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Analysis of the Factors of Population Flow in Liaoning Province based on FAVAR model

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Abstract. With the implementation of the policy of revitalizing the old industrial bases in Northeast China, the cities of Liaoning Province have continuously exchanged and cooperated outside the province and the province. The frequency of population movements in various cities in Liaoning Province has been increasing. Analysis of the influencing factors of the floating population has important practical significance for retaining talents in Liaoning Province and revitalizing the overall economy. Because of the many factors affecting population mobility, the traditional VAR model cannot describe the relationship between more scalars and the floating population, so this paper uses In the FAVAR model, more suitable variables are included in the model, and the relationship between these variables and the floating population is analyzed by impulse response. Finally, through the empirical analysis results provide some valuable suggestions for the relevant government.

1. Introduction

With the development of global economic integration, the role of economic development centered on urban agglomerations has become increasingly prominent, and it has also intensified the competition for resources, culture and talents. The globalization of economic development has accelerated the flow of capital and commodities in various regions. At the same time, it has also promoted the flow of talents in various regions. In order to promote economic development and enhance industrial competitiveness, governments in various regions of Liaoning Province have introduced corresponding policies and regulations. In response to the increasing competition for talents, we are constantly looking for effective ways to attract and retain talents. The key to solving this problem is to analyze the factors affecting population movement and what are the effects.

In practice, the significance of studying the factors affecting population mobility is as follows: First, it is helpful to find out the basic situation of the floating population in Liaoning Province. Second, it is conducive to the relevant departments to improve the formulation of the floating population management mechanism and related regulations. Third, promote the coordinated development of the floating population and the province's economy.

Most of the existing researches focus on the effects of changes in the floating population, explore their impact on the macro-economy, lack a comprehensive analysis perspective, and empirical analysis mostly adopts the VAR method, which can handle fewer variables and cannot fully and effectively cover each Market information. The purpose of this paper is to study the impact of macro variables on the floating population. By constructing a FAVAR model based on incremental factors, the macroeconomic information is utilized to the maximum extent, and the research objectives are comprehensively and systematically realized with a reasonable framework.

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2. FAVAR Model

For the FAVAR model, first assume that X_t is an N×1 dimensional vector composed of a large number of observable macroeconomic variables, a total of 49 macro indicators, including housing prices, GDP, CPI and other indicators, Y_t is composed of a set of observable macroeconomic variables M×1 dimensional vector, that is, the number of floating population at the end of Liaoning Province. However, in actual economic activities, $Y_t$cannot contain all economic information, nor can it express the interaction path between variables within the Y_t variable. Therefore, the K×1 dimensional unobservable factor vector F_t is used to express other economic information that cannot be included in Y_t, and the potential interaction between economic variables within Y_t, and assume that F_t can effectively cover most of the information contained in X_t. .

Since F_t cannot be directly observed, we need to infer F_t based on the X_t information. Assume that the number N of variables in X_t is much larger than the sum of the number of factors and observable variables in the FAVAR model, N>K+M, and that $X_t$satisfies the following formula:

$$X_t = \Lambda^f F_t + \Lambda^y Y_t + \omega_t \tag{1}$$

Where Λ^f is the N×K-dimensional load matrix, Λ^y is the N×M-dimensional load matrix, and ω_t is the N×1-dimensional residual vector. The formula contains information of Y_t and F_t, and the common factor of these two main factors can be recorded as C_t, that is, $C_t = (F_t, \ Y_t)'$, which can represent the main factor affecting X_t. For the method of solving the FAVAR model, there are generally principal component analysis, iterative iteration and Gibbs sampling. According to the results of Bernanke B.S. (2005), the two-step principal component method is simpler than the other two methods, and the accuracy is similar. Therefore, the two-step principal component method is used to estimate the FAVAR model.

