reflect the severity of haze in each year, so haze days are used as indicators of haze; Capital stock using the perpetual inventory method,  $K_t = (1 - \delta_t)K_{t-1} + I_t$ , including  $K_t$  for the first  $t$  years total fixed assets formation, and take the base period in 2000, the  $\delta_t$  as the allowance for depreciation and fixed value 9.6%, (Jun Zhang, 2004).  $I_t$  for past investment assets of different recursion. In the control variables, the industrial level is the proportion of the total output value of the manufacturing industry. Education was expressed as the average education period.

**Estimation methods and comparisons**

**Estimation method**

Simultaneous equations, (3), (4), (5) respectively by the three interwoven decision equation of floating population, per capita GDP, and the haze days, will use the system estimate method to estimate equations as a whole, fully considering the equation of the complex relationship between, and add the lag period in each decision equation be explained variables, making the equation dynamic, which estimates the principle of the GMM, three stage least squares method, and so on. In the process of testing, the system GMM estimation method, which is proposed by Blundell and bond, combines differential GMM and horizontal GMM estimation features to enhance the accuracy of the results.

**Comparison with a single equation estimation method**

In a single equation estimation method, the equations of each equation between unrelated must satisfy the disturbance hypothesis, and may result in inefficiencies of data, and the system estimate method made full use of every data, considering the haze and economy, the economy and the

floating population, the floating population and the fog haze, the intricate relationship between can better deal with the dynamic equations of endogenous variables and disturbance in the correlation, makes the result more accurate.

### Concluding remarks

This paper studies the correlation between floating population, economic growth and haze in Beijing. Considering the floating population to have effects on the economy, and formed between negative feedback mechanism and fog haze, adding lag in determining equation and time effect and making the dynamic data, to enhance the quality of data statistics. Nowadays, the haze problem has become a widely concerned environmental problem. The haze not only pollutes and destroys the ecological environment, but also has many influences on the development of the whole social economy. The economic phenomenon caused by haze has covered various industries, and it is closely related to economic development. With the economic growth, the haze problem gradually deepens, and after reaching a certain turning point, the haze pollution level starts to decrease. After reaching the highest point, the government realized the seriousness of the problem, and the intensity of the prevention and control of smog increased year by year (Wenjia, 2015).

In a word, the prevention and control of smog and economic growth are not contradictory. We should invest a lot of manpower and material resources in preventing and controlling smog. It is hoped that this paper can play a role in improving the awareness of haze.

### REFERENCES

- Fei Nie. Haiyun Liu. A study on the correlation between FDI, environmental pollution and economic growth -- empirical test based on dynamic simultaneous equation model [J]. International trade issues. The second issue of 2015.
- Jun Zhang. Guiying Wu. Jipeng Zhnag .(2004) "China's inter-provincial material capital stock accounting: 1952-2000" economic research. The 10<sup>th</sup>.
- Wenjia Ni. Yuzhu Li. Chengcheng Li. Research on the correlation between the prevention and control of haze and economic growth -- taking Beijing as an example [D]. Changchun, jilin: jilin university school of economics, 2015.
- Xuezhen Xu. An empirical study on the impact of floating population on economic growth in Beijing [D]. Beijing: capital economics and trade university, 2013.

\*\*\*\*\*