In the first step, the properties of the variables in the X_t set are divided into two sets of variables, "fast variables" and "slow variables". Drawing on Bernanke's approach, this paper defines variables that respond quickly to relevant policies as “quick variables”, such as exchange rates, currencies, etc. Variables that do not respond quickly to relevant policies are defined as “slow variables”. ", such as investment, consumption, etc. We set the "fast variable" to be observable, and estimate the F_t by constructing a new information set C_t^s for the K+M principal components before the "slow variable" extraction. At the same time, the regression equation can be determined:

$$C_t = \beta^f C_t^s + B^y Y_t + \theta_t \tag{2}$$

Therefore, according to the above formula, an estimated value of the unobservable factor is obtained $\hat{F}_t = C_t - \hat{\beta}^y \hat{Y}_t$.

In the second step, based on the estimated value $\hat{F}_t$ and the observable variable Y_t, a VAR model can be constructed:

$$\Gamma(L)\begin{bmatrix}\hat{F}_t \\ Y_t\end{bmatrix} = \mu_t \tag{3}$$

Where L is a lag operator, $\Gamma(L)$ is a lag polynomial matrix, and μ_t is a random error term with a mean of zero and a covariance of M. Thus the impulse response functions of $\hat{F}_t$ and Y_t are obtained:

$$\begin{bmatrix}\hat{F}_t \\ Y_t\end{bmatrix} = \varphi(L)\mu_t \tag{4}$$

In the above formula, $\varphi(L)$ is a hysteresis polynomial and satisfies $\varphi(L) = \Gamma(L)^{-1}$, and the pulse function can be further expressed as:

$$\hat{X}_t' = [\lambda^f \lambda^y] \begin{bmatrix} \hat{F}_t' \\ \hat{Y}_t' \end{bmatrix} = [\lambda^f \lambda^y] \varphi(L) \mu_t' \qquad (5)$$

Through the above method, not only the lag polynomial can be estimated, but also the impulse response function can be obtained, and the dynamic relationship between population flow and macroeconomic variables can be obtained.

The model estimates the annual data for the sample period from 2008 to 2017. A total of 49 economic indicators are used as variables to reflect the macroeconomic status. At the same time, considering the effect of eliminating the price factor on the selected variables, when selecting the variables, the actual growth rate indicators should be selected as much as possible, and other non-increasing speed data will be converted into similar data, and in order to avoid the influence of seasonal factors on the data, that is adopted to X-12 method to process all data, and finally, to ensure that all data is stationary data, logarithmic difference is used to convert non-stationary data into stationary data.

3. Impulse Response Function

Due to the large number of macro variables, this paper selects more representative indicators for analysis, GDP, housing price, CPI and rail capacity, and studies the dynamic correlation between these macro variables and population movement in Liaoning Province.

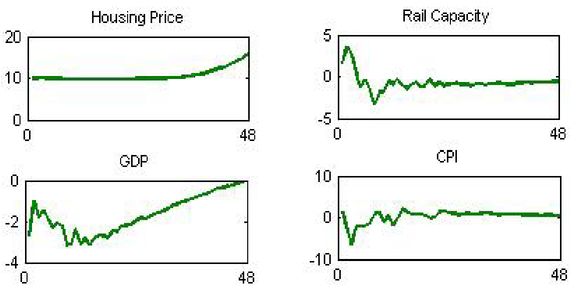

Figure 1. Impulse response function diagram

It is not difficult to see from Figure 1 that housing prices have a positive effect on the population movement in Liaoning Province, and the effect is very strong, indicating that when the house price in Liaoning Province rises, it will accelerate the population flow; the rail capacity has a positive effect on the floating population in the early stage. However, the impact time is very short. As time goes by, its effect gradually tends to 0; GDP has a significant negative effect on the floating population, indicating that when the economic situation of Liaoning Province is better, its population flow will slow down; The impact of the floating population is not obvious.

4. Conclusion

Through the FAVAR model, this paper analyzes the factors of floating population in Liaoning Province from a large number of macroeconomic data. Through the impulse response analysis, we can know that the main factors affecting the floating population are house prices and GDP, while the rail capacity and CPI are not. It can be seen that in order to retain talents, Liaoning Province needs to accelerate its own economic construction and curb the rapid growth of housing prices.

Only in this way can we attract talents and maintain the economic competitiveness of Liaoning Province.

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